APPENDIX E – BIOLOGICAL MONITORING

US ARMY CORPS OF ENGINEERS

US DEPARTMENT OF INTERIOR
NATIONAL PARK SERVICE

CAPE HATTERAS NATIONAL SEASHORE
NORTH CAROLINA

ENVIRONMENTAL ASSESSMENT

BEACH RESTORATION TO PROTECT NC HIGHWAY 12
CLEAN WATER ACT 404 AND NPS SPECIAL USE PERMITS

AT BUXTON, DARE COUNTY, NORTH CAROLINA

SEPTEMBER 2015

Nags Head Beach 2011 Nourishment Project

Biological Monitoring Post-Year 2 and Final Report

Prepared for:

Town of Nags Head, Dare County, NC

Prepared by:

CZR Incorporated
Wilmington, NC

and

Coastal Science & Engineering, Inc.
Columbia, SC

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Cover Photos: NHB Station 6 view to the north pre-spring 2010 on top and NHB Station 6 view to the north summer post-Y2 2013 on bottom.

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Nags Head Beach 2011 Nourishment Project

Post-Year 2 and Final Report

POST-YEAR 2 AND FINAL REPORT EXECUTIVE SUMMARY

As required by North Carolina Department of Environment and Natural Resources (NCDENR)/North Carolina Department of Coastal Management (NCDCM) Permit 45-10 Beach Nourishment Town of Nags Head, four pre-nourishment and eight post-nourishment (four in post-Year 1 [post-Y1] and four in post-Year 2 [post-Y2]) seasonal benthic and sediment sampling events occurred in the following areas shown on Figure 1:

- Nourished beach – 10 stations at Nags Head
- Control beach- five stations at Kitty Hawk and five stations at Cape Hatteras National Seashore
- Offshore borrow- 10 stations in the permitted borrow areas "2" and "3" within US Army Corps of Engineers (USACE) area S1, and
- Offshore control -10 separate stations in the S1 polygon outside of the designated borrow areas

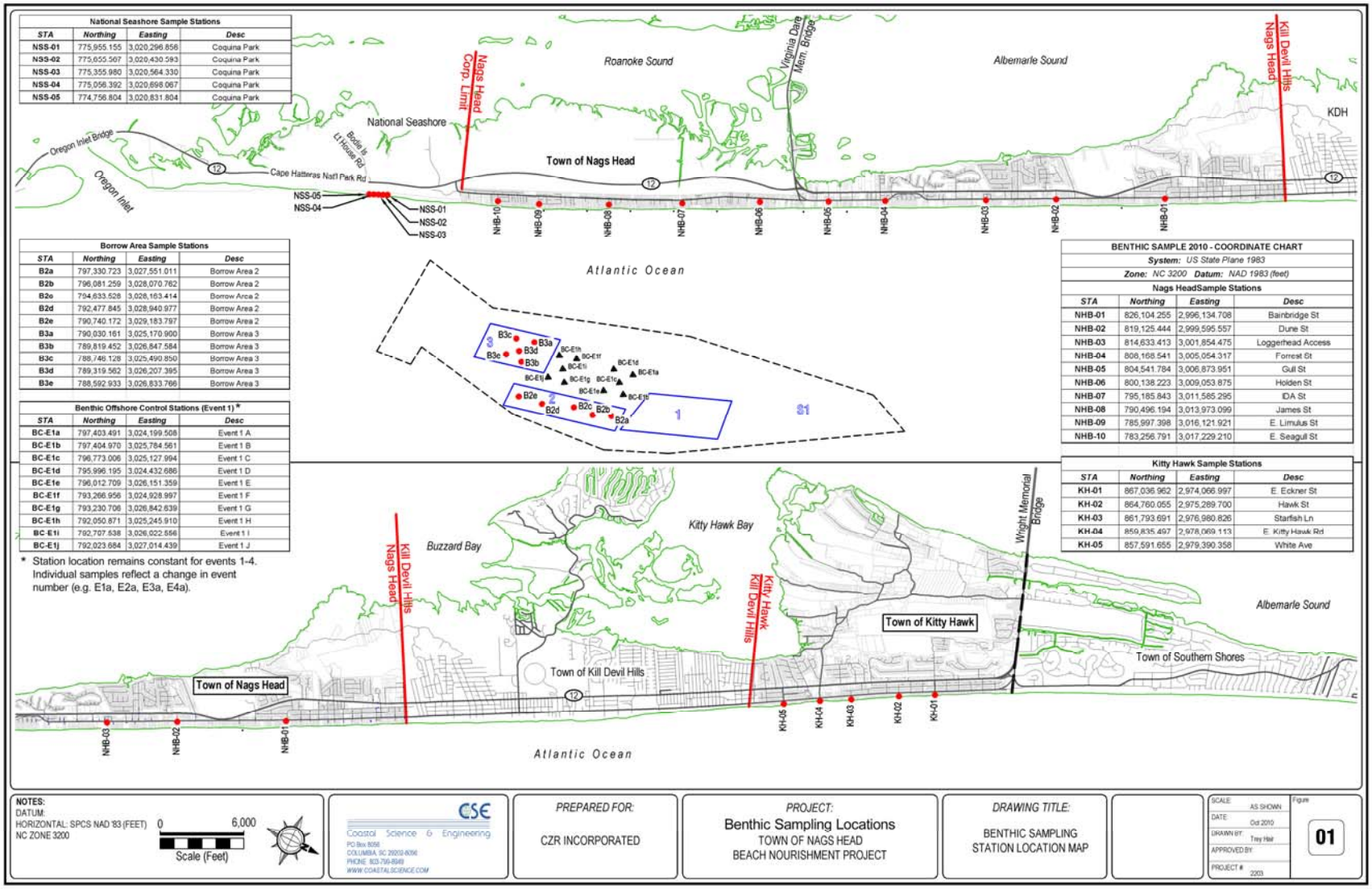
The Nags Head nourished beach (NHB) spans approximately 10 miles. The Kitty Hawk control beach (KH) is located between Kill Devil Hills to the south and Southern Shores to the north and spans approximately 2 miles. The National Seashore control beach (NSS) is located on Bodie Island directly adjacent to the ramp at the Coquina Beach recreation area. The middle NSS sample station is directly adjacent to the Coquina Beach ramp and NSS sampling stations span 0.25-mile.

Each seasonal beach sampling event occurred over a two-day period, during a two-hour window either side of low tide, for a maximum of four hours of possible sample collection. Each beach sample station consisted of an upper-beach swash Zone A and a lower-beach subtidal Zone B. Offshore sample collection was completed in one day with one or two divers deployed from a boat. The weather-dependent nature of safe survey conditions did not always allow for offshore and beach collections to co-occur and the lunar progression of tides did not always allow the eight post-nourishment collection events to occur during the same calendar week as the pre-nourishment events (Table 1).

Table 1. Dates of the 2011 Nags Head Beach Nourishment Project sample events (four pre-nourishment, four post-Y1 (Y1), and four post-Y2 (Y2) seasonal events, E1-E12).

	Spring	Summer	Fall	Winter
Pre-nourishment Events 1 - 4	8-9 June 2010 (E1)	19-20 August 2010 (E2)	17-18 November 2010 (E3)	14-15 April 2011 (E4)
Post-Y1 Events 5 - 8	13-14 & 19 June 2012 (E7)	28-30 August 2012 (E8)	15 December 2011 & 21-22 January 2012 (E5)	6-7 March 2012 (E6)
Post-Y2 Events 9 - 12	4-5 & 12 June 2013 (E11)	20-21 & 22 August 2013 (E12)	27 November & 11-12 December 2012 (E9)	9 April & 26-27 March 2013 (E10)

Figure 1. Benthic and sediment sampling stations for beach and offshore locations with north and easting coordinates for Town of Nags Head beach nourishment project.



GROUP ABUNDANCE

The pie charts of Figure 2 – Figure 7 show the percentage of major taxonomic groups in each event by season and location type (offshore control vs offshore borrow and nourished beach vs control beach) and all seasons combined on an annual basis. Figures 4 and 7 show the pie charts rearranged to compare impact areas (nourished beach and offshore borrow) to their designated controls on a seasonal basis.

OFFSHORE ABUNDANCE

Figure 2 depicts seasonal variability across the offshore control stations as well as variability from before nourishment to post-Y2; however, for most seasons and years, Polychaeta was the dominant group, the exceptions being the first two spring events when Mollusca was dominant. Similar to the offshore control stations, the offshore borrow stations showed a large degree of seasonal variability (Figure 3). Among the offshore borrow stations, post-Y2 spring appears to be the most different from its pre-nourishment counterpart among all post-seasons; at least somewhat due to the large number of razor clams found in the pre-nourishment sample which increased the percent of mollusks for that event. Figure 4 shows a large degree of similarity of dominant groups when the offshore borrow events are compared to offshore controls with a few exceptions: winter pre- (control had no Mollusca); spring post-Y1 (borrow had more Mollusca and less Polychaeta), and winter post-Y1 (control had twice the Polychaeta and almost no Mollusca). However, of particular importance, when all seasons are combined on annual basis, by post-Y2, there was very little difference between dominant groups compared to pre-nourishment.

BEACH ABUNDANCE

Figure 5 depicts seasonal variation across the control beach stations, as well as variation in pre-nourishment and post-Y1 and/or post-Y2 between the same seasons. Pre-nourishment, three fourths of summer and fall groups were from Polychaeta, but those were the only similarities among seasons pre-nourishment. The only similarities among post-Y1 events was that in summer and fall Decapoda were the dominant group at approximately 50 percent; among post-Y2 seasons, the only similarity was between the spring and summer when just over one third of the groups were Amphipoda and just under one fourth were Decapoda. On a seasonal basis across all years for the control beach, post-Y1 and -Y2 fall were similar in Decapoda percentages and pre-winter and post-Y1 winter were similar in Amphipoda percentages. After all seasons are combined, the post-Y2 distribution of species is more evenly distributed than either pre-nourishment or post-Y1. Figure 6 shows seasonal variability across the stations, as well as variability between pre-nourishment, post-Y1, and post-Y2. Slight similarity is shown between summer in both post-years for Decapoda and Amphipoda, but as for the control beach, there is little apparent similarity between either post year for any season compared to pre-nourishment. Figure 7 shows less similarity between NHB and the control beach for the pre-nourishment year than that shown in the offshore groups with two exceptions: NHB had more Decapoda and less Amphipoda in winter (although only slightly so) and spring post-Y1 where both locations were very similar. When all seasons are combined on an annual basis, the two location types (NHB and control) were notably dissimilar pre-nourishment; in fact, only spring post-Y1 was similar when NHB is compared to control beach.

Figure 2. Pie charts of pre-nourishment and post-Y1 and -Y2 abundance by season, group, and percent in offshore control stations.

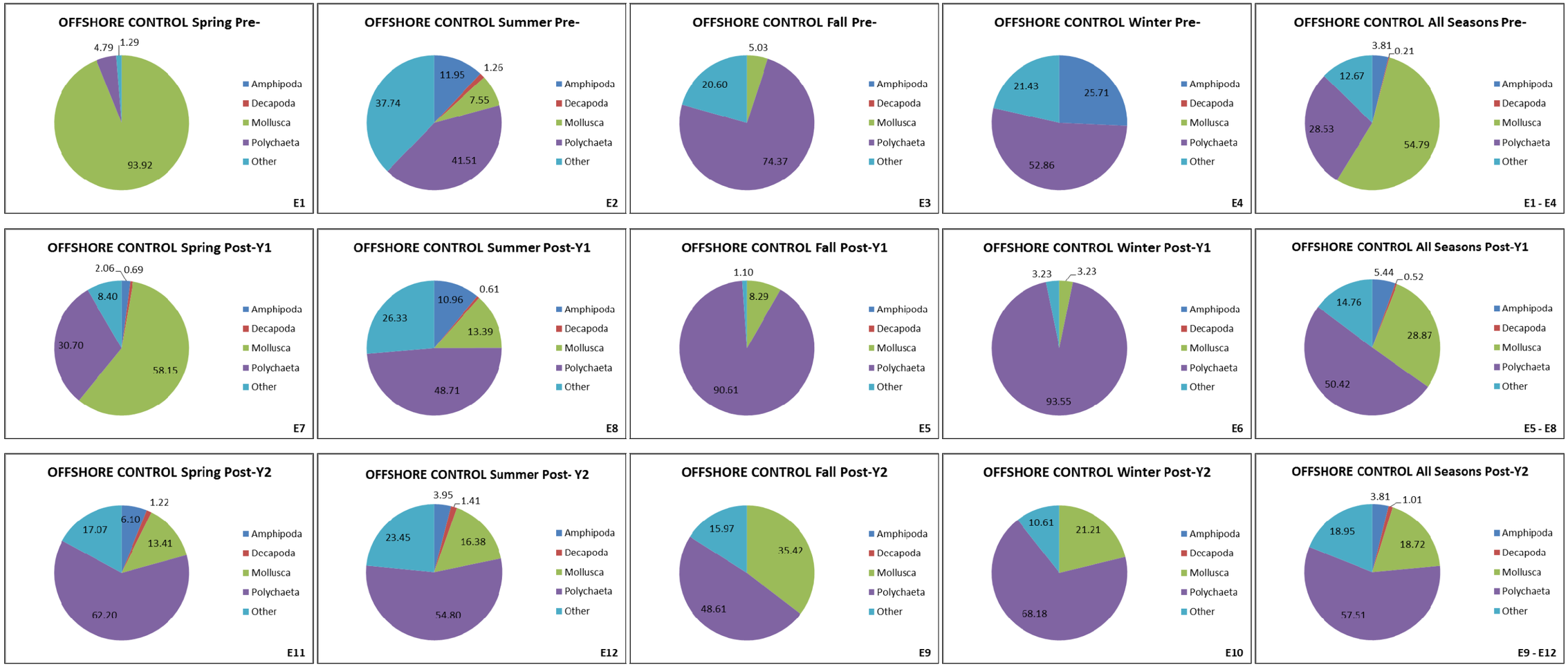


Figure 3. Pie charts of pre-nourishment and post-Y1 and -Y2 abundance by season, group, and percent in offshore borrow stations

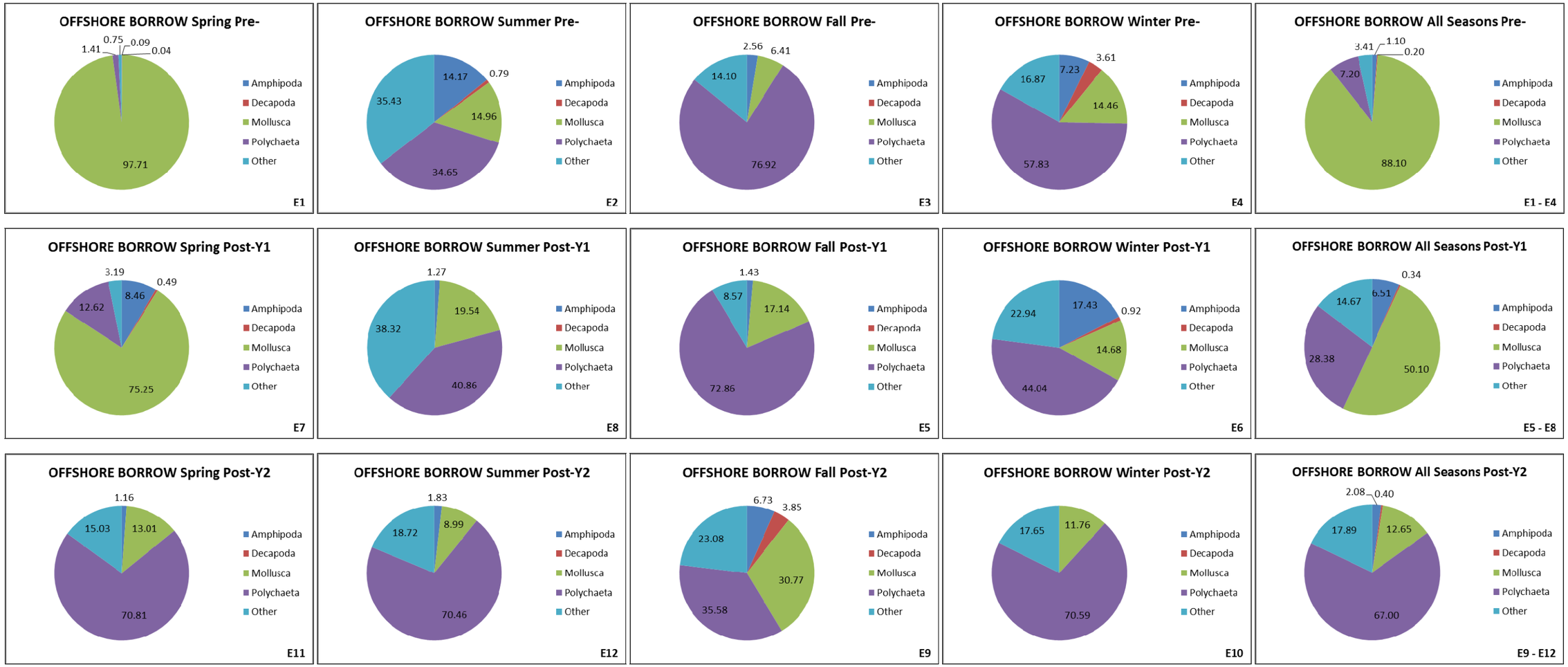


Figure 4. Pie charts of offshore borrow percent abundance by group compared to offshore control percent abundance by group on seasonal event basis and on all seasons combined annual basis.

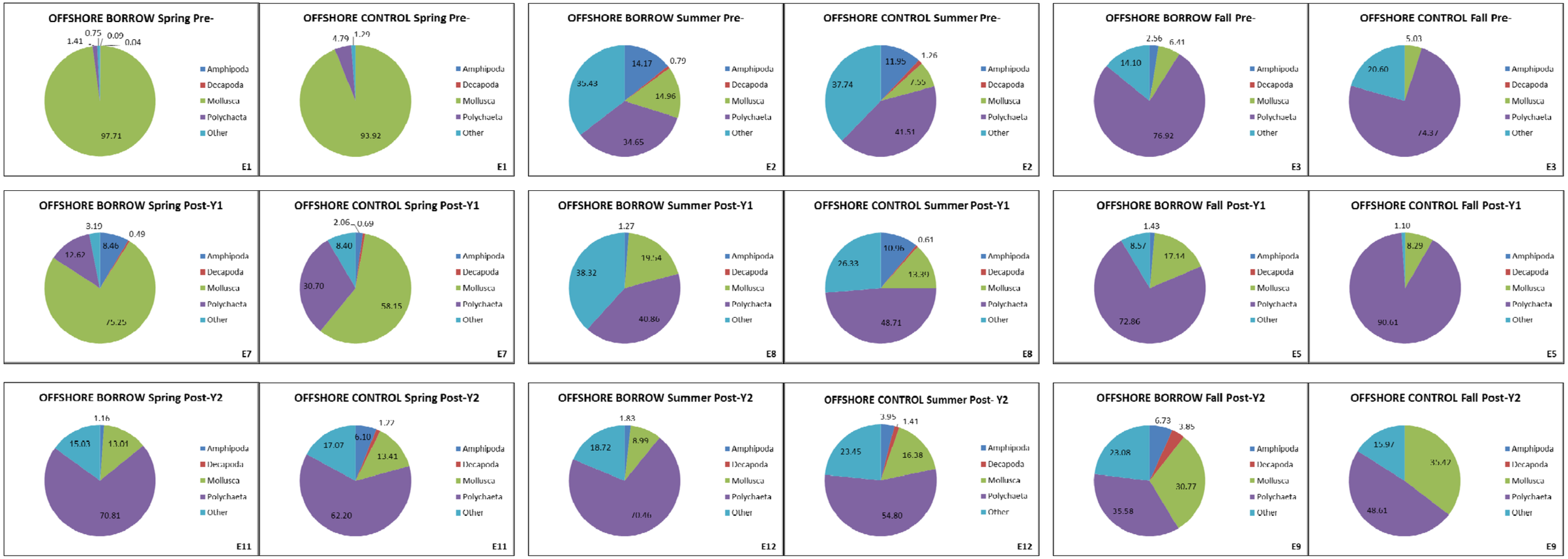


Figure 4. (continued)

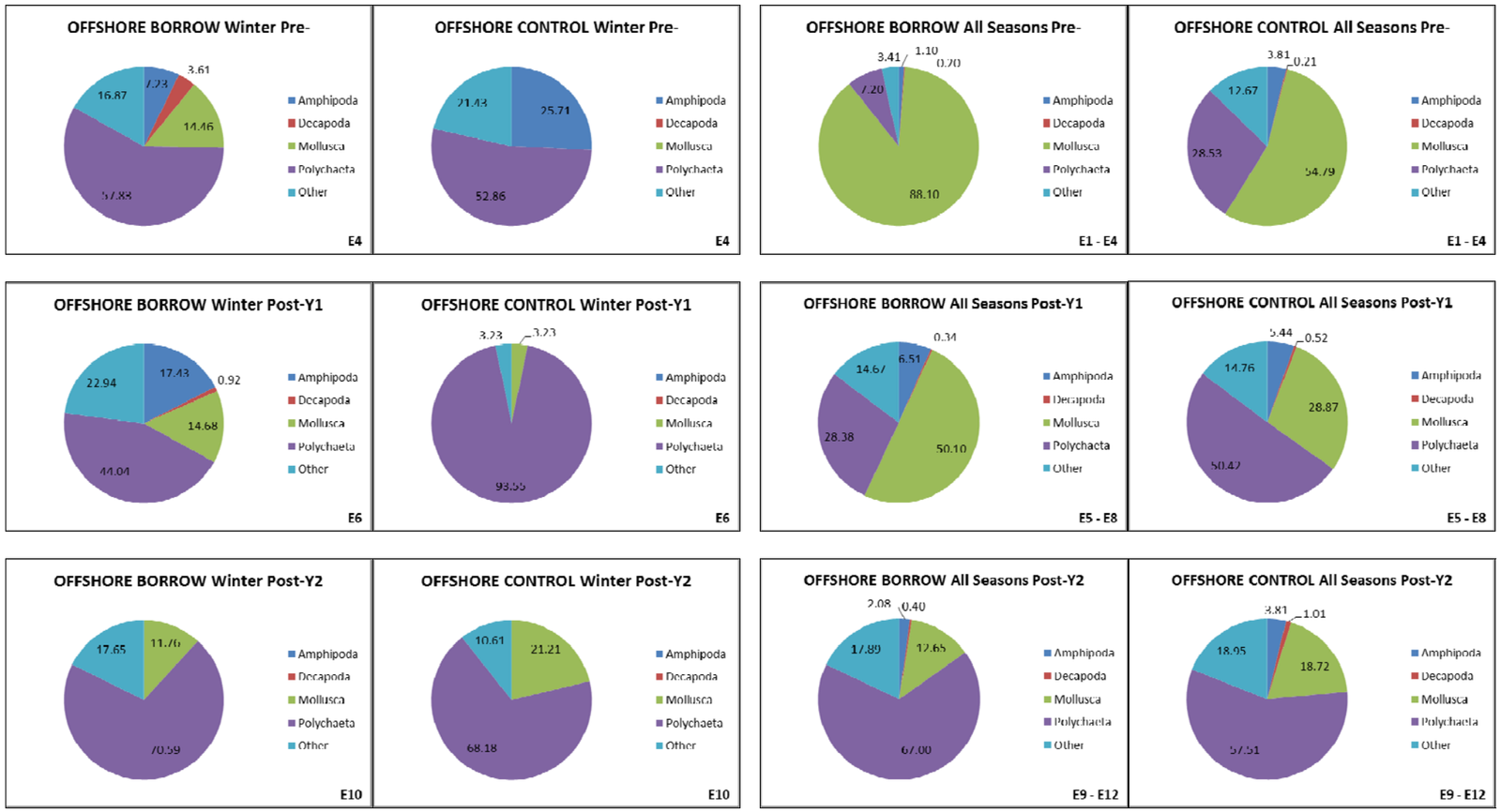


Figure 5. Pie charts of pre-nourishment and post-Y1 and post-Y2 control beach abundance by season, group, and percent for all stations combined.

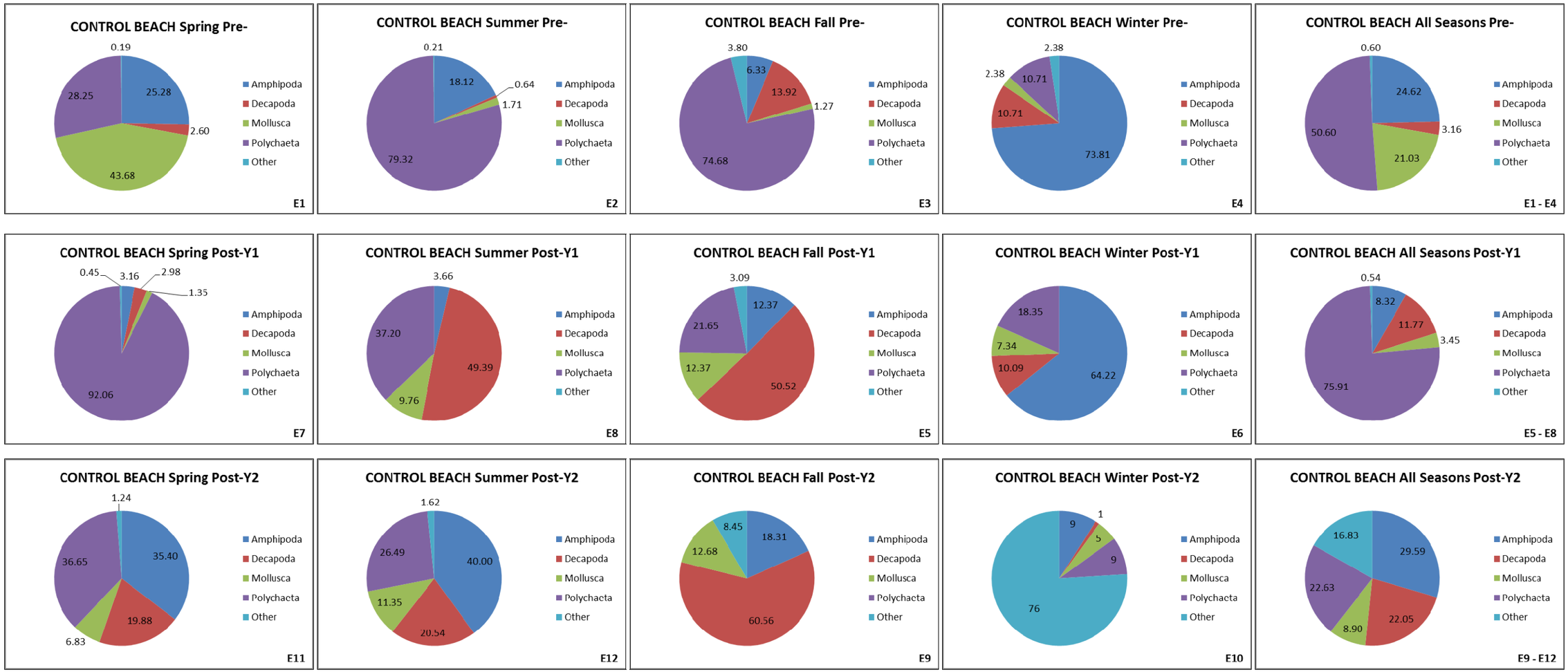


Figure 6. Pie charts of pre-nourishment and post-Y1 and post-Y2 nourished beach abundance by season, group, and percent for all stations combined.

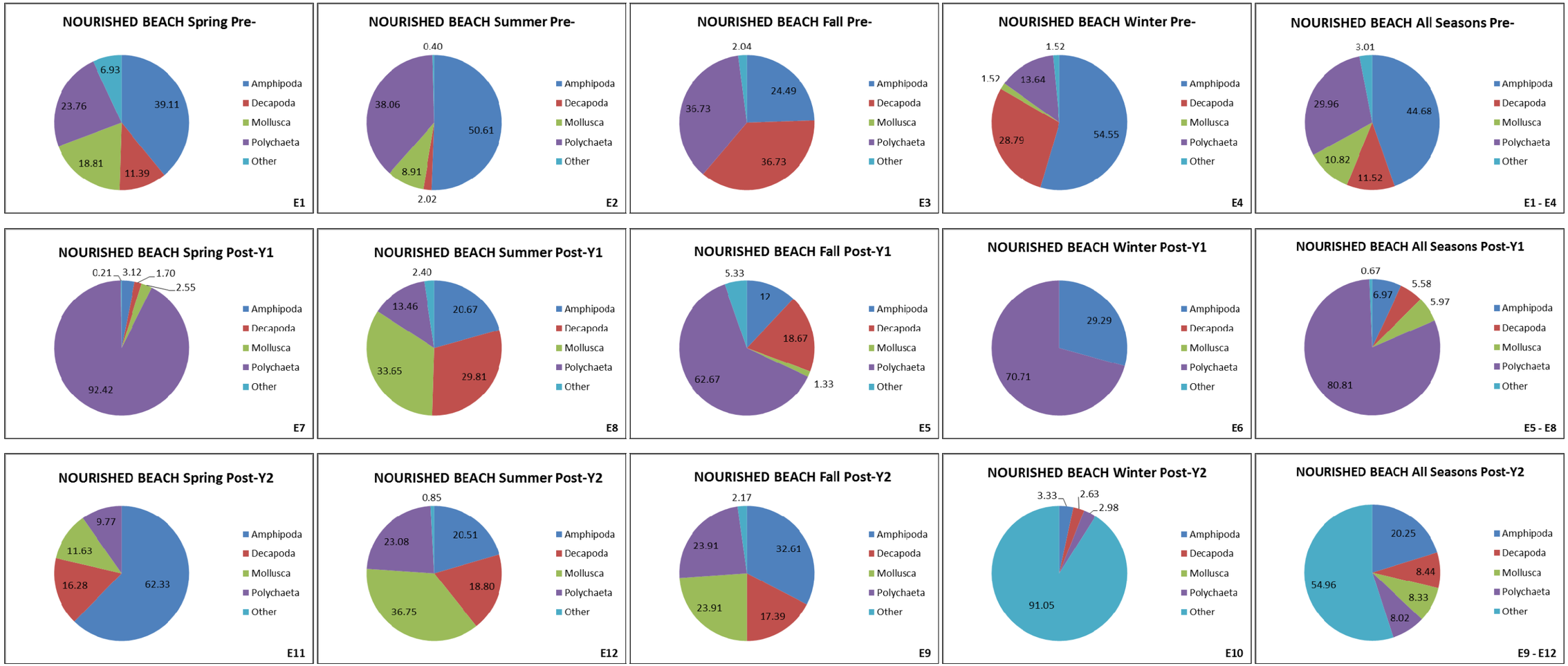


Figure 7. Pie charts of nourished beach percent abundance by group compared to control beach percent abundance by group on seasonal event basis and on all seasons combined annual basis.

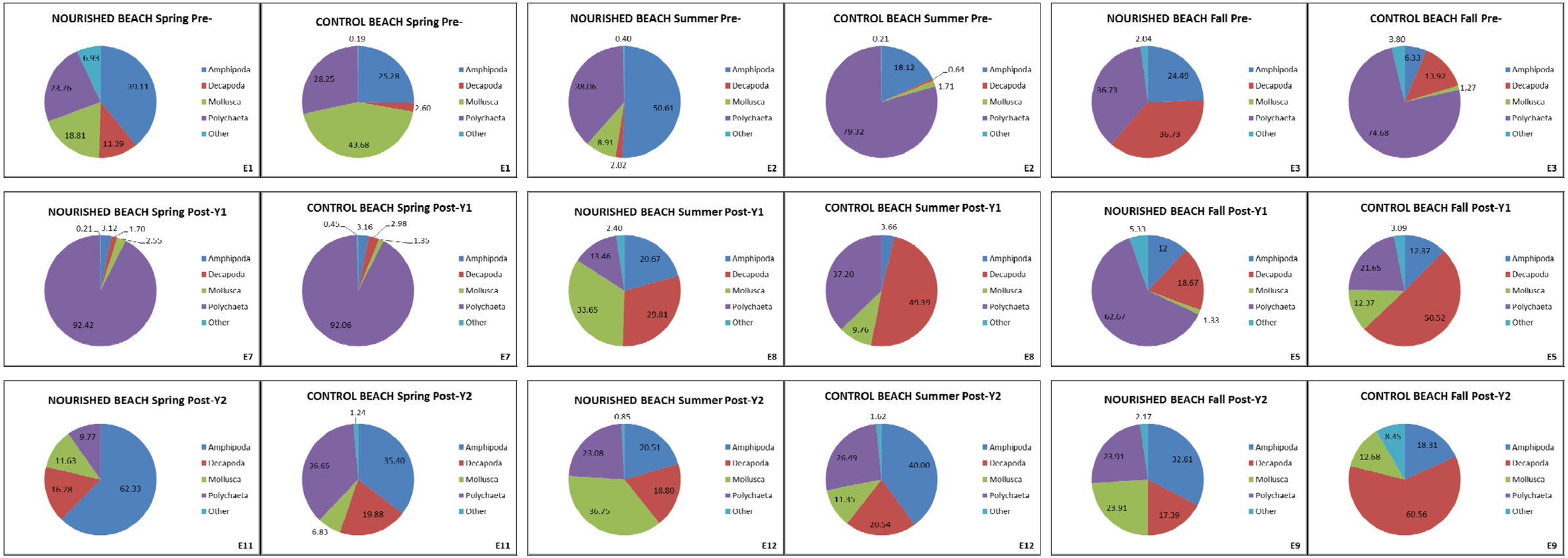
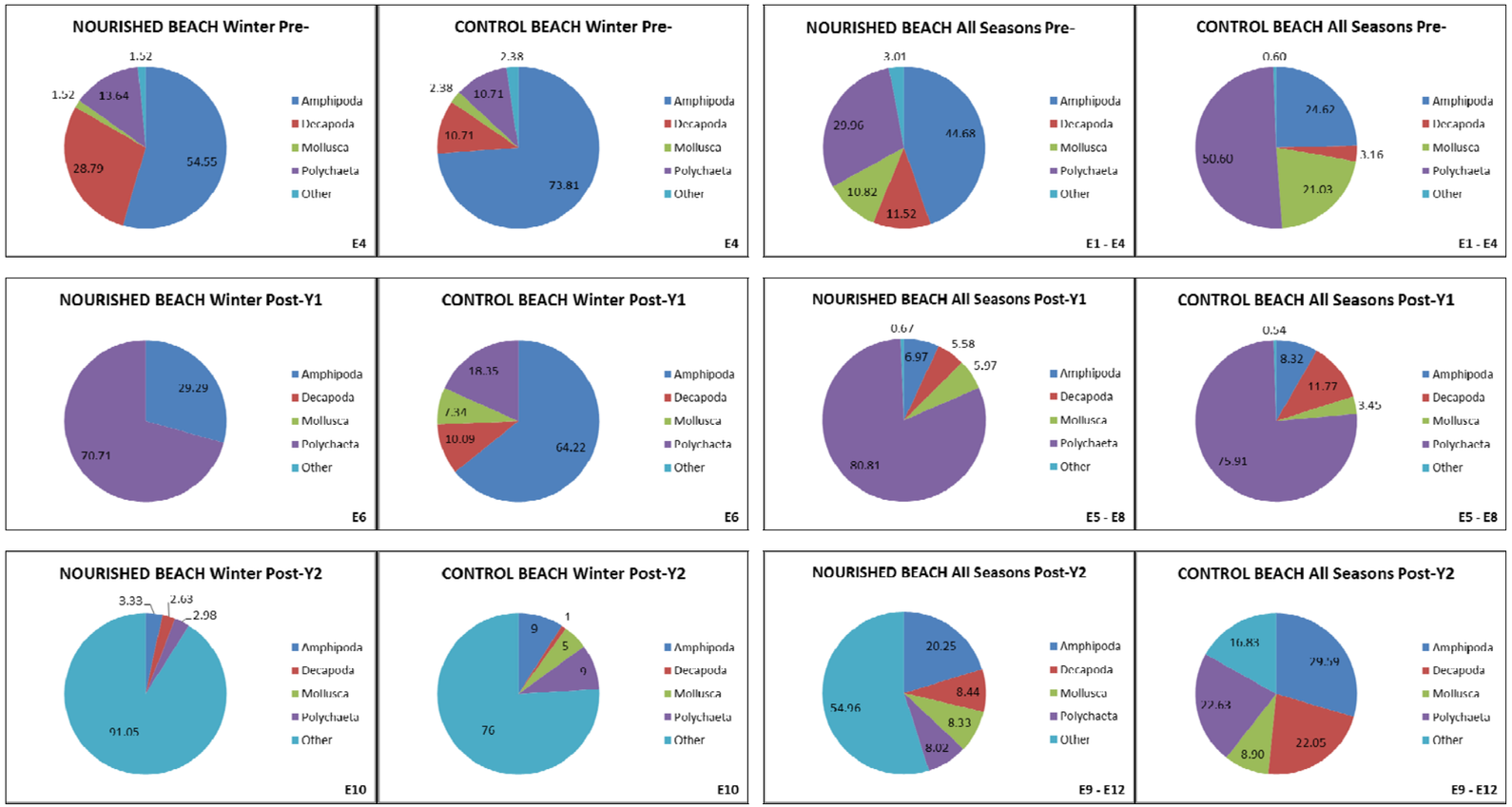


Figure 7. (Continued)



ABUNDANCE AND TAXA RICHNESS

As evident in Table 1, although the 12 events were sequential across the calendar, the first post-Y1 spring event was not the first event to occur post-nourishment. Table 2 shows the seasonal tally for each event by station type and location and all seasons combined on a sequential and an annual basis; the events are color coded by season and station type for visual ease of seasonal comparison.

Seasonally, the post-Y1 and post-Y2 offshore borrow abundances and taxa richness were similar to or exceeded the offshore control pre-year seasons; however, when combined on annual basis, the post-Y2 abundances for both station types were less than the pre-year while taxa richness was similar across all three years.

Variation between the control beach and NHB is shown across most seasons of the pre-year; however, abundances were always less on NHB than the control beach and NHB taxa richness was lower in two of the four pre-seasons. When combined on annual basis for the pre-year, taxa richness for the beaches appears more similar but abundances do not. On an annual basis, when post-Y1 and post-Y2 NHB abundance and taxa richness is compared to control beach, post-Y1 for both NHB and control beach was more diverse and had more abundance that either of the two other years. By post-Y2, NHB abundance was higher and taxa richness was lower than the pre-year NHB while the control beach showed less abundance and the same taxa richness as the pre-year.

STATISTICAL COMPARISONS

Table 3 portrays a condensed version of the following text which summarizes results of comparisons between pre-nourishment data and post-Y1 data and pre-nourishment data and post-Y2 data (by season and with all seasons combined). Richness, abundance, abundance/meter^2, grain size, and mean differences were tested using either t-tests or One-Way ANOVAs so only *statistically* significant results are presented for those parameters. The reader is reminded that a statistically significant difference carries no value judgment on magnitude or biological relevance of the effect. Statistically significant Pearson Product Moment correlations are also summarized below.

OFFSHORE COMPARISON SUMMARY OF PRE-YEAR TO POST-Y1 AND POST-Y2

Taxa richness, abundance (and abundance per square meter), and grain size-

Y1: control station abundance and abundance/meter^2 was significantly higher than pre-nourishment (p=0.009)

Y2: no significant differences on seasonal or annual basis

Mean differences (post minus pre) by station for abundance, taxa richness, and grain size-

Y1: the difference in mean pre- and post-nourishment spring abundances was significantly larger at the borrow sites (post abundances were smaller than pre abundances) than at the control borrow sites (Y1 p=0.031)

Y2: the difference in mean pre- and post-nourishment spring abundances was significantly larger at the borrow sites (post abundances were smaller than pre abundances) than at the control borrow sites (Y2 p<0.001)

Table 2. Seasonal tally of abundance and taxa richness for 2011 Nags Head Beach Nourishment Project events 1 through 12 and combined by annual totals.

BLUE = Fall GREEN = Spring
ORANGE = Winter PURPLE = Summer

PRE EVENTS		Pre-Spring (E1)			Pre-Summer (E2)		Pre-Fall (E3)		Pre-Winter (E4)		Pre-Year Totals		
DATE			8-9 June 2010		19-20 Aug 2010		17-18 Nov 2010		14-15 Apr 2011				
Location		N	Abundance	Richness	Abundance	Richness	Abundance	Richness	Abundance	Richness	N	Abundance	Richness
Beach		40	740	21	716	9	128	10	150	10	160	1,734	30
	Nourished	20	202	18	247	7	49	5	66	8	80	564	22
	Swash	10	102	10	161	7	30	4	50	4	40	343	14
	Subtidal	10	100	14	86	4	19	3	16	6	40	221	17
	Control	20	538	13	469	8	79	8	84	8	80	1,170	20
	Swash	10	359	8	263	6	64	7	41	5	40	727	15
	Subtidal	10	179	10	206	6	15	3	43	6	40	443	15
	Natl Seashore	10	327	11	299	5	56	4	67	6	40	749	15
	Swash	5	293	7	224	5	44	4	35	3	20	596	12
	Subtidal	5	34	7	75	2	12	1	32	5	20	153	9
	Kitty Hawk	10	211	6	170	8	23	5	17	4	40	421	13
	Swash	5	66	4	39	4	20	4	6	2	20	131	8
	Subtidal	5	145	5	131	6	3	2	11	3	20	290	10
Offshore		20	2,809	32	286	42	277	28	153	28	80	3,525	81
	Borrow	10	2,266	18	127	34	78	19	83	20	40	2,554	63
	Control	10	543	22	159	32	199	24	70	13	40	971	61

POST-Y1 EVENTS		Fall Y1 (E5)			Winter Y1 (E6)		Spring Y1 (E7)		Summer Y1 (E8)		Post-Y1 Totals		
DATE			15 Dec 2011 (off) 21-22 Jan 2012 (bch)		6-7 Mar 2012		19 June 2012 (off) 13-14 June 2012 (bch)		28-29 Aug 2012				
		N	Abundance	Richness	Abundance	Richness	Abundance	Richness	Abundance	Richness	N	Abundance	Richness
Beach		40	172	16	208	6	2,519	14	372	14	160	3,271	27
	Nourished	20	75	9	99	2	1,411	10	208	11	80	1,793	19
	Swash	10	63	7	33	2	138	8	93	6	40	327	14
	Subtidal	10	12	4	66	2	1,273	7	115	8	40	1,466	11
	Control	20	97	14	109	6	1,108	9	164	10	80	1,478	21
	Swash	10	74	10	59	4	96	7	103	6	40	332	13
	Subtidal	10	23	8	50	4	1,012	6	61	7	40	1,146	16
	Natl Seashore	10	18	6	94	5	858	7	61	6	40	1,031	15
	Swash	5	12	3	55	3	50	5	22	3	20	139	7
	Subtidal	5	6	4	39	3	808	5	39	5	20	892	13
	Kitty Hawk	10	79	9	15	4	250	5	103	7	40	447	15
	Swash	5	62	7	4	2	46	5	81	5	20	193	11
	Subtidal	5	17	4	11	3	204	3	22	4	20	254	8
Offshore		20	321	16	233	26	1,399	42	1,051	50	80	3,004	82
	Borrow	10	140	14	109	22	816	28	394	33	40	1,459	64
	Control	10	181	10	124	10	583	29	657	33	40	1,545	53

POST-Y2 EVENTS		Fall Y2 (E9)			Winter Y2 (E10)		Spring Y2 (E11)		Summer Y2 (E12)		Post-Y2 Totals		
DATE			27 Nov 2012 (off) 11-12 Dec 2012 (bch)		9 Apr 2013(off) 26-27 Mar 2013 (bch)		4-5 June 2013 (bch) 12 June 2013 (off)		20-21 Aug 2013 (bch) 22 Aug 2013 (off)				
		N	Abundance	Richness	Abundance	Richness	Abundance	Richness	Abundance	Richness	N	Abundance	Richness
Beach		40	117	11	670	12	376	11	302	13	160	1,465	25
	Nourished	20	46	8	570	7	215	7	117	11	80	948	16
	Swash	10	16	4	247	5	168	6	80	9	40	511	12
	Subtidal	10	30	6	323	6	47	4	37	10	40	437	15
	Control	20	71	8	100	6	161	9	185	11	80	517	20
	Swash	10	63	4	80	5	85	6	148	7	40	376	11
	Subtidal	10	8	6	20	4	76	7	37	7	40	141	17
	Natl Seashore	10	60	4	25	5	69	5	118	6	40	272	11
	Swash	5	59	4	16	5	47	3	105	4	20	227	8
	Subtidal	5	1	1	9	2	22	4	13	3	20	45	8
	Kitty Hawk	10	11	6	75	4	92	7	67	9	40	245	17
	Swash	5	4	1	64	3	38	5	43	6	20	149	9
	Subtidal	5	7	5	11	3	54	5	24	6	20	96	15
Offshore		20	248	24	83	12	674	46	899	50	80	1,904	83
	Borrow	10	104	18	17	6	346	34	545	35	40	1,012	60
	Control	10	144	14	66	9	328	29	354	36	40	892	60

N = number of samples per event/year by location

Table 3. Statistically significant results of all One-Way ANOVAs and t-tests performed on all seasonal pre-nourishment to post-Y1 and to post-Y2 comparisons and all seasons combined comparisons for each station type (offshore borrow, offshore control, nourished beach, control beach). (Only 14 of the possible relevant statistical comparisons showed a statistically significant difference, seven were favorable for offshore borrow and/or nourished beach [identified by *] and one was favorable for the combined control beaches, but it was then negated by the unfavorable result in post-Y2.)

OFFSHORE Y1	BEACH Y1	OFFSHORE Y2	BEACH Y2
Abundance&Abundance/meter^2	**Abundance&Abundance/meter^2**	**Abundance&Abundance/meter^2**	**Abundance&Abundance/meter^2**
Seasonal: no significant differences	Seasonal: no significant differences	Seasonal: no significant differences	*Seasonal: Nags Head winter p<0.001(higher post)
Seasons Combined: Control 0.009 (higher post)	Seasons Combined: no significant difference	Seasons Combined: no significant differences	Seasons Combined: Control p=0.013 (higher pre)
Xpost-Xpre Abundance	**Xpost-Xpre Abundance**	**XpostY2-Xpre Abundance**	**XpostY2-Xpre Abundance**
Seasonal: spring 0.031 (borrow had a larger difference-post was lower)	Seasonal: no significant differences	Seasonal: offshore spring p<0.001 (borrow had a larger difference-post was lower)	*Seasonal: winter p<0.001 (Nags Head had a larger difference-post was higher)
Seasons Combined: no significant differences	Seasons Combined: no significant differences	Seasons Combined: no significant differences	*Seasons Combined: Nags Head had slightly larger difference p=0.002
Richness	**Richness**	**Richness**	**Richness**
Seasonal: no significant differences	Seasonal: no significant differences	Seasonal: no significant differences	Seasonal: no significant differences
Seasons Combined: no significant differences	Seasons Combined: Nags Head 0.037 (higher pre)	Seasons Combined: no significant differences	Seasons Combined: Control p= 0.007 (higher pre)
Xpost-Xpre Richness	**Xpost-Xpre Richness**	**XpostY2-Xpre Richness**	**XpostY2-Xpre Richness**
Seasonal: no significant differences	Seasonal: no significant differences	Seasonal: no significant differences	Seasonal: no significant differences
Seasons Combined: no significant differences	Seasons Combined: no significant differences	Seasons Combined: no significant differences	Seasons Combined: no significant differences
Grain Size	**Grain Size**	**Grain Size**	**Grain Size**
Seasonal: no significant differences	*Seasonal: Nags Head fall 0.007 (larger pre)**	Seasonal: no significant differences	Seasonal: no significant differences
Seasons Combined: no significant differences	*Seasons Combined: Nags Head 0.003 (larger pre)**	Seasons Combined: no significant differences	Seasons Combined: no significant differences
*Pre vs Post NH to Borrow: Pre NH and Post Borrow (preNH larger, 0.001)	** See last paragraph Executive Summary	*Pre vs Post NH to Borrow: Pre NH and Post Borrow (preNH larger, <0.001)	
Xpost-Xpre Grain Size	**Xpost-Xpre Grain Size**	**XpostY2-Xpre Grain Size**	**XpostY2-Xpre Grain Size**
Seasonal: no significant differences	Seasonal: no significant differences	Seasonal: no significant differences	Seasonal: winter p<0.001 (Control had slightly larger difference-post higher)
Seasons Combined: no significant differences	Seasons Combined: no significant differences	Seasons Combined: no significant differences	Seasons Combined: no significant differences

Shannon index of diversity for all events combined-

Y1: post-control and post-borrow stations were more diverse (H'=3.1, control/H'=2.8, borrow) compared to pre-nourishment (H'=2.6, control/H'=1.4, borrow)

Y2: the post-control and post-borrow stations were also more diverse (H'=3.7, control/H'=3.3, borrow) compared to pre-nourishment

Shannon index of diversity on seasonal basis-

Y1: summer was most diverse (H'-3.2, pre-borrow/H'=3.1, pre-control; H'=3.0 for post-borrow and post-control)

Y2: summer was also most diverse (H'=3.3, post-borrow/H'-3.7, post-control)

Grain size differences between pre- and post-NHB to pre- and post-offshore borrow-

Y1: pre-NHB was larger than both pre- and post-offshore borrow and post-NHB, but only significantly larger than post-offshore borrow (p=0.001)

Y2: pre-NHB was larger than both pre- and post-offshore borrow and post-NHB, but only significantly larger than post-offshore borrow (p<0.001)

OFFSHORE CORRELATION SUMMARY OF PRE-YEAR AND POST-Y1 AND POST-Y2

Seasonal basis (pre- and post-borrow; pre- and post-control)

Pre: borrow spring and summer richness were negatively correlated with grain size (p=0.0495, 0.011) and summer abundance was also negatively correlated with grain size (0.033); borrow control spring abundance was positively correlated with grain size (p=0.028) and winter richness was negatively correlated with grain size (p=0.046)

Y1: no relevant significant results

Y2: borrow spring (p=0.004) and fall (p<0.001) abundances were significantly positively correlated with richness; winter abundance (p=0.007) and richness (p=0.007) were significantly negatively correlated with grain size; control borrow abundances were significantly positively correlated with richness in every season ($p \leq 0.005$)

Seasons combined (pre- and post-borrow; pre- and post-control)-

Pre: control borrow abundance was positively correlated with control borrow grain size (p=0.027)

Y1: borrow richness was negatively correlated with borrow grain size (p=0.04)

Y2: no relevant significant results

BEACH COMPARISON SUMMARY OF PRE-YEAR TO POST-Y1 AND POST-Y2

Taxa richness

Y1: NHB richness was significantly lower (p=0.037) than pre-nourishment

Y2: NSS/KHB combined was significantly lower than pre-nourishment

Mean difference in taxa richness (post-pre)

Y1: no significant differences on seasonal or annual basis

Y2: no significant differences on seasonal or annual basis

Abundance and Abundance/meter^2-

Y1: no significant differences on seasonal or annual basis

Y2: NHB winter abundance was significantly higher than pre-nourishment (p<0.001) and when the seasons were combined, KHB/NSS combined post abundance was lower than pre-nourishment (p=0.013)

Mean difference in abundance and abundance/meter^2 (post-pre)-

Y1: no significant differences on a seasonal or annual basis

Y2: NHB had a larger difference in mean winter abundances (post-Y2 mean was higher than pre) than KHB/NSS combined (p<0.001)

Grain sizes-

Y1: smallest on NSS control beach, largest on KHB control beach, with NHB grain sizes intermediate but closer to NSS; fall grain size at NHB was significantly smaller (finer) post-Y1 (p=0.007)and when all seasons were combined, NHB was significantly smaller (finer) post-Y1 (p=0.003)

Y2: smallest on NHB, largest on KHB control beach, with NSS control beach grain sizes intermediate and closer to NHB; no significant differences on a seasonal or annual basis

Mean difference in grain size

Y1: no significant differences on a seasonal or annual basis

Y2: the combined KHB/NSS had a larger difference in mean winter grain size (post-Y2 mean was higher than pre) than NHB (p<0.001); there were no significant differences when the seasons were combined

Shannon index of diversity indicated pre-NHB was slightly more diverse (H'=2.0) than pre-control beaches (H'=1.6) and -

Y1: the combined KHB/NSS was slightly more diverse (H'=1.1) than NHB (H'=0.09)

Y2: the combined KHB/NSS was slightly more diverse (H'=2.1) than NHB (H'=1.9)

BEACH CORRELATION SUMMARY OF PRE-YEAR TO POST-Y1 AND POST-Y2

Seasonal basis

Pre: NHB fall richness was positively correlated with grain size (p=0.042); KHB/NSS (combined) fall and winter abundances and winter richness were negatively correlated with grain size (p=0.031, 0.024, 0.004)

Y1: NHB fall abundance was positively correlated with grain size (p=0.049) and winter abundance was negatively correlated with grain size (p=0.002); KHB/NSS (combined) spring and winter abundances and winter richness were negatively correlated with grain size (p=0.043, 0.038, <0.001)

Y2: NHB summer richness was negatively correlated with grain size (p=0.007); KHB/NSS (combined) spring (p<0.001), fall (p=0.001), and winter (p<0.001) abundances were positively correlated with richness and spring richness was negatively correlated with grain size (p=0.002).

Seasons combined

Pre: KHB/NSS (combined) richness was negatively correlated with grain size (p<0.001)

Y1: KHB/NSS (combined) richness was negatively correlated with grain size (p=0.004)

Y2: NHB richness and grain size were just barely not significantly negatively correlated (p=0.053); KHB/NSS (combined) abundance and grain size were negatively correlated (p=0.047)

CONCLUSIONS

Benthic populations on NHB as well as the offshore borrow area are generally not different from control stations and demonstrated viable populations of organisms during the post-Y2 sample events. Seasonal variations dominate the data set whether in the impacted areas or the control areas. Benthic populations typically show abundances considerably higher in spring- or summer- sample events compared to fall-and winter-sample events. The exception was NHB post-Y2 winter event which produced the highest abundance observed during post-Y2 sampling events. Grain size was occasionally significantly correlated with richness and/or abundance, and usually negatively, which means as one number increases, the other decreases. Sediments in the borrow area did not change significantly between pre-nourishment and post-Y2 sample events. Sediments on the sampled section of NHB maintained consistency of ~0.5 mm sand during post-Y2. This reflects the characteristics of the borrow material and the burial of the unusually coarse sediment that dominated the eroding beach prior to the project, resulting in similar conditions to the natural berm in the area. Prior to nourishment, the lower surf zone contained very coarse sand, granules, and pea gravel at many stations, a lag deposit which is more common along eroding beaches(CSE 2005, USACE 2010).

This final and post-Y2 executive summary is to serve as a stand-alone document, or final report summary, as it contains condensed details of all three years' data with supporting graphics and tables. The table and figure numbers run sequentially from the executive summary to the main text of the remainder of this post-Y2 report. More detailed information on an annual basis for post-Y2 can be found in Section 3.0 of this report. Section 3.0 of each of the previous two reports contain specific detailed information for each year: post-Y1 in CZR 2013 and pre-nourishment in CZR 2011.

1.0 INTRODUCTION

This post-nourishment Year 2 (post-Y2) and final report was prepared per NCDENR/NCDCM Permit 45-10 Beach Nourishment Town of Nags Head, in accordance with the benthic monitoring plan proposed and submitted to the Town of Nags Head and regulatory agencies in April 2010 and presents methodology and results from four seasonal pre-nourishment benthic sampling events (spring 2010 – winter 2011) and eight seasonal post-nourishment benthic sampling events (Year 1 [Y1]: fall 2011 – summer 2012 and Year 2 [Y2]: fall 2012 – summer 2013). While some Y1 data are included for comparative purposes in this report, most of this report compares Y2 to the pre-nourishment data. The Y1 data were compared to pre-nourishment data and analyzed in a report submitted to the Town and agencies in July of 2013 (CZR Incorporated 2013). The supporting tables and figures of this report continue forward from the executive summary.

Associated project impacts result from placement of sediment on the beach (nourishment) and from sediment removal from the offshore borrow locations by the dredge operation. Since beach nourishment is the project goal, for the purpose of this report, all sample station data are considered either pre-nourishment (baseline year or pre-) or post-nourishment (post-Y1 or post-Y2).

2.0 METHODOLOGY

2.1 Offshore Sample Stations

Ten (10) borrow stations and 10 control stations were randomly selected within the S1 polygon identified previously by US Army Corps of Engineers (USACE) as an offshore borrow area for Outer Banks beach nourishment projects. The S1 area was further subdivided by Coastal Science and Engineering (CSE) into three polygons designated as potential borrow areas for the Nags Head Beach nourishment project (1, 2, and 3) as shown on Figure 1. These polygons are in approximately 40-50 feet of water. Five random GPS points (within the areas designated and at least 100 feet away from the polygon edge) were generated in the S1-2 polygon (B2a- B2e) and five random GPS points were generated in the S1-3 polygon (B3a-B3e); these 10 points were the offshore borrow stations. Ten (10) randomly generated GPS points were selected in the area outside of and between the three subarea polygons but still within the S1 polygon. Extensive coring and sediment analysis by the USACE and CSE indicated points within this area would serve as the 10 offshore control stations (BCE1a-BCE1j). Tables within Figure 1 contain the GPS coordinates for all sample stations.

Coordinates for all offshore stations were entered into the GPS system on the sampling boat and used to navigate and anchor the boat. Once anchored, a diver used two corers and four caps to collect the required sediment for benthic and grain size analysis (one core each). Sediment was collected with a clear 1.2 cm (0.25 in) thick acrylic tube/core with an approximately 10 cm (4-in) inside diameter and marked with tape at 15 cm (approximately 6 in) from the bottom. A full core up to the 15 cm mark contains approximately 1,180 ml (approximately 5 cups). Samples were collected via this hand-driven corer and secured with sealed caps to create a vacuum and contain sediment. The samples were then gently sieved with a 0.5-mm mesh bucket on the transom of the boat, preserved in 10 percent formalin

with added Rose Bengal, and labeled during navigation between sample stations, boat anchoring, and diver preparation for the next sample collection.

2.2 Beach Sample Stations

Ten (10) nourished beach stations and 10 control beach stations were selected based on proximity to existing beach profile stations, proximity to the beach sampling stations previously used during the CSA South benthic collections for the Town of Nags Head (CSA South 2008), and proximity to public beach accesses. With the exception of the five southern control beach stations (see Section 2.2.1 below), all other beach stations (nourished and northern control) are as shown in the monitoring plan submitted to state resource agencies in April 2010.

Each beach station (control and nourished) was comprised of two low-tide sampling zones, swash Zone A and subtidal Zone B. The sampling window for all beach stations was designated to be no more than two hours either side of the predicted low tide. The low-tide swash Zone A was the area of active wave run-up and the low-tide subtidal Zone B was an undescribed distance seaward but at depths no deeper than knee-height of the biologist. The sediment collector was the same as the corer used for the offshore sample collection. Three cores were collected at random locations in each zone and deposited in a tray. Sediments from these three cores were gently mixed in the tray and then a 1,000 ml Nalgene sample jar was filled, labeled inside and out, and transported to iced coolers.

Upon completion of beach sampling, all benthic beach samples were gently sieved through a 0.5-mm mesh bucket, placed in labeled sample jars, and preserved in 10 percent formalin with added Rose Bengal, and stored in coolers for transport. While care was taken to carefully turn and distribute the fixative throughout the sample, some samples with more than 500 ml of sand resulted in modification of the protocol; larger samples were put into multiple containers to avoid damage to preserved organisms (USEPA 2009).

2.2.1 Relocation of Cape Hatteras National Seashore Southern Control Beach Stations (NSS01-NSS05)

After submittal of the draft benthic monitoring plan in April 2010, further consultation among CSE, CZR, and NC Division of Marine Fisheries determined that the NSS control stations could be moved due to the potential during the course of the study for some, or all, of the NSS beach sampling stations identified in the draft plan to be within restricted access areas as designated by the National Park Service. The stations were moved to the vicinity of Coquina Beach Access Ramp 2 and the spacing between sites was reduced. The revised station locations were set up 100 meters (330 feet) apart with the center station, NSS03, located perpendicular from the Ramp 2 signpost as shown in Figure 1. This change was necessary in order to preserve a high likelihood that the same southern beach control stations could be used for the duration of the monitoring.

2.3 QA/QC Benthic Sorting and Identification

Benthic samples were sorted and identified by CZR; however, for quality control and quality assurance (QA/QC) ten percent of samples were sent to an outside laboratory to re-sort and re-identify (two control beach samples, two nourished beach samples, and two borrow samples). These samples were selected upon completion of the majority of the sorting and identification effort to make best use

of the QA/QC process. The selection methodology of which samples to send to the lab for QA/QC ensured that the benthic ecologist had no pre-knowledge of which samples would be selected. Benthic QA/QC was performed by Cove Corporation (Lusby, MD).

Taxa identified only to genus were not counted when another taxon identified to species shared that genus. Similarly, a taxon identified to a family level or higher was not counted when taxa in that family or group were identified to a lower taxonomic level. Appendix A contains a complete list of taxa identified seasonally from the 20 beach stations and the 20 offshore stations. Meiofauna were noted but not counted and are indicated as such in Appendix A.

2.4 Sediment Sampling

Following the same methodology as described above for benthic samples, a fourth core sample was taken at each beach station zone (40 cores) and a second core sample was taken at each offshore location (20 cores) for sediment analysis. These samples were labeled and sealed in plastic bags and analyzed for grain size and calcium carbonate content.

Sediments collected were analyzed in the CSE lab via standard dry-sieving at 0.5 phi intervals and the results provided to CZR Incorporated in a digital format. Appendix B contains graphic depictions of grain size distribution and other data from each sampling event.

2.4.1 Percent Calcium Carbonate Substituted for Percent Organic

Subsequent to the April 2010 monitoring plan submittal and after the June 2010 sampling event, additional correspondence among CZR, CSE, and NCDCM representatives (Anne Deaton of the Wilmington office and Jeff Warren of the Raleigh office) resulted in a decision to analyze the sediment for percent calcium carbonate by acid digestion for all events as opposed to percent organic content by combustion as specified in the draft plan. Analysis followed ASTM Method D2487 for classification of soils where sieve sizes range from 4.75 mm (US Standard sieve No. 4) to 63 µm (US Standard sieve No. 230) and sediments were categorized by Wentworth's classification (Wentworth 1922).

2.5 Pre- and Post-nourishment Comparative Statistical Analysis

Per the 2010 monitoring plan and contract with the Town of Nags Head, data have been quantitatively compared among sites and over time to evaluate changes in the benthic fauna abundances, diversity indices, species richness, and mean number of species per station before and after nourishment. To detect differences between sites and seasons, one-way ANOVA or other appropriate inferential statistics were performed. When the data failed normality (Shapiro-Wilk), a Kruskal-Wallis One Way Analysis of Variance on Ranks was performed. For the repeated measures beach sampling, each sample measure (three replicates per zone/per event = one sample measure) from the before data set (X_{Bi}) was paired with the sample measure taken for that location in the after data set (X_{Ai}), and the difference between the two time periods was calculated (X_{Ai} - . X_{Bi}). The mean, standard deviation, and sample size for the impact (X_I, S_I, N_I, respectively) and control stations (X_C, S_C, N_C) was calculated from the differences. For the spatially randomized samples in the borrow areas, the individual sample measure (1 replicate = 1 sample measure) was independent among time periods within the delineated impact (X_I and S_I, respectively) and control areas (X_C and S_C), resulting in means

standard deviations within the before and after impact locations (X_{IB} and S_{IB}; X_{IA} and S_{IA}, respectively and; X_{CB} and S_{CB}; X_{CA} and S_{CA}). The difference between the after and before means was calculated for the impact ($X_{IA} – X_{IB} = X_I$) and control ($X_{CA} – S_{CB} = X_C$) locations; the standard deviation of the difference was calculated as the pooled standard deviation of the before and after data at the impact (S_I) and control (S_C) locations. Sample size was calculated conservatively as the average sample size of the before and after time periods for the impact (N_I) and control (N_C) locations (Bergquist and Crowe 2009).

3.0 RESULTS

For ease of future comparison some graphic depictions of benthic data were modeled after previous sampling efforts performed by Versar for the U.S. Army Corps of Engineers (Versar 2006). The "groups" classification used in the Versar reports is not a formal taxonomic classification; class, orders, subphyla, and other formal classifications are retained under the umbrella of "group" for this report as well as for Appendix A. Taxa richness, abundance, number of groups, and diversity indices were calculated. To evaluate the diversity and evenness of all species found, the Shannon Index of diversity was utilized. Values for this index typically range from 1.5 (low diversity) to 3.5 (high diversity).

The timeline of sample events has been provided in Table 1. When results of post-nourishment are considered, as well as comparisons of those data to pre-nourishment it should be remembered that nourishment occurred over the 2011 spring and summer benthic sampling seasons and that the first post-Y1 benthic sampling occurred in fall of 2011 (Event 5). Table 2 is a tally of abundance and taxa richness for all 12 events on a seasonal and combined annual basis. Table 3 provides a summary of all statistically significant comparisons.

For all four post-Y2 events combined, the QA/QC error rate was 7.45 percent on taxonomic identification and 0.36 percent on sorting. Ten percent or below is the widely accepted error rate used by others and followed by Versar in its report(s). Comparison QA/QC data are available upon request.

3.1 Offshore Control Benthos and Sediment

Table 4 provides summary information for all 12 seasonal sampling events considered in this report (four pre- and eight post-nourishment [four Y1 and four Y2]) by season, by station, and combined across annual events. This information and comparison results between pre-data and post-Y2 data are described in the two sections below. Pre- and post-nourishment abundance data by season, group, and percent for the offshore control stations are also depicted in pie charts in Figure 2 for all 12 events. These depictions show seasonal variability across the control stations as well as variability from the pre-nourishment year to post-Y2; however, for most seasons and years, Polychaeta was the dominant group, the exceptions being the first two spring events when Mollusca was dominant.

3.1.1 Offshore Control Benthos Pre-nourishment and Post-Y2

The offshore pre-nourishment sampling events identified 61 taxa from the control stations compared to 60 in post-Y2 (Table 4) The taxa with the highest abundance for pre-nourishment were juvenile Bivalvia sp. (Mollusca) (39 individuals respectively) and post-Y2, the taxa with the highest abundance were *Spiophanes bombyx* (Polychaeta) (80 individuals respectively). The next most abundant

Table 4. Summary of benthic and sediment parameters across four seasonal survey events in the pre-nourishment year, four each in post-Y1 and -Y2, and all four seasons combined for each year.

	Pre-nourishment					Post-Y1					Post-Y2				
	Spring	Summer	Fall	Winter	Combined across events	Fall	Winter	Spring	Summer	Combined across events	Fall	Winter	Spring	Summer	Combined across events
OFFSHORE CONTROL															
Taxa richness	22	32	24	13	61	10	10	29	33	53	14	9	29	36	60
Number of taxonomic groups	8	13	8	5	16	3	3	11	11	12	6	4	7	10	13
Abundance	543	159	199	70	971	181	124	583	657	1,545	144	66	328	354	892
Average taxa per square meter	7,059	2,067	2,587	910	3,156	2,353	1,612	7,579	8,541	5,021	1,872	858	4,264	4,602	2,899
Shannon index of diversity (H')*	1.0	3.1	2.6	2.3	2.6	1.5	1.9	2.2	3.0	3.1	2.3	2.1	3.0	3.2	3.7
Average number of taxa per station	4.4	8.5	4.4	1.9	4.8	2.5	2.1	6.3	7.6	4.6	2.7	1.7	5.8	7.0	4.3
Average grain size (mm)**	0.60	0.58	0.48	0.53	0.55	0.49	0.52	0.48	0.51	0.50	0.53	0.50	0.55	0.54	0.53
Average percent calcium carbonate**	1.8	1.9	1.2	2.3	1.8	1.6	1.6	1.7	1.8	1.7	2.5	1.5	1.4	1.6	1.8
OFFSHORE BORROW															
Taxa richness	18	34	19	20	63	14	22	28	33	64	18	6	34	35	60
Number of taxonomic groups	9	13	10	7	15	8	9	8	9	10	9	3	11	10	14
Abundance	2,266	127	78	83	2,554	140	109	816	394	1,459	104	17	346	545	1,012
Average taxa per square meter	29,458	1,651	1,014	1,079	8,301	1,820	1,417	10,608	4,264	4,742	1,352	221	4,498	7,085	3,289
Shannon index of diversity (H')*	0.8	3.2	2.2	2.8	1.4	1.9	2.7	1.8	3.0	2.8	2.6	1.5	2.9	2.4	3.3
Average number of taxa per station	3.9	6.9	3.0	2.7	4.1	2.5	3.2	5.3	7.3	4.6	2.6	0.8	6.2	7.8	4.4
Average grain size (mm)**	0.50	0.49	0.47	0.45	0.48	0.48	0.43	0.42	0.43	0.44	0.43	0.41	0.44	0.44	0.43
Average percent calcium carbonate**	1.2	1.5	1.3	1.9	1.5	2.0	1.6	1.4	2	1.8	1.4	1.4	1.5	1.7	1.5

Nourishment occurred in spring and summer 2011.

Table 4. (continued)

	Pre-nourishment					Post-Y1					Post-Y2				
	Spring	Summer	Fall	Winter	Combined across events	Fall	Winter	Spring	Summer	Combined across events	Fall	Winter	Spring	Summer	Combined across events
CONTROL BEACH[a]															
Taxa richness	13	8	8	8	20	14	6	9	10	21	8	6	9	11	20
Number of taxonomic groups	5	5	6	5	8	6	4	6	4	8	6	5	5	6	9
Abundance	538	469	79	84	1,170	97	109	1,108	164	1,478	71	100	161	185	517
Taxa per square meter (average of 2 zones)	3,497	3,049	514	546	1,901	631	709	7,202	1,066	2,402	462	650	1,047	1,203	840
Shannon index of diversity (H')*	1.5	0.8	1.3	1.6	1.6	1.8	1.2	0.5	1.5	1.1	1.4	1.5	1.4	1.6	2.1
Swash Zone A	1.5	1.0	1.4	0.9	1.6	1.5	0.8	1.8	0.8	1.7	1.0	1.4	1.1	1.4	1.9
Subtidal Zone B	1.0	1.1	0.6	1.4	1.5	1.7	1.2	0.2	1.6	0.6	1.7	1.1	1.0	1.3	1.8
Average number of taxa per station															
All control stations	2.8	2.1	1.2	1.5	1.9	1.8	1.2	1.9	1.8	1.7	0.8	0.8	1.8	2.1	1.4
Swash Zone A	2.9	2.2	1.8	1.1	2.0	1.8	1.2	2.4	1.5	1.7	0.9	1.1	1.9	2.5	1.6
Subtidal Zone B	2.7	2.0	0.5	1.8	1.8	1.0	1.2	1.4	2.0	1.4	0.6	0.5	1.7	1.7	1.1
KH swash Zone A	2.6	1.4	1.6	0.6	1.6	2.2	0.4	2.2	2.0	1.7	0.4	1.2	2	2.2	1.5
KH subtidal Zone B	2.6	2.4	0.4	1.2	1.7	1.0	0.8	1.0	1.6	1.1	1.0	0.6	2.0	2.0	1.4
NSS swash Zone A	3.2	3.0	2.0	1.6	2.5	1.4	2.0	2.6	1.0	1.8	1.4	1.0	1.8	2.8	1.8
NSS subtidal Zone B	2.8	1.6	0.6	2.4	1.9	1.0	1.6	1.8	2.4	1.7	0.2	0.4	1.4	1.4	0.9
Average grain size (mm)**															
All control stations	1.17	0.79	1.50	0.81	1.07	1.01	0.89	1.00	0.79	0.92	0.95	1.58	0.83	0.68	1.01
Swash Zone A	1.11	0.69	1.04	0.86	0.93	0.95	0.91	0.82	1.05	0.93	1.20	1.38	1.02	0.93	1.13
Subtidal Zone B	1.22	0.89	1.96	0.76	1.21	1.07	0.86	1.17	0.53	0.91	0.70	1.77	0.65	0.44	0.89
KH swash Zone A	1.76	1.07	1.50	1.16	1.37	1.26	1.37	1.22	1.31	1.29	1.90	1.97	1.01	1.41	1.57
KH subtidal Zone B	2.05	1.36	2.95	1.12	1.87	1.81	1.32	1.85	0.75	1.43	0.82	2.35	0.51	0.33	1.00
NSS swash Zone A	0.47	0.32	0.59	0.57	0.49	0.64	0.46	0.42	0.79	0.58	0.51	0.79	1.03	0.45	0.69
NSS subtidal Zone B	0.38	0.42	0.97	0.39	0.54	0.33	0.40	0.50	0.30	0.38	0.57	1.20	0.79	0.55	0.78
Average percent calcium carbonate**															
All control stations	3.3	3.2	4.9	3.8	3.8	2.8	2.8	2.5	4	3.0	2.7	4.4	3.0	3.6	3.4
Swash Zone A	3.6	2.5	4.6	4.5	3.8	3.3	2.7	2	4.7	3.2	3.2	3.9	3.3	3.1	3.3
Subtidal Zone B	3.1	3.9	5.1	3.1	3.8	2.5	2.9	3.1	3.4	3.0	2.3	4.9	2.7	4.2	3.5
KH swash Zone A	3.8	2.8	4.2	3.1	3.5	3.2	2.8	2.7	3.5	3.1	4.1	4.3	4.1	3.1	3.9
KH subtidal Zone B	4	5	2.6	3.2	3.7	2.9	4.2	3.8	4.8	3.9	2.2	5.5	2.1	2.4	3.1
NSS swash Zone A	3.3	2.2	5	5.9	4.1	3.4	2.6	1.3	5.9	3.3	2.3	3.5	2.5	3.0	2.8
NSS subtidal Zone B	2.1	2.7	7.6	3	3.9	2.0	1.6	2.3	1.9	2.0	2.3	4.2	3.3	6.0	4.0

Nourishment occurred in spring and summer 2011.

Table 4. (concluded)

	Pre-nourishment					Post-Y1					Post-Y2				
	Spring	Summer	Fall	Winter	Combined across events	Fall	Winter	Spring	Summer	Combined across events	Fall	Winter	Spring	Summer	Combined across events
NOURISHED BEACH[b]															
Taxa richness	18	7	5	8	22	9	2	10	11	19	8	7	7	11	16
Number of taxonomic groups	6	4	4	5	8	5	2	5	6	8	5	4	4	5	6
Abundance	202	247	49	66	564	75	99	1411	208	1,793	46	570	215	117	948
Taxa per square meter (average of 2 zones)	1,313	1,606	319	442	920	488	644	9,172	1,352	2,914	299	3705	1,398	761	1,541
Shannon index of diversity (H')*	2.3	1.3	1.4	1.5	2.0	1.3	0.6	0.6	2.0	0.9	2.0	1.0	1.4	2.0	1.9
NHB Swash Zone A	1.9	1.0	1.1	1.0	1.6	1.1	0.7	1.3	1.2	1.6	1.3	1.1	1.2	1.8	2.0
NHB Subtidal Zone B	2.0	1.1	0.6	1.3	1.9	1.1	0.6	0.2	1.8	0.6	1.8	0.7	1.3	1.8	1.6
Average number of taxa per station															
All NHB stations	3.9	2.2	1.0	1	2.0	1.1	0.7	2.3	1.5	1.4	1.0	1.7	2.2	2.3	1.8
NHB Swash Zone A	3.3	2.5	1.0	0.9	1.9	1.3	0.7	2.3	1.2	1.4	0.7	1.8	2.6	2.6	1.9
NHB Subtidal Zone B	4.4	1.9	1.0	1.0	2.1	0.8	0.6	2.3	1.8	1.4	1.3	1.5	1.8	2.0	1.7
Average grain size (mm)**															
All NHB stations	0.73	0.85	0.89	0.68	0.79	0.49	0.48	0.55	0.55	0.52	0.50	0.55	0.62	0.42	0.52
NHB Swash Zone A	0.84	1.04	0.76	0.7	0.83	0.59	0.52	0.65	0.61	0.59	0.69	0.50	0.69	0.45	0.58
NHB Subtidal Zone B	0.62	0.67	1.02	0.66	0.74	0.40	0.45	0.44	0.49	0.45	0.31	0.60	0.54	0.39	0.46
Average percent calcium carbonate**															
All NHB stations	3.1	3.4	3.7	3.8	3.5	1.9	1.6	2.5	2.3	2.1	3.2	2.2	2.5	1.9	2.5
NHB Swash Zone A	3.5	3.6	4.1	3.5	3.7	2.1	1.3	2.4	2.4	2.1	3.7	1.8	2.6	2.1	2.6
NHB Subtidal Zone B	2.7	3.1	3.3	4.1	3.3	1.8	1.8	2.6	2.2	2.1	2.6	2.5	2.4	1.8	2.3

Nourishment occurred in spring and summer 2011.

[a] Control beaches: KH=Kitty Hawk NSS=National Seashore
[b] Nourished beach: NHB=Nags Head
* Shannon diversity index H'=Index commonly used to characterize species diversity in a community. Shannon's index accounts for both abundance and evenness of the species present. Values for this index typically range from 1.5 (low diversity) to 3.5 (high diversity).
** Mean calculated from seasonal totals

taxa for the offshore control stations were *Ensis directus* in the pre-nourishment year and *Bivalvia sp.* (Mollusca) in post-Y2 (123 and 67 individuals respectively).

Taxa richness for the 10 control stations across events varied between 13 and 32 with an average of 4.8 taxa per station for the pre-nourishment samples and between 9 and 36 with an average of 4.3 per station for post-Y2. A total of 16 groups and 971 individuals were identified from the pre-nourishment samples compared to 13 groups and 892 individuals for the post-Y2 samples. When all sampling events were evaluated for diversity on an annual basis, the Shannon diversity index value (H') was 2.6 for the pre-nourishment year and 3.7 for post-Y2.

In both sample years, summer had the highest taxa richness with 32 taxa identified pre- and 36 taxa post-Y2. The highest pre-nourishment abundances occurred in spring with 543 individuals, while the highest abundance post-Y2 occurred in the summer (354) followed closely by Y2-spring abundance of 328. Summer was the season with the most number of groups present for both the pre-year (13) and the post-Y2 (10). For both sample years, summer had the highest average number of species and the highest Shannon score (H') with 8.5 taxa and H' = 3.1 in the pre- and 7.0 taxa and H' = 3.2 in the post-Y2.

3.1.2 Offshore Control Sediment Pre-nourishment and Post-Y2

The pre-nourishment offshore control sediment sample means ranged from 0.34 mm during fall to 0.75 mm during spring with an average of 0.55 mm (coarse sand) while post-Y2 means ranged from 0.39 mm in winter to 0.97 mm in spring with an average of 0.53 mm. The fall pre-nourishment sediment samples had the lowest average grain size (0.48 mm) while the winter season was lowest post-Y2 (0.50 mm). The spring pre-nourishment season had the highest seasonal average (0.6 mm) as did spring for post-Y2 (0.55 mm). Percent calcium carbonate per station ranged from 3.7 percent during the winter to 0.8 percent during the fall for the pre-nourishment and ranged from 0.9 in winter and spring to 6.0 percent during fall post-Y2. The annual average of percent calcium carbonate was 1.8 for both years.

3.2 Offshore Borrow Benthos and Sediment

Table 4 provides summary information for all 12 seasonal sampling events (four pre- and eight post-nourishment [four Y1 and four Y2]) by season, by station, and combined across all seasonal events. This information and comparison results between pre-data and post-Y2 data are described in the two sections below. Pre-nourishment and post-Y2 abundance data by season, group, and percent for the offshore borrow stations are depicted in pie charts in Figure 3. Similar to the offshore control stations, there is a large degree of seasonal variability. Post-Y2 spring appears to be the most different from its pre-nourishment counterpart among all post-seasons; at least somewhat due to the large number of razor clams found in the pre-nourishment sample which increased the percent of mollusks for that event.

3.2.1 Offshore Borrow Benthos Pre-nourishment and Post-Y2

Within the offshore borrow stations 63 taxa were identified during the pre-nourishment year compared to 60 taxa in post-Y2 (Table 4). The most abundant taxa were in the Mollusca group for the pre-nourishment year, *Ensis directus* (1,532 individuals) and Bivalvia sp. juv (688 individuals). During post-Y2 the most abundant taxa were *Polygordius jouinae* (Polychaeta) (260 individuals). Similar to offshore control samples, taxa richness ranged from 18 to 34 taxa per season with an average richness of 4.1 taxa per station in the pre-nourishment year compared to 6 to 35 taxa per season with average richness of 4.4 per

station for post-Y2. The number of groups ranged from 7 to 13 in the pre-nourishment year and from 3 to 11 in post-Y2. Total groups pre-nourishment was 15 while in post-Y2 the total number of groups was 14. The Shannon's index of diversity (H') for all pre-nourishment events combined was 1.4, which was considerably lower than the combined post-Y2 score of 3.3.

Taxa richness was highest in the summer for both years with little difference between years (34 pre-nourishment compared to 35 in post-Y2). Abundance was highest in the spring in pre-nourishment year with 2,266 individuals (1,532 of which were *Ensis directus*) compared to 545 individuals in post-Y2 summer.

3.2.2 Offshore Borrow Sediment Pre-nourishment and Post-Y2

The offshore borrow sediment sample means ranged in size from 0.31 mm in summer to 0.76 mm in fall with an average of 0.48 mm (medium sand) in the pre-nourishment year compared to a range of 0.27 mm in winter to 0.58 mm in fall with an average of 0.43 mm (medium sand) in post-Y2. Average grain size was lowest during winter (0.45 mm) and highest during the spring (0.5 mm) in the pre-nourishment year, lowest during winter (0.41 mm), and highest during spring and summer (0.44 mm) in post-Y2. Seasonal differences were small in all years. The percent calcium carbonate ranged from 0.7 in spring to 2.4 in winter in the pre-nourishment year and from 0.9 in the fall to 2.9 in the summer and fall of post-Y2. The annual average percent for calcium carbonate was 1.5 for all borrow stations in both years.

3.3 Graphic and Statistical Comparisons for Offshore Stations

Figure 4 depicts pie charts of major taxonomic groups collected in the offshore borrow stations compared to offshore control stations by season and by all seasons combined annually. This rearrangement shows a large degree of similarity of dominant groups when the offshore borrow events are compared to offshore controls with a few exceptions: winter pre- (control had no Mollusca); spring post-Y1 (borrow had more Mollusca and less Polychaeta), and winter post-Y1 (control had twice the Polychaeta and almost no Mollusca). However, when all seasons are combined on annual basis, by post-Y2, there was little difference between dominant groups compared to pre-nourishment.

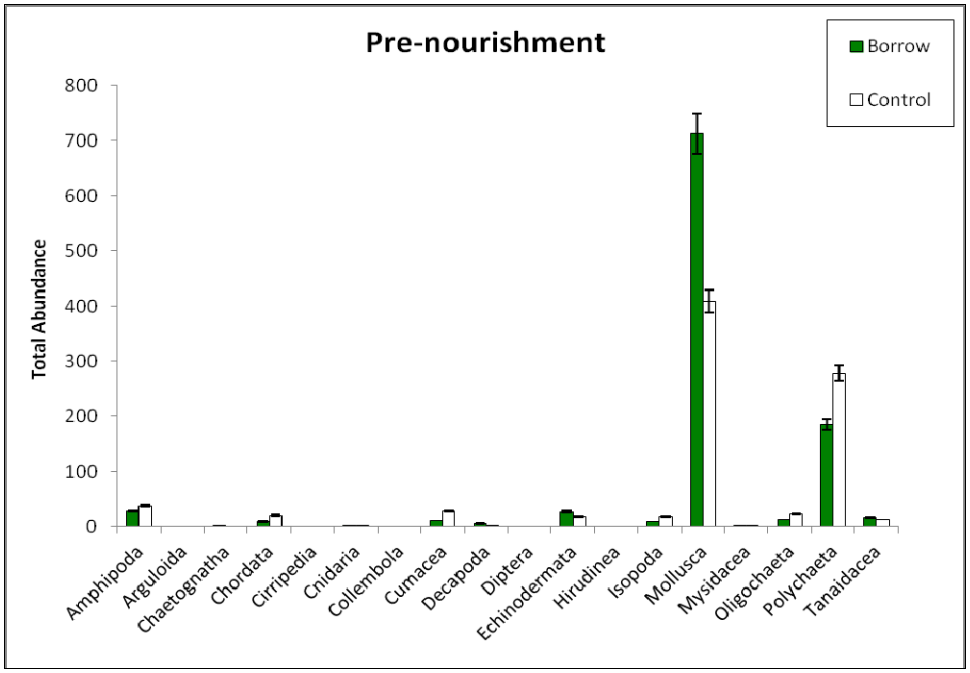
Table 3 lists all statistically significant results of all one-way ANOVAs and t-tests performed on all seasonal pre-nourishment/post-Y2 comparisons and all seasons combined pre-nourishment/post-Y2 comparisons for each station type. Various comparisons of abundance, tax richness, diversity, and sediment data for pre-nourishment and post-Y2 offshore stations are depicted in bar graphs and box plots and are described in the three subsections below (Figures 8 – 21). These graphical depictions present the data shown in Table 4 plus additional data in different combinations.

3.3.1 Offshore Abundance

Figure 8 shows that total abundance in all the offshore stations was dominated by the same two groups (Mollusca and Polychaeta) in the pre-nourishment year and in post-Y2; however, in post-Y2, there was a slight increase in abundance in three additional groups (Echinodermata, Chordata, and Oligochaeta) in both station types. Polychaeta were dominant in post-Y2 for both station types while Mollusca were higher during pre-nourishment. Figure 9 is a bar graph display of offshore abundance combined by type and by season for pre-nourishment and post-Y2. Post-Y2 fall abundance is higher than pre-fall in the borrow stations and lower in the control stations. Post-Y2 winter abundance is lower than pre-winter in both the borrow stations and the control stations. Pre-spring abundance was higher for both station types than post-Y2. Summer post-Y2 abundance was higher for both station types than pre-

summer. Spring and fall were the pre-nourishment seasons with the highest abundances at the control stations compared to spring and summer for the borrow stations; for post-Y2, spring and summer had the highest abundances for both station types. Seasonal similarities in offshore abundance were observed for both station types during winter pre-nourishment and spring post-Y2. (Text continues on Page 21.)

Figure 8. Bar graphs of pre-nourishment and post-Y2 offshore total abundance by macroinvertebrate group in borrow stations compared to control stations, minus 1,532 *Ensis directus* found in the borrow stations during spring pre-nourishment event. Error bars depict +/- 0.5.



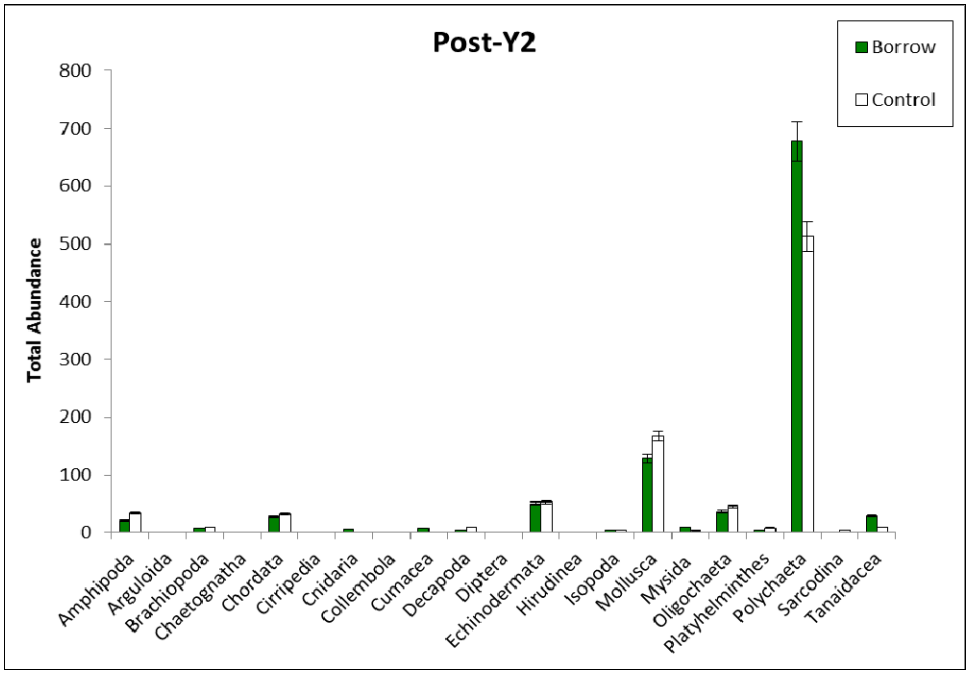


Figure 9. Bar graph of pre-nourishment and post-Y2 total abundance by season for offshore borrow stations compared to control stations. Due to extremely high abundances, 1,532 *Ensis directus* (razor clam) have been removed from the pre-nourishment spring offshore borrow data. Seasonal sample events are shown in the order they occurred. Error bars depict +/-0.5.

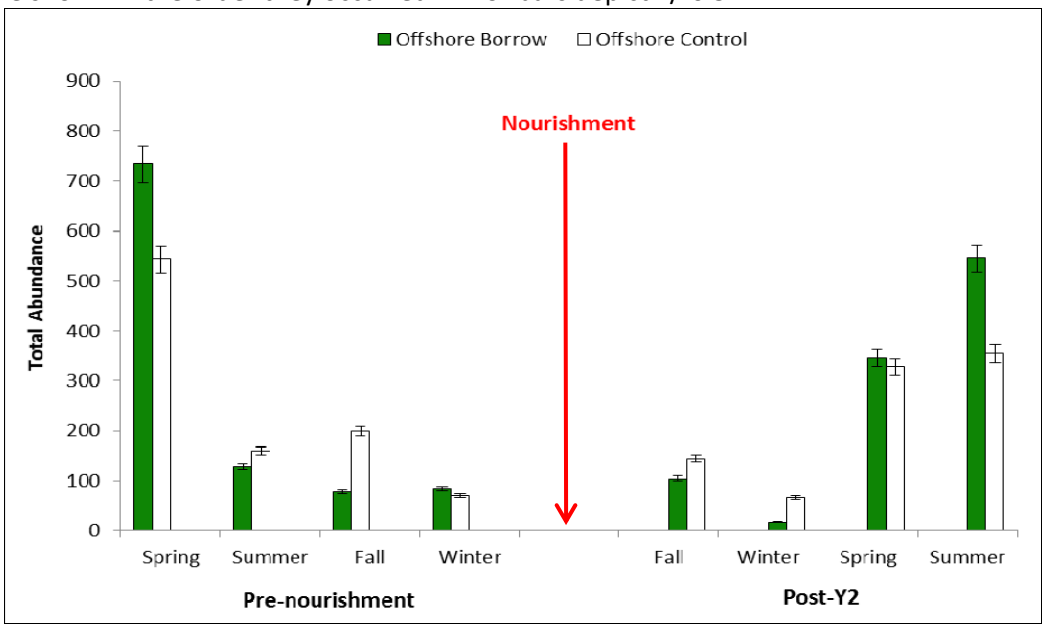


Figure 10. Box plots of pre-nourishment and post-Y2 abundance for offshore stations combined by season and station type. Due to extremely high abundances, 1,532 *Ensis directus* (razor clam) were removed from the spring borrow pre-nourishment event. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line shown is the median; the dashed line is the mean.

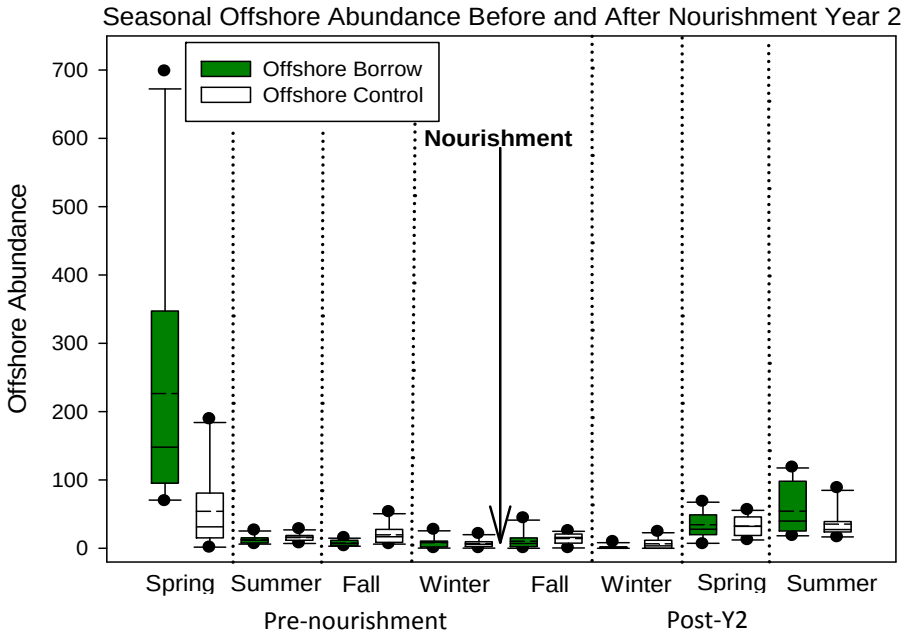


Figure 11. Box plots of pre-nourishment and post-Y2 offshore abundance compared annually by station type. Due to extremely high abundances, 1,532 *Ensis directus* (razor clam) were removed from the spring borrow pre-nourishment event. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median; the dashed line is the mean.

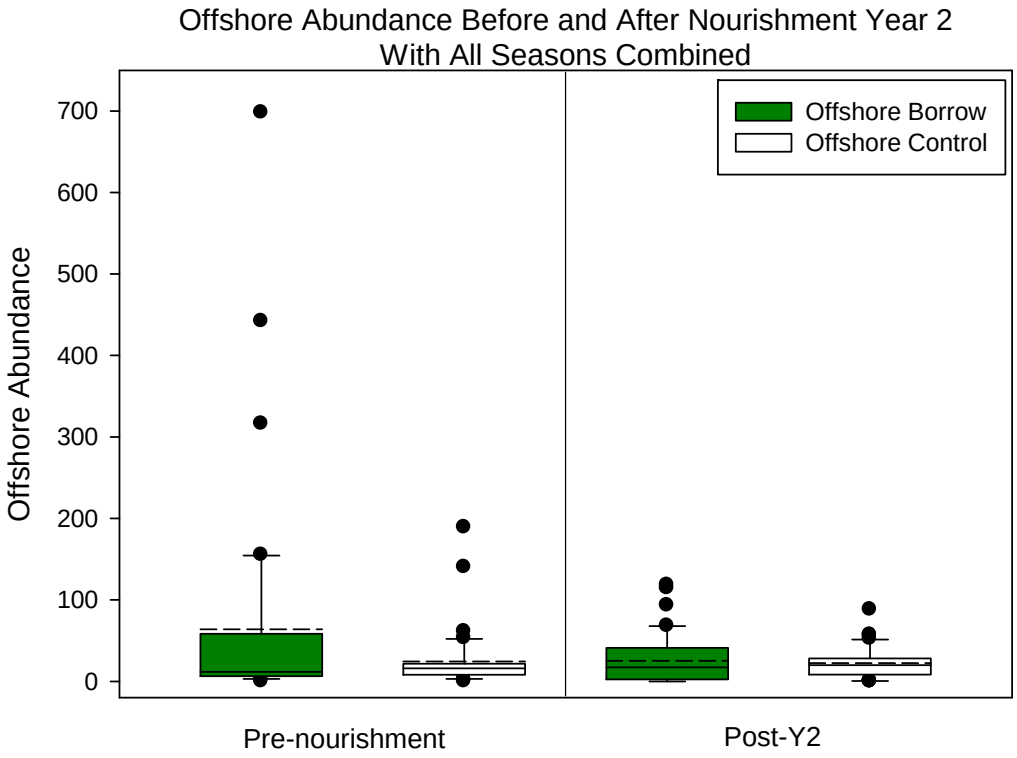
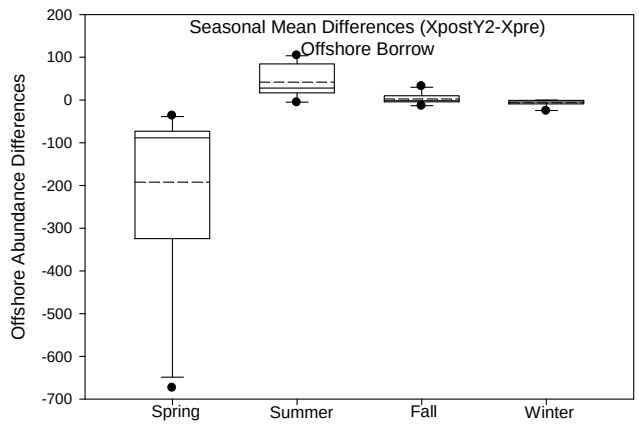
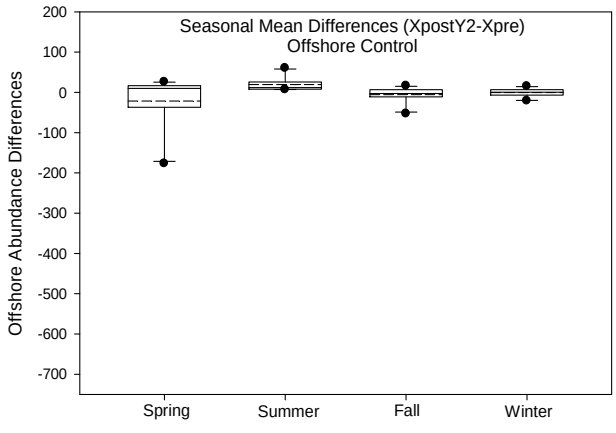


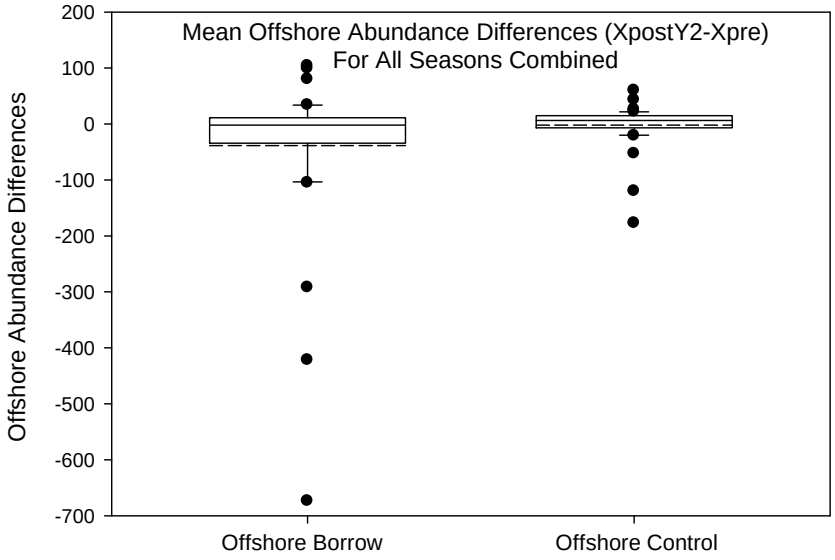
Figure 12. Box plots of seasonal mean differences (XpostY2-Xpre) for offshore abundance by station type and for all seasons combined by station type. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median; the dashed line is the mean. Spring mean differences were statistically significantly different (p<0.001)



a)



b)



c)

Figure 13. Bar graph of pre-nourishment and post-Y2 offshore total taxa richness combined by season for borrow stations compared to control stations. Error bars depict +/-0.5.

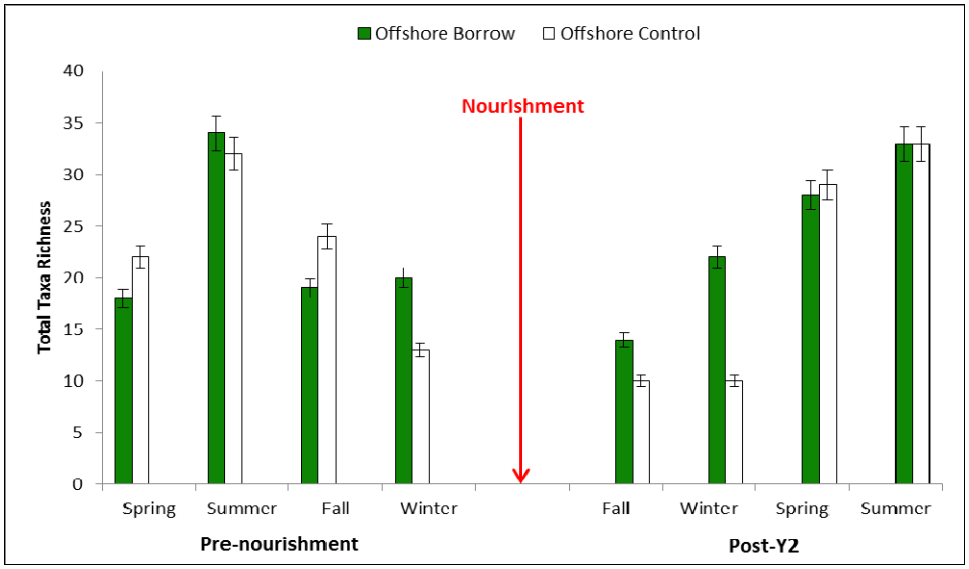


Figure 14. Box plots of pre-nourishment and post-Y2 taxa richness for offshore stations combined by season and by station type. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median; the dashed line is the mean.

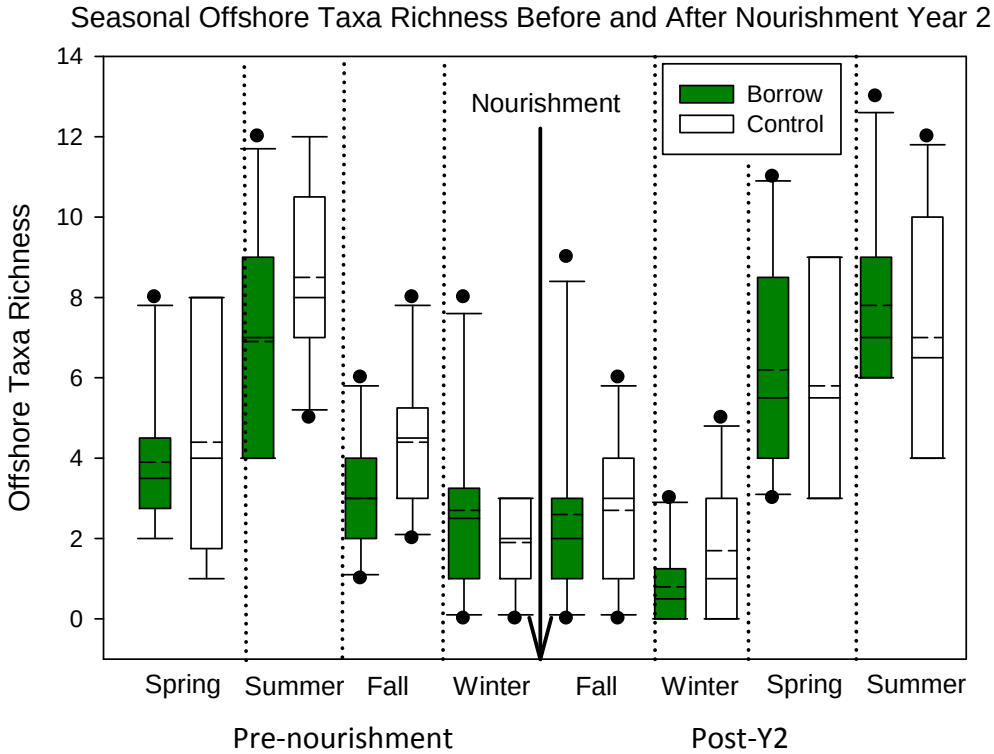


Figure 15. Box plots of pre-nourishment and post-Y2 offshore taxa richness in all borrow and all control stations. Borrow and control boxes represent all seasonal sampling events combined. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median, the dashed line is the mean.

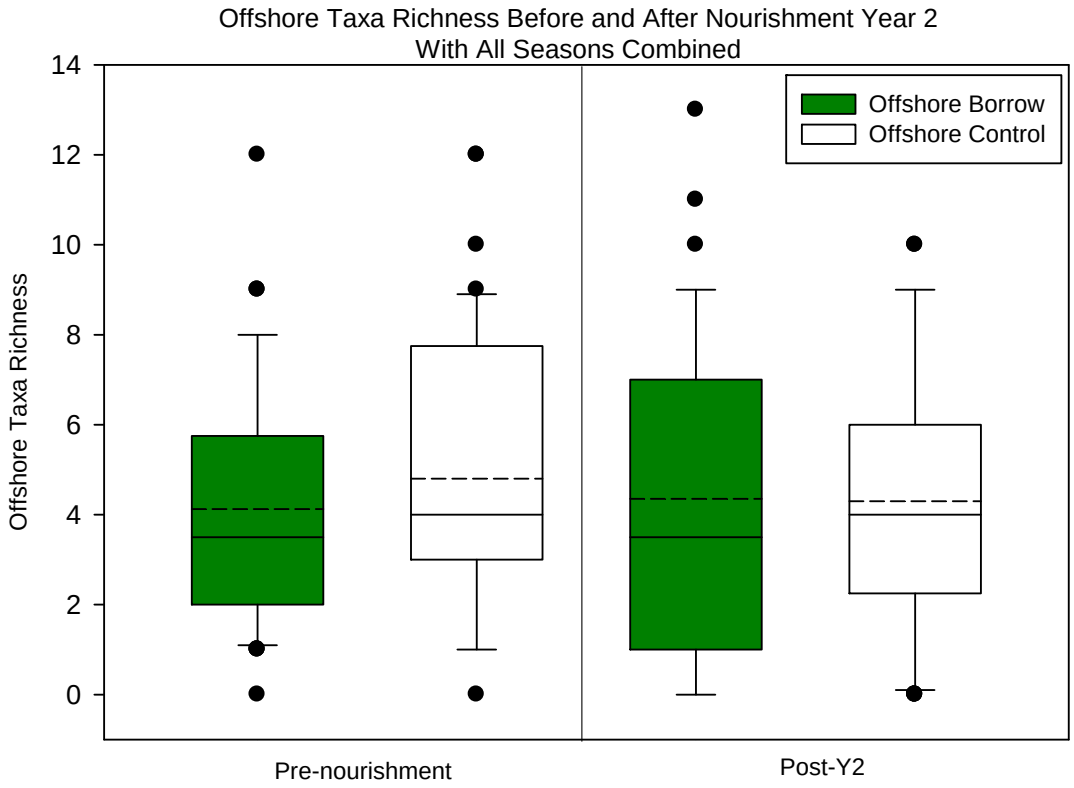


Figure 16. Box plots of seasonal mean differences (XpostY2-Xpre) for offshore taxa richness by station type and for all seasons combined by station type. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median, the dashed line is the mean.

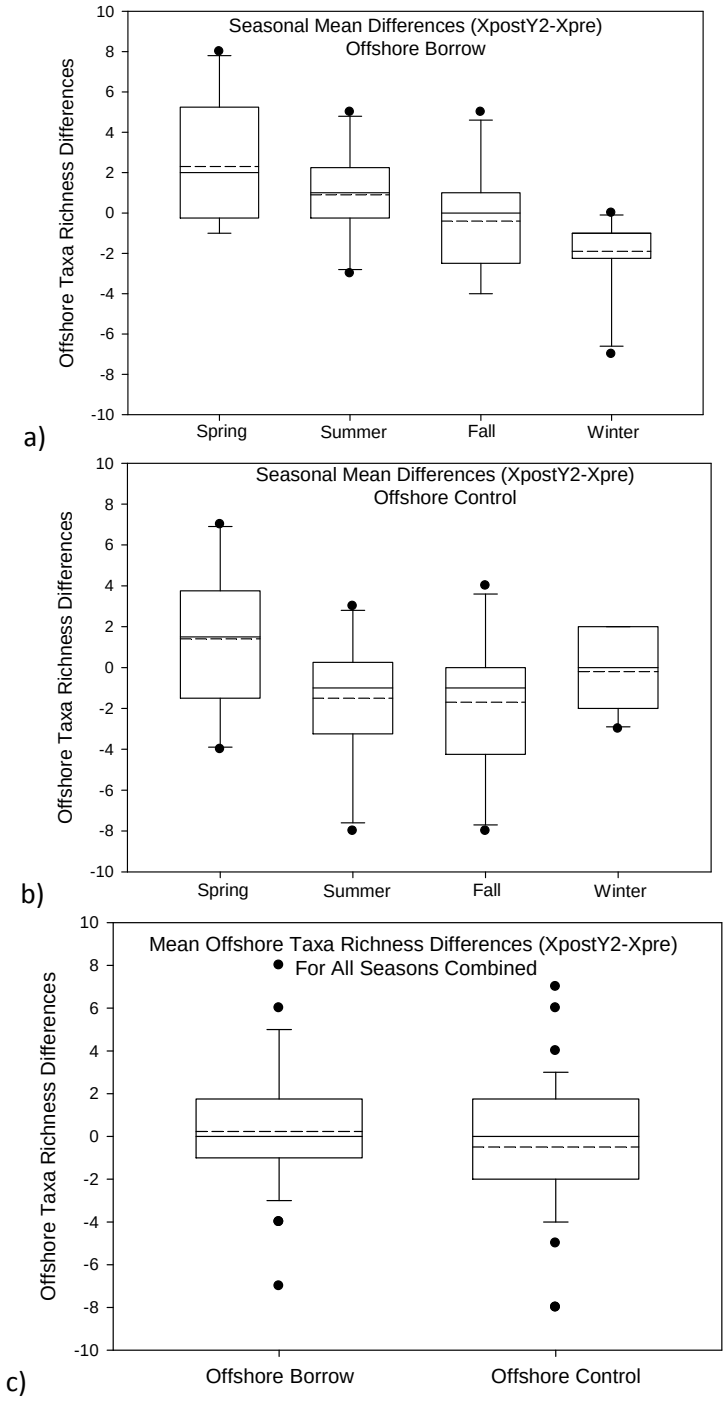


Figure 17. Bar graph of pre-nourishment and post-Y2 offshore Shannon diversity indices combined by season for borrow stations compared to control stations.

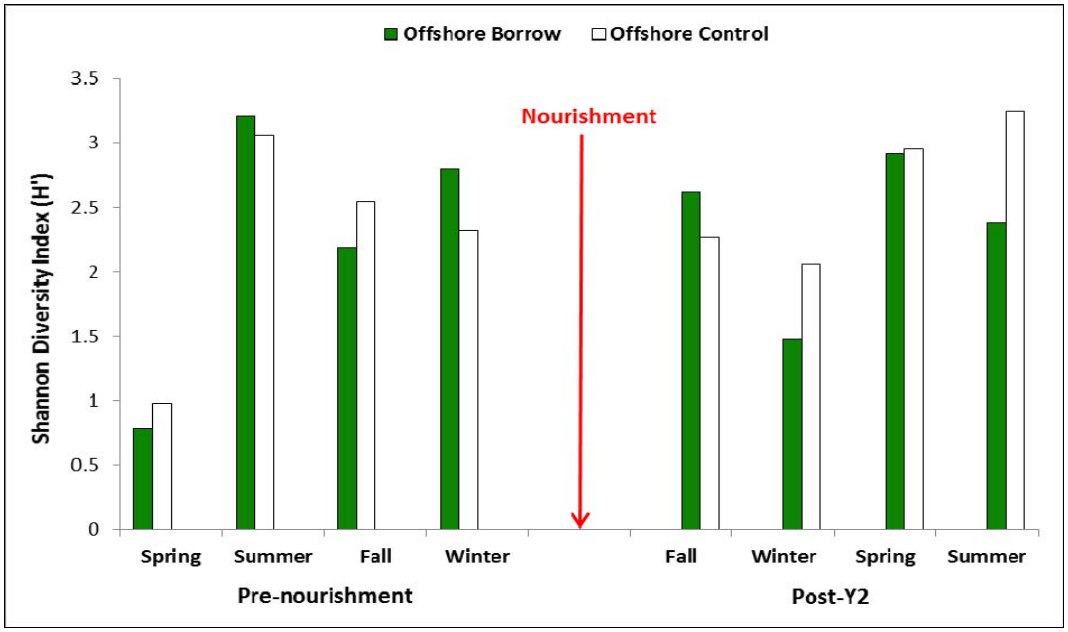


Figure 18. Bar graph of average grain size of offshore stations combined by season compared by station type for the pre-nourishment year and post-Y2.

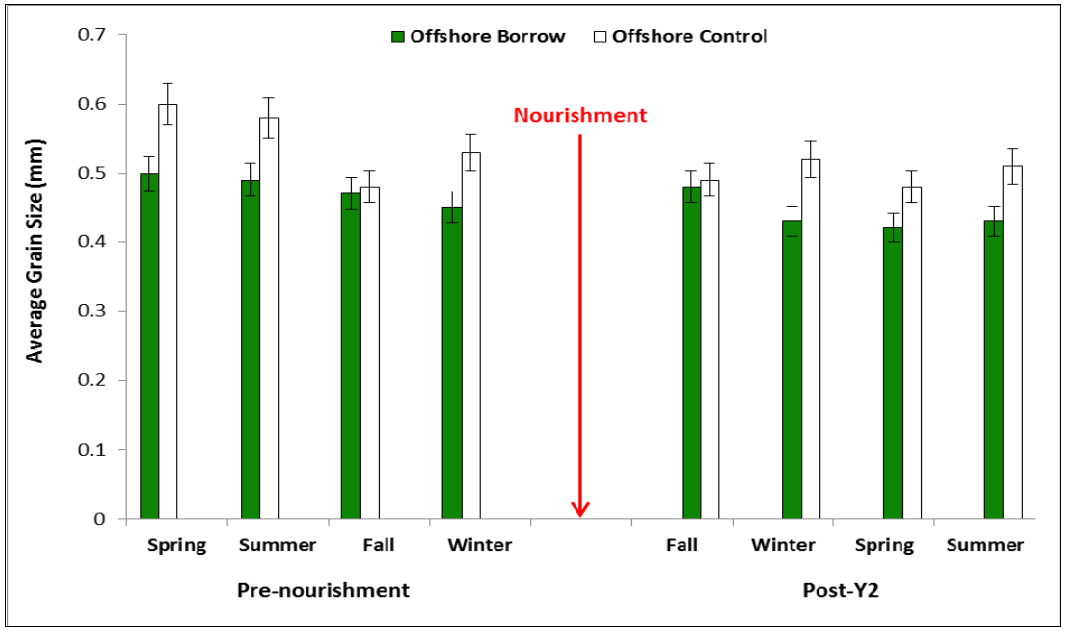


Figure 19. Box plots of pre-nourishment and post-Y2 grain size (mm) for offshore stations combined by season and by station type. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median; the dashed line is the mean.

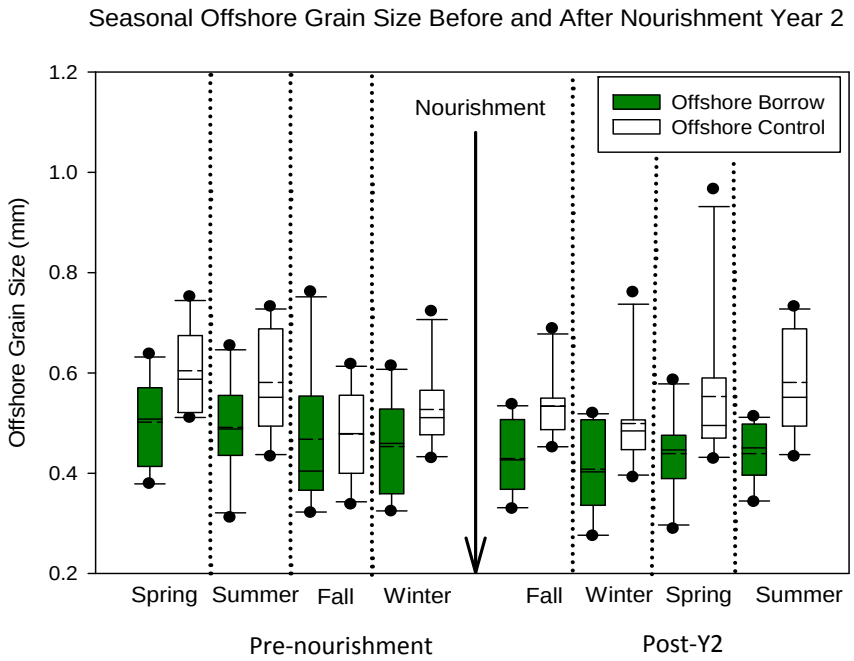


Figure 20. Box plots of pre-nourishment and post-Y2 grain size (mm) for offshore stations combined annually by station type. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median; the dashed line is the mean.

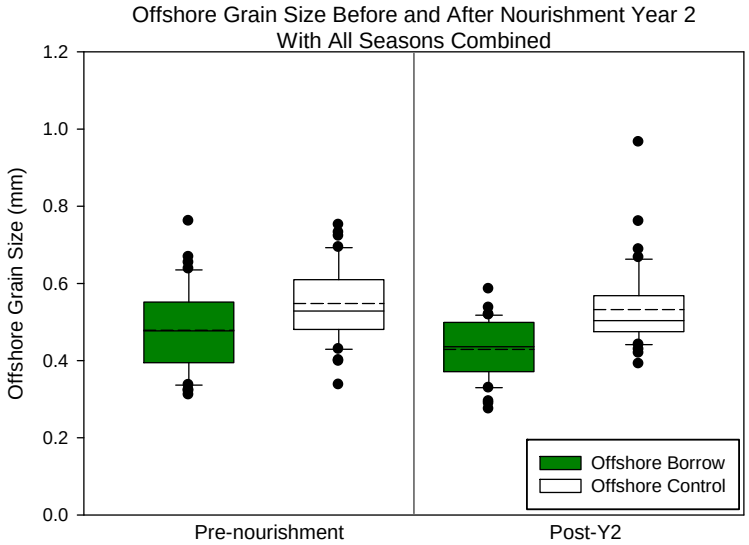
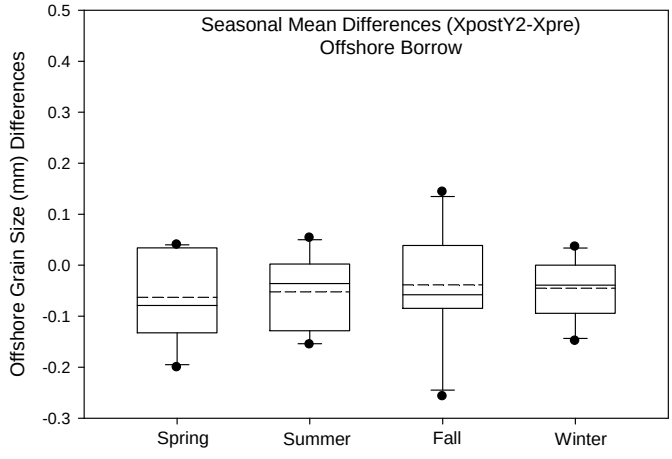
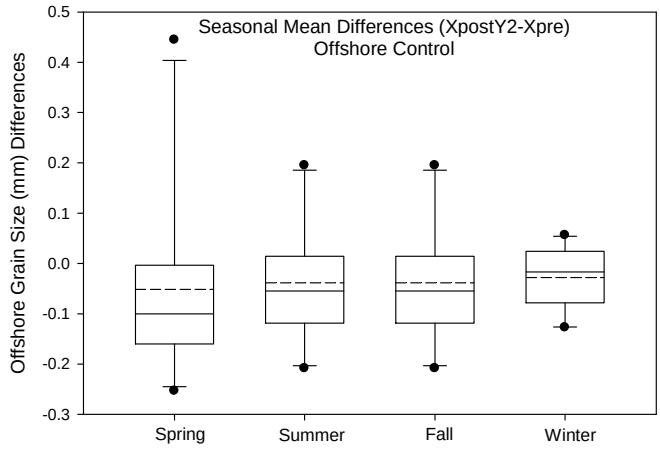


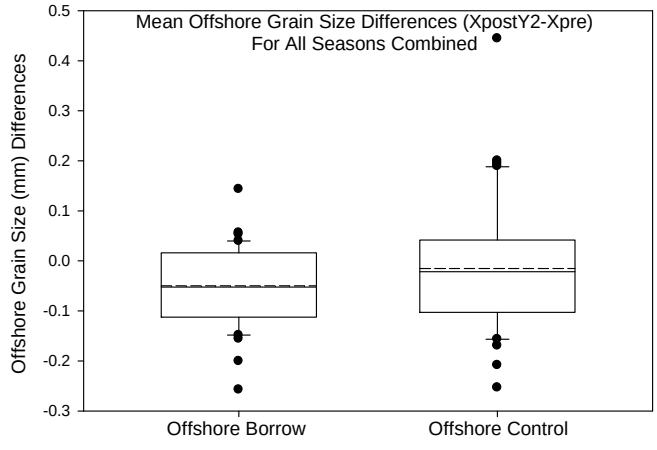
Figure 21. Box plots of seasonal mean differences (XpostY2-Xpre) for offshore grain size by station type and for all seasons combined by station type. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median; the dashed line is the mean.



a)



b)



c)

Figure 10 is a box plot depiction of combined abundance data with the two station types paired by season; there were no statistically significant comparisons between pre- and post-abundance for any season at either station type. Figure 11 is a box plot depiction of abundance data combined annually and compared pre- to post-nourishment by station type; there were no statistically significant comparisons between pre- and post- abundance for any season at either the borrow or the control stations. The same statistical results of the abundance comparisons occurred when testing the abundance per meter^2. Including the high numbers of razor clams collected in the spring pre-nourishment event, borrow stations' pre-nourishment mean abundance per meter^2 was 8,301 compared to 3,159 in the control stations, but the numbers were much closer in post-Y2 with borrow mean abundance per meter^2 at 3,289 compared to 2,899 in the control stations. Lastly, the differences in mean abundances were significantly different only in the spring at the offshore borrow stations (p<0.001) and there were no significant differences when all seasons were combined (Figure 10).

3.3.2 Offshore Taxa Richness and Diversity

Figure 13 depicts taxa richness in the same format as Figure 9 and shows that the post-Y2 fall taxa richness was below the pre-fall richness for all stations. By the next sample event, post-Y2 winter, richness was similar to pre-winter for the borrow stations but the control stations were below the pre-winter number. By post-Y2 spring and summer, richness exceeded the pre-spring richness and was similar to pre-summer richness in the borrow stations and met or exceeded the pre-nourishment values in the control stations. Figure 14 is a box plot depiction of combined taxa richness with the two station types paired by season; there were no statistically significant comparisons between pre-and post-taxa richness for any season at either station type. When taxa richness is combined for each station type and for each year (all pre- vs all post-Y2 by type), no significant differences were found between pre- and post-Y2 for either station type (Figure 15). The differences in mean taxa richness between pre-nourishment and post-Y2 were not significantly different. The mean differences at the control stations varied more than the borrow stations, seen by the higher upper percentiles and outliers (Figure 16).

In the same format as the bar graphs of Figure 9 and Figure 14, Figure 17 compares pre-nourishment and post-Y2 offshore Shannon diversity scores (H') among station types by season. Diversity was lower in both offshore station types in the post-Y2 winter compared to pre-winter, but the rest of post-Y2 seasons for both station types either closely matched or surpassed pre-nourishment diversity (Figure 17). Summer had the highest diversity score for both pre- and post-Y2 control stations; however, for the borrow stations, summer was the most diverse pre-nourishment but spring was the most diverse post-Y2. The lowest diversity among all eight seasons and both station types was pre-spring; however, for post-Y2 the control and borrow stations were least diverse in the winter.

3.3.3 Offshore Sediment Grain Size

The average grain size at the offshore control stations was larger than the borrow stations in each season, except only slightly in the fall, both pre-nourishment and post-Y2 (Figure 18). There were no significant differences between any season pre-nourishment and post-Y2 for either borrow or offshore control stations and there was not much seasonal variability in grain size (Figure 19). Additionally, there were no significant differences in grain sizes pre- and post-nourishment with all seasons combined and the spread of data is comparatively similar, with the most variability post-nourishment at the offshore control stations (Figure 20). The differences in the mean grain sizes

between pre- and post-nourishment were small and not significant between seasons or with all seasons combined, except for winter (Figure 21).

When grain size of all offshore stations is combined by type and compared by season to other parameters (e.g., all pre-control fall richness or abundance compared to each pre-season, etc.), the correlation between grain size and taxa richness was almost always negative. Seasonal grain size was only significantly correlated with abundance (P=0.007) and also with richness (P=0.007) in the winter post-nourishment at the borrow stations. With all seasons combined, grain size was significantly correlated with richness pre-nourishment at the borrow stations (P=0.034) and with abundance pre-nourishment at the control stations (P=0.027).

3.4 Control Beach Benthos and Sediment

Table 4 provides summary information for all 12 seasonal sampling events (four pre-nourishment and eight post-nourishment [four post-Y1 and four post-Y2]) by season, by station, by zone (A= swash and B= subtidal), and combined across events for the five National Seashore (NSS) and five Kitty Hawk (KHB) control beach stations. This information and additional data details are described in the three sections below. Pre- and post-nourishment abundance data by season and percent by group for the beach control stations are depicted in pie charts on Figure 5. These depictions show seasonal variation in species diversity, as well as variation in species diversity pre-nourishment and post-Y2 between the same seasons. Pre-nourishment, three fourths of summer and fall groups were from Polychaeta, but those were the only similarities among seasons pre-nourishment. The only similarities among post-Y2 seasons were between the spring and summer when just over one third of the groups were Amphipoda and just under one fourth were Decapoda. After all seasons are combined, the post-Y2 distribution of species is more evenly distributed than pre-nourishment and there are not any similarities in groups between pre- and post-nourishment.

3.4.1 Control Beach Benthos and Sediment Pre-nourishment and Post-Y2

Pre- nourishment sampling identified 20 taxa from the control beach stations in both zones and post-Y2 also pre- nourishment sampling identified 20 taxa from the control beach stations in both zones and post-Y2 also identified 20, one less than post-Y1 (Table 4). The most abundant taxa pre-nourishment included *Scolelepis squamata* (Polychaeta) (507 individuals), *Amphiporeia virginiana* (Amphipoda) (239 individuals), and post-Y2 included *Amphiporeia virginiana* (Amphipoda) (125 individuals), *Emerita talpoida* (Decapoda) (114 individuals), and *Scolelepis squamata* (Polychaeta) (106 individuals). Thirteen (13) taxa were identified in the KHB stations in the pre-nourishment year compared to 17 in post-Y2. The most abundant pre-nourishment taxa on KHB were *S. squamata* and *Donax variabilis* with 160 and 119 individuals, respectively and the most abundant taxa post-Y2 was *S. squamata* with 76 individuals. At the NSS stations, 15 taxa were identified pre-nourishment and 11 were identified in post-Y2. Eight of the 11 were also found in the KHB stations. The most abundant taxa identified from the NSS stations pre-nourishment were *S. squamata* and *A. virginiana* (347 and 227 individuals) and the most abundant taxa in post-Y2 were *A. virginiana* and *Emerita talpoida* (97 and 96 individuals).

Pre-nourishment taxa richness was highest for the control stations during the spring (13 taxa) and lowest in the other three seasons (eight taxa each) while post-Y2 taxa richness was highest in the summer with 11 and lowest in the winter with six. Pre-nourishment, abundance was highest in the spring (538 individuals) and post-Y2, abundance was highest in the summer (185 individuals.) For both

years, abundance was lowest in the fall (79 individuals pre-nourishment and 71 post-Y2). While number of taxa and abundance fluctuated with season, in both years the range of groups present was narrow and similar (five to six). A total of eight groups were represented pre-nourishment and nine were represented post-Y2. The average number of taxa per station for all pre-nourishment seasons combined was 1.9 and for post-Y2 was 1.4. The Shannon diversity index (H') for all control beach stations was 1.6 pre-and 2.1 post-Y2.

3.4.1.1 Control Beach Zone A and Zone B Benthos Pre-nourishment and Post-Y2

Seasonal differences between control beach Zone A and Zone B benthic stations were often small and subtle. However, in post-Y2, Zone A values for average taxa per station, Shannon diversity scores, and grain size were usually higher than Zone B (Table 4).

Pre-nourishment Zone A from the combined control stations identified a total of 15 taxa and 727 individuals compared to Zone B with 15 taxa and 443 individuals. The most abundant taxa in pre-Zone A included *S. squamata* and *A. virginiana* with 280 and 212 individuals, respectively. The most abundant taxa in pre-Zone B included *S. squamata* (227). Post-Y2 Zone A from the combined control stations identified a total of 11 taxa and 376 individuals compared to Zone B with 17 taxa and 141 individuals. The most abundant taxa in post-Y2-Zone A included *Emerita talpoida* (110) and *A. virginiana* (117). The most abundant taxa in post-Y2-Zone B included *S. squamata* (76).

The average number of taxa per station in both Zone A and B pre-nourishment was highest in the spring, but post-Y2 was highest in the summer for Zone A and spring and summer were tied for highest in Zone B. The average number of taxa per station in Zone A pre-nourishment was lowest in the winter and in Zone B was lowest in the fall; the opposite occurred post-Y2, (Zone A lowest in fall and Zone B lowest in winter).

3.4.1.2 Control Beach Zone A and Zone B Sediment Pre-nourishment and Post-Y2

Sediment parameters (average grain size and average percent calcium carbonate) in the control beach stations were slightly lower post-Y2 than in the pre-nourishment year (Table 4). For most pre-nourishment seasons (and seasons combined), Zone B tended to be slightly coarser (ranged from 0.76 to 1.96 mm) than Zone A sediments (ranged from 0.69 to 1.11 mm), but post-Y2, Zone A tended to have slightly more coarse sediment (ranged from 0.60 to 3.94 mm compared to 0.80 to 3.36 mm for Zone B). KH stations had coarser sediment than NSS in both Zone A and B, across all seasons and both years (Table4).

Percent calcium carbonate tended to be similar overall between zones, between KH and NSS and between pre- and post-Y2 (Table 4). Pre-nourishment, stations in NSS had higher calcium carbonate in Zone A than post-Y2; the same was true for KH Zone B. When control beaches were combined by season, post-Y2 values were lower than pre-nourishment values with one exception (summer Zone B).

3.5 Nourished Beach (Nags Head Beach or NHB) Benthos and Sediment

Table 4 provides summary information for all 12 seasonal sampling events (four pre-nourishment and eight post-nourishment [four post-Y1 and four post-Y2]) by season, by station, by zone (A = swash and B = subtidal), and combined across events for the NHB stations. This information and comparison results are described in the three sections below. Pre-nourishment and post-Y2 abundance data by season and percent by group for the NHB stations are depicted in pie charts on Figure 6. These depictions show much seasonal variability across the stations, as well as variability between pre-nourishment and post-Y2; however, pre-fall and post-Y2 fall have similar percentages of the dominant group, Decapoda.

3.5.1 NHB Benthos and Sediment Pre-nourishment and Post-Y2

A total of 22 taxa and 564 individuals were identified from the Nags Head beach stations during the pre-nourishment year compared to 16 taxa and 948 individuals during post-Y2 (Table 4). The most abundant pre-nourishment taxa included *A. virginiana* and *S. squamata* with 193 and 150 individuals identified, respectively. The most abundant post-Y2 taxa were *Oligochaeta* sp. (413) and *A. virginiana* (143).

Pre-nourishment taxa richness in NHB stations was highest during the spring (18 taxa) and lowest in the fall (5 taxa). Post-Y2 taxa richness was highest in the summer (11) and lowest in the spring and winter (7 each). Pre-nourishment abundance was highest in the summer with 247 individuals and lowest in the fall with 49 individuals. Post-Y2 abundance was highest in the winter (570) and also lowest in the fall (46). The number of groups identified from NHB stations showed little seasonal variation between pre-nourishment (four to six) and post-Y2 (four to five). Taxa richness per station for all pre-nourishment events averaged 2.0 taxa and 1.8 taxa post-Y2. Pre-nourishment, Shannon diversity was lowest in summer and highest in spring. Post-Y2, Shannon diversity was lowest in winter and highest in summer and fall. When all events are combined by year, NHB stations had a Shannon diversity index of 2.0 pre-nourishment and 1.9 post-Y2 (Table 4).

Pre-nourishment, average percent calcium carbonate and grain size on NHB was higher in all seasons with one exception (fall post-Y2 percent calcium carbonate). Pre-nourishment, percent calcium carbonate was lowest in the spring (3.1) and highest in the winter (3.8) with an average of 3.5 percent in the pre-nourishment year and in post-Y2 the percent was highest in fall (3.2) and lowest in the summer (1.9) with a combined annual average of 2.5.

3.5.1.1 NHB Zone A and Zone B Benthos Pre-nourishment and Post-Y2

During the four pre-nourishment sample events, NHB Zone A contained 15 taxa and 727 individuals and Zone B contained 15 taxa and 443 individuals. Pre-nourishment, the most abundant taxa in Zone A were *A. virginiana* and *E. talpoida,* (175 and 62 individuals respectively) and the most abundant in Zone B were *S. squamata* and *Donax varibilis* (106 and 33 respectively). Post-Y2, Zone A contained 12 taxa and 511 individuals and Zone B contained 15 taxa and 437 individuals. The most abundant taxa in Zone A were *A. virginiana* and *Oligochaeta* sp. (115 and 142 respectively) and in Zone B was *Oligochaeta* sp. (271). Typically, Zone A had slightly higher taxa per stations than Zone B during post-Y2, but there was not a pattern pre-nourishment. Seasonal pre-nourishment and post-Y2 differences between zones were variable (Table 4). Even though there were pre and post differences in

Shannon diversity scores in each zone among seasons, the overall diversity was very similar between pre- and post-values.

3.5.1.2 NHB Zone A and Zone B Sediments Pre-nourishment and Post-Y2

With the exception of pre-fall and post-winter, grain size was always coarser in Zone A compared to Zone B in both years, although sometimes the differences were small.

Pre-nourishment grain size in Zone A of NHB had a wide range of sizes but averaged 0.83 mm (coarse sand) compared to Zone B which averaged 0.74 mm (coarse sand). Seasonal variation in Zone A pre-nourishment grain sizes was minimal, with the summer having the widest range of grain sizes and the highest average grain size. Post-Y2 grain size in Zone A of NHB averaged 0.58 mm (coarse sand) while Zone B averaged 0.46 mm (medium sand). Pre-nourishment, in Zone A the coarsest sediment was collected in the summer and in Zone B the coarsest sediment was collected in the fall. Post-Y2, in Zone A the coarsest sediment was collected in the fall and in Zone B the coarsest sediment was collected in the winter.

Percent calcium carbonate was most often higher in Zone A than Zone B across both years. Pre-nourishment percent calcium carbonate was lowest in Zone A in spring and winter (3.5 percent) and highest in fall (4.1 percent) with an average of 3.7 percent. Zone B was lowest in spring (2.7) and highest in winter (4.1) with an average of 3.3. Post-nourishment calcium carbonate in Zone A was lowest in winter (1.8 percent) and highest in fall (3.7 percent) with an average of 2.6 percent; Zone B was lowest in summer (1.8 percent) and highest in fall (2.6 percent) with an average of 2.3 percent. Overall, percent calcium carbonate was lower in post-Y2 than in pre-nourishment.

3.6 Graphic and Statistical Comparisons for Beach Stations

Figure 7 depicts pie charts of major taxonomic groups collected in the NHB stations compared to control beach stations by season and all seasons combined annually. This rearrangement of the pie charts shows that when NHB group abundance is compared to control beach group abundance on a seasonal basis, the dissimilarity evident pre-nourishment continued post-Y2 with the exception of winter post-Y2, when NHB beach was most similar to control beach. When all seasons are combined annually, NHB appeared similar to control beach only in post-Y1.

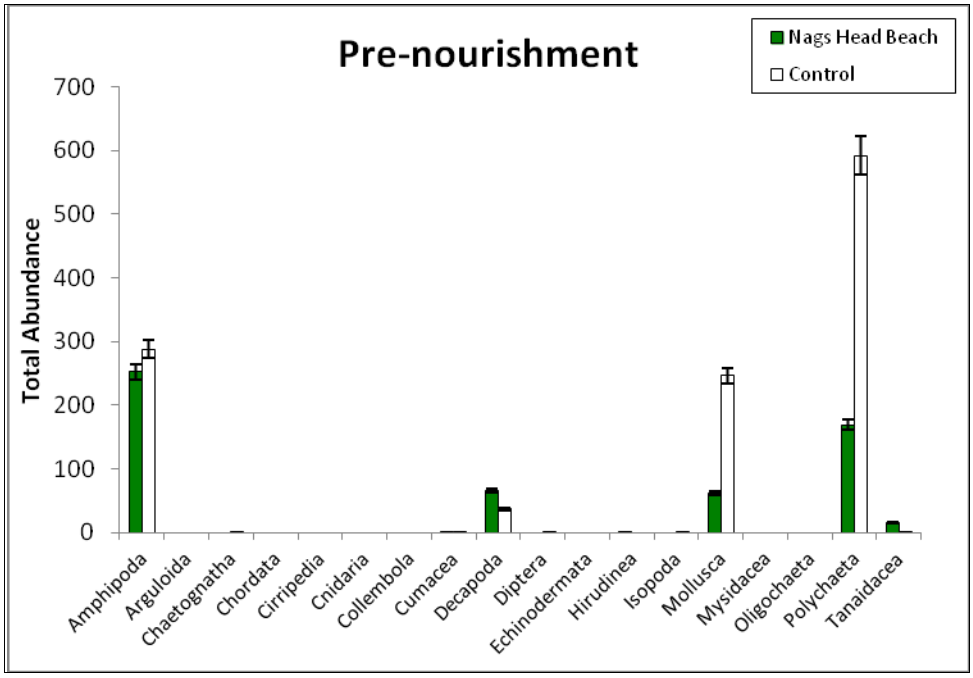
Table 3 lists all statistically significant results of all one-way ANOVAs and t-tests performed on all seasonal pre-nourishment and post-Y2 comparisons and all seasons combined pre-nourishment and post-Y2 comparisons for each station type. Abundance, taxa richness, diversity, and grain size were used to compare benthic and sediment variation in the NHB stations and in the control beach stations pre-nourishment and post-Y2. These data are depicted in bar graphs and box plots and are described in the three subsections below (Figures 22-35). These graphical depictions present the data shown in Table 4 plus additional data in different combinations.

3.6.1 Beach Abundance.

Figure 22 is a bar graph depiction of total abundance by group for NHB and control beach stations. Polychaeta was the most dominant group pre-nourishment and Amphipoda was the most dominant group post-Y2 at the control beach stations. At NHB, Amphipoda was the most dominant group pre-nourishment and Oligochaeta was the most dominant group post-Y2. Overall

abundance was higher post-Y2 at NHB, likely due to the significantly higher winter abundance. However, it was lower at the control beaches post-Y2, largely due to the large decrease in spring and summer abundances (Table 4). Figure 23 is a bar graph comparison of beach total abundance for the NHB and control stations combined by season and station type. Abundances were lowest in fall in both years at NHB and control beach stations and winter was nearly as low in both years at control beach stations. Abundance was highest before nourishment in the spring and post-Y2 in the summer at the control beach stations. At NHB stations before nourishment, abundance was highest in the summer, but post-Y2 it was highest in the winter. Figure 24 is a box plot of combined abundance data with the two station types paired by season; there were no statistically significant comparisons between pre-nourishment and post-Y2 abundance for any season at either NHB or the control beach stations, except the pre-nourishment winter season was significantly lower than post-Y2 at NHB ($P<0.001$). Figure 25 is a box plot of abundance data combined annually and compared pre-nourishment to post-Y2 by station type; there were no statistically significant comparisons between pre- and post- abundance for any season at either NHB or the control beach stations, except the pre-nourishment control beach stations were significantly higher than post-Y2 control beach stations ($P=0.013$). (Text continues on Page 37.)

Figure 22. Bar graphs of pre-nourishment and post-Y2 total abundance by station type and macroinvertebrate group, combined nourished beach stations compared to combined control beach stations.



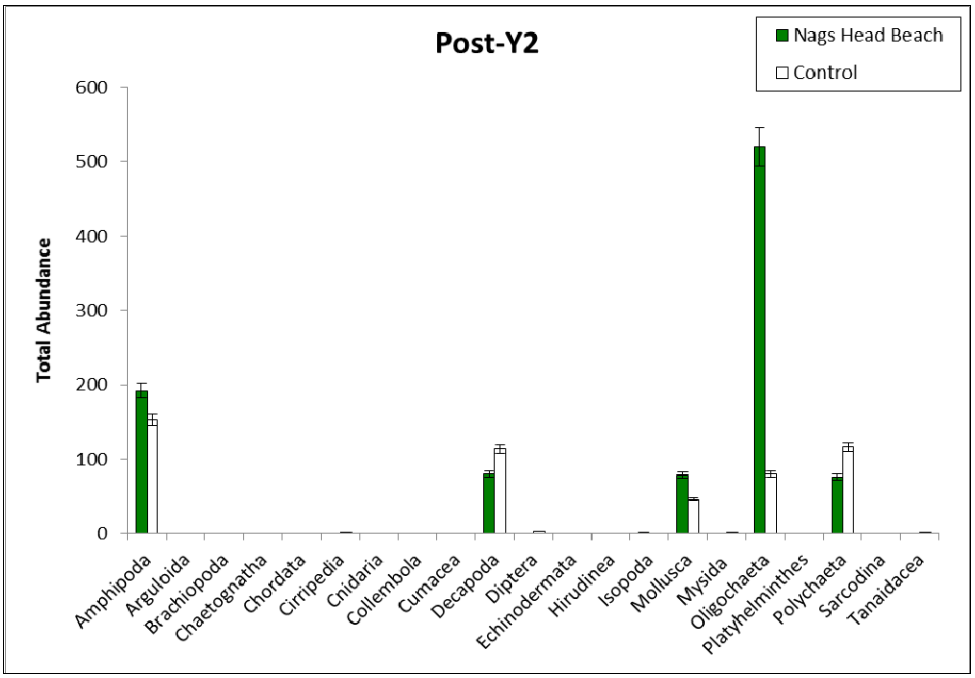


Figure 23. Bar graph comparison of pre-nourishment and post-Y2 beach total abundance by season between combined nourished and combined control stations. Error bars depict +/-0.5.

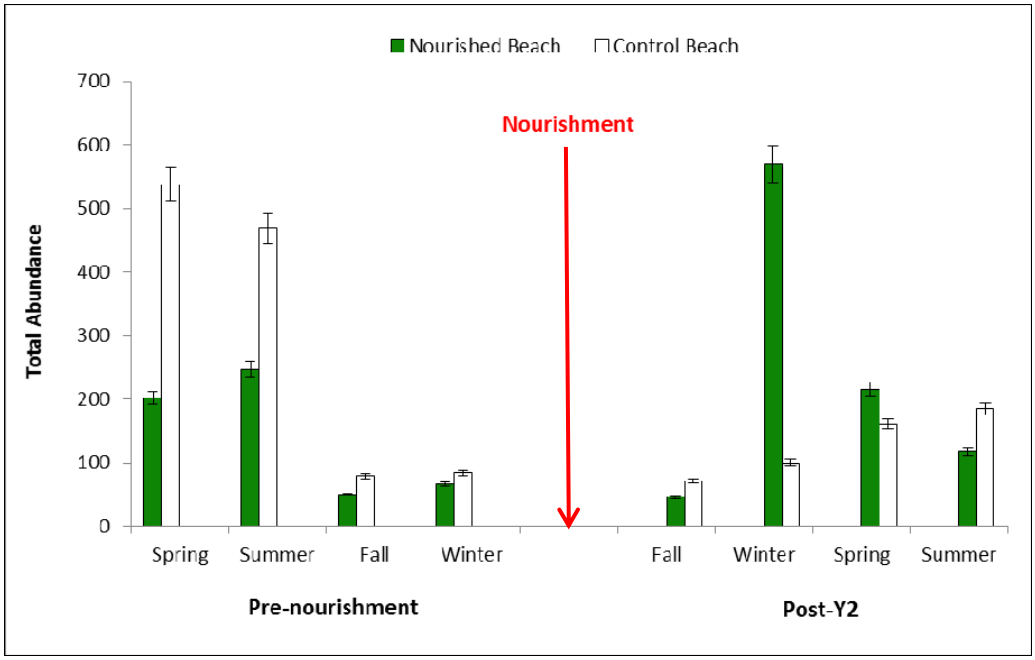


Figure 24. Box plots of pre-nourishment and post-Y2 abundance for beach stations by season and by type. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median, the dashed line is the mean. Winter at NHB was statistically significant different (p<0.001)

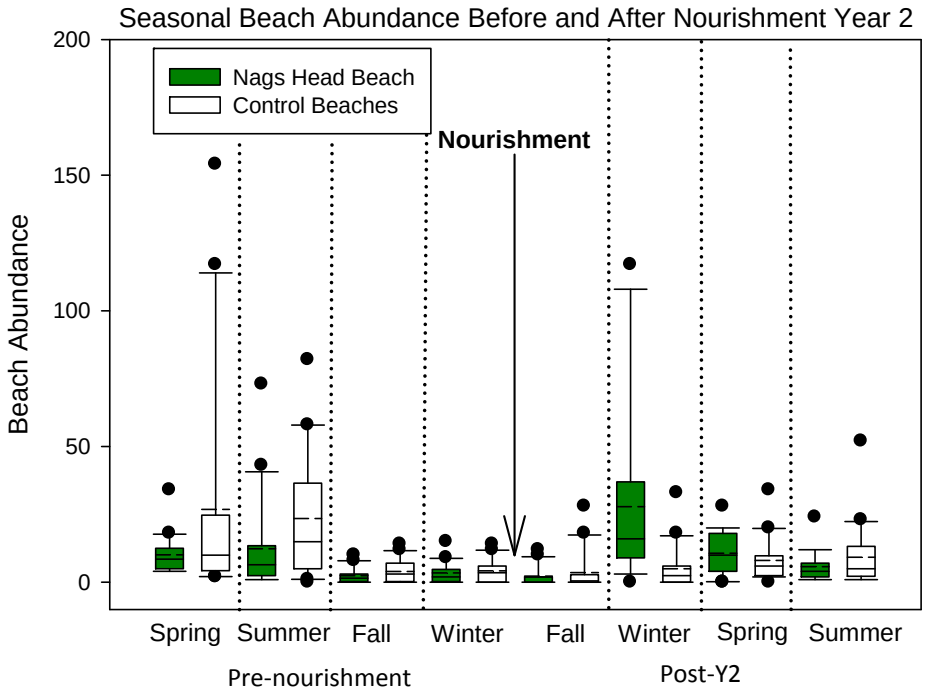


Figure 25. Box plots of pre-nourishment and post-Y2 beach abundance for nourished and control beach stations combined by type and by each control beach. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median, the dashed line is the mean. Control beaches were significantly higher pre-nourishment (p=0.013)

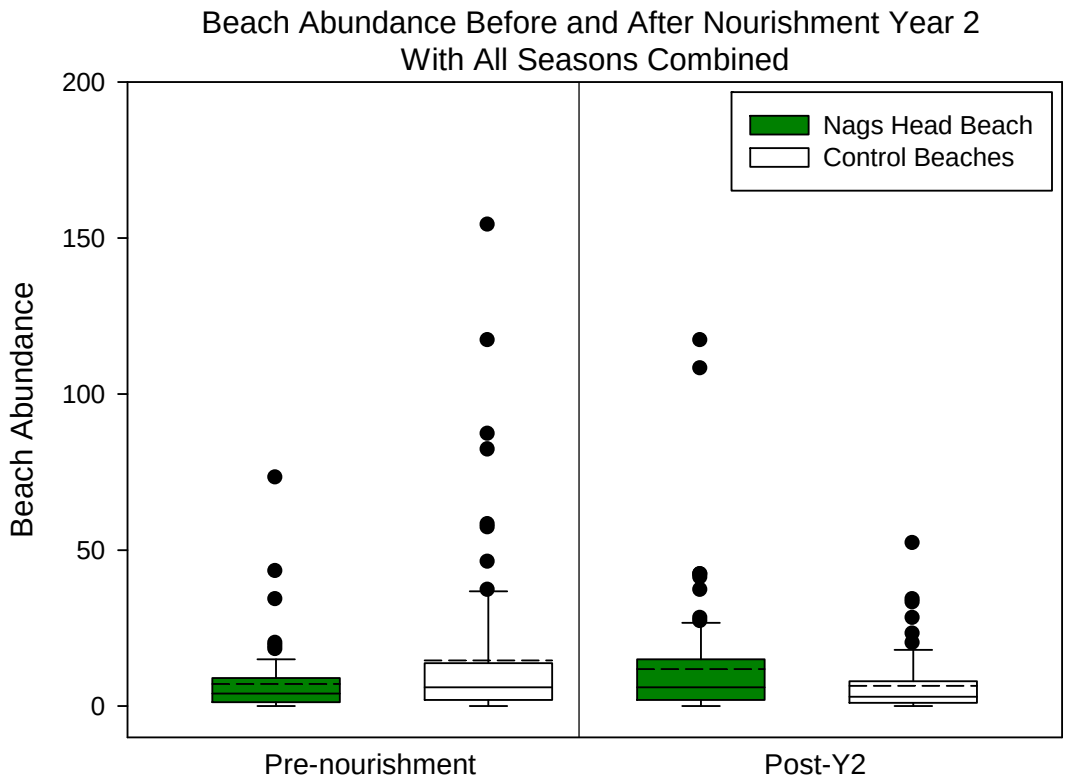


Figure 26. Box plots of seasonal mean differences (XpostY2-Xpre) for Nags Head beach abundance by station type and for all seasons combined by station type. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median; the dashed line is the mean. Significant differences: winter (NHB had a larger difference in means $p<0.001$); seasons combined NHB had a larger mean difference ($p=0.002$).

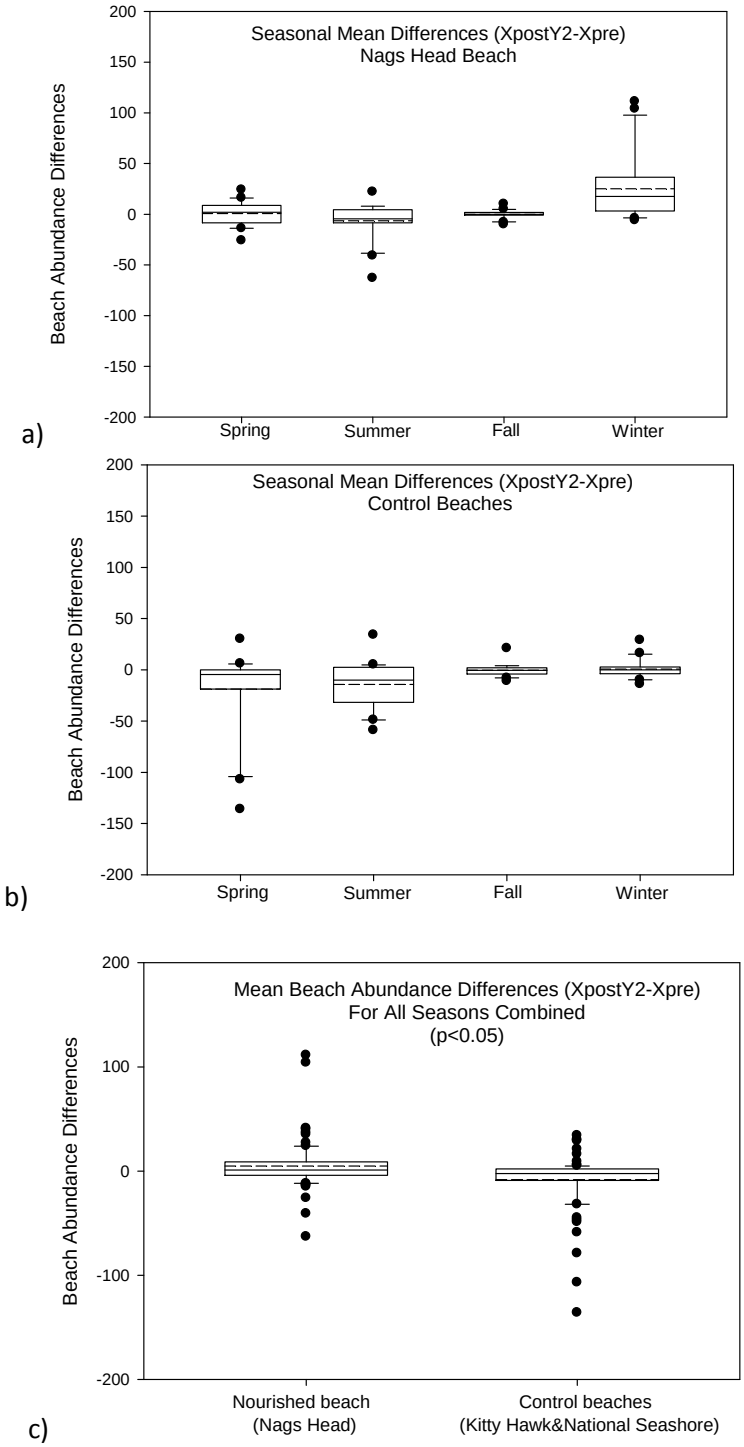


Figure 27. Bar graph comparison of pre-nourishment and post-Y2 beach total taxa richness by season between the combined nourished and combined control stations. Error bars depict +/-0.5.

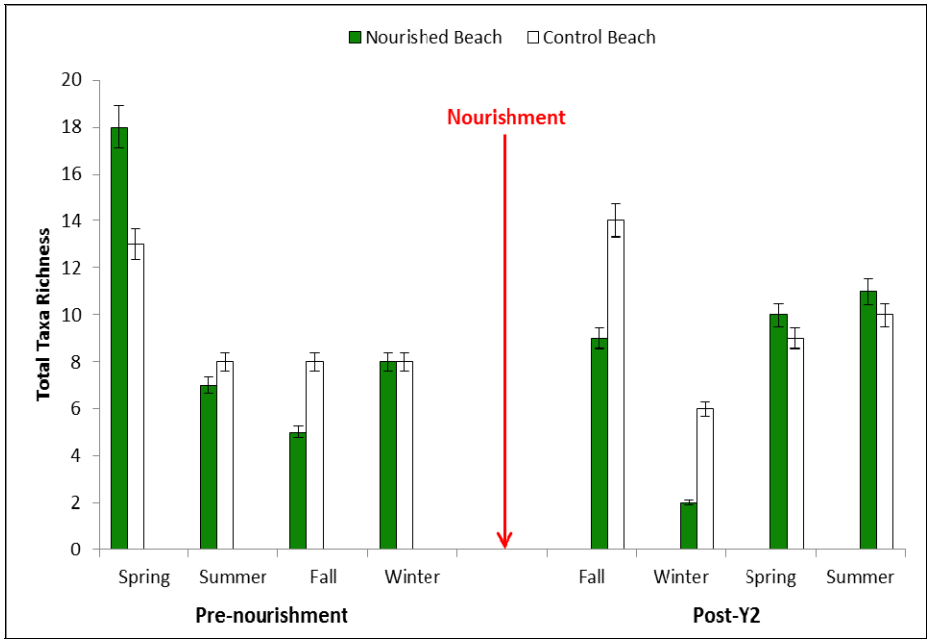


Figure 28. Box plots of pre-nourishment and post-Y2 beach taxa richness combined by season and by station type. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median, the dashed line is the mean.

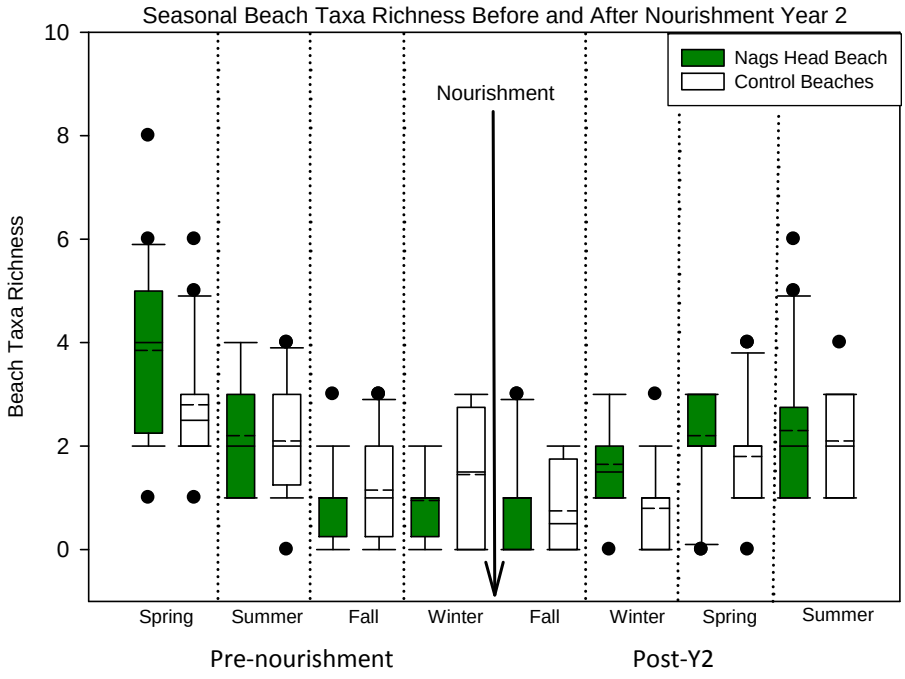


Figure 29. Box plots of beach taxa richness for pre-nourishment and post-Y2 combined by season and by station type. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median, the dashed line is the mean. Significant differences: control beach higher pre-nourishment (p=0.007)

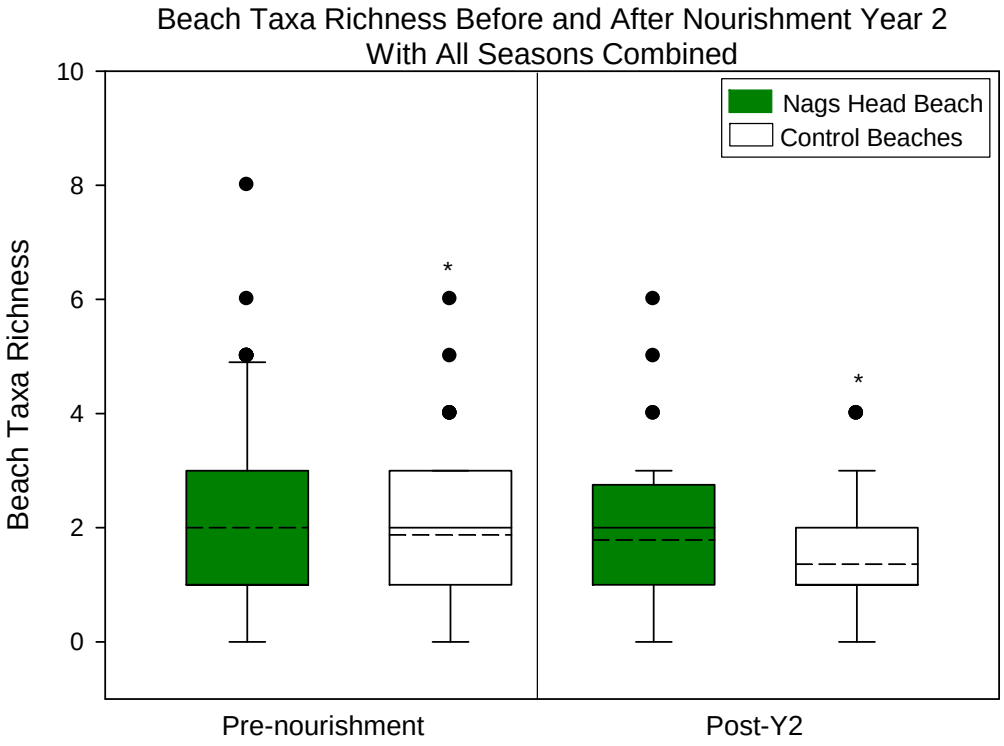
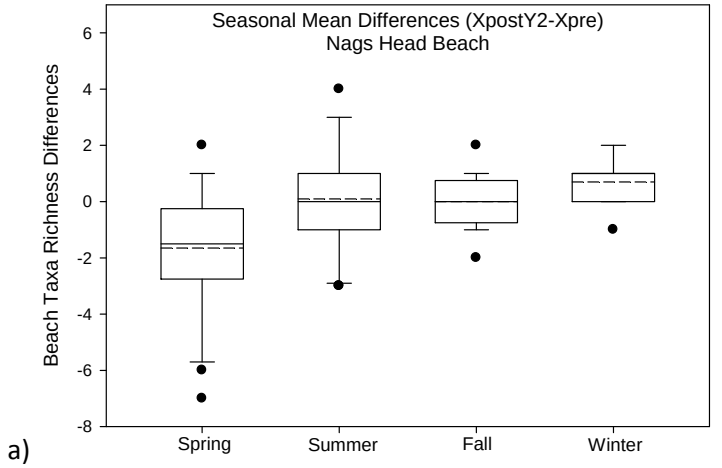
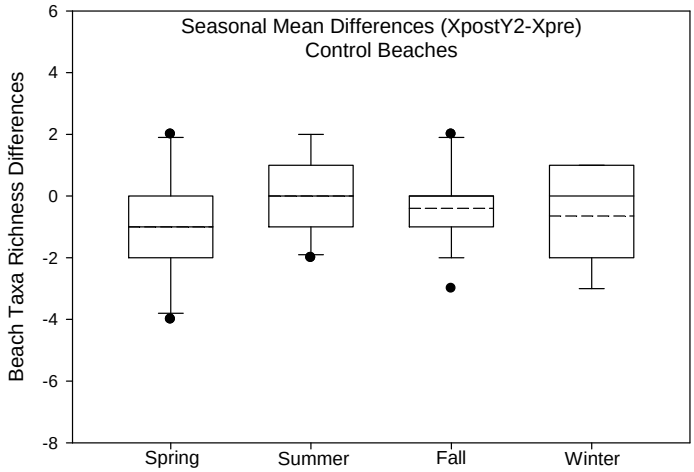


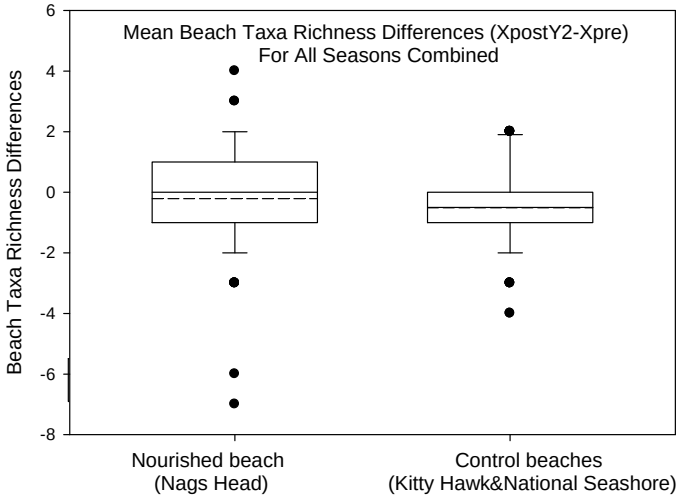
Figure 30. Box plots of seasonal mean differences (XpostY2-Xpre) for Nags Head beach taxa richness by station type and for all seasons combined by station type. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median; the dashed line is the mean.



a)



b)



c)

Figure 31. Bar graph comparison of beach Shannon diversity index values by season between the combined nourished and combined control stations. Seasonal sample events are shown in the order they occurred.

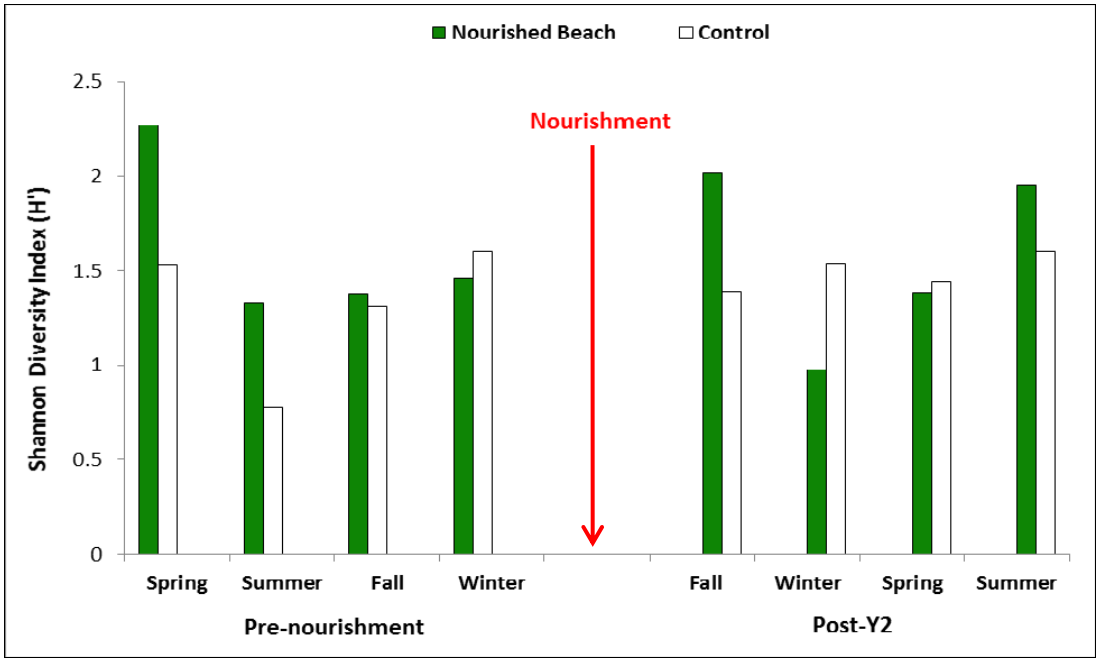


Figure 32. Bar graph of pre- and post- nourishment year 2 beach grain size by season and station type. Error bars depict +/-0.5.

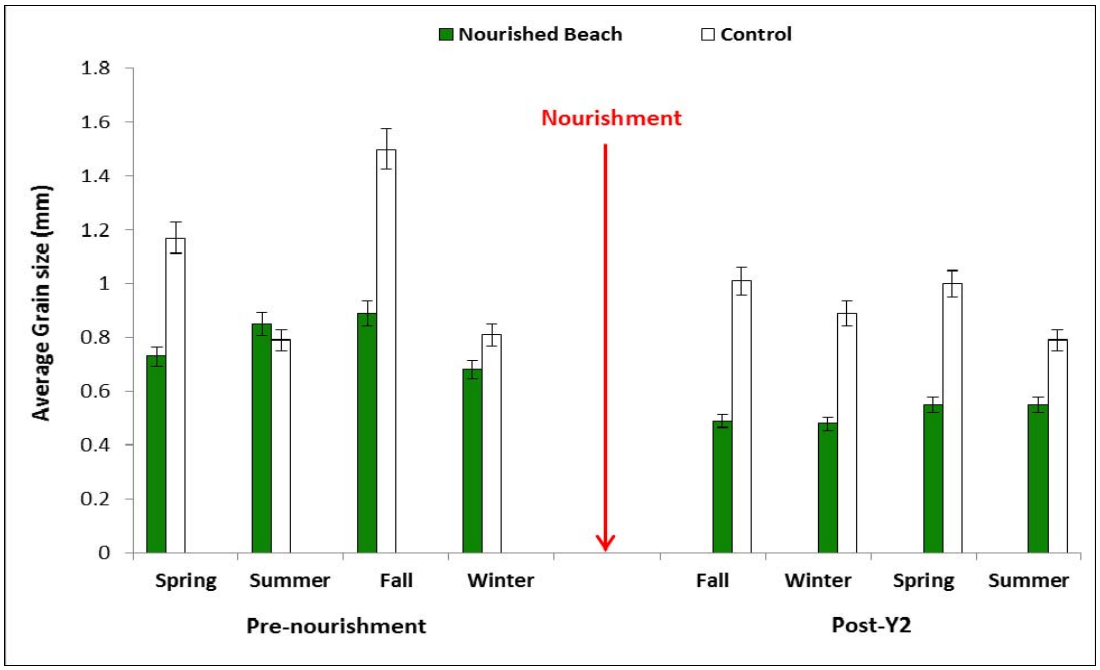


Figure 33. Box plots of pre-nourishment and post-Y2 beach grain size (mm) grouped by season and by station type. The box boundary closest to zero indicates the 25th percentile, the box boundary farthest from zero indicates the 75th percentile, and the error bars indicate the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line shown indicates the median, the dashed line indicates the mean.

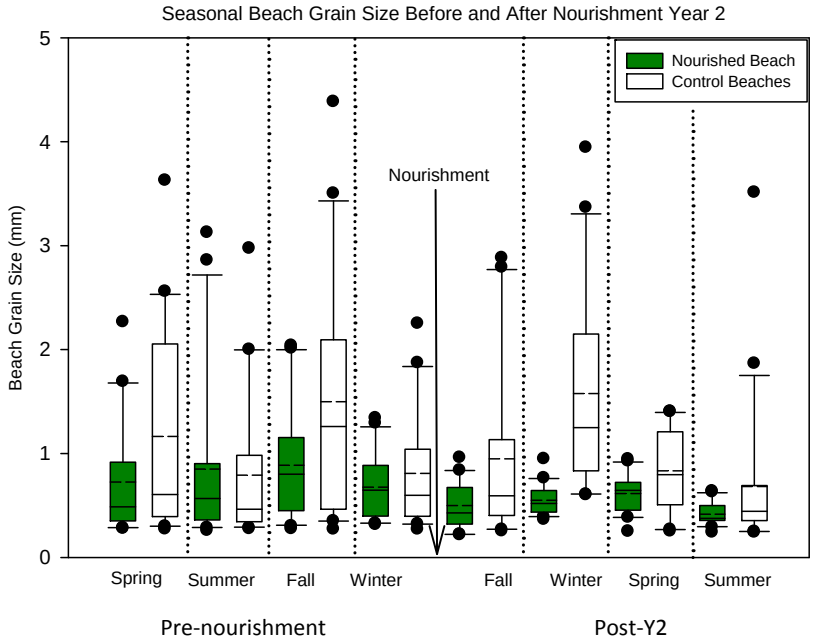


Figure 34. Box plots of beach grain size for pre- and post-Y2 combined by station type and location. The box boundary closest to zero indicates the 25th percentile, the box boundary farthest from zero indicates the 75th percentile, and the error bars indicate the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line shown indicates the median, the dashed line indicates the mean.

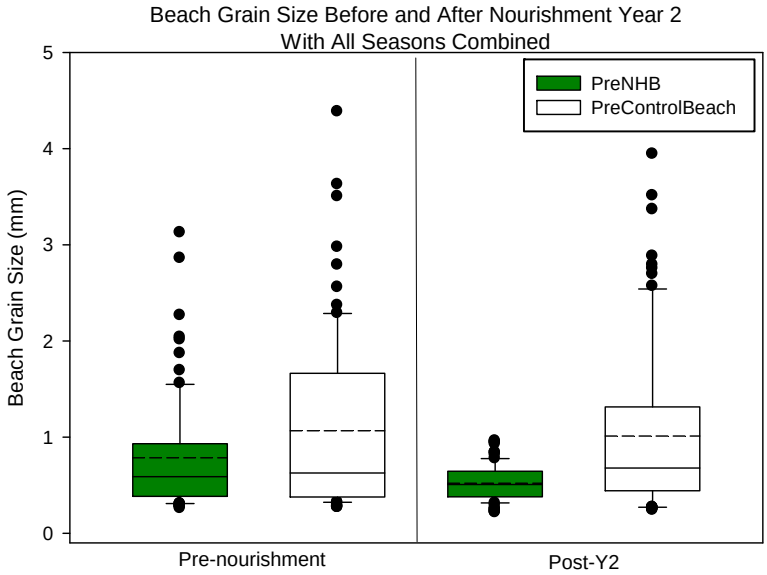
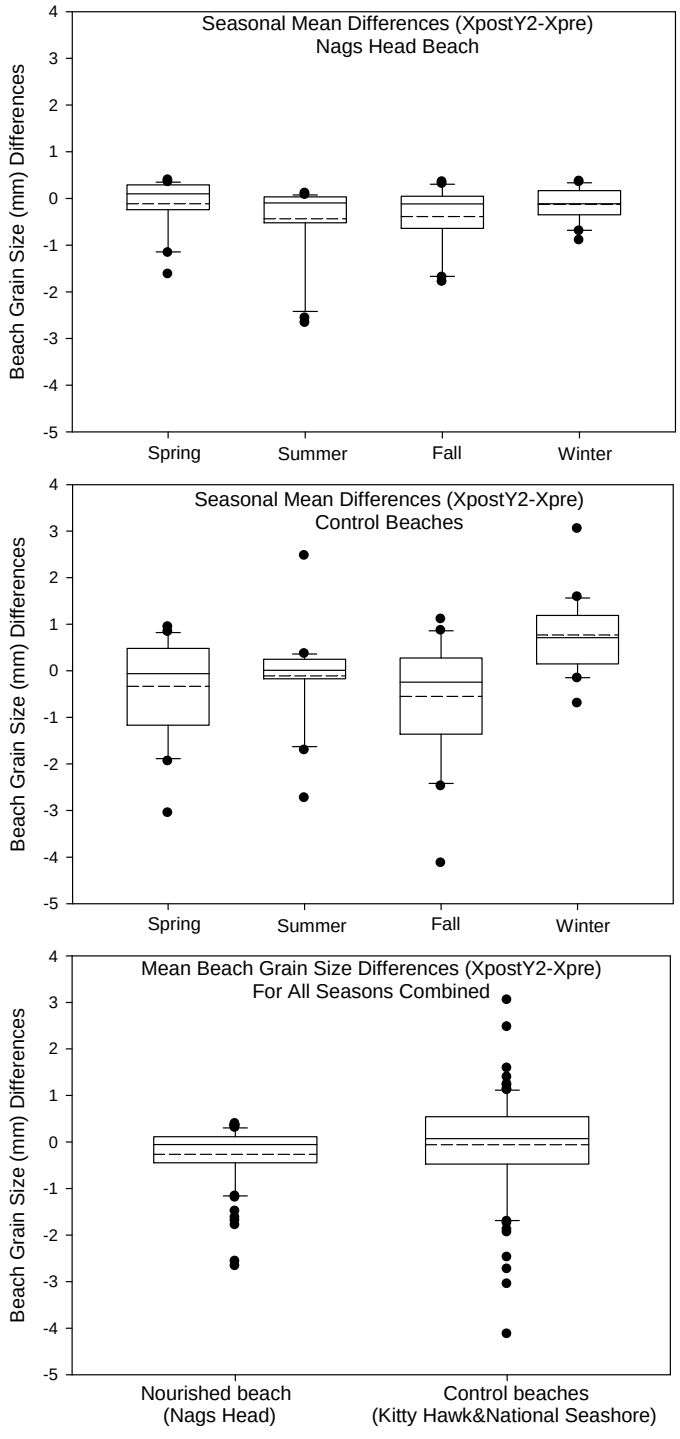


Figure 35. Box plots of seasonal mean differences (XpostY2-Xpre) for Nags Head beach grain size by station type and for all seasons combined by station type. The box boundary closest to zero is the 25th percentile, the box boundary farthest from zero is the 75th percentile, and the error bars are the 10th and 90th percentiles. Values shown above and below the error bars are singular data points outside of the 10th or 90th percentile. The solid line is the median; the dashed line is the mean. Significant differences: winter (control had a larger difference in means $p<0.001$).



The same statistical results of the abundance comparisons occurred when testing the abundance per meter^2. Lastly, the differences in mean abundances were only significantly different in the winter (p<0.001). When all seasons were combined, the NHB difference in means was slightly larger (p=0.002).

3.6.2 Beach Taxa Richness and Diversity

Figure 27 is a bar graph depiction of pre-nourishment and post-Y2 total taxa richness by season between combined NHB and combined control stations. Pre-nourishment taxa richness was highest in the spring at both NHB and control beach while NHB taxa richness was lowest in the fall, but at the control beach, the other three seasons were tied for lowest richness. Post-Y2, taxa richness was lowest in the winter at NHB and control beach. Figure 28 is a box plot of beach taxa richness grouped by season and by station type. No seasons were significantly different between pre-nourishment and post-Y2. Figure 29 is a box plot of beach taxa richness with all seasons combined by station type. Pre-nourishment taxa richness at control beach stations was significantly higher than post-Y2 taxa (p=0.007). There were no significant differences between the mean richness differences (XpostY2-Xpre) of NHB and the control beach either seasonally or with seasons combined-the differences were all similar (Figure 30).

Shannon diversity scores for combined NHB stations compared to combined control stations by season are depicted on a bar graph in Figure 31. Combined pre-spring, -summer, and -fall Shannon scores were all higher on NHB stations than the control beach stations; post-Y2 winter and spring scores were higher on the control beach stations. Pre-nourishment, spring had the highest Shannon diversity for NHB while winter was highest at the control beach. Post-Y2, NHB fall had the highest Shannon diversity overall, followed closely by NHB summer, while at the control beach stations, the four seasons were similar, with winter and summer slightly higher than the other seasons. At NHB, post-Y2 spring and winter diversity decreased from pre-nourishment but fall and summer diversity increased. At the control beach, diversity was similar pre- and post-Y2 for all seasons except summer, which had a large increase post-Y2.

3.6.3. Beach Grain Size

Seasonally, average grain size at the Nags Head beach compared to the control beaches was always smaller except for pre-summer (Figure 32). Figure 33 is a box plot of pre-nourishment and post-Y2 grain size grouped by season and station type. Grain size at NHB was lower every season post-Y2, but none of the decreases were significant. Post-Y2, grain size at the control beach stations was lower in spring and fall, but none of the decreases (or increases in other seasons) were significant. When all seasons were combined, the overall pre-nourishment and post-Y2 increases and decreases at both NHB and control beach stations were small and insignificant. The seasonal differences in mean grain size were similar between NHB and the control beach for each season, except for winter when the post-Y2 control beach stations had a larger difference in means (p<0.001) (Figure 35). There was no significant difference in mean differences between the control beaches and NHB when seasons were combined.

Borrow and NHB grain sizes were compared before and after nourishment in both post-years. Pre-nourishment NHB grain size was typically the largest and was statistically significantly larger than the borrow grain size in both post-Y1 and post-Y2 (p=0.001, <0.001).

4.0 CONCLUSIONS

Benthic populations in the nourished beach as well as the offshore borrow area remained viable and diverse over the monitoring period. Seasonal variations were evident in abundance and richness, but less evident in grain size. There were few significant differences (eight of approximately 50) for any parameter at the offshore borrow or NHB stations, and none were a cause for concern. Out of all the statistical comparisons between pre- and post-nourishment by season and with seasons combined, only 14 resulted in a statistically significant difference. Seven of those were favorable towards the offshore borrow sites or nourished beach. One was favorable towards the combined control beaches, but the result was then negated by the post-Y2 result. Benthic populations typically showed higher abundances and richness in spring and summer sample events compared to fall and winter sample events. Sediments on the sampled section of the nourished beach were finer post-Y2, which reflects the characteristics of the borrow material and burial of the coarse sediment that dominated the eroding beach prior to the project. The post-Y2 NHB (i.e. lower surf zone sample areas) now consists of ~0.5 mm sand (similar to the natural berm in the area), which is more favorable. Prior to nourishment, the lower surf zone contained very coarse sand, granules, and pea gravel at many stations, a lag deposit which is more common along eroding beaches (CSE 2005, USACE 2010). Additionally, the similarity of sediments in the borrow area before and after dredging likely contributed to the rapid recovery of the benthic population.

This study showed that biological communities in the surf zone are highly variable and exhibit seasonal changes. Artificial manipulations such as nourishment produce short-term impacts that are rapidly mitigated by replacement of organisms, just as the benthic populations adjust continually with the seasons. If manipulations are performed responsibly, diverse and abundant benthic populations will be found shortly after the work is completed. Post-Y1 results showed a significant decrease in richness at Nags Head beach, although it was not a large difference, but by post-Y2, richness was only slightly (not statistically significant) lower than before nourishment. The finer sand grains present after nourishment likely contributed to the increase in richness. (At the combined control beach sites, richness was significantly lower post-Y2 than pre-nourishment.) Abundance was not significantly different between pre-nourishment and post-Y1 or -Y2 at either the offshore borrow site or Nags Head beach, except the post-Y2 winter abundance at Nags Head beach was significantly higher in the post-Y2. (Abundance at the combined control beaches was significantly higher in post-Y1 but significantly lower in post-Y2.)

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Appendix A

Taxa Enumerated From Each Pre-, Post-Y1 and -Y2 Benthos Sampling Event by Station Type (Offshore Control, Offshore Borrow, Control Beach, and Nourished Beach)

Note: highlighted taxa refer to meiofauna that were noted but not counted

Spring Pre-nourishment E1

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Offshore Borrow	Annelida	C/Oligochaeta	Tubificidae	Clitellio arenicolus
	Annelida	C/Polychaeta	Capitellidae	Capitella capitata
	Annelida	C/Polychaeta	Cirratulidae	Caulleriella killariensis
	Annelida	C/Polychaeta	Nephtyidae	Aglaophamus verrilli
	Annelida	C/Polychaeta	Paraonidae	Cirrophorus sp.
	Annelida	C/Polychaeta	Spionidae	Spiophanes bombyx
	Annelida	C/Polychaeta	Syllidae	Brania wellfleetensis
	Annelida	C/Polychaeta	Syllidae	Streptosyllis pettiboneae
	Arthropoda	O/Amphipoda	Aoridae	Unciola irrorata
	Arthropoda	O/Decapoda	Paguridae	Pagarus pollicaris
	Arthropoda	O/Isopoda	Idoteidae	Chirodotea (caeca)
	Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissus sp.
	Chordata	?	?	Tunicata sp.
	Chordata	C/Cephalochordata	Branchiostomidae	Branchiostoma caribaeum
	Echinodermata	?	?	Echinodermata juv. sp.
	Echinodermata	C/Echinoidea	Mellitidae	Mellita isometra
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
	Mollusca	C/Bivalvia	Mactridae	Spisula raveneli
	Mollusca	C/Bivalvia	Pandoridae	Pandora trilineata
	Mollusca	C/Bivalvia	Pharidae	Ensis directus
	Mollusca	C/Bivalvia	Thraciidae	Thraciidae juv. Sp
Offshore Control	Annelida	C/Oligochaeta	Tubificidae	Clitellio arenicolus
	Annelida	C/Oligochaeta	Tubificidae	Tubificidae w/o hair
	Annelida	C/Polychaeta	Capitellidae	Capitella capitata
	Annelida	C/Polychaeta	Cirratulidae	(Aphelochaeta sp.)
	Annelida	C/Polychaeta	Cirratulidae	Cirratulidae sp.
	Annelida	C/Polychaeta	Dorvilleidae	Dorvilleidae sp.
	Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
	Annelida	C/Polychaeta	Glyceridae	Glycera sp.
	Annelida	C/Polychaeta	Lumbrineridae	Lumbrinerides dayi
	Annelida	C/Polychaeta	Paraonidae	Paraonis pygoenigmatica
	Annelida	C/Polychaeta	Phyllodocidae	Eteone heteropoda
	Annelida	C/Polychaeta	Phyllodocidae	Phyllodocidae sp.
	Annelida	C/Polychaeta	Sigalionidae	Sigalion sp.
	Annelida	C/Polychaeta	Spionidae	Spiophanes bombyx
	Annelida	C/Polychaeta	Syllidae	Brania wellfleetensis
	Annelida	C/Polychaeta	Syllidae	Streptosyllis pettiboneae
	Arthropoda	O/Cumacea	Diastylidae	Oxyurostylis smithi
	Arthropoda	O/Isopoda	Cirolanidae	Cirolani polita
	Chordata	?	?	Tunicata sp.
	Chordata	C/Cephalochordata	Branchiostomidae	Branchiostoma caribaeum
	Cnidaria	C/Anthozoa	?	Hexacorallia sp.
	Echinodermata	C/Echinoidea	Schizasteridae	Moira atropos
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
	Mollusca	C/Bivalvia	Pharidae	Ensis directus
	Mollusca	C/Bivalvia	Thraciidae	Thraciidae juv. sp.
	Mollusca	C/Gastropoda	?	Gastropoda sp.
	Mollusca	C/Gastropoda	Naticidae	Polinices duplicatus
	Mollusca	C/Gastropoda	Vitrinellidae	Vitrinellidae sp.
	Platyhelminth	?	?	Platyhelminth sp.

Spring Pre-nourishment E1

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Nourished Beach	Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
	Annelida	C/Polychaeta	Phyllodocidae	Eteone heteropoda
	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	?	Amphipoda sp.
	Arthropoda	O/Amphipoda	Corophiidae	Apocorophium louisianum
	Arthropoda	O/Amphipoda	Gammaridae	Mucrogammarus mucronata
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustoridae sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Amphipoda	Haustoriidae	Lepidactylus triarticulatus
	Arthropoda	O/Amphipoda	Haustoriidae	Parahaustorius attenuatus
	Arthropoda	O/Amphipoda	Haustoriidae	Parahaustorius longimerus
	Arthropoda	O/Amphipoda	Haustoriidae	Protohaustorius cf. bousfieldi
	Arthropoda	O/Amphipoda	Photidae	Microprotopus raneyi
	Arthropoda	O/Cumacea	Bodotriidae	Mancocuma juv. sp.
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Arthropoda	O/Decapoda	Palaemonidae	Palaemonetes (P.) pugio
	Arthropoda	O/Tanaidacea	Leptocheliidae	Leptocheliidae juv. sp.
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis
	Platyhelminth	?	?	Platyhelminth sp.
Control Beach	Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
	Annelida	C/Polychaeta	Polynoidae	Polynoidae sp.
	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	?	Amphipoda sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius canadensis
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Amphipoda	Haustoriidae	Lepidactylus triarticulatus
	Arthropoda	O/Amphipoda	Haustoriidae	Parahaustorius attenuatus
	Arthropoda	O/Amphipoda	Haustoriidae	Parahaustorius longimerus
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Arthropoda	O/Decapoda	Portunidae	Ovalipes ocellatus
	Arthropoda	O/Homoptera	Aphididae	Aphididae
	Arthropoda	O/Tanaidacea	Leptocheliidae	Leptocheliidae juv. sp.
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis
	Platyhelminth	?	?	Platyhelminth sp.

Offshore Borrow

Summer Pre-nourishment E2

PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Annelida	C/Polychaeta	Capitellidae	Capitella capitata
Annelida	C/Polychaeta	Cirratulidae	Aphelochaeta sp.
Annelida	C/Polychaeta	Cirratulidae	Caulleriella killariensis
Annelida	C/Polychaeta	Cirratulidae	Cirratulidae sp.
Annelida	C/Polychaeta	Glyceridae	Glycera sp.
Annelida	C/Polychaeta	Nephtyidae	Aglaophamus verrilli
Annelida	C/Polychaeta	Onuphidae	Onuphis eremita oculata
Annelida	C/Polychaeta	Onuphidae	Ramphobrachium atlanticum
Annelida	C/Polychaeta	Opheliidae	Ophelia denticulata
Annelida	C/Polychaeta	Opheliidae	Ophelia sp.
Annelida	C/Polychaeta	Oweniidae	Owenia sp.A
Annelida	C/Polychaeta	Phyllodocidae	Eteone heteropoda
Annelida	C/Polychaeta	Spionidae	Polydora cornuta
Annelida	C/Polychaeta	Spionidae	Polydora socialis
Annelida	C/Polychaeta	Spionidae	Spiophanes bombyx
Annelida	C/Polychaeta	Syllidae	Brania wellfleetensis
Annelida	C/Polychaeta	Syllidae	Streptosyllis pettiboneae
Arthropoda	O/Amphipoda	Aoridae	Unciola irrorata
Arthropoda	O/Amphipoda	Atylidae	Nototropis/Atylus sp.
Arthropoda	O/Amphipoda	Haustoriidae	Acanthohaustorius sp.
Arthropoda	O/Amphipoda	Photidae	Microprotopus raneyi
Arthropoda	O/Cumacea	Bodotriidae	Cyclaspis varians
Arthropoda	O/Cumacea	Diastylidae	Oxyurostylis smithi
Arthropoda	O/Decapoda	Paguridae	Pagarus longicarpus
Arthropoda	O/Isopoda	Idoteidae	Edotea sp.
Arthropoda	O/Ostracoda	?	Ostracoda sp.
Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissus sp.
Chordata	C/Ascidiacea	?	Ascidiacea sp.
Chordata	C/Cephalochordata	Branchiostomidae	Branchiostoma caribaeum
Chordata	O/Pleurogona	Molgulidae	Molgula arenata
Cnidaria	C/Hydrozoa	Hydractiniidae	Hydractinia echinata
Cnidaria	O/Actiniaria	Actiniidae	Actiniaria juv. sp.
Echinodermata	C/Asteroidea	Asteriidae	Asterias forbesi
Echinodermata	C/Echinoidea	?	Echinoidea juv. sp.
Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
Mollusca	C/Bivalvia	Corbulidae	Corbula contracta
Mollusca	C/Bivalvia	Matridae	Spisula solidissima
Mollusca	C/Bivalvia	Periplomatidae	Periploma sp.
Mollusca	C/Bivalvia	Tellinidae	Tellina sp.
Mollusca	C/Gastropoda	?	Gastropoda juv. sp.
Mollusca	C/Gastropoda	Cylichnidae	Cylichna sp.

Summer Pre-nourishment E2

Offshore Control

PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Annelida	C/Polychaeta	Capitellidae	Capitella capitata
Annelida	C/Polychaeta	Cirratulidae	Caulleriella killariensis
Annelida	C/Polychaeta	Cirratulidae	Cirratulidae sp.
Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
Annelida	C/Polychaeta	Eunicidae	(lysidice ninetta)
Annelida	C/Polychaeta	Glyceridae	Glycera sp.
Annelida	C/Polychaeta	Lysaretidae	(lysarete brasiliensis)
Annelida	C/Polychaeta	Nephtyidae	Aglaophamus verrilli
Annelida	C/Polychaeta	Onuphidae	Ramphobrachium atlanticum
Annelida	C/Polychaeta	Opheliidae	(Dindymenides concinna)
Annelida	C/Polychaeta	Oweniidae	Owenia sp.A
Annelida	C/Polychaeta	Phyllodocidae	Eteone heteropoda
Annelida	C/Polychaeta	Phyllodocidae	Phyllodocidae sp.
Annelida	C/Polychaeta	Sigalionidae	Sigalion sp.
Annelida	C/Polychaeta	Spionidae	Spiophanes bombyx
Annelida	C/Polychaeta	Syllidae	Brania wellfleetensis
Annelida	Eunicida	Onuphidae	Onuphis eremita oculata
Arthropoda	O/Amphipoda	Aoridae	Unciola irrorata
Arthropoda	O/Amphipoda	Haustoriidae	Acanthohaustorius bousfieldi
Arthropoda	O/Amphipoda	Photidae	Microprotopus raneyi
Arthropoda	O/Cumacea	Diastylidae	Oxyurostylis smithi
Arthropoda	O/Decapoda	?	Brachyura juv sp.
Arthropoda	O/Decapoda	?	Megalops sp.
Arthropoda	O/Decapoda	Processidae	Processa sp.
Arthropoda	O/Isopoda	Cirolanidae	Cirolana polita
Arthropoda	O/Isopoda	Idoteidae	Edotea sp.
Arthropoda	O/Tanaidacea	Nototanidae	Tanaissus sp.
Chordata	C/Ascidiacea	?	Ascidiacea sp.
Chordata	C/Cephalochordata	Branchiostomidae	Branchiostoma caribaeum
Chordata	O/Pleurogona	Molgulidae	Molgula arenata
Cnidaria	O/Actiniaria	Actiniidae	Actiniaria juv. sp.
Echinodermata	C/Asteroidea	Asteriidae	Asterias forbesi
Echinodermata	C/Echinoidea	?	Echinoidea juv. sp.
Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
Mollusca	C/Bivalvia	Mactridae	Spisula solidissima
Mollusca	C/Bivalvia	Periplomatidae	Periploma margaritaceum
Mollusca	C/Bivalvia	Tellinidae	Tellina sp.
Mollusca	C/Gastropoda	?	Gastropoda juv. sp.
Mollusca	C/Gastropoda	Cylichnidae	Cylichna sp.

Summer Pre-nourishment E2

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Nourished Beach	Annelida	C/Hirudinea	?	Hirudinea sp.
	Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Lepidactylus triarticulatus
	Arthropoda	O/Araneae	?	Araneae sp
	Arthropoda	O/Decapoda	?	Zoea sp.
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Arthropoda	O/Ostracoda	?	Ostracoda sp.
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis
Control Beach	Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Annelida	C/Polychaeta	Spionidae	Streblospio benedicti
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Lepidactylus triarticulatus
	Arthropoda	O/Cumacea	Diastylidae	Oxyurostylis smithi
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis
	Nemertea	?	?	Nemertea sp.

Fall Pre-nourishment E3

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Offshore Borrow	Annelida	C/Oligochaeta	Tubificidae	Clitellia arenicolus
	Annelida	C/Oligochaeta	Tubificidae	Tubificidae w/o hair
	Annelida	C/Polychaeta	Cirratulidae	Cirratulidae sp.
	Annelida	C/Polychaeta	Cirratulidae	Tharynx sp.
	Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
	Annelida	C/Polychaeta	Nephtyidae	Nephtys bucera
	Annelida	C/Polychaeta	Opheliidae	Ophelia denticulata
	Annelida	C/Polychaeta	Opheliidae	Opheliidae juv. sp.
	Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
	Annelida	C/Polychaeta	Protodrilidae	Protodriloides chaetifer
	Annelida	C/Polychaeta	Syllidae	Pionosyllis sp.
	Annelida	C/Polychaeta	Syllidae	Streptosyllis pettiboneae
	Annelida	C/Polychaeta	Terebellidae	Lysilla sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Haustoriidae sp.
	Arthropoda	O/Mysidacea	?	Mysidacea sp.
	Arthropoda	O/Ostracoda	?	Ostracoda sp.
	Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissus sp.
	Chaetognatha	C/Sagittoidea	Sagittidae	Sagitta sp.
	Chordata	C/Ascidiacea	?	Ascidiacea sp.
	Chordata	C/Cephalochordata	Branchiostomidae	Branchiostoma caribaeum
	Echinodermata	C/Echinoidea	Mellitidae	Mellita isometra
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
	Mollusca	C/Gastropoda	?	Gastropoda juv. sp.
Offshore Control	Annelida	C/Oligochaeta	Tubificidae	Clitellio arenicolus
	Annelida	C/Oligochaeta	Tubificidae	Tubificidae w/o hair
	Annelida	C/Polychaeta	Cirratulidae	Cirratulidae sp.
	Annelida	C/Polychaeta	Cirratulidae	Tharynx sp.
	Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
	Annelida	C/Polychaeta	Glyceridae	Hemipodus sp.
	Annelida	C/Polychaeta	Lumbrineridae	Lumbrineridae sp.
	Annelida	C/Polychaeta	Lumbrineridae	Lumbrinerides dayi
	Annelida	C/Polychaeta	Nephtyidae	Nephtys bucera
	Annelida	C/Polychaeta	Opheliidae	Ophelia denticulata
	Annelida	C/Polychaeta	Paraonidae	Aricidea (Acmira) sp.
	Annelida	C/Polychaeta	Paraonidae	Cirrophorus sp.
	Annelida	C/Polychaeta	Phyllodocidae	Eteone lactea
	Annelida	C/Polychaeta	Phyllodocidae	Phyllodocidae sp.
	Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
	Annelida	C/Polychaeta	Polynoidae	Harmothoe sp.
	Annelida	C/Polychaeta	Spionidae	Polydora socialis
	Annelida	C/Polychaeta	Syllidae	Syllidae sp.
	Annelida	C/Polychaeta	Terebellidae	Lysilla sp.
	Arthropoda	O/Decapoda	?	Megalops sp.
	Arthropoda	O/Isopoda	Idoteidae	Chirodotea (caeca)
	Arthropoda	O/Isopoda	Sphaeromatidae	Ancinus depressus
	Arthropoda	O/Mysidacea	Mysidae	Americamysis bigelowi
	Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissus sp.
	Chordata	C/Ascidiacea	?	Ascidiacea sp.
	Chordata	C/Cephalochordata	Branchiostomidae	Branchiostoma caribaeum
	Echinodermata	C/Echinoidea	Mellitidae	Mellita isometra
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
	Mollusca	C/Bivalvia	Periplomatidae	Periploma (margaritaceum)
	Mollusca	C/Bivalvia	Tellinidae	Tellina sp.

Fall Pre-nourishment E3

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Nourished Beach	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	C/Arachnida	?	Acari sp
	Arthropoda	O/Amphipoda	Corophiidae	Apocorophium sp.
	Arthropoda	O/Amphipoda	Corophiidae	Corophiidae sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Arthropoda	O/Tanaidacea	Leptocheliidae	Leptocheliidae sp.
	Chordata	C/Ascidiacea	?	Ascidiacea sp.
	Nemertea	?	?	Nemertea sp.
Control Beach	Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Coleoptera	Staphylinidae	Staphylinidae sp.
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Arthropoda	O/Isopoda	Idoteidae	Edotea sp.
	Chaetognatha	C/Sagittoidea	Sagittidae	Sagitta sp.
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
	Nemertea	?	?	Nemertea sp.

Winter Pre-nourishment E4

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Offshore Borrow	Annelida	C/Oligochaeta	Tubificidae	Clitellio arenicolus
	Annelida	C/Oligochaeta	Tubificidae	Tubificidae w/o hair
	Annelida	C/Polychaeta	Cirratulidae	Tharynx sp.
	Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
	Annelida	C/Polychaeta	Nephtyidae	Nephtys bucera
	Annelida	C/Polychaeta	Onuphidae	Diopatra cuprea
	Annelida	C/Polychaeta	Phyllodocidae	Hesionura coineaui
	Annelida	C/Polychaeta	Phyllodocidae	Phyllodocidae sp.
	Annelida	C/Polychaeta	Phyllodocidae	Streptosyllis pettiboneae
	Annelida	C/Polychaeta	Polygordiidae	Chaetogordius canaliculatus
	Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
	Annelida	C/Polychaeta	Syllidae	Streptosyllis pettiboneae
	Annelida	C/Polychaeta	Terebellidae	Terebellidae sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Lepidactylus dytiscus
	Arthropoda	O/Amphipoda	Haustoriidae	Protohaustorius wigleyi
	Arthropoda	O/Amphipoda	Phoxocephalidae	Rhepoxynius epistomus
	Arthropoda	O/Decapoda	Paguridae	Pagarus annulipes
	Arthropoda	O/Isopoda	Idoteidae	Chirodotea arenicola
	Chordata	C/Ascidiacea	?	Ascidiacea sp.
	Chordata	C/Cephalochordata	Branchiostomidae	Branchiostoma caribaeum
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
	Mollusca	C/Bivalvia	cultellidae	Ensis directus
Offshore Control	Annelida	C/Oligochaeta	Tubificidae	Clitellio arenicolus
	Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
	Annelida	C/Polychaeta	Nephtyidae	Nephtys bucera
	Annelida	C/Polychaeta	Phyllodocidae	Phyllodocidae sp.
	Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
	Annelida	C/Polychaeta	Sigalionidae	Sigalion sp.
	Annelida	C/Polychaeta	Syllidae	Pionosyllis sp.
	Annelida	C/Polychaeta	Syllidae	Streptosyllis pettiboneae
	Arthropoda	O/Amphipoda	Aoridae	Unciola irrorata
	Arthropoda	O/Amphipoda	Photidae	Microprotopus raneyi
	Arthropoda	O/Isopoda	?	Flabellifera juv sp.
	Arthropoda	O/Isopoda	Apanthuridae	Apanthura magnifica
	Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissus sp.
	Chordata	C/Ascidiacea	?	Ascidiacea sp.
	Nemertea	?	?	Nemertea sp.

Winter Pre-nourishment E4

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Nourished Beach	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Amphipoda	Oedicerotidae	Ameroculodes spp complex
	Arthropoda	O/Araneae	?	Araneae sp
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Arthropoda	O/Decapoda	Portunidae	Ovalipes ocellatus
	Arthropoda	O/Diptera	?	Diptera adult
	Arthropoda	O/Tanaidacea	Leptocheliidae	Leptocheliidae sp.
	Mollusca	O/Nudibranchia	Corambidae	(Doridella sp.)
	Nemertea	?	?	Nemertea sp.
Control Beach	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Amphipoda	Oedicerotidae	Ameroculodes spp complex
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Arthropoda	O/Decapoda	Portunidae	Ovalipes ocellatus
	Arthropoda	O/Diptera	Chironomidae	Diptera sp.
	Chordata	C/Ascidiacea	?	Ascidiacea sp.
	Mollusca	C/Bivalvia	Mytilidae	Mytilus edulis
	Nemertea	?	?	Nemertea sp.

Fall Post-Y1 E5

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Offshore Borrow	Annelida	C/Oligochaeta	Tubificidae	Bothrioneurum vejdovskyanum
	Annelida	C/Polychaeta	Cirratulidae	Caulleriella venefica
	Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
	Annelida	C/Polychaeta	Opheliidae	Ophelia denticulata
	Annelida	C/Polychaeta	Phyllodocidae	Heisonura coineaui
	Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
	Annelida	C/Polychaeta	Syllidae	Brania wellfleetensis
	Annelida	C/Polychaeta	Syllidae	Streptosyllis pettiboneae
	Arthropoda	O/Amphipoda	Haustoriidae	Lepidactylus dytiscus
	Arthropoda	O/Isopoda	Sphaeromatidae	Ancinus depressus
	Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissis sp.
	Chordata	C/Ascidiacea	?	Ascidiacea sp.
	Chordata	C/Cephalochordata	Branchiostomidae	Branchiostoma caribaeum
	Echinodermata	C/Echinoidea	Mellitidae	Mellita isometra
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
Offshore Control	Annelida	C/Polychaeta	Cirratulidae	Caulleriella venefica
	Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
	Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
	Annelida	C/Polychaeta	Phyllodocidae	Heisonura coineaui
	Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
	Annelida	C/Polychaeta	Syllidae	Brania wellfleetensis
	Annelida	C/Polychaeta	Syllidae	Sphaerosyllis (aciculata)
	Annelida	C/Polychaeta	Syllidae	Streptosyllis pettiboneae
	Annelida	C/Polychaeta	?	Polychaeta juv. sp.
	Chordata	C/Ascidiacea	?	Ascidiacea sp.
	Echinodermata	C/Echinoidea	Mellitidae	Mellita isometra
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.

Fall Post-Y1 E5

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Nourished Beach	Annelida	C/Oligochaeta	Naididae	Paranais littoralis
	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Annelida	O/Phyllocida	Phyllodocidae	Eteone heteropoda
	Arthropoda	O/Amphipoda	Corophiidae	Apocorophium sp.
	Arthropoda	O/Amphipoda	Corophiidae	Monocorophium sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Chordata	C/Ascidiacea	?	Ascidiacea sp.
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis
	Nemertea	?	?	Nemertea sp.
Control Beach	Annelida	C/Oligochaeta	Naididae	Paranais littoralis
	Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
	Annelida	C/Polychaeta	Phyllodocidae	Eteone heteropoda
	Annelida	C/Polychaeta	Spionidae	Polydora cornuta
	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	Corophiidae	Americorophium spp. Complex
	Arthropoda	O/Amphipoda	Corophiidae	Apocorophium sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius (jayneae)
	Arthropoda	O/Amphipoda	Photidae	Microprotopus raneyi
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Arthropoda	O/Decapoda	Portunidae	Arenaeus cribrarius
	Arthropoda	O/Mysida	Mysidae	Metamysidopsis swifti
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
	Nemertea	?	?	Nemertea sp.

Winter Post-Y1 E6

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Offshore Borrow	Annelida	C/Oligochaeta	Tubificidae	Tubificidae w/o hair
	Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
	Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
	Annelida	C/Polychaeta	Opheliidae	Ophelia denticulata
	Annelida	C/Polychaeta	Phyllodocidae	Heisonura coineaui
	Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Annelida	C/Polychaeta	Spionidae	Spiophanes bombyx
	Arthropoda	O/Amphipoda	Haustoriidae	Acanthohaustorius shoemakeri
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Lepidactylus dytiscus
	Arthropoda	O/Amphipoda	Haustoriidae	Parahaustorius holmesi
	Arthropoda	O/Amphipoda	Haustoriidae	Parahaustorius longimerus
	Arthropoda	O/Amphipoda	Haustoriidae	Protohaustorius wigleyi
	Arthropoda	O/Amphipoda	Haustoriidae	Pseudohaustorius sp.
	Arthropoda	O/Decapoda	Paguridae	Pagarus longicarpus
	Arthropoda	O/Isopoda	Sphaeromatidae	Ancinus depressus
	Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissis sp.
	Arthropoda	O/Tanaidacea	?	Mancocuma (diterum)
	Echinodermata	C/Echinoidea	?	Echinoidea juv. sp.
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
	Mollusca	C/Gastropoda	Naticidae	Polinices duplicatus
Offshore Control	Annelida	C/Oligochaeta	Tubificidae	Clitellio arenicolus
	Annelida	C/Polychaeta	Cirratulidae	Cirratulidae sp.
	Annelida	C/Polychaeta	Cirratulidae	Tharynx sp.
	Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
	Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
	Annelida	C/Polychaeta	Lumbrineridae	Lumbrinerides dayi
	Annelida	C/Polychaeta	Opheliidae	Ophelia denticulata
	Annelida	C/Polychaeta	Phyllodocidae	Hesionura coineaui
	Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
	Annelida	C/Polychaeta	Syllidae	Brania wellfleetensis
	Mollusca	C/Bivalvia	Mactridae	Spisula solidissima
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.

Winter Post-Y1 E6

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Nourished Beach	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
Control Beach	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	Corophiidae	Apocorophium louisianum
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis

Offshore Borrow

Spring Post-Y1 E7

PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Annelida	C/Oligochaeta	Tubificidae	Heterodrilus arenicolus
Annelida	C/Oligochaeta	Tubificidae	Tubificidae w/o hair
Annelida	C/Oligochaeta	?	Oligochaeta sp.
Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
Annelida	C/Polychaeta	Nephtyidae	Nephtyidae sp.
Annelida	C/Polychaeta	Onuphidae	Ramphobrachium atlanticum
Annelida	C/Polychaeta	Opheliidae	Opheliidae sp.
Annelida	C/Polychaeta	Phyllodocidae	Heisonura coineaui
Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
Annelida	C/Polychaeta	Sabellaridae	Sabellaria vulgaris vulgaris
Annelida	C/Polychaeta	Spionidae	Marenzellaria viridis
Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
Annelida	C/Polychaeta	Spionidae	Spiophanes bombyx
Annelida	C/Polychaeta	Syllidae	Pionosyllis sp.
Arthropoda	O/Amphipoda	Aoridae	Pseudunciola obliquua
Arthropoda	O/Amphipoda	Aoridae	Unciola sp.
Arthropoda	O/Amphipoda	Bateidae	Batea cathariensis
Arthropoda	O/Amphipoda	Haustoriidae	Acanthohaustorius bousfieldi
Arthropoda	O/Amphipoda	Haustoriidae	Acanthohaustorius sp.
Arthropoda	O/Amphipoda	Haustoriidae	Protohaustorius wigleyi
Arthropoda	O/Amphipoda	Ischyroceridae	Ericthonius punctatus
Arthropoda	O/Amphipoda	Tironidae	Tiron tropakis
Arthropoda	O/Decapoda	Paguridae	Pagarus longicarpus
Arthropoda	O/Decapoda	Paguridae	Pagarus pollicaris
Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissis sp.
Chordata	C/Ascidiacea	?	Ascidiacea sp.
Chordata	C/Cephalochordata	Branchiostomidae	Branchiostoma sp.
Chordata	C/Cephalochordata	Branchiostomidae	Branchiostoma virginiae
Cnidaria	O/Actiniaria	?	Actiniaria juv. sp.
Mollusca	C/Bivalvia	Mactridae	Spisula solidissima
Mollusca	C/Bivalvia	Tellinidae	Angulus sp.
Mollusca	C/Bivalvia	Tellinidae	Tellinidae sp.
Mollusca	C/Bivalvia	Thraciidae	Thracia sp.
Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
Mollusca	C/Gastropoda	Calyptraeidae	Crepidula sp.

Spring Post-Y1 E7

Offshore Control

PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Annelida	C/Oligochaeta	?	Oligochaeta sp.
Annelida	C/Oligochaeta	Tubificidae	Tubificidae w/o hair
Annelida	C/Polychaeta	Ampharetidae	Ampharetidae sp.
Annelida	C/Polychaeta	Cirratulidae	Caulleriella venefica
Annelida	C/Polychaeta	Dorvilleidae	Dorvilleidae sp .
Annelida	C/Polychaeta	Dorvilleidae	Ophryotrocha sp. 2
Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
Annelida	C/Polychaeta	Onuphidae	Onuphidae sp.
Annelida	C/Polychaeta	Onuphidae	Ramphobrachium atlanticum
Annelida	C/Polychaeta	Oweniidae	Owenia fusiformis
Annelida	C/Polychaeta	Phyllodocidae	Heisonura coineaui
Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
Annelida	C/Polychaeta	Spionidae	Paraprionospio longicirrata
Annelida	C/Polychaeta	Spionidae	Spiophanes bombyx
Annelida	C/Polychaeta	Syllidae	Brania wellfleetensis
Annelida	C/Polychaeta	Syllidae	Streptosyllis pettiboneae
Arthropoda	O/Amphipoda	?	Amphipoda sp.
Arthropoda	O/Amphipoda	Corophiidae	Apocorophium sp.
Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
Arthropoda	O/Collembola	?	Collembola sp.
Arthropoda	O/Decapoda	Paguridae	Pagarus longicarpus
Arthropoda	O/Decapoda	Paguridae	Pagarus pollicaris
Arthropoda	O/Isopoda	Idoteidae	Chirodotea arenicola
Arthropoda	O/Isopoda	Idoteidae	Edotea sp.
Arthropoda	O/Isopoda	Sphaeromatidae	Cirolana polita
Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissis sp.
Chordata	C/Ascidiacea	?	Ascidiacea sp.
Chordata	C/Cephalochordata	Branchiostomidae	Branchiostoma sp.
Cnidaria	O/Actiniaria	?	Actiniaria juv. sp.
Echinodermata	C/Echinoidea	Mellitidae	Mellita isometra
Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
Mollusca	C/Bivalvia	Mactridae	Mactridae sp.
Mollusca	C/Bivalvia	Mactridae	Spisula solidissima
Mollusca	C/Bivalvia	Tellinidae	Tellinidae sp.
Mollusca	C/Bivalvia	Thraciidae	Thracia sp.
Mollusca	C/Gastropoda	?	Gastropoda juv. sp.

Spring Post-Y1 E7

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Nourished Beach	Annelida	C/Polychaeta	Spionidae	Polydora sp.
	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	Caprellidae	Caprellidae juv.sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius canadensis
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius jayneae
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Arthropoda	O/Diptera	Chironomidae	Chironomidae sp.
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
Control Beach	Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Apocorophium sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Haustoriidae sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Arguloida	Argulidae	Argulus sp.
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Arthropoda	O/Isopoda	?	Valvifera sp.
	Cnidaria	O/Actiniaria	?	Actiniaria juv. sp.
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis

Summer Post-Y1 E8

Offshore Borrow

PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Annelida	C/Oligochaeta	Tubificidae	Clitellio arenicolus
Annelida	C/Polychaeta	Capitellidae	Capitellidae sp.
Annelida	C/Polychaeta	Cirratulidae	Cirratulidae sp.
Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
Annelida	C/Polychaeta	Hesionidae	Hesionura coineaui
Annelida	C/Polychaeta	Hesionidae	Podarke sp.
Annelida	C/Polychaeta	Magelonidae	Magelona papillicornis
Annelida	C/Polychaeta	Maldanidae	Axiothella sp.
Annelida	C/Polychaeta	Nephtyidae	Nephtys sp.
Annelida	C/Polychaeta	Opheliidae	Armandia maculata
Annelida	C/Polychaeta	Opheliidae	Ophelia denticulata
Annelida	C/Polychaeta	Orbiniidae	Leitoscoloplos sp.
Annelida	C/Polychaeta	Orbiniidae	Scoloplos (rubra)
Annelida	C/Polychaeta	Oweniidae	Oweniidae sp.
Annelida	C/Polychaeta	Paraonidae	Paraonidae sp.
Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
Annelida	C/Polychaeta	Spionidae	Marenzellaria viridis
Annelida	C/Polychaeta	Spionidae	Paraprionospio pinnata
Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
Annelida	C/Polychaeta	Spionidae	Spiophanes bombyx
Annelida	C/Polychaeta	Syllidae	Streptosyllis arenae
Arthropoda	O/Amphipoda	Haustoriidae	Acanthohaustorius shoemakeri
Arthropoda	O/Cumacea	Bodotriidae	Cyclaspis varians
Arthropoda	O/Cumacea	Diastylidae	Oxyurostylis smithi
Arthropoda	O/Tanaidacea	Leptocheliidae	Leptocheliidae sp.
Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissus psammophilus
Chordata	Sp/Cephalochordata	Branchiostomidae	Branchiostoma virginiae
Echinodermata	C/Asteroidea	?	Asteroidea sp.
Echinodermata	C/Echinoidea	Schizasteridae	Moira atropos
Echinodermata	C/Echinoidea	?	Echinoidea juv. sp.
Mollusca	C/Bivalvia	Lyonsiidae	Lyonsia hyalina
Mollusca	C/Bivalvia	Mactridae	Mactridae sp.
Mollusca	C/Bivalvia	Tellinidae	Tellinidae sp.
Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
Mollusca	C/Gastropoda	Naticidae	Naticidae sp.
Mollusca	C/Gastropoda	?	Gastropoda juv. sp.

Summer Post-Y1 E8

Offshore Control

PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Annelida	C/Oligochaeta	Tubificidae	Clitellio arenicolus
Annelida	C/Oligochaeta	Tubificidae	Tubificidae w/o hair
Annelida	C/Oligochaeta	?	Oligochaeta sp.
Annelida	C/Polychaeta	Cirratulidae	Caulleriella killarensis
Annelida	C/Polychaeta	Dorvilleidae	Dorvilleidae sp .
Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
Annelida	C/Polychaeta	Glyceridae	Glycera sp.
Annelida	C/Polychaeta	Lumbrineridae	Lumbrinerides dayi
Annelida	C/Polychaeta	Magelonidae	Magelona papillicornis
Annelida	C/Polychaeta	Nephtyidae	Nephtys cryptomma
Annelida	C/Polychaeta	Nereidae	Neanthes sp.
Annelida	C/Polychaeta	Onuphidae	Kimbergonuphis sp.
Annelida	C/Polychaeta	Opheliidae	Armandia maculata
Annelida	C/Polychaeta	Opheliidae	Ophelia bicornis
Annelida	C/Polychaeta	Orbiniidae	Scoloplos (rubra)
Annelida	C/Polychaeta	Oweniidae	Owenia fusiformis
Annelida	C/Polychaeta	Paraonidae	Paraonidae sp.
Annelida	C/Polychaeta	Phyllodocidae	Hesionura coineaui
Annelida	C/Polychaeta	Spionidae	Prionospio cristata
Annelida	C/Polychaeta	Spionidae	Prionospio sp.
Annelida	C/Polychaeta	Spionidae	Spionidae sp.
Annelida	C/Polychaeta	Spionidae	Spiophanes bombyx
Annelida	C/Polychaeta	Syllidae	Brania wellfleetensis
Annelida	C/Polychaeta	Syllidae	Parapionosyllis longicerrata
Annelida	C/Polychaeta	Syllidae	Pionosyllis sp.
Annelida	C/Polychaeta	Syllidae	Streptosyllis arenae
Annelida	C/Polychaeta	?	Polychaeta juv. sp.
Arthropoda	C/Cirripedia	?	Balanoidea sp.
Arthropoda	O/Amphipoda	Corophiidae	Erichthonius brasiliensis
Arthropoda	O/Amphipoda	?	Amphipoda sp.
Arthropoda	O/Decapoda	Paguridae	Paguridae sp.
Arthropoda	O/Decapoda	?	Zoea sp.
Arthropoda	O/Isopoda	Idoteidae	Chirodotea arenicola
Arthropoda	O/Isopoda	Sphaeromatidae	Ancinus depressus
Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissus psammophilus
Chordata	Sp/Cephalochordata	Branchiostomidae	Branchiostoma virginiae
Echinodermata	C/Echinoidea	Schizasteridae	Moira atropos
Echinodermata	C/Echinoidea	?	Echinoidea juv. sp.
Mollusca	C/Bivalvia	Tellinidae	Tellinidae sp.
Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
Mollusca	C/Gastropoda	Caecidae	Caecum sp.
Mollusca	C/Gastropoda	Epitoniidae	Epitoniidae sp.
Mollusca	C/Gastropoda	?	Gastropoda juv. sp.

Post-Summer E8

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Nourished Beach	Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
	Annelida	C/Polychaeta	Sabellaridae	Sabellaria vulgaris vulgaris
	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	Corophiidae	Corophiidae sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius canadensis
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Amphipoda	Haustoriidae	Parahaustorius longimerus
	Arthropoda	O/Araneae	?	Acarina sp.
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Arthropoda	O/Mysida	Mysidae	Metamysidopsis swifti
	Arthropoda	O/Tanaidacea	Leptocheliidae	Leptocheliidae sp.
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
Control Beach	Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
	Annelida	C/Polychaeta	Nereidae	Nereidae sp.
	Annelida	C/Polychaeta	Sabellaridae	Sabellaria vulgaris vulgaris
	Annelida	C/Polychaeta	Spionidae	Polydora cornuta
	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Annelida	C/Polychaeta	?	Polychaeta juv. sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius canadensis
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Mollusca	C/Bivalvia	Arcidae	Arcidae sp.
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.

Fall Post-Y2 E9

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Offshore Borrow	Annelida	C/Oligochaeta	Tubificidae	Tubificidae w/o hair
	Annelida	C/Polychaeta	Opheliidae	Travisia sp.
	Annelida	C/Polychaeta	Phyllodocidae	Hesionura coineaui
	Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
	Annelida	C/Polychaeta	Protodrilidae	Protodriloides chaetifer
	Annelida	C/Polychaeta	Sigalionidae	Sigalion arenicola
	Annelida	C/Polychaeta	Spionidae	Dispio uncinata
	Annelida	C/Polychaeta	Syllidae	Brania wellfleetensis
	Annelida	C/Polychaeta	Syllidae	Streptosyllis arenae
	Arthropoda	O/Amphipoda	Haustoriidae	Acanthohaustorius shoemakeri
	Arthropoda	O/Decapoda	Paguridae	Pagarus longicarpus
	Arthropoda	O/Mysida	Mysidae	Americamysis juv. sp.
	Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissus psammophilus
	Chordata	C/Cephalochordata	Branchiostomidae	Branchiostoma virginiae
	Echinodermata	C/Echinoidea	?	Echinoidea juv. sp.
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
	Mollusca	C/Gastropoda	Calyptraeidae	Crepidula sp.
	Mollusca	C/Gastropoda	Epitoniidae	Boreoscala greenlandica
Offshore Control	Annelida	C/Oligochaeta	?	Oligochaeta sp.
	Annelida	C/Oligochaeta	Tubificidae	Clitellio arenicolus
	Annelida	C/Polychaeta	Cirratulidae	Caulleriella venefica
	Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
	Annelida	C/Polychaeta	Nephtyidae	Nephtys cryptomma
	Annelida	C/Polychaeta	Opheliidae	Travisia sp.
	Annelida	C/Polychaeta	Paraonidae	Aricidea (Acmira) cerrutii
	Annelida	C/Polychaeta	Phyllodocidae	Hesionura coineaui
	Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
	Annelida	C/Polychaeta	Syllidae	Streptosyllis arenae
	Annelida	C/Polychaeta	Syllidae	Syllidae sp.
	Arthropoda	O/Mysida	Mysidae	Americamysis bigelowi
	Chordata	C/Ascidiacea	?	Ascidiacea sp.
	Chordata	C/Cephalochordata	Branchiostomidae	Branchiostoma virginiae
	Echinodermata	C/Echinoidea	?	Echinoidea juv. sp.
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.

Fall Post-Y2 E9

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Nourished Beach	Annelida	C/Oligochaeta	Naididae	Naididae sp.
	Annelida	C/Polychaeta	?	Polychaeta juv. sp.
	Annelida	C/Polychaeta	Protodrilidae	Protodriloides chaetifer
	Annelida	C/Polychaeta	Spionidae	Spionidae sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius canadensis
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis
Control Beach	Annelida	C/Oligochaeta	Naididae	Naididae sp.
	Annelida	C/Oligochaeta	Tubificidae	Tubificidae w/o hair
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustoriidae sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Arthropoda	O/Diptera	Chironomidae	Chironomidae sp.
	Arthropoda	O/Tanaidacea	Leptocheliidae	Leptocheliidae sp.
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis

Winter Post-Y2 E10

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Offshore Borrow	Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
	Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
	Annelida	C/Polychaeta	Nephtyidae	Nephtys sp.
	Annelida	C/Polychaeta	Sigalionidae	Sigalion arenicola
	Arthropoda	O/Tanaidacea	Leptocheliidae	Tanaissus psammophilus
	Mollusca	C/Bivalvia	Pandoridae	Pandora trilineata
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
Offshore Control	Annelida	C/Polychaeta	Cirratulidae	Caulleriella venefica
	Annelida	C/Polychaeta	Dinophilidae	Dinophilidae sp.
	Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
	Annelida	C/Polychaeta	Nephtyidae	Nephtys sp.
	Annelida	C/Polychaeta	Phyllodocidae	Heisonura coineaui
	Annelida	C/Polychaeta	Syllidae	Streptosyllis arenae
	Annelida	C/Polychaeta	Syllidae	Syllidae sp.
	Echinodermata	C/Echinoidea	?	Echinoidea juv. sp.
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.
	Sarcodina	O/Foraminiferida	?	Foraminiferida sp.

Winter Post-Y2 Year E10

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Nourished Beach	Annelida	C/Oligochaeta	Enchytraeidae	Enchytraeidae sp.
	Annelida	C/Oligochaeta	Naididae	Paranais littoralis
	Annelida	C/Oligochaeta	?	Oligochaeta sp.
	Annelida	C/Polychaeta	Protodrilidae	Protodriloides chaetifer
	Annelida	C/Polychaeta	Spionidae	Marenzellaria viridis
	Annelida	C/Polychaeta	Spionidae	Spionidae sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Amphipoda	?	Amphipoda sp.
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
Control Beach	Annelida	C/Oligochaeta	Tubificidae	Tubificidae w/o hair
	Annelida	C/Oligochaeta	?	Oligochaeta sp.
	Annelida	C/Polychaeta	Ampharetidae	Ampharetidae sp.
	Annelida	C/Polychaeta	Maldanidae	Maldanidae sp.
	Annelida	C/Polychaeta	?	Polychaeta juv. sp.
	Arthropoda	O/Amphipoda	Corophiidae	Corophiidae sp.
	Arthropoda	O/Amphipoda	?	Amphipoda sp.
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Mollusca	C/Bivalvia	Mytilidae	Mytilidae juv. sp.
	Mollusca	C/Bivalvia	?	Bivalvia juv. sp.

Offshore Borrow

Spring Post-Y2 E11

PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Annelida	C/Oligochaeta	Tubificidae	Tubificidae w/o hair
Annelida	C/Polychaeta	Capitellidae	Amastigos caperatus
Annelida	C/Polychaeta	Capitellidae	Capitella capitata
Annelida	C/Polychaeta	Capitellidae	Capitella jonesi
Annelida	C/Polychaeta	Capitellidae	Capitellidae sp.
Annelida	C/Polychaeta	Capitellidae	Mediomastus sp.
Annelida	C/Polychaeta	Dorvilleidae	Dorvilleidae sp .
Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
Annelida	C/Polychaeta	Glyceridae	Glycera sp.
Annelida	C/Polychaeta	Nephtyidae	Nephtys cryptomma
Annelida	C/Polychaeta	Onuphidae	Ramphobrachium sp.
Annelida	C/Polychaeta	Opheliidae	Opheliidae sp.
Annelida	C/Polychaeta	Paraonidae	Cirrophorus sp.
Annelida	C/Polychaeta	Phyllodocidae	Hesionura coineaui
Annelida	C/Polychaeta	Phyllodocidae	Mystides borealis
Annelida	C/Polychaeta	Poecilochaetidae	Poecilochaetidae sp.
Annelida	C/Polychaeta	Spionidae	Marenzellaria viridis
Annelida	C/Polychaeta	Spionidae	Microspio pigmentata
Annelida	C/Polychaeta	Spionidae	Paraprionospio pinnata
Annelida	C/Polychaeta	Spionidae	Prionospio sp.
Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
Annelida	C/Polychaeta	Spionidae	Spionidae sp.
Annelida	C/Polychaeta	Spionidae	Spiophanes bombyx
Annelida	C/Polychaeta	Syllidae	Brania wellfleetensis
Arthropoda	O/Amphipoda	Haustoriidae	Acanthohaustorius shoemakeri
Arthropoda	O/Amphipoda	Haustoriidae	Protohaustorius sp.
Arthropoda	O/Amphipoda	Oedicerotidae	Americhelidium americanum
Arthropoda	O/Isopoda	Idoteidae	Chirodotea sp.
Arthropoda	O/Mysidacea	Mysidae	Americamysis bigelowi
Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissus psammophilus
Chordata	C/Ascidiacea	?	Ascidiacea sp.
Chordata	sp/Cephalochordata	Branchiostomidae	Branchiostoma virginiae
Cnidaria	O/Actiniaria	?	Actiniaria sp.
Echinodermata	C/Echinoidea	Mellitidae	Mellita isometra
Mollusca	C/Bivalvia	Culltellidae	Ensis directus
Mollusca	C/Bivalvia	Mactridae	Mactridae sp.
Mollusca	C/Bivalvia	?	Bivalvia sp.
Platyhelminthe	?	?	Platyhelminthe sp.

Spring Post-Y2 E11

Offshore Control

PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Annelida	C/Oligochaeta	Tubificidae	Tubificidae w/o hair
Annelida	C/Polychaeta	Ampharetidae	Ampharete cf.lindstroemi
Annelida	C/Polychaeta	Ampharetidae	Ampharete jonesi
Annelida	C/Polychaeta	Ampharetidae	Asabellides oculata
Annelida	C/Polychaeta	Ampharetidae	Samythella elongata
Annelida	C/Polychaeta	Capitellidae	Capitella capitata
Annelida	C/Polychaeta	Capitellidae	Capitella sp.
Annelida	C/Polychaeta	Capitellidae	Mediomastus sp.
Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
Annelida	C/Polychaeta	Lumbrineridae	Lumbrinerides dayi
Annelida	C/Polychaeta	Onuphidae	Ramphobrachium sp.
Annelida	C/Polychaeta	Onuphidae	Rhamphobrachium spp. Complex
Annelida	C/Polychaeta	Paraonidae	Cirrophorus lyra
Annelida	C/Polychaeta	Paraonidae	Paraonidae sp.
Annelida	C/Polychaeta	Phyllodocidae	Hesionura coineaui
Annelida	C/Polychaeta	Sigalionidae	Sigalion arenicola
Annelida	C/Polychaeta	Spionidae	Marenzellaria viridis
Annelida	C/Polychaeta	Spionidae	Polydora sp.
Annelida	C/Polychaeta	Spionidae	Prionospio sp.
Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
Annelida	C/Polychaeta	Spionidae	Spiophanes bombyx
Annelida	C/Polychaeta	Syllidae	Brania wellfleetensis
Annelida	C/Polychaeta	?	Polychaeta juv. sp.
Arthropoda	O/Amphipoda	Haustoriidae	Acanthohaustorius cousfieldi
Arthropoda	O/Amphipoda	Haustoriidae	Acanthohaustorius shoemakeri
Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
Arthropoda	O/Amphipoda	Haustoriidae	Parahaustorius longimerus
Arthropoda	O/Decapoda	?	Pinnotheridae sp.
Chordata	C/Ascidiacea	?	Ascidiacea sp.
Chordata	sp/Cephalochordata	Branchiostomidae	Branchiostoma virginiae
Mollusca	C/Bivalvia	?	Bivalvia sp.
Platyhelminthe	?	?	Platyhelminthe sp.
Platyhelminthe	?	?	Stylochus ellipticus

Post-Spring E11

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Nourished Beach	Annelida	C/Polychaeta	Protodrilidae	Protodriloides chaetifer
	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	Gammaridae	Gammarus mucronatus
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustoriidae sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis
	Mollusca	C/Bivalvia	?	Bivalvia sp.
Control Beach	Annelida	C/Polychaeta	Phyllodocidae	Eteone heteropoda
	Annelida	C/Polychaeta	Spionidae	Marenzellaria viridis
	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	Corophidae	Apocorophium sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Cirripedia	Balanidae	Balanus improvisus
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis

Summer Post-Y2 E12

Offshore Borrow

PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Annelida	C/Oligochaeta	Tubificidae	Tubificidae w/o hair
Annelida	C/Polychaeta	Capitellidae	Mediomastus ambiseta
Annelida	C/Polychaeta	Capitellidae	Mediomastus sp.
Annelida	C/Polychaeta	Capitellidae	Notomastus hemipodus
Annelida	C/Polychaeta	Chaetopteridae	Spiochaetopterus costarum oculatus
Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
Annelida	C/Polychaeta	Glyceridae	Glycera sp.
Annelida	C/Polychaeta	Glyceridae	Hemipodus roseus
Annelida	C/Polychaeta	Hesionidae	Hesionides pettiboneae
Annelida	C/Polychaeta	Magelonidae	Magelona sp.
Annelida	C/Polychaeta	Maldanidae	Maldanidae sp.
Annelida	C/Polychaeta	Nephtyidae	Nephtys sp.
Annelida	C/Polychaeta	Opheliidae	Armandia maculata
Annelida	C/Polychaeta	Orbiniidae	Scoloplos rubra
Annelida	C/Polychaeta	Oweniidae	Owenia fusiformis spp. Complex
Annelida	C/Polychaeta	Phyllodocidae	Hesionura coineaui
Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
Annelida	C/Polychaeta	Scalibregmatidae	Scalibregma inflatum
Annelida	C/Polychaeta	Sigalionidae	Sigalionidae sp.
Annelida	C/Polychaeta	Spionidae	Marenzellaria viridis
Annelida	C/Polychaeta	Spionidae	Polydora sp.
Annelida	C/Polychaeta	Spionidae	Spionidae sp.
Annelida	C/Polychaeta	Syllidae	Brania wellfleetensis
Annelida	C/Polychaeta	Syllidae	Streptosyllis arenae
Annelida	C/Polychaeta	Syllidae	Streptosyllis pettiboneae
Annelida	C/Polychaeta	?	Unid. polychaeta
Arthropoda	O/Amphipoda	Haustoriidae	Acanthohaustorius bousfieldi
Arthropoda	O/Amphipoda	Haustoriidae	Acanthohaustorius shoemakeri
Arthropoda	O/Amphipoda	Phoxocephalidae	Rhepoxynius epistomus
Arthropoda	O/Cumacea	Bodotriidae	Cyclaspis varians
Arthropoda	O/Mysidacea	Mysidae	Americamysis bigelowi
Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissus psammophilus
Brachiopoda	C/Inarticulata	Lingulidae	Glottidia pyramidata
Chordata	C/Ascidiacea	Branchiostomidae	Branchiostoma virginiae
Echinodermata	C/Echinoidea	?	Echinoidea juv. sp.
Mollusca	C/Bivalvia	Culltellidae	Ensis directus
Mollusca	C/Bivalvia	Donacidae	Donax variabilis
Mollusca	C/Bivalvia	Mactridae	Mactridae sp.
Mollusca	C/Bivalvia	?	Bivalvia sp.

Summer Post-Y2 E12

Offshore Control

PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Annelida	C/Oligochaeta	Tubificidae	Clitellio arenicolus
Annelida	C/Oligochaeta	Tubificidae	Grania sp.
Annelida	C/Polychaeta	Capitellidae	Mediomastus sp.
Annelida	C/Polychaeta	Capitellidae	Notomastus hemipodus
Annelida	C/Polychaeta	Dorvilleidae	Parougia caeca
Annelida	C/Polychaeta	Glyceridae	Glyceridae sp.
Annelida	C/Polychaeta	Glyceridae	Hemipodus roseus
Annelida	C/Polychaeta	Lumbrineridae	Lumbrinerides sp.
Annelida	C/Polychaeta	Magelonidae	Magelona sp.
Annelida	C/Polychaeta	Nephtyidae	Nephtys bucera
Annelida	C/Polychaeta	Nephtyidae	Nephtys picta
Annelida	C/Polychaeta	Nephtyidae	nephtys sp.
Annelida	C/Polychaeta	Opheliidae	Ophelia denticulata
Annelida	C/Polychaeta	Oweniidae	Owenia fusiformis spp. Complex
Annelida	C/Polychaeta	Paraonidae	Aricidea sp.
Annelida	C/Polychaeta	Paraonidae	Aricidea suecica
Annelida	C/Polychaeta	Paraonidae	Cirrophorus lyra
Annelida	C/Polychaeta	Paraonidae	Paraonidae sp.
Annelida	C/Polychaeta	Phyllodocidae	Heisonura coineaui
Annelida	C/Polychaeta	Polygordiidae	Polygordius jouinae
Annelida	C/Polychaeta	Spionidae	Prionospio sp.
Annelida	C/Polychaeta	Spionidae	Spiophanes bombyx
Annelida	C/Polychaeta	Syllidae	Brania wellfleetensis
Annelida	C/Polychaeta	Syllidae	Streptosyllis arenae
Annelida	C/Polychaeta	Syllidae	Streptosyllis pettiboneae
Arthropoda	O/Amphipoda	Haustoriidae	Acanthohaustorius bousfieldi
Arthropoda	O/Amphipoda	Haustoriidae	Acanthohaustorius shoemakeri
Arthropoda	O/Amphipoda	Haustoriidae	Parahaustorius holmesi
Arthropoda	O/Amphipoda	Phoxocephalidae	Rhepoxynius epistomus
Arthropoda	O/Decapoda	Processidae	Nikoides schmitti
Arthropoda	O/Decapoda	?	Megalopa sp.
Arthropoda	O/Isopoda	Bopyridae	Pseudione sp.
Arthropoda	O/Tanaidacea	Nototanaidae	Tanaissus psammophilus
Brachiopoda	C/Inarticulata	Lingulidae	Glottidia pyramidata
Chordata	C/Ascidiacea	Branchiostomidae	Branchiostoma virginiae
Echinodermata	C/Echinoidea	?	Echinoidea juv. sp.
Mollusca	C/Bivalvia	Donacidae	Donax variabilis
Mollusca	C/Bivalvia	Mactridae	Mactridae sp.
Mollusca	C/Bivalvia	Mactridae	Spisula solidissima
Mollusca	C/Bivalvia	Mactridae	Spisula sp.
Mollusca	C/Bivalvia	Semelidae	Semele proficua
Mollusca	C/Bivalvia	?	Bivalvia sp.
Mollusca	C/Gastropoda	?	Gastropoda juv. sp.

Summer Post-Y2 E12

	PHYLUM	CLASS/ORDER	FAMILY	SPECIES
Nourished Beach	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	Corophidae	Corophidae sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius canadensis
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Amphipoda	Haustoriidae	Parahaustorius attenuatus
	Arthropoda	O/Amphipoda	Haustoriidae	Parahaustorius longimerus
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Arthropoda	O/Isopoda	Idoteidae	Erichsonella sp.
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis
	Mollusca	C/Bivalvia	?	Bivalvia sp.
	Mollusca	C/Gastropoda	?	Gastropoda juv. sp.
Control Beach	Annelida	C/Polychaeta	Spionidae	Scolelepis squamata
	Arthropoda	O/Amphipoda	Corophidae	Apocorophium sp.
	Arthropoda	O/Amphipoda	Haustoriidae	Amphiporeia virginiana
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius canadensis
	Arthropoda	O/Amphipoda	Haustoriidae	Haustorius sp. D
	Arthropoda	O/Amphipoda	Haustoriidae	Parahaustorius longimerus
	Arthropoda	O/Decapoda	Hippidae	Emerita talpoida
	Arthropoda	O/Diptera	Chironomidae	Apedilum sp.
	Arthropoda	O/Mysidacea	Mysidae	Metamysidopsis sp.
	Mollusca	C/Bivalvia	Donacidae	Donax variabilis
	Mollusca	C/Gastropoda	?	Gastropoda juv. sp.

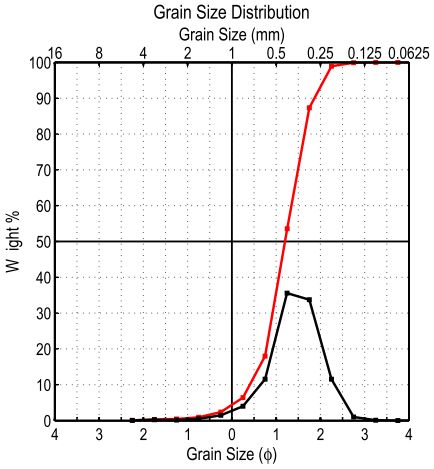
Appendix B

Sediment Analyses Results
for Nags Head Beach 2011 Nourishment Project
Post-Y2 (Part 1)
Pre-nourishment (Part 2)
and Post-Y1 (Part 3)

Performed by Coastal Science & Engineering Inc.

Appendix B – Part 1

Post-Y2 Sediment Analyses Results



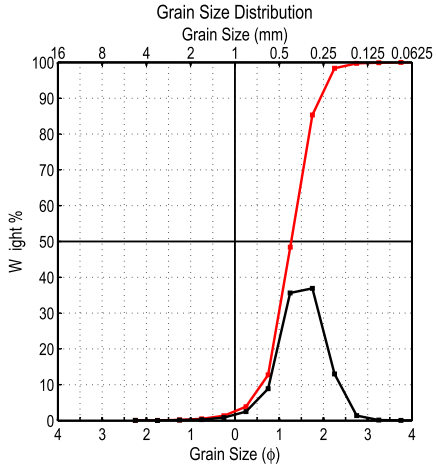
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**B2a**
Interval	**Grab**
Mean	**0.377 mm**
STD	**0.659 mm**
Skewness	**-1.083**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	121.30
% finer than 4.00 phi	0.00
% coarser than 1.00 phi	2.40

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.10	0.08	0.08
-1.5	-1.75	0.27	0.22	0.31
-1	-1.25	0.16	0.13	0.44
-0.5	-0.75	0.59	0.49	0.92
0	-0.25	1.79	1.48	2.40
0.5	0.25	4.86	4.01	6.41
1	0.75	14.05	11.58	17.99
1.5	1.25	43.16	35.58	53.57
2	1.75	40.94	33.75	87.32
2.5	2.25	14.05	11.58	98.90
3	2.75	1.21	1.00	99.90
3.5	3.25	0.11	0.09	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.725
5	0.075
16	0.665
25	0.850
50	1.200
75	1.565
84	1.700
95	2.080
99	2.300

Moment Measures	(phi)	(mm)
Mean	1.409	0.377
Standard Deviation	0.601	0.659
Skewness	-1.083	
Kurtosis	6.536	
Dispersion		
Standard Deviation		
D viation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.182	1.188
Standard Deviation	0.517	0.563
Skewness (1)	-0.034	-0.078
Skewness (2)	-0.237	
Kurtosis	0.937	1.149



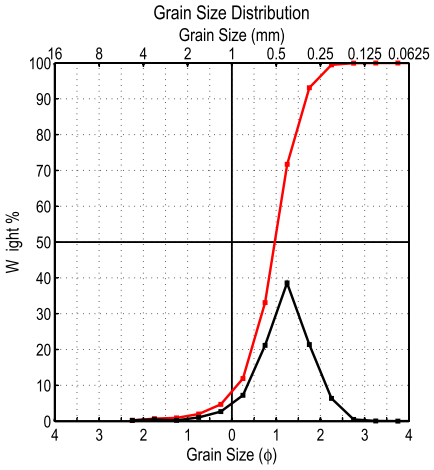
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**B2b**
Interval	**Grab**
Mean	**0.354 mm**
STD	**0.684 mm**
Skewness	**-0.738**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	158.99
% finer than 4.00 phi	0.02
% coarser than 1.00 phi	1.35

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.07	0.04	0.04
-1.5	-1.75	0.04	0.03	0.07
-1	-1.25	0.23	0.14	0.21
-0.5	-0.75	0.47	0.30	0.51
0	-0.25	1.33	0.84	1.35
0.5	0.25	4.01	2.52	3.87
1	0.75	14.16	8.91	12.77
1.5	1.25	56.64	35.62	48.40
2	1.75	58.71	36.93	85.33
2.5	2.25	20.70	13.02	98.35
3	2.75	2.22	1.40	99.74
3.5	3.25	0.27	0.17	99.91
4	3.75	0.11	0.07	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-0.455
5	0.315
16	0.795
25	0.920
50	1.270
75	1.610
84	1.730
95	2.120
99	2.485

Moment Measures	(phi)	(mm)
Mean	1.497	0.354
Standard Deviation	0.548	0.684
Skewness	-0.738	
Kurtosis	6.240	
Dispersion		
Standard Deviation		
D viation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.263	1.265
Standard Deviation	0.468	0.507
Skewness (1)	-0.016	-0.037
Skewness (2)	-0.112	
Kurtosis	0.930	1.072



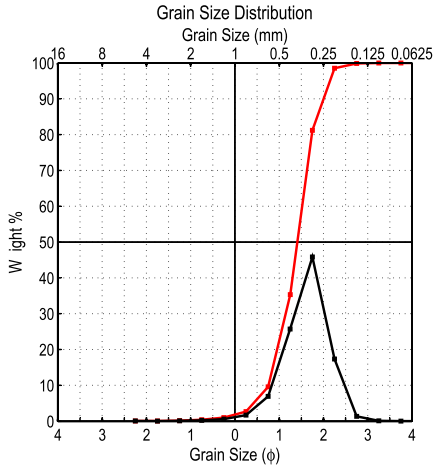
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**B2c**
Interval	**Grab**
Mean	**0.447 mm**
STD	**0.633 mm**
Skewness	**-1.065**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	110.31
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	4.68

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.24	0.22	0.22
-1.5	-1.75	0.53	0.48	0.70
-1	-1.25	0.26	0.24	0.93
-0.5	-0.75	1.17	1.06	1.99
0	-0.25	2.96	2.68	4.68
0.5	0.25	7.97	7.23	11.90
1	0.75	23.37	21.19	33.09
1.5	1.25	42.58	38.60	71.69
2	1.75	23.59	21.39	93.07
2.5	2.25	7.05	6.39	99.47
3	2.75	0.53	0.48	99.95
3.5	3.25	0.05	0.05	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.220
5	-0.230
16	0.345
25	0.560
50	0.970
75	1.325
84	1.540
95	1.900
99	2.215

Moment Measures	(phi)	(mm)
Mean	1.162	0.447
Standard Deviation	0.660	0.633
Skewness	-1.065	
Kurtosis	6.238	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.942	0.952
Standard Deviation	0.598	0.621
Skewness (1)	-0.046	-0.086
Skewness (2)	-0.226	
Kurtosis	0.782	1.141



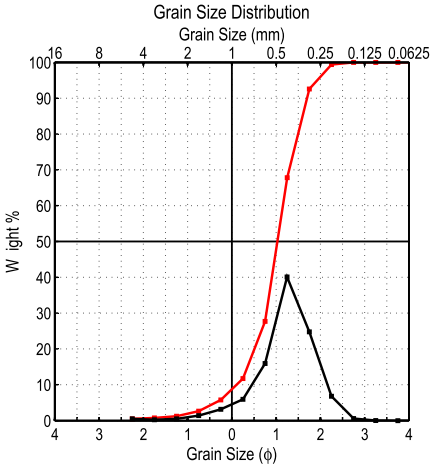
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**B2d**
Interval	**Grab**
Mean	**0.329 mm**
STD	**0.698 mm**
Skewness	**-1.093**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	110.87
% finer than 4.00 phi	0.00
% coarser than 1.00 phi	1.00

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.07	0.06	0.06
-1.5	-1.75	0.01	0.01	0.07
-1	-1.25	0.10	0.09	0.16
-0.5	-0.75	0.28	0.25	0.41
0	-0.25	0.65	0.59	1.00
0.5	0.25	1.86	1.68	2.68
1	0.75	7.67	6.92	9.60
1.5	1.25	28.52	25.72	35.32
2	1.75	50.83	45.85	81.17
2.5	2.25	19.22	17.34	98.50
3	2.75	1.51	1.36	99.86
3.5	3.25	0.13	0.12	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.250
5	0.420
16	0.875
25	1.050
50	1.410
75	1.685
84	1.830
95	2.150
99	2.435

Moment Measures	(phi)	(mm)
Mean	1.606	0.329
Standard Deviation	0.519	0.698
Skewness	-1.093	
Kurtosis	7.196	
Dispersion		
Standard Deviation		
D viation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.353	1.372
Standard Deviation	0.478	0.501
Skewness (1)	-0.120	-0.132
Skewness (2)	-0.262	
Kurtosis	0.812	1.117



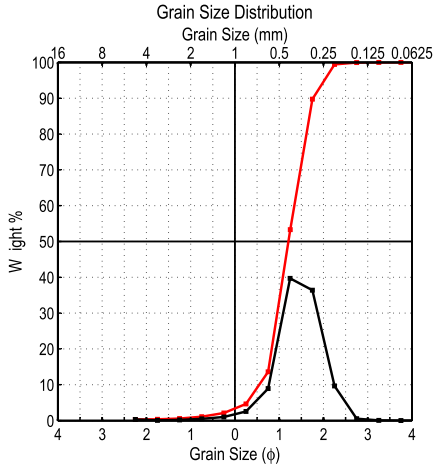
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**B2e**
Interval	**Grab**
Mean	**0.435 mm**
STD	**0.618 mm**
Skewness	**-1.381**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	111.27
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	5.78

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.57	0.51	0.51
-1.5	-1.75	0.28	0.25	0.76
-1	-1.25	0.53	0.48	1.24
-0.5	-0.75	1.55	1.39	2.63
0	-0.25	3.50	3.15	5.78
0.5	0.25	6.63	5.96	11.74
1	0.75	17.75	15.95	27.69
1.5	1.25	44.62	40.10	67.79
2	1.75	27.56	24.77	92.56
2.5	2.25	7.58	6.81	99.37
3	2.75	0.66	0.59	99.96
3.5	3.25	0.04	0.04	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.500
5	-0.375
16	0.385
25	0.665
50	1.030
75	1.395
84	1.575
95	1.930
99	2.225

Moment Measures	(phi)	(mm)
Mean	1.200	0.435
Standard Deviation	0.695	0.618
Skewness	-1.381	
Kurtosis	6.971	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.980	0.997
Standard Deviation	0.595	0.647
Skewness (1)	-0.084	-0.152
Skewness (2)	-0.424	
Kurtosis	0.937	1.294



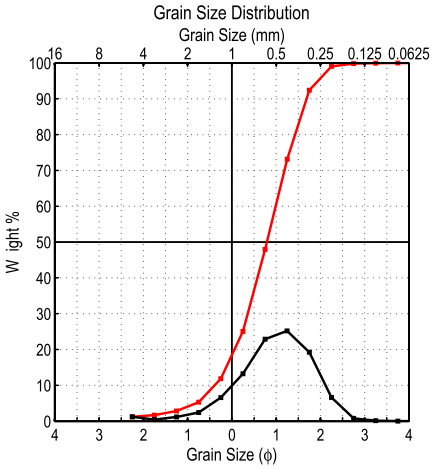
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**B3a**
Interval	**Grab**
Mean	**0.373 mm**
STD	**0.675 mm**
Skewness	**-1.653**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	118.17
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	2.12

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.36	0.30	0.30
-1.5	-1.75	0.09	0.08	0.38
-1	-1.25	0.24	0.20	0.58
-0.5	-0.75	0.60	0.51	1.09
0	-0.25	1.21	1.02	2.12
0.5	0.25	3.02	2.56	4.67
1	0.75	10.57	8.94	13.62
1.5	1.25	46.91	39.70	53.31
2	1.75	43.02	36.41	89.72
2.5	2.25	11.45	9.69	99.41
3	2.75	0.62	0.52	99.93
3.5	3.25	0.06	0.05	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.840
5	0.270
16	0.780
25	0.895
50	1.210
75	1.550
84	1.670
95	2.025
99	2.230

Moment Measures	(phi)	(mm)
Mean	1.424	0.373
Standard Deviation	0.566	0.675
Skewness	-1.653	
Kurtosis	10.469	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.225	1.220
Standard Deviation	0.445	0.488
Skewness (1)	0.034	-0.019
Skewness (2)	-0.140	
Kurtosis	0.972	1.098



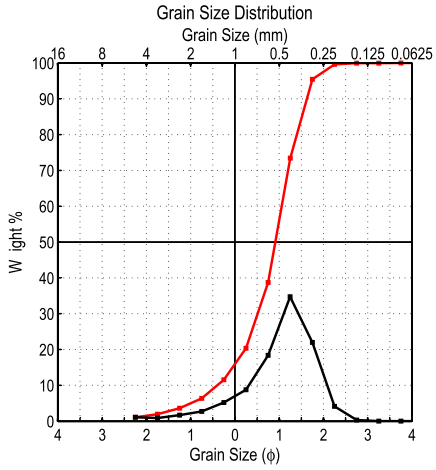
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**B3b**
Interval	**Grab**
Mean	**0.518 mm**
STD	**0.548 mm**
Skewness	**-0.872**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	108.74
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	11.85

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.34	1.23	1.23
-1.5	-1.75	0.50	0.46	1.69
-1	-1.25	1.28	1.18	2.87
-0.5	-0.75	2.62	2.41	5.28
0	-0.25	7.14	6.57	11.85
0.5	0.25	14.37	13.21	25.06
1	0.75	24.88	22.88	47.94
1.5	1.25	27.40	25.20	73.14
2	1.75	20.91	19.23	92.37
2.5	2.25	7.23	6.65	99.02
3	2.75	0.85	0.78	99.80
3.5	3.25	0.16	0.15	99.94
4	3.75	0.04	0.04	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-0.810
16	-0.095
25	0.250
50	0.790
75	1.300
84	1.530
95	1.950
99	2.250

Moment Measures	(phi)	(mm)
Mean	0.949	0.518
Standard Deviation	0.867	0.548
Skewness	-0.872	
Kurtosis	4.643	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.718	0.742
Standard Deviation	0.812	0.824
Skewness (1)	-0.089	-0.124
Skewness (2)	-0.271	
Kurtosis	0.698	1.077



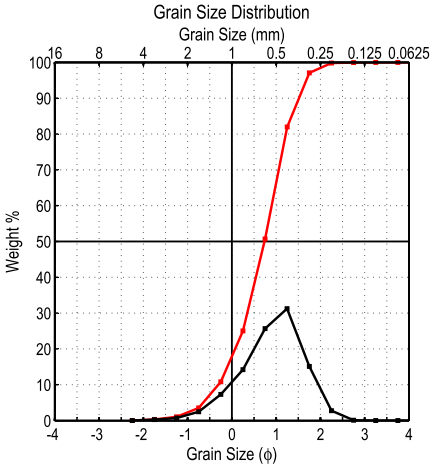
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**B3c**
Interval	**Grab**
Mean	**0.503 mm**
STD	**0.556 mm**
Skewness	**-1.311**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	119.97
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	11.57

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.29	1.08	1.08
-1.5	-1.75	1.06	0.88	1.96
-1	-1.25	2.01	1.68	3.63
-0.5	-0.75	3.26	2.72	6.35
0	-0.25	6.26	5.22	11.57
0.5	0.25	10.52	8.77	20.34
1	0.75	22.05	18.38	38.72
1.5	1.25	41.65	34.72	73.44
2	1.75	26.40	22.01	95.44
2.5	2.25	4.99	4.16	99.60
3	2.75	0.38	0.32	99.92
3.5	3.25	0.04	0.03	99.95
4	3.75	0.03	0.03	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-1.000
16	0.005
25	0.375
50	0.910
75	1.285
84	1.490
95	1.740
99	2.180

Moment Measures	(phi)	(mm)
Mean	0.990	0.503
Standard Deviation	0.847	0.556
Skewness	-1.311	
Kurtosis	5.380	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.747	0.802
Standard Deviation	0.742	0.786
Skewness (1)	-0.219	-0.307
Skewness (2)	-0.727	
Kurtosis	0.845	1.234



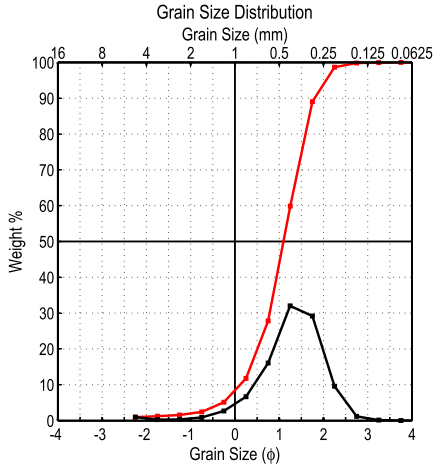
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**B3d**
Interval	**Grab**
Mean	**0.536 mm**
STD	**0.615 mm**
Skewness	**-0.588**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	125.19
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	10.82

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.04	0.03	0.03
-1.5	-1.75	0.37	0.30	0.33
-1	-1.25	0.89	0.71	1.04
-0.5	-0.75	3.11	2.48	3.52
0	-0.25	9.14	7.30	10.82
0.5	0.25	17.79	14.21	25.03
1	0.75	32.13	25.66	50.70
1.5	1.25	39.13	31.26	81.96
2	1.75	18.92	15.11	97.07
2.5	2.25	3.45	2.76	99.82
3	2.75	0.16	0.13	99.95
3.5	3.25	0.03	0.02	99.98
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.275
5	-0.650
16	-0.070
25	0.250
50	0.735
75	1.140
84	1.320
95	1.680
99	2.100

Moment Measures	**(phi)**	**(mm)**
Mean	0.899	0.536
Standard Deviation	0.702	0.615
Skewness	-0.588	
Kurtosis	3.660	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.625	0.662
Standard Deviation	0.695	0.701
Skewness (1)	-0.158	-0.174
Skewness (2)	-0.317	
Kurtosis	0.676	1.073



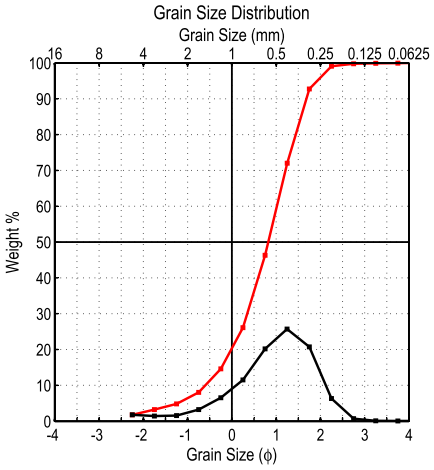
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**B3e**
Interval	**Grab**
Mean	**0.418 mm**
STD	**0.593 mm**
Skewness	**-1.413**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	136.68
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	5.11

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.29	0.94	0.94
-1.5	-1.75	0.37	0.27	1.21
-1	-1.25	0.46	0.34	1.55
-0.5	-0.75	1.21	0.89	2.44
0	-0.25	3.65	2.67	5.11
0.5	0.25	9.09	6.65	11.76
1	0.75	21.94	16.05	27.81
1.5	1.25	43.80	32.05	59.86
2	1.75	39.90	29.19	89.05
2.5	2.25	13.10	9.58	98.63
3	2.75	1.63	1.19	99.82
3.5	3.25	0.18	0.13	99.96
4	3.75	0.05	0.04	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.145
5	-0.270
16	0.380
25	0.660
50	1.095
75	1.510
84	1.665
95	2.060
99	2.405

Moment Measures	**(phi)**	**(mm)**
Mean	1.259	0.418
Standard Deviation	0.753	0.593
Skewness	-1.413	
Kurtosis	7.338	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.023	1.047
Standard Deviation	0.643	0.674
Skewness (1)	-0.113	-0.142
Skewness (2)	-0.311	
Kurtosis	0.813	1.123



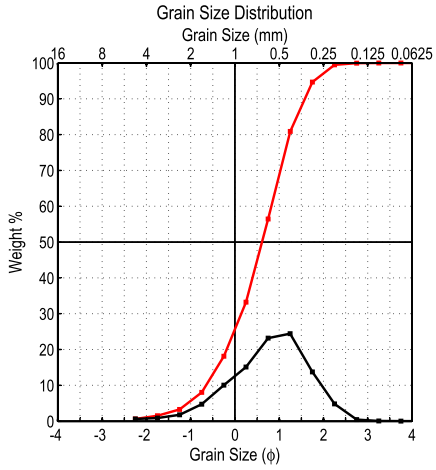
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**BC-E9a**
Interval	**Grab**
Mean	**0.533 mm**
STD	**0.515 mm**
Skewness	**-1.027**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	108.30
% finer than 4.00 phi	0.05
% coarser than -1.00 phi	14.59

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.95	1.80	1.80
-1.5	-1.75	1.55	1.43	3.23
-1	-1.25	1.71	1.58	4.81
-0.5	-0.75	3.52	3.25	8.06
0	-0.25	7.07	6.53	14.59
0.5	0.25	12.46	11.51	26.09
1	0.75	21.88	20.20	46.30
1.5	1.25	27.83	25.70	71.99
2	1.75	22.47	20.75	92.74
2.5	2.25	6.87	6.34	99.09
3	2.75	0.75	0.69	99.78
3.5	3.25	0.13	0.12	99.90
4	3.75	0.06	0.06	99.95
>4.0	4.25	0.05	0.05	100.00

Percentiles	
1	-2.250
5	-1.220
16	-0.190
25	0.200
50	0.820
75	1.320
84	1.540
95	1.930
99	2.245

Moment Measures	**(phi)**	**(mm)**
Mean	0.908	0.533
Standard Deviation	0.958	0.515
Skewness	-1.027	
Kurtosis	4.467	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.675	0.723
Standard Deviation	0.865	0.910
Skewness (1)	-0.168	-0.231
Skewness (2)	-0.538	
Kurtosis	0.821	1.153



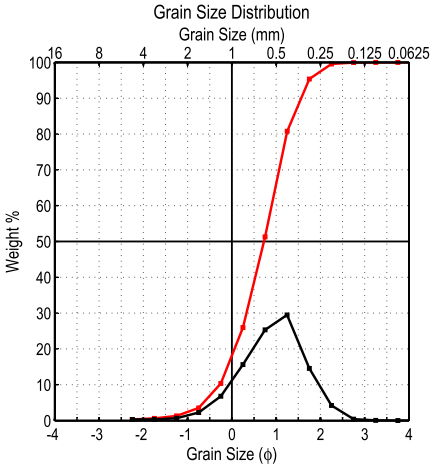
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**BC-E9b**
Interval	**Grab**
Mean	**0.587 mm**
STD	**0.547 mm**
Skewness	**-0.594**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	131.74
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	18.12

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.83	0.63	0.63
-1.5	-1.75	1.18	0.90	1.53
-1	-1.25	2.34	1.78	3.30
-0.5	-0.75	6.24	4.74	8.04
0	-0.25	13.28	10.08	18.12
0.5	0.25	19.93	15.13	33.25
1	0.75	30.55	23.19	56.44
1.5	1.25	32.21	24.45	80.89
2	1.75	18.13	13.76	94.65
2.5	2.25	6.34	4.81	99.46
3	2.75	0.62	0.47	99.93
3.5	3.25	0.07	0.05	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.045
5	-1.070
16	-0.355
25	-0.025
50	0.610
75	1.130
84	1.365
95	1.785
99	2.200

Moment Measures	**(phi)**	**(mm)**
Mean	0.769	0.587
Standard Deviation	0.871	0.547
Skewness	-0.594	
Kurtosis	3.525	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.505	0.540
Standard Deviation	0.860	0.863
Skewness (1)	-0.122	-0.149
Skewness (2)	-0.294	
Kurtosis	0.660	1.013



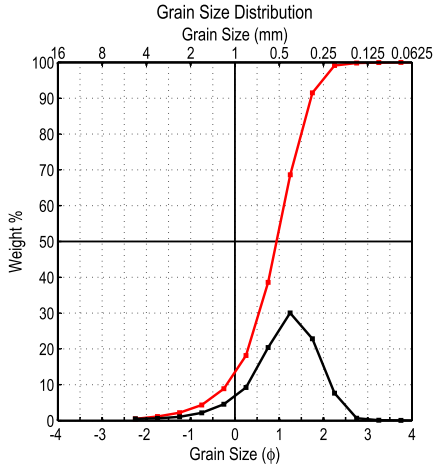
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**BC-E9c**
Interval	**Grab**
Mean	**0.534 mm**
STD	**0.600 mm**
Skewness	**-0.594**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	122.45
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	10.35

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.38	0.31	0.31
-1.5	-1.75	0.38	0.31	0.62
-1	-1.25	0.84	0.69	1.31
-0.5	-0.75	2.76	2.25	3.56
0	-0.25	8.31	6.79	10.35
0.5	0.25	19.13	15.62	25.97
1	0.75	31.00	25.32	51.29
1.5	1.25	36.10	29.48	80.77
2	1.75	17.83	14.56	95.33
2.5	2.25	5.15	4.21	99.53
3	2.75	0.49	0.40	99.93
3.5	3.25	0.06	0.05	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.475
5	-0.645
16	-0.070
25	0.220
50	0.725
75	1.150
84	1.360
95	1.740
99	2.185

Moment Measures	**(phi)**	**(mm)**
Mean	0.905	0.534
Standard Deviation	0.737	0.600
Skewness	-0.594	
Kurtosis	4.142	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.645	0.672
Standard Deviation	0.715	0.719
Skewness (1)	-0.112	-0.130
Skewness (2)	-0.248	
Kurtosis	0.668	1.051



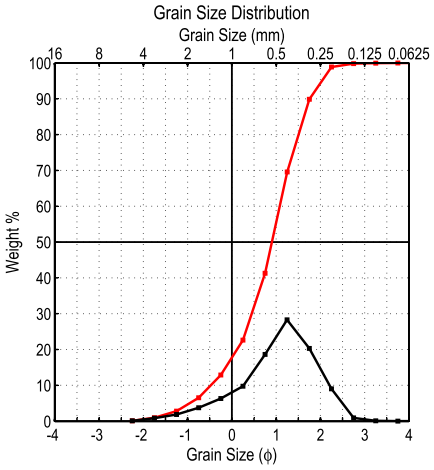
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**BC-E9d**
Interval	**Grab**
Mean	**0.471 mm**
STD	**0.572 mm**
Skewness	**-0.990**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	132.02
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	8.92

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.66	0.50	0.50
-1.5	-1.75	0.83	0.63	1.13
-1	-1.25	1.40	1.06	2.19
-0.5	-0.75	2.85	2.16	4.35
0	-0.25	6.04	4.58	8.92
0.5	0.25	12.22	9.26	18.18
1	0.75	26.93	20.40	38.58
1.5	1.25	39.67	30.05	68.63
2	1.75	30.16	22.85	91.47
2.5	2.25	10.12	7.67	99.14
3	2.75	0.88	0.67	99.80
3.5	3.25	0.15	0.11	99.92
4	3.75	0.07	0.05	99.97
>4.0	4.25	0.04	0.03	100.00

Percentiles	
1	-1.850
5	-0.680
16	0.130
25	0.415
50	0.940
75	1.390
84	1.585
95	1.980
99	2.240

Moment Measures	**(phi)**	**(mm)**
Mean	1.086	0.471
Standard Deviation	0.806	0.572
Skewness	-0.990	
Kurtosis	4.977	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.857	0.885
Standard Deviation	0.728	0.767
Skewness (1)	-0.113	-0.166
Skewness (2)	-0.399	
Kurtosis	0.828	1.118



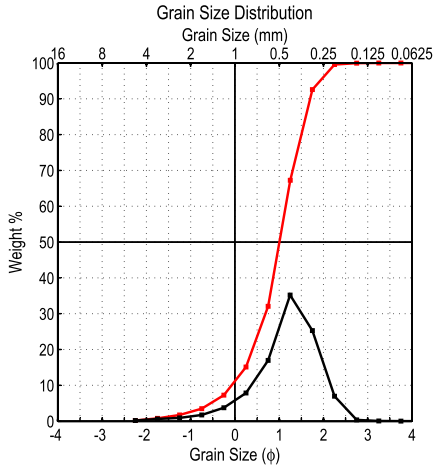
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**BC-E9e**
Interval	**Grab**
Mean	**0.492 mm**
STD	**0.546 mm**
Skewness	**-0.758**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	136.90
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	12.88

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.15	0.11	0.11
-1.5	-1.75	1.15	0.84	0.95
-1	-1.25	2.56	1.87	2.82
-0.5	-0.75	5.11	3.73	6.55
0	-0.25	8.66	6.33	12.88
0.5	0.25	13.35	9.75	22.63
1	0.75	25.53	18.65	41.28
1.5	1.25	38.71	28.28	69.55
2	1.75	27.78	20.29	89.85
2.5	2.25	12.37	9.04	98.88
3	2.75	1.29	0.94	99.82
3.5	3.25	0.17	0.12	99.95
4	3.75	0.05	0.04	99.99
>4.0	4.25	0.02	0.01	100.00

Percentiles	
1	-1.735
5	-0.960
16	-0.090
25	0.315
50	0.905
75	1.385
84	1.605
95	2.035
99	2.310

Moment Measures	**(phi)**	**(mm)**
Mean	1.024	0.492
Standard Deviation	0.873	0.546
Skewness	-0.758	
Kurtosis	3.634	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.758	0.807
Standard Deviation	0.847	0.878
Skewness (1)	-0.174	-0.210
Skewness (2)	-0.434	
Kurtosis	0.767	1.147



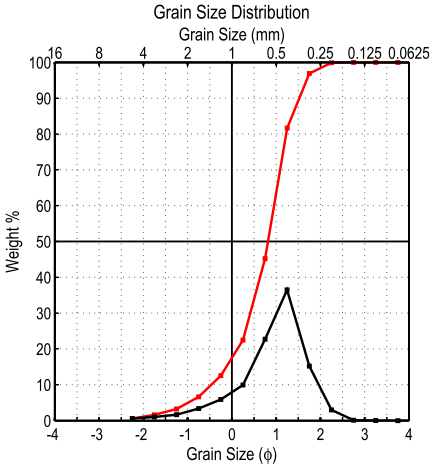
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**BC-E9f**
Interval	**Grab**
Mean	**0.451 mm**
STD	**0.598 mm**
Skewness	**-1.171**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	107.21
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	7.26

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.21	0.20	0.20
-1.5	-1.75	0.66	0.62	0.81
-1	-1.25	1.01	0.94	1.75
-0.5	-0.75	1.87	1.74	3.50
0	-0.25	4.03	3.76	7.26
0.5	0.25	8.42	7.85	15.11
1	0.75	18.19	16.97	32.08
1.5	1.25	37.72	35.18	67.26
2	1.75	27.13	25.30	92.57
2.5	2.25	7.49	6.99	99.55
3	2.75	0.41	0.38	99.93
3.5	3.25	0.05	0.05	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.650
5	-0.550
16	0.275
25	0.540
50	1.005
75	1.405
84	1.580
95	1.925
99	2.210

Moment Measures	**(phi)**	**(mm)**
Mean	1.150	0.451
Standard Deviation	0.741	0.598
Skewness	-1.171	
Kurtosis	5.380	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.927	0.953
Standard Deviation	0.653	0.701
Skewness (1)	-0.119	-0.188
Skewness (2)	-0.487	
Kurtosis	0.897	1.173



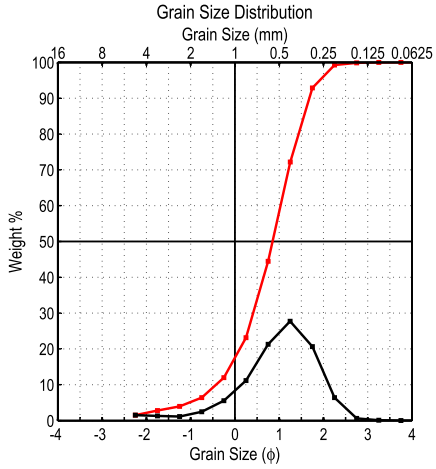
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**BC-E9g**
Interval	**Grab**
Mean	**0.537 mm**
STD	**0.575 mm**
Skewness	**-1.194**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	143.34
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	12.54

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.81	0.57	0.57
-1.5	-1.75	1.47	1.03	1.59
-1	-1.25	2.39	1.67	3.26
-0.5	-0.75	4.84	3.38	6.63
0	-0.25	8.47	5.91	12.54
0.5	0.25	14.21	9.91	22.46
1	0.75	32.57	22.72	45.18
1.5	1.25	52.29	36.48	81.66
2	1.75	21.82	15.22	96.88
2.5	2.25	4.29	2.99	99.87
3	2.75	0.17	0.12	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.040
5	-0.990
16	-0.075
25	0.305
50	0.815
75	1.160
84	1.325
95	1.690
99	2.105

Moment Measures	(phi)	(mm)
Mean	0.897	0.537
Standard Deviation	0.797	0.575
Skewness	-1.194	
Kurtosis	4.903	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.625	0.688
Standard Deviation	0.700	0.756
Skewness (1)	-0.271	-0.309
Skewness (2)	-0.664	
Kurtosis	0.914	1.285



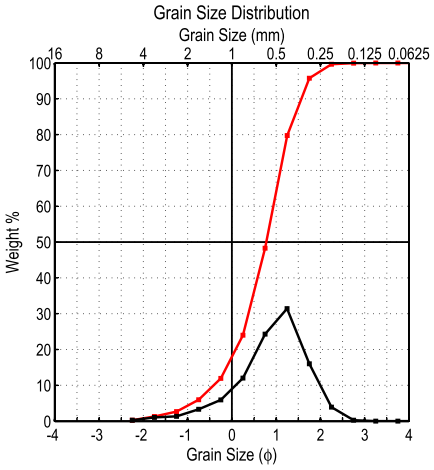
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**BC-E9h**
Interval	**Grab**
Mean	**0.515 mm**
STD	**0.535 mm**
Skewness	**-1.144**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	127.17
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	11.99

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.95	1.53	1.53
-1.5	-1.75	1.65	1.30	2.83
-1	-1.25	1.44	1.13	3.96
-0.5	-0.75	3.12	2.45	6.42
0	-0.25	7.09	5.58	11.99
0.5	0.25	14.21	11.17	23.17
1	0.75	27.08	21.29	44.46
1.5	1.25	35.27	27.73	72.19
2	1.75	26.25	20.64	92.84
2.5	2.25	8.14	6.40	99.24
3	2.75	0.78	0.61	99.85
3.5	3.25	0.14	0.11	99.96
4	3.75	0.04	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.040
16	-0.070
25	0.295
50	0.850
75	1.320
84	1.535
95	1.920
99	2.230

Moment Measures	(phi)	(mm)
Mean	0.958	0.515
Standard Deviation	0.903	0.535
Skewness	-1.144	
Kurtosis	5.012	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.732	0.772
Standard Deviation	0.803	0.850
Skewness (1)	-0.146	-0.212
Skewness (2)	-0.511	
Kurtosis	0.844	1.184



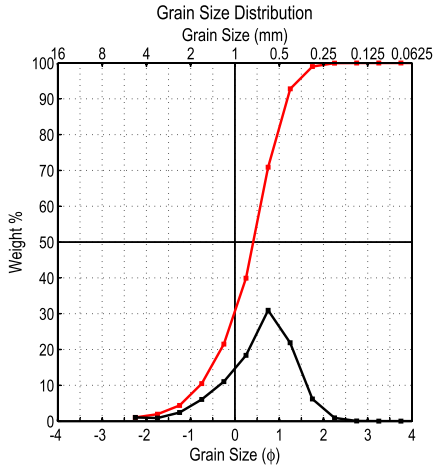
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**BC-E9i**
Interval	**Grab**
Mean	**0.535 mm**
STD	**0.577 mm**
Skewness	**-0.919**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	107.72
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	11.95

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.30	0.28	0.28
-1.5	-1.75	1.13	1.05	1.33
-1	-1.25	1.44	1.34	2.66
-0.5	-0.75	3.58	3.32	5.99
0	-0.25	6.42	5.96	11.95
0.5	0.25	12.97	12.04	23.99
1	0.75	26.18	24.30	48.29
1.5	1.25	33.86	31.43	79.73
2	1.75	17.26	16.02	95.75
2.5	2.25	4.21	3.91	99.66
3	2.75	0.32	0.30	99.95
3.5	3.25	0.03	0.03	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.905
5	-0.900
16	-0.080
25	0.270
50	0.775
75	1.175
84	1.385
95	1.725
99	2.165

Moment Measures	(phi)	(mm)
Mean	0.902	0.535
Standard Deviation	0.792	0.577
Skewness	-0.919	
Kurtosis	4.397	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.652	0.693
Standard Deviation	0.732	0.764
Skewness (1)	-0.167	-0.222
Skewness (2)	-0.495	
Kurtosis	0.792	1.189



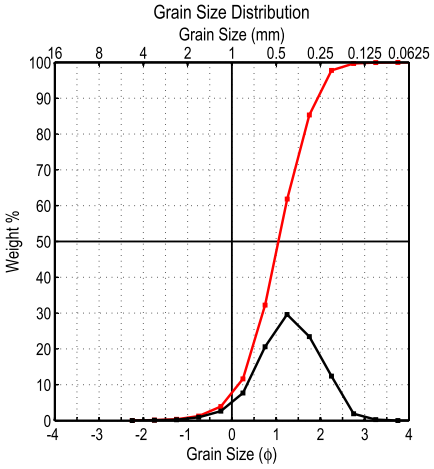
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2012**
Station	**BC-E9j**
Interval	**Grab**
Mean	**0.688 mm**
STD	**0.574 mm**
Skewness	**-0.814**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	114.95
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	21.52

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.23	1.07	1.07
-1.5	-1.75	1.03	0.90	1.97
-1	-1.25	2.81	2.44	4.41
-0.5	-0.75	6.99	6.08	10.49
0	-0.25	12.68	11.03	21.52
0.5	0.25	21.14	18.39	39.91
1	0.75	35.60	30.97	70.88
1.5	1.25	25.18	21.91	92.79
2	1.75	7.14	6.21	99.00
2.5	2.25	1.06	0.92	99.92
3	2.75	0.06	0.05	99.97
3.5	3.25	0.01	0.01	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.200
16	-0.500
25	-0.155
50	0.415
75	0.845
84	1.050
95	1.430
99	1.750

Moment Measures	(phi)	(mm)
Mean	0.540	0.688
Standard Deviation	0.801	0.574
Skewness	-0.814	
Kurtosis	4.060	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.275	0.322
Standard Deviation	0.775	0.786
Skewness (1)	-0.181	-0.204
Skewness (2)	-0.387	
Kurtosis	0.697	1.078



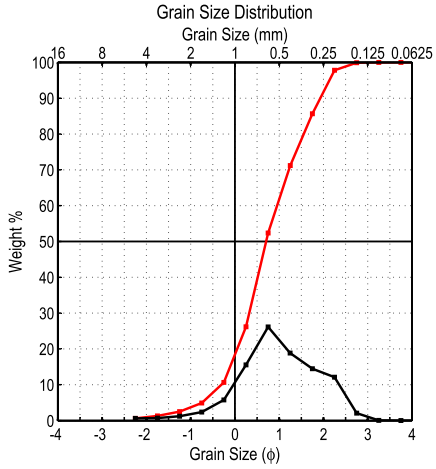
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NSS-01a**
Interval	**Swash**
Mean	**0.412 mm**
STD	**0.615 mm**
Skewness	**-0.377**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	104.67
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	3.92

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.01	0.01	0.01
-1.5	-1.75	0.13	0.12	0.13
-1	-1.25	0.23	0.22	0.35
-0.5	-0.75	0.97	0.93	1.28
0	-0.25	2.76	2.64	3.92
0.5	0.25	8.08	7.72	11.64
1	0.75	21.58	20.62	32.25
1.5	1.25	30.99	29.61	61.86
2	1.75	24.55	23.45	85.32
2.5	2.25	13.02	12.44	97.75
3	2.75	2.02	1.93	99.68
3.5	3.25	0.27	0.26	99.94
4	3.75	0.03	0.03	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-0.900
5	-0.180
16	0.355
25	0.575
50	1.050
75	1.530
84	1.720
95	2.140
99	2.575

Moment Measures	(phi)	(mm)
Mean	1.279	0.412
Standard Deviation	0.701	0.615
Skewness	-0.377	
Kurtosis	3.717	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.037	1.042
Standard Deviation	0.682	0.693
Skewness (1)	-0.018	-0.039
Skewness (2)	-0.103	
Kurtosis	0.700	0.996



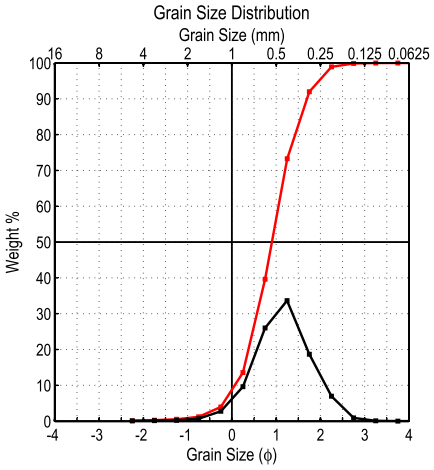
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NSS-01b**
Interval	**LTT**
Mean	**0.505 mm**
STD	**0.538 mm**
Skewness	**-0.468**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	123.75
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	10.67

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.76	0.61	0.61
-1.5	-1.75	0.87	0.70	1.32
-1	-1.25	1.50	1.21	2.53
-0.5	-0.75	2.95	2.38	4.91
0	-0.25	7.12	5.75	10.67
0.5	0.25	19.22	15.53	26.20
1	0.75	32.35	26.14	52.34
1.5	1.25	23.33	18.85	71.19
2	1.75	17.90	14.46	85.66
2.5	2.25	15.00	12.12	97.78
3	2.75	2.60	2.10	99.88
3.5	3.25	0.10	0.08	99.96
4	3.75	0.03	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.975
5	-0.740
16	-0.080
25	0.210
50	0.705
75	1.380
84	1.695
95	2.135
99	2.540

Moment Measures	(phi)	(mm)
Mean	0.985	0.505
Standard Deviation	0.895	0.538
Skewness	-0.468	
Kurtosis	3.720	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.807	0.773
Standard Deviation	0.887	0.879
Skewness (1)	0.115	0.055
Skewness (2)	-0.008	
Kurtosis	0.620	1.007



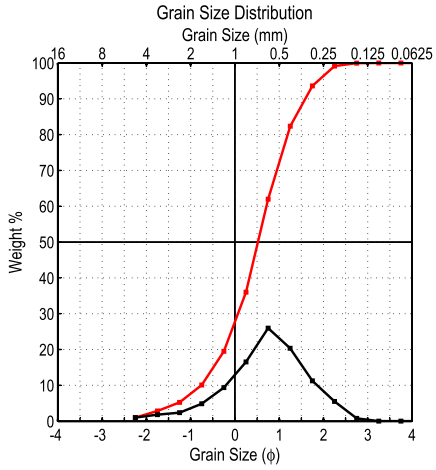
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NSS-02a**
Interval	**Swash**
Mean	**0.456 mm**
STD	**0.636 mm**
Skewness	**-0.403**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	117.06
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	3.97

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.12	0.10	0.10
-1.5	-1.75	0.19	0.16	0.26
-1	-1.25	0.30	0.26	0.52
-0.5	-0.75	0.82	0.70	1.22
0	-0.25	3.22	2.75	3.97
0.5	0.25	11.25	9.61	13.58
1	0.75	30.47	26.03	39.61
1.5	1.25	39.39	33.65	73.26
2	1.75	21.86	18.67	91.94
2.5	2.25	8.17	6.98	98.92
3	2.75	1.08	0.92	99.84
3.5	3.25	0.14	0.12	99.96
4	3.75	0.02	0.02	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-0.910
5	-0.195
16	0.295
25	0.470
50	0.905
75	1.295
84	1.540
95	1.970
99	2.295

Moment Measures	(phi)	(mm)
Mean	1.134	0.456
Standard Deviation	0.653	0.636
Skewness	-0.403	
Kurtosis	4.609	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.917	0.913
Standard Deviation	0.623	0.639
Skewness (1)	0.020	0.002
Skewness (2)	-0.028	
Kurtosis	0.739	1.076



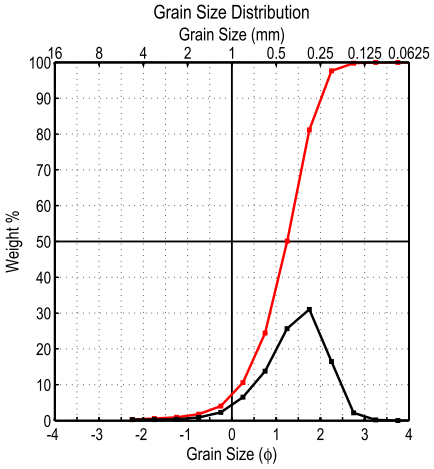
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NSS-02b**
Interval	**LTT**
Mean	**0.619 mm**
STD	**0.524 mm**
Skewness	**-0.580**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.74
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	19.49

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.23	1.03	1.03
-1.5	-1.75	2.20	1.84	2.86
-1	-1.25	2.85	2.38	5.24
-0.5	-0.75	5.83	4.87	10.11
0	-0.25	11.23	9.38	19.49
0.5	0.25	19.78	16.52	36.01
1	0.75	31.08	25.96	61.97
1.5	1.25	24.39	20.37	82.34
2	1.75	13.48	11.26	93.59
2.5	2.25	6.61	5.52	99.11
3	2.75	0.96	0.80	99.92
3.5	3.25	0.05	0.04	99.96
4	3.75	0.02	0.02	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-1.300
16	-0.435
25	-0.085
50	0.520
75	1.070
84	1.325
95	1.875
99	2.240

Moment Measures	(phi)	(mm)
Mean	0.692	0.619
Standard Deviation	0.933	0.524
Skewness	-0.580	
Kurtosis	3.633	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.445	0.470
Standard Deviation	0.880	0.921
Skewness (1)	-0.085	-0.116
Skewness (2)	-0.264	
Kurtosis	0.804	1.127



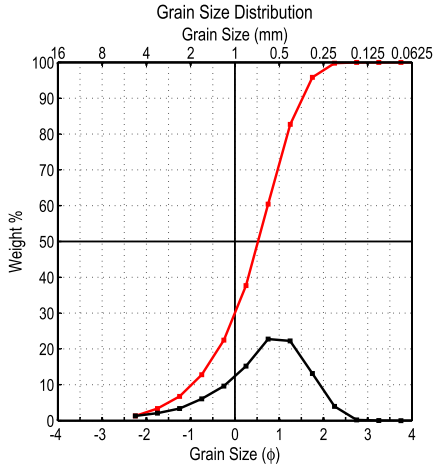
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NSS-03a**
Interval	**Swash**
Mean	**0.381 mm**
STD	**0.599 mm**
Skewness	**-1.039**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	121.82
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	4.06

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.34	0.28	0.28
-1.5	-1.75	0.34	0.28	0.56
-1	-1.25	0.44	0.36	0.92
-0.5	-0.75	1.06	0.87	1.79
0	-0.25	2.77	2.27	4.06
0.5	0.25	7.99	6.56	10.62
1	0.75	16.81	13.80	24.42
1.5	1.25	31.27	25.67	50.09
2	1.75	37.83	31.05	81.14
2.5	2.25	20.07	16.48	97.62
3	2.75	2.63	2.16	99.78
3.5	3.25	0.23	0.19	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.205
5	-0.180
16	0.445
25	0.760
50	1.250
75	1.650
84	1.835
95	2.170
99	2.570

Moment Measures	(phi)	(mm)
Mean	1.394	0.381
Standard Deviation	0.740	0.599
Skewness	-1.039	
Kurtosis	5.429	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.140	1.177
Standard Deviation	0.695	0.704
Skewness (1)	-0.158	-0.188
Skewness (2)	-0.367	
Kurtosis	0.691	1.082



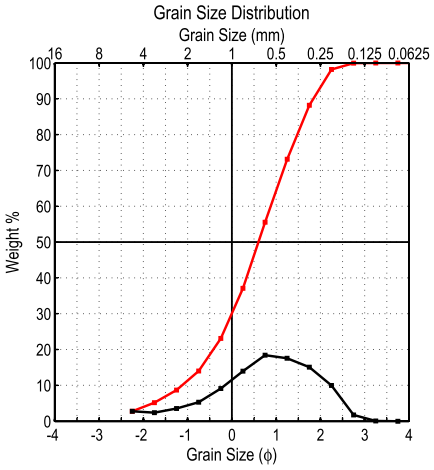
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NSS-03b**
Interval	**LTT**
Mean	**0.644 mm**
STD	**0.514 mm**
Skewness	**-0.713**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	111.63
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	22.45

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.45	1.30	1.30
-1.5	-1.75	2.33	2.09	3.39
-1	-1.25	3.75	3.36	6.75
-0.5	-0.75	6.78	6.07	12.82
0	-0.25	10.75	9.63	22.45
0.5	0.25	16.99	15.22	37.67
1	0.75	25.42	22.77	60.44
1.5	1.25	24.84	22.25	82.69
2	1.75	14.67	13.14	95.83
2.5	2.25	4.41	3.95	99.79
3	2.75	0.23	0.21	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.510
16	-0.585
25	-0.165
50	0.520
75	1.075
84	1.300
95	1.720
99	2.150

Moment Measures	(phi)	(mm)
Mean	0.634	0.644
Standard Deviation	0.961	0.514
Skewness	-0.713	
Kurtosis	3.317	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.357	0.412
Standard Deviation	0.942	0.961
Skewness (1)	-0.172	-0.215
Skewness (2)	-0.440	
Kurtosis	0.714	1.068



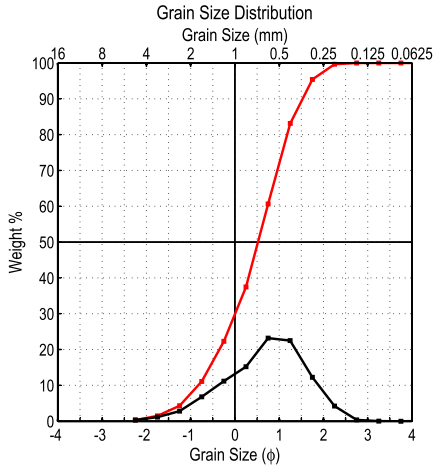
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NSS-04a**
Interval	**Swash**
Mean	**0.607 mm**
STD	**0.457 mm**
Skewness	**-0.636**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	105.96
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	23.12

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.95	2.78	2.78
-1.5	-1.75	2.53	2.39	5.17
-1	-1.25	3.74	3.53	8.70
-0.5	-0.75	5.61	5.29	14.00
0	-0.25	9.67	9.13	23.12
0.5	0.25	14.80	13.97	37.09
1	0.75	19.54	18.44	55.53
1.5	1.25	18.62	17.57	73.10
2	1.75	15.98	15.08	88.18
2.5	2.25	10.59	9.99	98.18
3	2.75	1.84	1.74	99.92
3.5	3.25	0.09	0.08	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.785
16	-0.640
25	-0.185
50	0.600
75	1.315
84	1.610
95	2.090
99	2.485

Moment Measures	(phi)	(mm)
Mean	0.721	0.607
Standard Deviation	1.131	0.457
Skewness	-0.636	
Kurtosis	3.044	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.485	0.523
Standard Deviation	1.125	1.150
Skewness (1)	-0.102	-0.167
Skewness (2)	-0.398	
Kurtosis	0.722	1.059



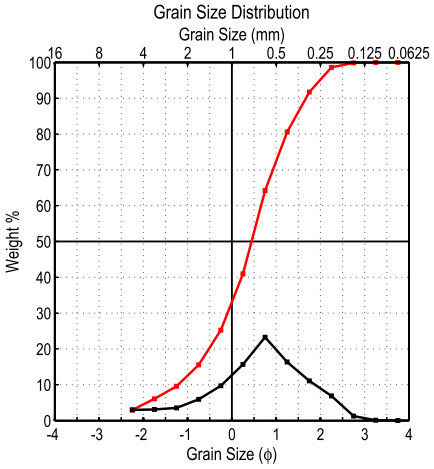
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NSS-04b**
Interval	**LTT**
Mean	**0.628 mm**
STD	**0.538 mm**
Skewness	**-0.471**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	122.74
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	22.27

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.41	0.33	0.33
-1.5	-1.75	1.40	1.14	1.47
-1	-1.25	3.46	2.82	4.29
-0.5	-0.75	8.36	6.81	11.10
0	-0.25	13.71	11.17	22.27
0.5	0.25	18.65	15.19	37.47
1	0.75	28.44	23.17	60.64
1.5	1.25	27.61	22.49	83.14
2	1.75	15.04	12.25	95.39
2.5	2.25	5.20	4.24	99.63
3	2.75	0.43	0.35	99.98
3.5	3.25	0.02	0.02	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.960
5	-1.200
16	-0.530
25	-0.160
50	0.520
75	1.070
84	1.285
95	1.735
99	2.175

Moment Measures	(phi)	(mm)
Mean	0.672	0.628
Standard Deviation	0.895	0.538
Skewness	-0.471	
Kurtosis	2.997	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.378	0.425
Standard Deviation	0.907	0.898
Skewness (1)	-0.157	-0.165
Skewness (2)	-0.278	
Kurtosis	0.617	0.978



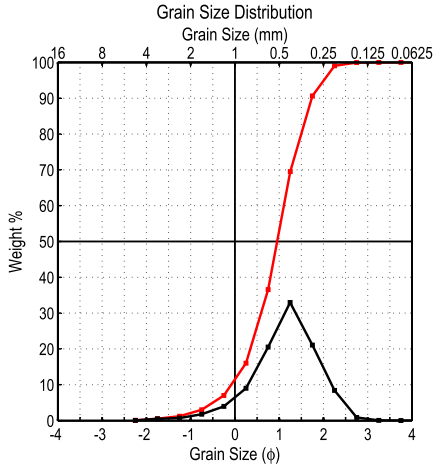
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NSS-05a**
Interval	**Swash**
Mean	**0.672 mm**
STD	**0.467 mm**
Skewness	**-0.567**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	108.76
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	25.25

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.23	2.97	2.97
-1.5	-1.75	3.38	3.11	6.08
-1	-1.25	3.84	3.53	9.61
-0.5	-0.75	6.45	5.93	15.54
0	-0.25	10.56	9.71	25.25
0.5	0.25	17.07	15.70	40.94
1	0.75	25.30	23.26	64.21
1.5	1.25	17.81	16.38	80.58
2	1.75	12.08	11.11	91.69
2.5	2.25	7.51	6.91	98.59
3	2.75	1.39	1.28	99.87
3.5	3.25	0.13	0.12	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.925
16	-0.725
25	-0.265
50	0.445
75	1.080
84	1.405
95	1.990
99	2.410

Moment Measures	(phi)	(mm)
Mean	0.573	0.672
Standard Deviation	1.099	0.467
Skewness	-0.567	
Kurtosis	3.126	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.340	0.375
Standard Deviation	1.065	1.126
Skewness (1)	-0.099	-0.155
Skewness (2)	-0.387	
Kurtosis	0.838	1.193



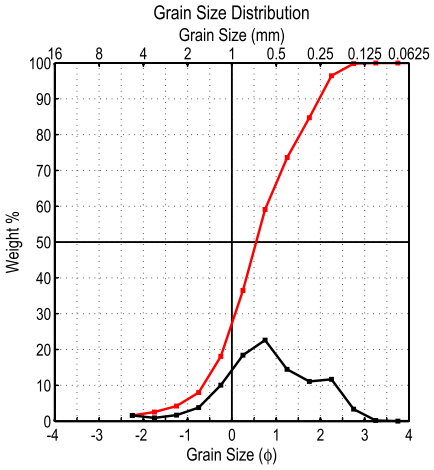
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NSS-05b**
Interval	**LTT**
Mean	**0.456 mm**
STD	**0.600 mm**
Skewness	**-0.785**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	144.94
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	7.00

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.07	0.05	0.05
-1.5	-1.75	0.69	0.48	0.52
-1	-1.25	1.03	0.71	1.23
-0.5	-0.75	2.59	1.79	3.02
0	-0.25	5.77	3.98	7.00
0.5	0.25	13.10	9.04	16.04
1	0.75	29.74	20.52	36.56
1.5	1.25	47.77	32.96	69.52
2	1.75	30.59	21.11	90.62
2.5	2.25	12.22	8.43	99.05
3	2.75	1.28	0.88	99.94
3.5	3.25	0.07	0.05	99.99
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.415
5	-0.500
16	0.250
25	0.470
50	0.955
75	1.380
84	1.595
95	2.010
99	2.245

Moment Measures	(phi)	(mm)
Mean	1.132	0.456
Standard Deviation	0.736	0.600
Skewness	-0.785	
Kurtosis	4.398	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.922	0.933
Standard Deviation	0.672	0.717
Skewness (1)	-0.048	-0.104
Skewness (2)	-0.297	
Kurtosis	0.866	1.130



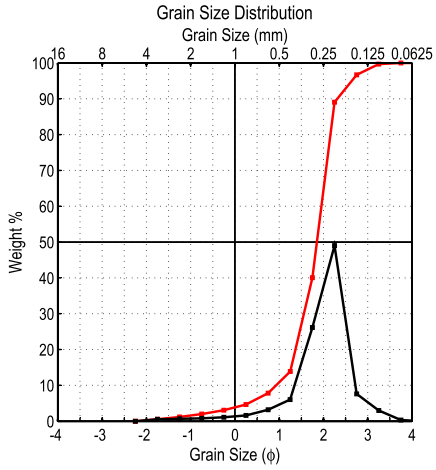
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-01a**
Interval	**Swash**
Mean	**0.563 mm**
STD	**0.491 mm**
Skewness	**-0.350**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	119.87
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	18.06

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.92	1.60	1.60
-1.5	-1.75	1.12	0.93	2.54
-1	-1.25	2.01	1.68	4.21
-0.5	-0.75	4.55	3.80	8.01
0	-0.25	12.05	10.05	18.06
0.5	0.25	22.07	18.41	36.47
1	0.75	27.14	22.64	59.11
1.5	1.25	17.37	14.49	73.60
2	1.75	13.31	11.10	84.71
2.5	2.25	14.02	11.70	96.40
3	2.75	4.06	3.39	99.79
3.5	3.25	0.23	0.19	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.145
16	-0.355
25	-0.060
50	0.550
75	1.315
84	1.720
95	2.190
99	2.635

Moment Measures	(phi)	(mm)
Mean	0.828	0.563
Standard Deviation	1.027	0.491
Skewness	-0.350	
Kurtosis	3.289	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.682	0.638
Standard Deviation	1.037	1.024
Skewness (1)	0.128	0.056
Skewness (2)	-0.027	
Kurtosis	0.607	0.994



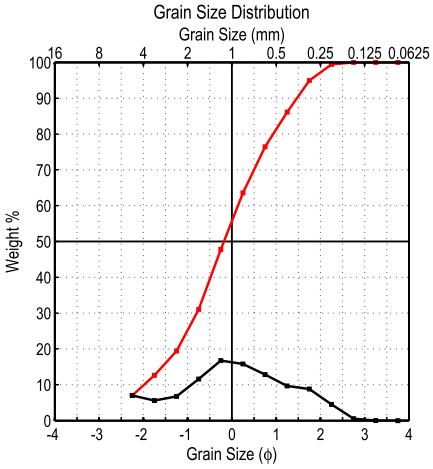
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-01b**
Interval	**LTT**
Mean	**0.258 mm**
STD	**0.602 mm**
Skewness	**-1.997**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	134.04
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	3.07

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.72	0.54	0.54
-1	-1.25	0.88	0.66	1.19
-0.5	-0.75	1.06	0.79	1.98
0	-0.25	1.46	1.09	3.07
0.5	0.25	2.14	1.60	4.67
1	0.75	4.26	3.18	7.85
1.5	1.25	8.10	6.04	13.89
2	1.75	35.07	26.16	40.06
2.5	2.25	65.68	49.00	89.06
3	2.75	10.21	7.62	96.67
3.5	3.25	4.00	2.98	99.66
4	3.75	0.44	0.33	99.99
>4.0	4.25	0.02	0.01	100.00

Percentiles	
1	-1.400
5	0.300
16	1.290
25	1.460
50	1.850
75	2.105
84	2.200
95	2.640
99	3.140

Moment Measures	(phi)	(mm)
Mean	1.957	0.258
Standard Deviation	0.733	0.602
Skewness	-1.997	
Kurtosis	9.562	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.745	1.780
Standard Deviation	0.455	0.582
Skewness (1)	-0.231	-0.278
Skewness (2)	-0.835	
Kurtosis	1.571	1.487



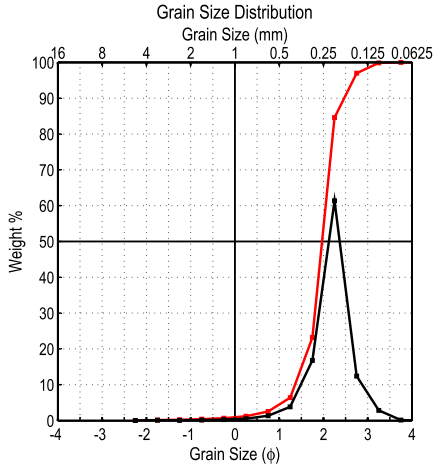
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-02a**
Interval	**Swash**
Mean	**0.960 mm**
STD	**0.430 mm**
Skewness	**-0.106**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	108.55
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	47.78

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	7.61	7.01	7.01
-1.5	-1.75	6.10	5.62	12.63
-1	-1.25	7.35	6.77	19.40
-0.5	-0.75	12.61	11.62	31.02
0	-0.25	18.19	16.76	47.78
0.5	0.25	17.15	15.80	63.57
1	0.75	13.97	12.87	76.44
1.5	1.25	10.52	9.69	86.14
2	1.75	9.55	8.80	94.93
2.5	2.25	4.89	4.50	99.44
3	2.75	0.58	0.53	99.97
3.5	3.25	0.03	0.03	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.500
25	-1.010
50	-0.180
75	0.695
84	1.140
95	1.755
99	2.200

Moment Measures	(phi)	(mm)
Mean	0.058	0.960
Standard Deviation	1.216	0.430
Skewness	-0.106	
Kurtosis	2.345	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.180	-0.180
Standard Deviation	1.320	1.267
Skewness (1)	-0.000	-0.017
Skewness (2)	-0.051	
Kurtosis	0.517	0.963



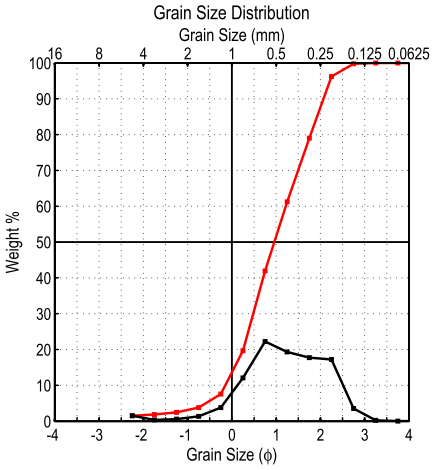
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-02b**
Interval	**LTT**
Mean	**0.222 mm**
STD	**0.704 mm**
Skewness	**-2.040**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	118.52
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	0.67

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.04	0.03	0.03
-1.5	-1.75	0.15	0.13	0.16
-1	-1.25	0.10	0.08	0.24
-0.5	-0.75	0.17	0.14	0.39
0	-0.25	0.33	0.28	0.67
0.5	0.25	0.65	0.55	1.21
1	0.75	1.61	1.36	2.57
1.5	1.25	4.53	3.82	6.40
2	1.75	19.91	16.80	23.19
2.5	2.25	72.74	61.37	84.57
3	2.75	14.72	12.42	96.99
3.5	3.25	3.38	2.85	99.84
4	3.75	0.18	0.15	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	0.055
5	1.065
16	1.535
25	1.765
50	1.970
75	2.170
84	2.245
95	2.670
99	3.105

Moment Measures	(phi)	(mm)
Mean	2.169	0.222
Standard Deviation	0.507	0.704
Skewness	-2.040	
Kurtosis	14.633	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.890	1.917
Standard Deviation	0.355	0.421
Skewness (1)	-0.225	-0.177
Skewness (2)	-0.289	
Kurtosis	1.261	1.624



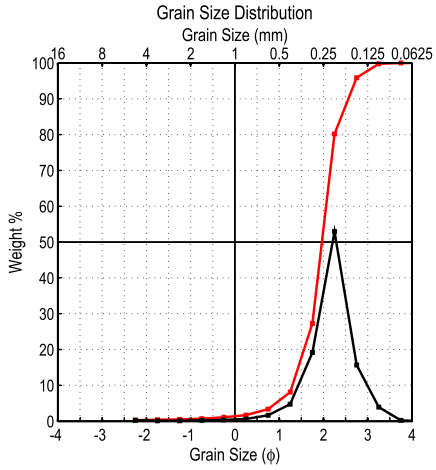
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-03a**
Interval	**Swash**
Mean	**0.443 mm**
STD	**0.524 mm**
Skewness	**-0.848**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	117.17
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.59

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.77	1.51	1.51
-1.5	-1.75	0.43	0.37	1.88
-1	-1.25	0.67	0.57	2.45
-0.5	-0.75	1.56	1.33	3.78
0	-0.25	4.46	3.81	7.59
0.5	0.25	14.16	12.09	19.67
1	0.75	26.07	22.25	41.92
1.5	1.25	22.62	19.31	61.23
2	1.75	20.80	17.75	78.98
2.5	2.25	20.17	17.21	96.19
3	2.75	4.17	3.56	99.75
3.5	3.25	0.27	0.23	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-0.590
16	0.100
25	0.370
50	0.960
75	1.640
84	1.895
95	2.215
99	2.645

Moment Measures	(phi)	(mm)
Mean	1.175	0.443
Standard Deviation	0.933	0.524
Skewness	-0.848	
Kurtosis	4.619	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.998	0.985
Standard Deviation	0.897	0.874
Skewness (1)	0.042	-0.032
Skewness (2)	-0.164	
Kurtosis	0.563	0.905



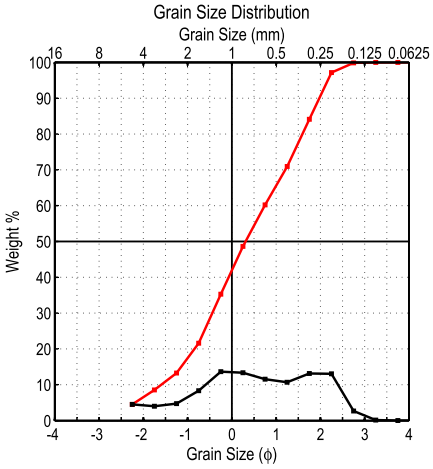
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-03b**
Interval	**LTT**
Mean	**0.225 mm**
STD	**0.659 mm**
Skewness	**-2.268**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	116.37
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	1.07

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.33	0.28	0.28
-1.5	-1.75	0.13	0.11	0.40
-1	-1.25	0.12	0.10	0.50
-0.5	-0.75	0.26	0.22	0.72
0	-0.25	0.41	0.35	1.07
0.5	0.25	0.74	0.64	1.71
1	0.75	1.94	1.67	3.38
1.5	1.25	5.53	4.75	8.13
2	1.75	22.27	19.14	27.27
2.5	2.25	61.57	52.91	80.17
3	2.75	18.25	15.68	95.86
3.5	3.25	4.56	3.92	99.77
4	3.75	0.25	0.21	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.355
5	0.920
16	1.455
25	1.690
50	1.965
75	2.200
84	2.370
95	2.725
99	3.150

Moment Measures	(phi)	(mm)
Mean	2.154	0.225
Standard Deviation	0.602	0.659
Skewness	-2.268	
Kurtosis	15.337	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.913	1.930
Standard Deviation	0.458	0.502
Skewness (1)	-0.115	-0.136
Skewness (2)	-0.311	
Kurtosis	0.973	1.450



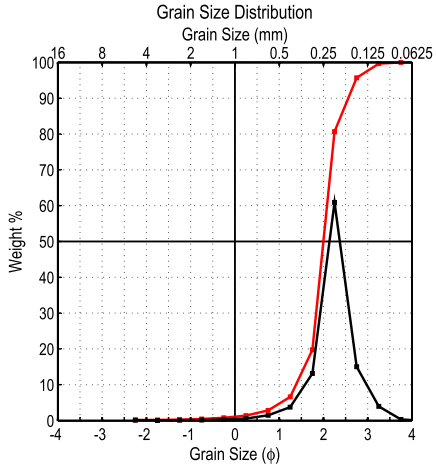
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-04a**
Interval	**Swash**
Mean	**0.693 mm**
STD	**0.402 mm**
Skewness	**-0.300**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	106.08
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	35.28

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	4.82	4.54	4.54
-1.5	-1.75	4.25	4.01	8.55
-1	-1.25	5.03	4.74	13.29
-0.5	-0.75	8.83	8.32	21.62
0	-0.25	14.49	13.66	35.28
0.5	0.25	14.17	13.36	48.63
1	0.75	12.28	11.58	60.21
1.5	1.25	11.37	10.72	70.93
2	1.75	13.96	13.16	84.09
2.5	2.25	13.84	13.05	97.13
3	2.75	2.86	2.70	99.83
3.5	3.25	0.16	0.15	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.195
16	-1.085
25	-0.625
50	0.310
75	1.405
84	1.745
95	2.170
99	2.595

Moment Measures	(phi)	(mm)
Mean	0.530	0.693
Standard Deviation	1.315	0.402
Skewness	-0.300	
Kurtosis	2.266	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.330	0.323
Standard Deviation	1.415	1.369
Skewness (1)	0.014	-0.067
Skewness (2)	-0.228	
Kurtosis	0.542	0.881



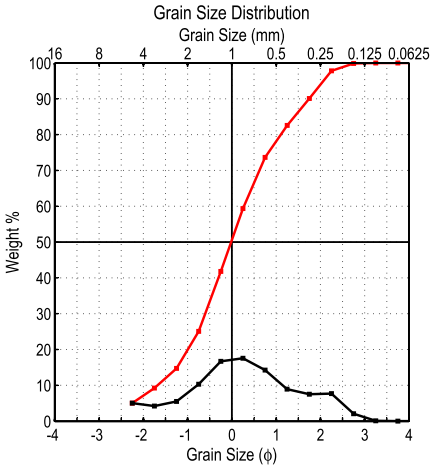
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-04b**
Interval	**LTT**
Mean	**0.216 mm**
STD	**0.687 mm**
Skewness	**-2.127**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	107.06
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	0.78

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.16	0.15	0.15
-1.5	-1.75	0.04	0.04	0.19
-1	-1.25	0.10	0.09	0.28
-0.5	-0.75	0.17	0.16	0.44
0	-0.25	0.36	0.34	0.78
0.5	0.25	0.64	0.60	1.37
1	0.75	1.60	1.49	2.87
1.5	1.25	4.04	3.77	6.64
2	1.75	14.06	13.13	19.77
2.5	2.25	65.19	60.89	80.67
3	2.75	16.08	15.02	95.68
3.5	3.25	4.25	3.97	99.65
4	3.75	0.36	0.34	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.060
5	1.035
16	1.605
25	1.795
50	2.000
75	2.205
84	2.360
95	2.725
99	3.170

Moment Measures	(phi)	(mm)
Mean	2.208	0.216
Standard Deviation	0.543	0.687
Skewness	-2.127	
Kurtosis	15.367	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.982	1.988
Standard Deviation	0.377	0.445
Skewness (1)	-0.046	-0.094
Skewness (2)	-0.318	
Kurtosis	1.238	1.689



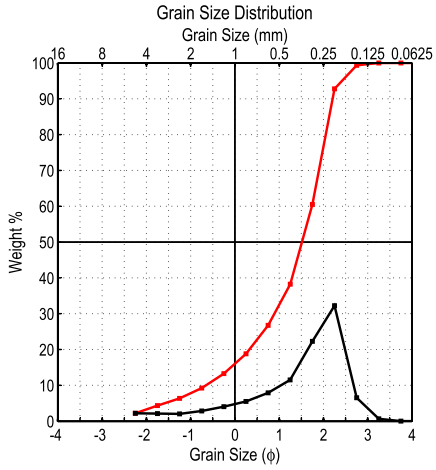
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-05a**
Interval	**Swash**
Mean	**0.838 mm**
STD	**0.428 mm**
Skewness	**-0.060**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	121.33
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	41.79

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.09	5.02	5.02
-1.5	-1.75	5.13	4.23	9.25
-1	-1.25	6.67	5.50	14.74
-0.5	-0.75	12.54	10.34	25.08
0	-0.25	20.27	16.71	41.79
0.5	0.25	21.31	17.56	59.35
1	0.75	17.31	14.27	73.62
1.5	1.25	10.86	8.95	82.57
2	1.75	9.11	7.51	90.08
2.5	2.25	9.36	7.71	97.79
3	2.75	2.52	2.08	99.87
3.5	3.25	0.14	0.12	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.190
25	-0.755
50	-0.015
75	0.825
84	1.345
95	2.070
99	2.540

Moment Measures	(phi)	(mm)
Mean	0.254	0.838
Standard Deviation	1.223	0.428
Skewness	-0.060	
Kurtosis	2.536	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.077	0.047
Standard Deviation	1.267	1.288
Skewness (1)	0.073	0.019
Skewness (2)	-0.059	
Kurtosis	0.704	1.121



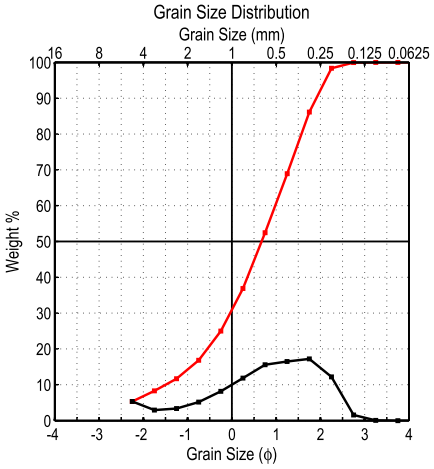
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-05b**
Interval	**LTT**
Mean	**0.381 mm**
STD	**0.440 mm**
Skewness	**-1.348**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	113.59
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	13.29

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.53	2.23	2.23
-1.5	-1.75	2.41	2.12	4.35
-1	-1.25	2.31	2.03	6.38
-0.5	-0.75	3.26	2.87	9.25
0	-0.25	4.59	4.04	13.29
0.5	0.25	6.28	5.53	18.82
1	0.75	9.00	7.92	26.75
1.5	1.25	13.07	11.51	38.25
2	1.75	25.30	22.27	60.53
2.5	2.25	36.63	32.25	92.77
3	2.75	7.45	6.56	99.33
3.5	3.25	0.74	0.65	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.590
16	-0.005
25	0.640
50	1.515
75	1.975
84	2.115
95	2.420
99	2.725

Moment Measures	(phi)	(mm)
Mean	1.390	0.381
Standard Deviation	1.185	0.440
Skewness	-1.348	
Kurtosis	4.282	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.055	1.208
Standard Deviation	1.060	1.138
Skewness (1)	-0.434	-0.491
Skewness (2)	-1.038	
Kurtosis	0.892	1.231



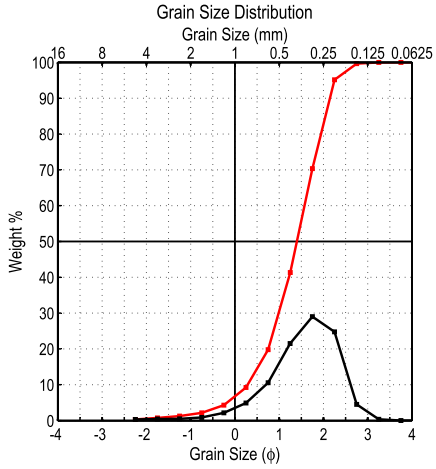
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-06a**
Interval	**Swash**
Mean	**0.615 mm**
STD	**0.418 mm**
Skewness	**-0.740**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	120.40
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	25.01

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.45	5.36	5.36
-1.5	-1.75	3.53	2.93	8.29
-1	-1.25	4.08	3.39	11.68
-0.5	-0.75	6.21	5.16	16.84
0	-0.25	9.84	8.17	25.01
0.5	0.25	14.27	11.85	36.86
1	0.75	18.75	15.57	52.43
1.5	1.25	19.85	16.49	68.92
2	1.75	20.73	17.22	86.14
2.5	2.25	14.71	12.22	98.36
3	2.75	1.90	1.58	99.93
3.5	3.25	0.08	0.07	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-0.830
25	-0.250
50	0.670
75	1.425
84	1.690
95	2.115
99	2.455

Moment Measures	(phi)	(mm)
Mean	0.701	0.615
Standard Deviation	1.258	0.418
Skewness	-0.740	
Kurtosis	2.857	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.430	0.510
Standard Deviation	1.260	1.291
Skewness (1)	-0.190	-0.264
Skewness (2)	-0.585	
Kurtosis	0.732	1.068



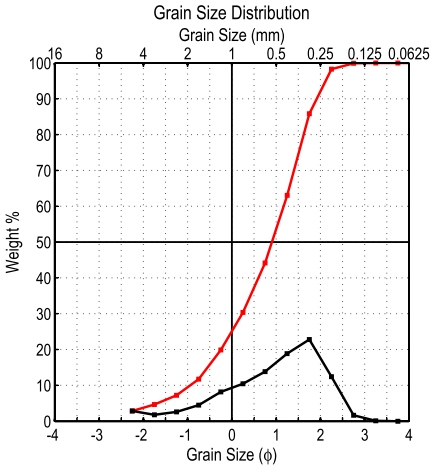
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-06b**
Interval	**LTT**
Mean	**0.347 mm**
STD	**0.577 mm**
Skewness	**-1.247**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	124.00
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	4.31

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.39	0.31	0.31
-1.5	-1.75	0.55	0.45	0.76
-1	-1.25	0.63	0.51	1.27
-0.5	-0.75	1.10	0.89	2.16
0	-0.25	2.67	2.15	4.31
0.5	0.25	6.10	4.92	9.23
1	0.75	13.11	10.57	19.80
1.5	1.25	26.69	21.52	41.32
2	1.75	35.98	29.02	70.34
2.5	2.25	30.73	24.78	95.12
3	2.75	5.60	4.52	99.64
3.5	3.25	0.44	0.35	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.515
5	-0.180
16	0.570
25	0.870
50	1.400
75	1.845
84	2.025
95	2.250
99	2.680

Moment Measures	(phi)	(mm)
Mean	1.529	0.347
Standard Deviation	0.793	0.577
Skewness	-1.247	
Kurtosis	5.783	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.297	1.332
Standard Deviation	0.728	0.732
Skewness (1)	-0.141	-0.221
Skewness (2)	-0.502	
Kurtosis	0.670	1.021



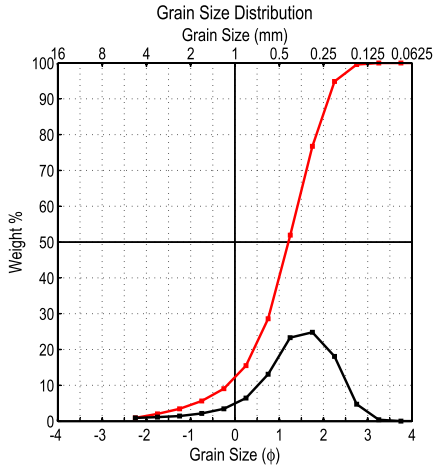
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-07a**
Interval	**Swash**
Mean	**0.532 mm**
STD	**0.456 mm**
Skewness	**-0.900**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	109.37
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	19.90

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.12	2.85	2.85
-1.5	-1.75	1.95	1.78	4.64
-1	-1.25	2.85	2.61	7.24
-0.5	-0.75	4.91	4.49	11.73
0	-0.25	8.93	8.16	19.90
0.5	0.25	11.44	10.46	30.36
1	0.75	15.11	13.82	44.17
1.5	1.25	20.62	18.85	63.02
2	1.75	24.94	22.80	85.83
2.5	2.25	13.59	12.43	98.25
3	2.75	1.80	1.65	99.90
3.5	3.25	0.11	0.10	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.680
16	-0.490
25	-0.005
50	0.905
75	1.515
84	1.710
95	2.120
99	2.475

Moment Measures	(phi)	(mm)
Mean	0.911	0.532
Standard Deviation	1.132	0.456
Skewness	-0.900	
Kurtosis	3.376	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.610	0.708
Standard Deviation	1.100	1.126
Skewness (1)	-0.268	-0.314
Skewness (2)	-0.623	
Kurtosis	0.727	1.025



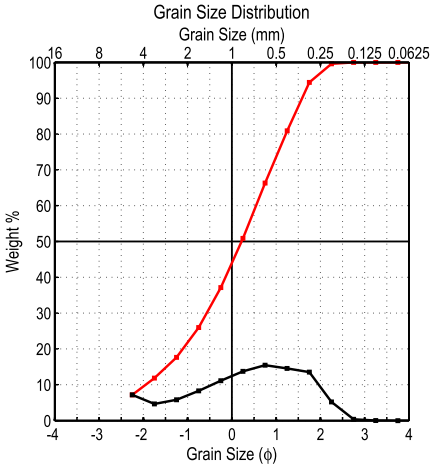
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-07b**
Interval	**LTT**
Mean	**0.404 mm**
STD	**0.513 mm**
Skewness	**-1.169**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	117.05
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	9.07

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.08	0.92	0.92
-1.5	-1.75	1.32	1.13	2.05
-1	-1.25	1.66	1.42	3.47
-0.5	-0.75	2.53	2.16	5.63
0	-0.25	4.03	3.44	9.07
0.5	0.25	7.54	6.44	15.51
1	0.75	15.33	13.10	28.61
1.5	1.25	27.30	23.32	51.94
2	1.75	29.04	24.81	76.74
2.5	2.25	21.16	18.08	94.82
3	2.75	5.55	4.74	99.56
3.5	3.25	0.48	0.41	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.215
5	-0.895
16	0.270
25	0.610
50	1.210
75	1.715
84	1.950
95	2.270
99	2.690

Moment Measures	(phi)	(mm)
Mean	1.308	0.404
Standard Deviation	0.963	0.513
Skewness	-1.169	
Kurtosis	4.853	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.110	1.143
Standard Deviation	0.840	0.900
Skewness (1)	-0.119	-0.225
Skewness (2)	-0.622	
Kurtosis	0.884	1.174



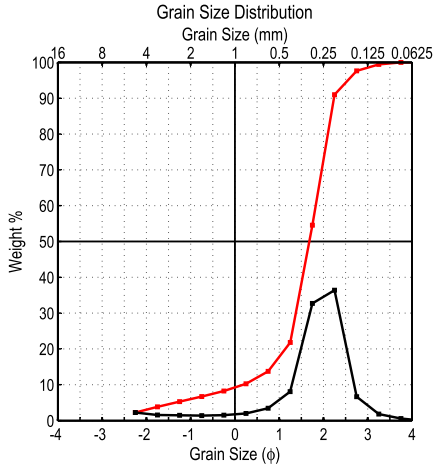
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-08a**
Interval	**Swash**
Mean	**0.817 mm**
STD	**0.416 mm**
Skewness	**-0.438**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	142.90
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	37.12

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	10.28	7.19	7.19
-1.5	-1.75	6.67	4.67	11.86
-1	-1.25	8.30	5.81	17.67
-0.5	-0.75	11.86	8.30	25.97
0	-0.25	15.93	11.15	37.12
0.5	0.25	19.62	13.73	50.85
1	0.75	22.10	15.47	66.31
1.5	1.25	20.80	14.56	80.87
2	1.75	19.33	13.53	94.39
2.5	2.25	7.45	5.21	99.61
3	2.75	0.53	0.37	99.98
3.5	3.25	0.03	0.02	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.395
25	-0.810
50	0.220
75	1.050
84	1.365
95	1.810
99	2.190

Moment Measures	(phi)	(mm)
Mean	0.291	0.817
Standard Deviation	1.264	0.416
Skewness	-0.438	
Kurtosis	2.312	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.015	0.063
Standard Deviation	1.380	1.305
Skewness (1)	-0.170	-0.194
Skewness (2)	-0.319	
Kurtosis	0.471	0.895



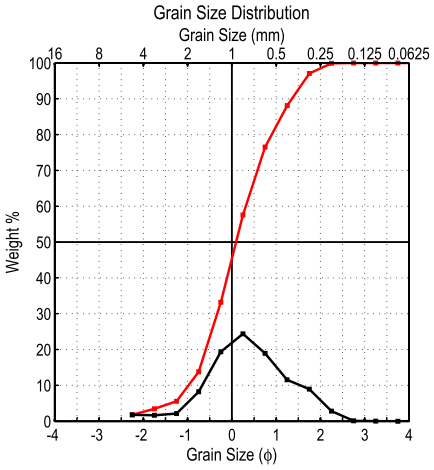
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-08b**
Interval	**LTT**
Mean	**0.313 mm**
STD	**0.475 mm**
Skewness	**-2.021**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	134.01
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	8.25

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.01	2.25	2.25
-1.5	-1.75	2.12	1.58	3.83
-1	-1.25	1.99	1.48	5.31
-0.5	-0.75	1.89	1.41	6.72
0	-0.25	2.05	1.53	8.25
0.5	0.25	2.69	2.01	10.26
1	0.75	4.65	3.47	13.73
1.5	1.25	10.84	8.09	21.82
2	1.75	43.86	32.73	54.55
2.5	2.25	48.80	36.42	90.96
3	2.75	8.92	6.66	97.62
3.5	3.25	2.43	1.81	99.43
4	3.75	0.76	0.57	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.355
16	0.890
25	1.300
50	1.680
75	2.030
84	2.155
95	2.555
99	3.130

Moment Measures	(phi)	(mm)
Mean	1.676	0.313
Standard Deviation	1.073	0.475
Skewness	-2.021	
Kurtosis	7.357	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.523	1.575
Standard Deviation	0.633	0.909
Skewness (1)	-0.249	-0.401
Skewness (2)	-1.708	
Kurtosis	2.091	2.195



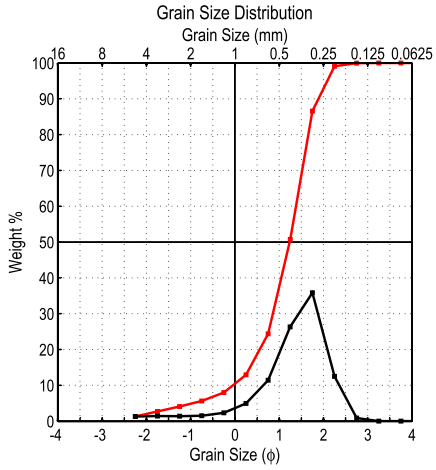
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-09a**
Interval	**Swash**
Mean	**0.776 mm**
STD	**0.532 mm**
Skewness	**-0.248**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	117.41
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	33.17

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.10	1.79	1.79
-1.5	-1.75	1.95	1.66	3.45
-1	-1.25	2.49	2.12	5.57
-0.5	-0.75	9.67	8.24	13.81
0	-0.25	22.74	19.37	33.17
0.5	0.25	28.64	24.39	57.57
1	0.75	22.26	18.96	76.53
1.5	1.25	13.57	11.56	88.08
2	1.75	10.52	8.96	97.04
2.5	2.25	3.32	2.83	99.87
3	2.75	0.13	0.11	99.98
3.5	3.25	0.01	0.01	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.385
16	-0.695
25	-0.460
50	0.095
75	0.710
84	1.075
95	1.635
99	2.095

Moment Measures	(phi)	(mm)
Mean	0.366	0.776
Standard Deviation	0.911	0.532
Skewness	-0.248	
Kurtosis	3.326	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.190	0.158
Standard Deviation	0.885	0.900
Skewness (1)	0.107	0.064
Skewness (2)	0.034	
Kurtosis	0.706	1.058



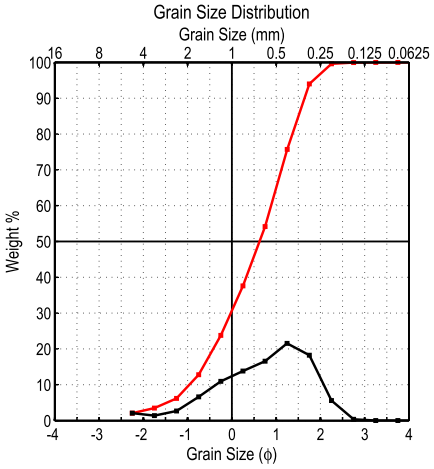
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-09b**
Interval	**LTT**
Mean	**0.414 mm**
STD	**0.537 mm**
Skewness	**-1.776**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	117.79
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.99

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.54	1.31	1.31
-1.5	-1.75	1.69	1.43	2.74
-1	-1.25	1.62	1.38	4.12
-0.5	-0.75	1.81	1.54	5.65
0	-0.25	2.75	2.33	7.99
0.5	0.25	5.83	4.95	12.94
1	0.75	13.47	11.44	24.37
1.5	1.25	31.02	26.34	50.71
2	1.75	42.24	35.86	86.57
2.5	2.25	14.71	12.49	99.06
3	2.75	1.05	0.89	99.95
3.5	3.25	0.05	0.04	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-0.965
16	0.385
25	0.760
50	1.235
75	1.590
84	1.715
95	2.090
99	2.250

Moment Measures	(phi)	(mm)
Mean	1.273	0.414
Standard Deviation	0.896	0.537
Skewness	-1.776	
Kurtosis	6.813	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.050	1.112
Standard Deviation	0.665	0.795
Skewness (1)	-0.278	-0.359
Skewness (2)	-1.011	
Kurtosis	1.297	1.508



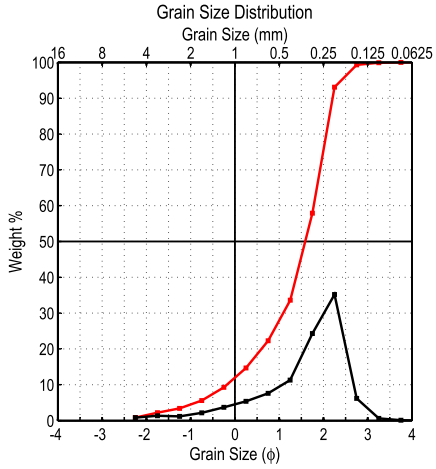
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-10a**
Interval	**Swash**
Mean	**0.614 mm**
STD	**0.490 mm**
Skewness	**-0.707**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	126.57
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	23.78

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.66	2.10	2.10
-1.5	-1.75	1.79	1.41	3.52
-1	-1.25	3.39	2.68	6.19
-0.5	-0.75	8.38	6.62	12.82
0	-0.25	13.88	10.97	23.78
0.5	0.25	17.50	13.83	37.61
1	0.75	20.96	16.56	54.17
1.5	1.25	27.27	21.55	75.71
2	1.75	23.13	18.27	93.99
2.5	2.25	7.07	5.59	99.57
3	2.75	0.48	0.38	99.95
3.5	3.25	0.05	0.04	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.475
16	-0.605
25	-0.205
50	0.625
75	1.235
84	1.475
95	1.840
99	2.200

Moment Measures	(phi)	(mm)
Mean	0.703	0.614
Standard Deviation	1.028	0.490
Skewness	-0.707	
Kurtosis	3.173	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.435	0.498
Standard Deviation	1.040	1.022
Skewness (1)	-0.183	-0.225
Skewness (2)	-0.425	
Kurtosis	0.594	0.943



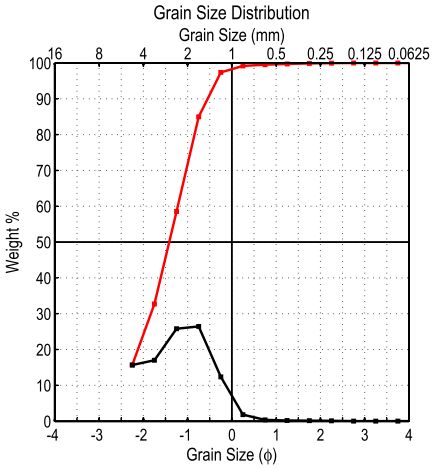
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**NHB-10b**
Interval	**LTT**
Mean	**0.344 mm**
STD	**0.493 mm**
Skewness	**-1.456**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	112.42
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	9.30

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.94	0.84	0.84
-1.5	-1.75	1.54	1.37	2.21
-1	-1.25	1.35	1.20	3.41
-0.5	-0.75	2.45	2.18	5.59
0	-0.25	4.17	3.71	9.30
0.5	0.25	6.06	5.39	14.69
1	0.75	8.56	7.61	22.30
1.5	1.25	12.71	11.31	33.61
2	1.75	27.31	24.29	57.90
2.5	2.25	39.56	35.19	93.09
3	2.75	6.96	6.19	99.28
3.5	3.25	0.70	0.62	99.90
4	3.75	0.10	0.09	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.190
5	-0.885
16	0.335
25	0.870
50	1.585
75	1.995
84	2.120
95	2.405
99	2.725

Moment Measures	(phi)	(mm)
Mean	1.540	0.344
Standard Deviation	1.022	0.493
Skewness	-1.456	
Kurtosis	5.065	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.228	1.347
Standard Deviation	0.893	0.945
Skewness (1)	-0.401	-0.451
Skewness (2)	-0.924	
Kurtosis	0.843	1.199



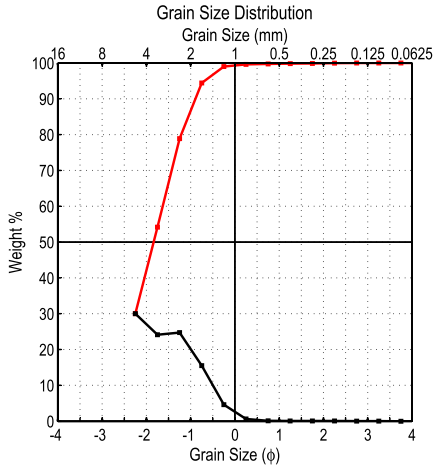
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**KH-01a**
Interval	**Swash**
Mean	**2.277 mm**
STD	**0.616 mm**
Skewness	**0.400**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	126.93
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	97.36

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	19.92	15.69	15.69
-1.5	-1.75	21.61	17.03	32.72
-1	-1.25	32.77	25.82	58.54
-0.5	-0.75	33.55	26.43	84.97
0	-0.25	15.73	12.39	97.36
0.5	0.25	2.31	1.82	99.18
1	0.75	0.44	0.35	99.53
1.5	1.25	0.22	0.17	99.70
2	1.75	0.19	0.15	99.85
2.5	2.25	0.12	0.09	99.94
3	2.75	0.03	0.02	99.97
3.5	3.25	0.02	0.02	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.240
25	-1.975
50	-1.415
75	-0.940
84	-0.770
95	-0.345
99	0.200

Moment Measures	(phi)	(mm)
Mean	-1.187	2.277
Standard Deviation	0.698	0.616
Skewness	0.400	
Kurtosis	4.152	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.505	-1.475
Standard Deviation	0.735	0.656
Skewness (1)	-0.122	0.000
Skewness (2)	0.160	
Kurtosis	0.296	0.754



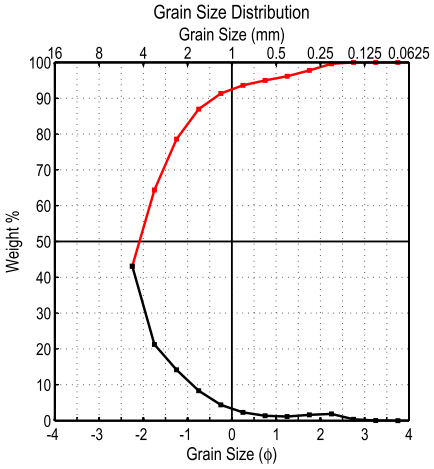
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**KH-01b**
Interval	**LTT**
Mean	**2.882 mm**
STD	**0.639 mm**
Skewness	**0.883**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Fine Skewed
	Leptokurtic
Total weight (gram)	148.67
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	99.00

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	44.62	30.01	30.01
-1.5	-1.75	35.87	24.13	54.14
-1	-1.25	36.79	24.75	78.89
-0.5	-0.75	23.07	15.52	94.40
0	-0.25	6.84	4.60	99.00
0.5	0.25	0.90	0.61	99.61
1	0.75	0.17	0.11	99.72
1.5	1.25	0.11	0.07	99.80
2	1.75	0.10	0.07	99.87
2.5	2.25	0.11	0.07	99.94
3	2.75	0.06	0.04	99.98
3.5	3.25	0.03	0.02	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.835
75	-1.330
84	-1.085
95	-0.685
99	-0.250

Moment Measures	(phi)	(mm)
Mean	-1.527	2.882
Standard Deviation	0.646	0.639
Skewness	0.883	
Kurtosis	4.979	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.668	-1.723
Standard Deviation	0.583	0.528
Skewness (1)	0.288	0.379
Skewness (2)	0.631	
Kurtosis	0.343	0.697



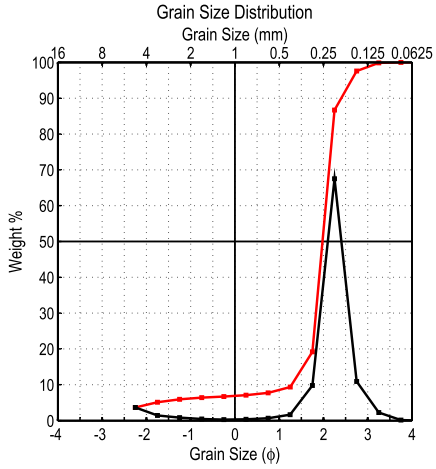
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**KH-02a**
Interval	**Swash**
Mean	**2.792 mm**
STD	**0.482 mm**
Skewness	**1.912**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Poorly Sorted
Poorly Graded	Strongly Fine Skewed
	Leptokurtic
Total weight (gram)	183.27
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	91.31

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	78.97	43.09	43.09
-1.5	-1.75	38.99	21.27	64.36
-1	-1.25	26.02	14.20	78.56
-0.5	-0.75	15.32	8.36	86.92
0	-0.25	8.05	4.39	91.31
0.5	0.25	4.20	2.29	93.61
1	0.75	2.49	1.36	94.96
1.5	1.25	2.12	1.16	96.12
2	1.75	2.98	1.63	97.75
2.5	2.25	3.40	1.86	99.60
3	2.75	0.70	0.38	99.98
3.5	3.25	0.03	0.02	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-2.090
75	-1.375
84	-0.925
95	0.765
99	2.090

Moment Measures	(phi)	(mm)
Mean	-1.481	2.792
Standard Deviation	1.054	0.482
Skewness	1.912	
Kurtosis	6.587	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.587	-1.755
Standard Deviation	0.663	0.788
Skewness (1)	0.758	0.826
Skewness (2)	2.034	
Kurtosis	1.275	1.412



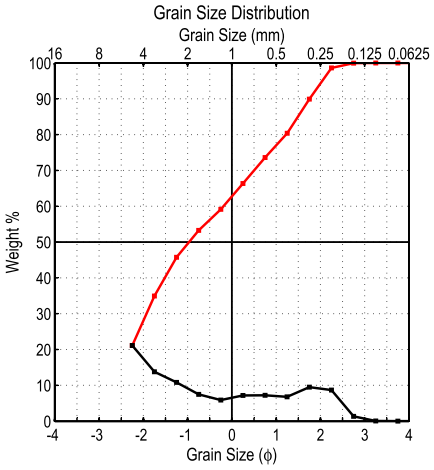
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**KH02b**
Interval	**LTT**
Mean	**0.255 mm**
STD	**0.470 mm**
Skewness	**-2.972**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	105.08
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	6.70

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.87	3.68	3.68
-1.5	-1.75	1.50	1.43	5.11
-1	-1.25	0.89	0.85	5.96
-0.5	-0.75	0.47	0.45	6.40
0	-0.25	0.31	0.30	6.70
0.5	0.25	0.40	0.38	7.08
1	0.75	0.70	0.67	7.75
1.5	1.25	1.73	1.65	9.39
2	1.75	10.29	9.79	19.19
2.5	2.25	70.91	67.48	86.67
3	2.75	11.48	10.93	97.59
3.5	3.25	2.36	2.25	99.84
4	3.75	0.15	0.14	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.790
16	1.585
25	1.795
50	1.980
75	2.165
84	2.230
95	2.630
99	3.065

Moment Measures	(phi)	(mm)
Mean	1.973	0.255
Standard Deviation	1.089	0.470
Skewness	-2.972	
Kurtosis	11.301	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.908	1.932
Standard Deviation	0.323	0.831
Skewness (1)	-0.225	-0.465
Skewness (2)	-4.837	
Kurtosis	5.853	4.896



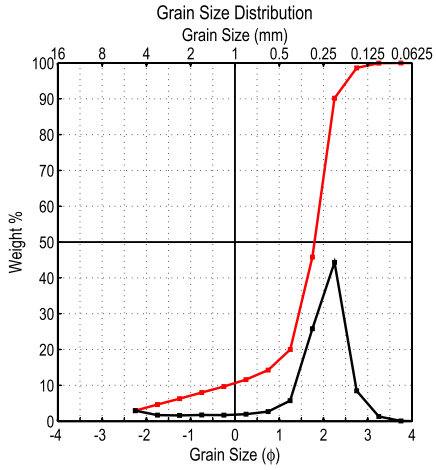
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**KH-03a**
Interval	**Swash**
Mean	**1.288 mm**
STD	**0.329 mm**
Skewness	**0.349**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	123.74
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	59.15

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	26.14	21.12	21.12
-1.5	-1.75	17.08	13.80	34.93
-1	-1.25	13.41	10.84	45.77
-0.5	-0.75	9.28	7.50	53.26
0	-0.25	7.28	5.88	59.15
0.5	0.25	8.90	7.19	66.34
1	0.75	8.96	7.24	73.58
1.5	1.25	8.42	6.80	80.39
2	1.75	11.76	9.50	89.89
2.5	2.25	10.77	8.70	98.59
3	2.75	1.65	1.33	99.93
3.5	3.25	0.08	0.06	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.110
50	-0.970
75	0.855
84	1.440
95	2.045
99	2.400

Moment Measures	(phi)	(mm)
Mean	-0.365	1.288
Standard Deviation	1.602	0.329
Skewness	0.349	
Kurtosis	1.699	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.405	-0.593
Standard Deviation	1.845	1.573
Skewness (1)	0.306	0.355
Skewness (2)	0.470	
Kurtosis	0.164	0.594



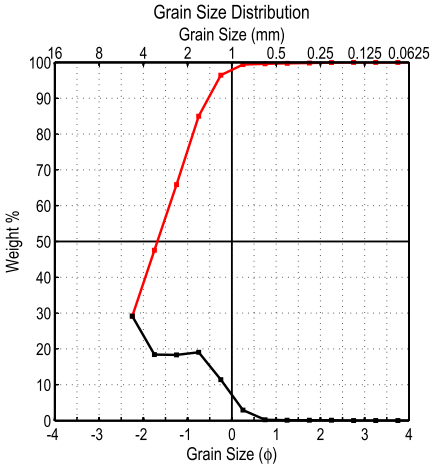
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**KH-03b**
Interval	**LTT**
Mean	**0.310 mm**
STD	**0.452 mm**
Skewness	**-2.088**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	114.56
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	9.68

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.37	2.94	2.94
-1.5	-1.75	1.95	1.70	4.64
-1	-1.25	1.86	1.62	6.27
-0.5	-0.75	1.98	1.73	8.00
0	-0.25	1.93	1.68	9.68
0.5	0.25	2.22	1.94	11.62
1	0.75	3.05	2.66	14.28
1.5	1.25	6.56	5.73	20.01
2	1.75	29.55	25.79	45.80
2.5	2.25	50.79	44.33	90.14
3	2.75	9.72	8.48	98.62
3.5	3.25	1.50	1.31	99.93
4	3.75	0.07	0.06	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.640
16	0.900
25	1.345
50	1.795
75	2.080
84	2.180
95	2.535
99	2.895

Moment Measures	(phi)	(mm)
Mean	1.690	0.310
Standard Deviation	1.144	0.452
Skewness	-2.088	
Kurtosis	6.931	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.540	1.625
Standard Deviation	0.640	0.953
Skewness (1)	-0.398	-0.522
Skewness (2)	-2.105	
Kurtosis	2.262	2.328



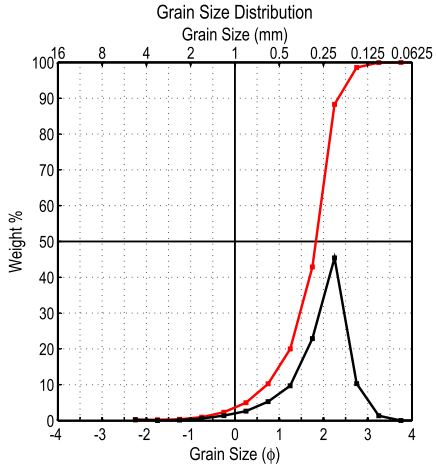
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**KH-04a**
Interval	**Swash**
Mean	**2.570 mm**
STD	**0.583 mm**
Skewness	**0.643**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	123.58
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	96.42

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	36.00	29.13	29.13
-1.5	-1.75	22.75	18.41	47.54
-1	-1.25	22.67	18.34	65.88
-0.5	-0.75	23.59	19.09	84.97
0	-0.25	14.14	11.44	96.42
0.5	0.25	3.65	2.95	99.37
1	0.75	0.30	0.24	99.61
1.5	1.25	0.12	0.10	99.71
2	1.75	0.13	0.11	99.81
2.5	2.25	0.14	0.11	99.93
3	2.75	0.05	0.04	99.97
3.5	3.25	0.02	0.02	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.685
75	-1.010
84	-0.775
95	-0.310
99	0.190

Moment Measures	(phi)	(mm)
Mean	-1.362	2.570
Standard Deviation	0.779	0.583
Skewness	0.643	
Kurtosis	3.518	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.513	-1.570
Standard Deviation	0.738	0.663
Skewness (1)	0.234	0.326
Skewness (2)	0.549	
Kurtosis	0.315	0.641



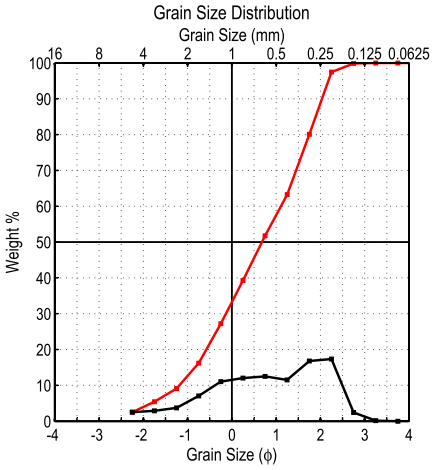
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**KH-04b**
Interval	**LTT**
Mean	**0.267 mm**
STD	**0.611 mm**
Skewness	**-1.593**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	105.82
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	2.35

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.23	0.22	0.22
-1.5	-1.75	0.03	0.03	0.25
-1	-1.25	0.14	0.13	0.38
-0.5	-0.75	0.63	0.60	0.97
0	-0.25	1.46	1.38	2.35
0.5	0.25	2.78	2.63	4.98
1	0.75	5.61	5.30	10.28
1.5	1.25	10.29	9.72	20.01
2	1.75	24.20	22.87	42.87
2.5	2.25	48.05	45.41	88.28
3	2.75	10.90	10.30	98.58
3.5	3.25	1.45	1.37	99.95
4	3.75	0.04	0.04	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.740
5	0.250
16	1.045
25	1.360
50	1.830
75	2.105
84	2.205
95	2.575
99	2.900

Moment Measures	(phi)	(mm)
Mean	1.904	0.267
Standard Deviation	0.710	0.611
Skewness	-1.593	
Kurtosis	7.234	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.625	1.693
Standard Deviation	0.580	0.642
Skewness (1)	-0.353	-0.356
Skewness (2)	-0.720	
Kurtosis	1.004	1.279



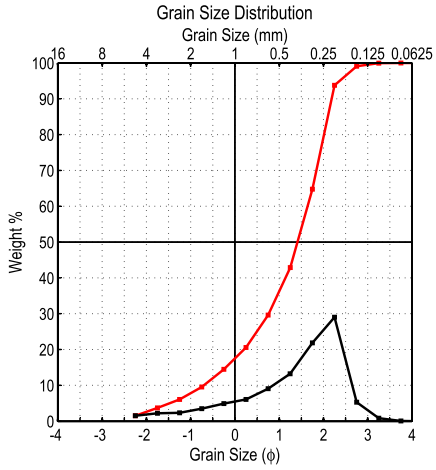
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**KH-05a**
Interval	**Swash**
Mean	**0.579 mm**
STD	**0.422 mm**
Skewness	**-0.515**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	126.31
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	27.22

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.19	2.53	2.53
-1.5	-1.75	3.65	2.89	5.42
-1	-1.25	4.67	3.70	9.11
-0.5	-0.75	8.94	7.08	16.19
0	-0.25	13.93	11.03	27.22
0.5	0.25	15.21	12.04	39.26
1	0.75	15.77	12.49	51.75
1.5	1.25	14.56	11.53	63.27
2	1.75	21.23	16.81	80.08
2.5	2.25	21.92	17.35	97.43
3	2.75	3.04	2.41	99.84
3.5	3.25	0.20	0.16	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.820
16	-0.765
25	-0.350
50	0.680
75	1.600
84	1.865
95	2.180
99	2.575

Moment Measures	(phi)	(mm)
Mean	0.790	0.579
Standard Deviation	1.244	0.422
Skewness	-0.515	
Kurtosis	2.458	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.550	0.593
Standard Deviation	1.315	1.264
Skewness (1)	-0.099	-0.174
Skewness (2)	-0.380	
Kurtosis	0.521	0.841



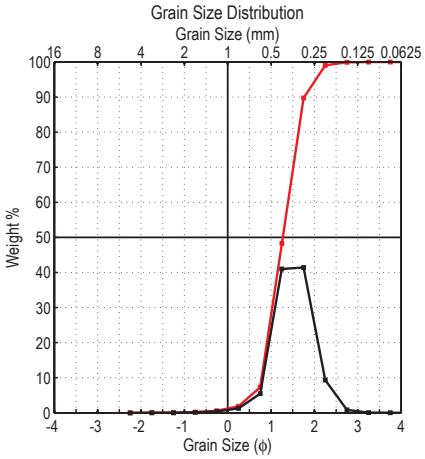
Project	**2203**
Location	**Nags Head NC**
Date	**Dec 2012**
Station	**KH-05b**
Interval	**LTT**
Mean	**0.400 mm**
STD	**0.445 mm**
Skewness	**-1.155**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	118.89
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	14.47

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.80	1.51	1.51
-1.5	-1.75	2.63	2.21	3.73
-1	-1.25	2.78	2.34	6.06
-0.5	-0.75	4.15	3.49	9.56
0	-0.25	5.84	4.91	14.47
0.5	0.25	7.24	6.09	20.56
1	0.75	10.80	9.08	29.64
1.5	1.25	15.74	13.24	42.88
2	1.75	26.00	21.87	64.75
2.5	2.25	34.51	29.03	93.78
3	2.75	6.30	5.30	99.07
3.5	3.25	1.00	0.84	99.92
4	3.75	0.07	0.06	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-1.480
16	-0.125
25	0.495
50	1.415
75	1.925
84	2.080
95	2.365
99	2.745

Moment Measures	(phi)	(mm)
Mean	1.321	0.400
Standard Deviation	1.168	0.445
Skewness	-1.155	
Kurtosis	3.809	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.978	1.123
Standard Deviation	1.103	1.134
Skewness (1)	-0.397	-0.451
Skewness (2)	-0.882	
Kurtosis	0.744	1.102



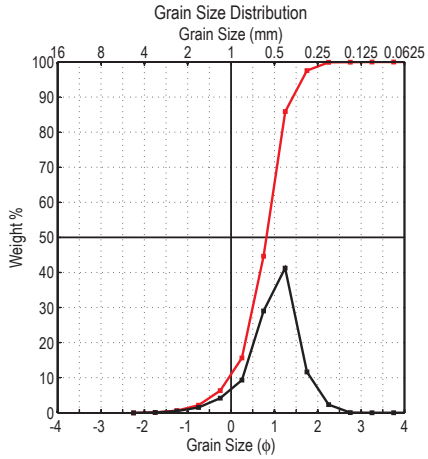
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**B2a**
Interval	**Grab**
Mean	**0.350 mm**
STD	**0.736 mm**
Skewness	**-0.475**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	121.83
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.59

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.02	0.02	0.02
-1	-1.25	0.03	0.02	0.04
-0.5	-0.75	0.19	0.16	0.20
0	-0.25	0.48	0.39	0.59
0.5	0.25	1.53	1.26	1.85
1	0.75	6.67	5.47	7.32
1.5	1.25	49.92	40.98	48.30
2	1.75	50.46	41.42	89.72
2.5	2.25	11.36	9.32	99.04
3	2.75	1.04	0.85	99.89
3.5	3.25	0.09	0.07	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.085
5	0.540
16	0.855
25	0.965
50	1.270
75	1.570
84	1.680
95	2.035
99	2.250

Moment Measures	(phi)	(mm)
Mean	1.515	0.350
Standard Deviation	0.442	0.736
Skewness	-0.475	
Kurtosis	6.122	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.268	1.268
Standard Deviation	0.413	0.433
Skewness (1)	-0.006	0.009
Skewness (2)	0.042	
Kurtosis	0.812	1.013



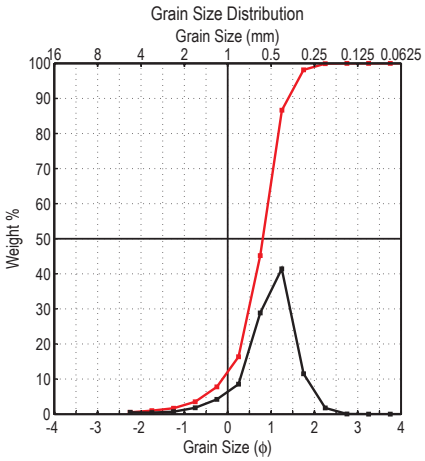
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**B2b**
Interval	**Grab**
Mean	**0.505 mm**
STD	**0.663 mm**
Skewness	**-0.761**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	124.34
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	6.31

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.15	0.12	0.12
-1	-1.25	0.62	0.50	0.62
-0.5	-0.75	1.90	1.53	2.15
0	-0.25	5.18	4.17	6.31
0.5	0.25	11.59	9.32	15.63
1	0.75	36.06	29.00	44.64
1.5	1.25	51.29	41.25	85.89
2	1.75	14.47	11.64	97.52
2.5	2.25	2.92	2.35	99.87
3	2.75	0.09	0.07	99.94
3.5	3.25	0.03	0.02	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.125
5	-0.410
16	0.255
25	0.410
50	0.815
75	1.120
84	1.225
95	1.640
99	2.065

Moment Measures	(phi)	(mm)
Mean	0.987	0.505
Standard Deviation	0.592	0.663
Skewness	-0.761	
Kurtosis	4.869	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.740	0.765
Standard Deviation	0.485	0.553
Skewness (1)	-0.155	-0.175
Skewness (2)	-0.412	
Kurtosis	1.113	1.183



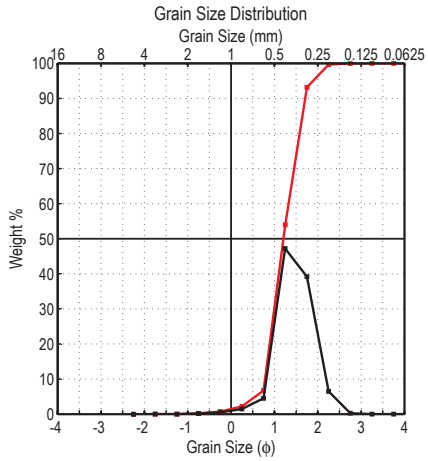
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**B2c**
Interval	**Grab**
Mean	**0.519 mm**
STD	**0.633 mm**
Skewness	**-1.436**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	121.63
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	7.79

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.67	0.55	0.55
-1.5	-1.75	0.55	0.45	1.00
-1	-1.25	0.86	0.71	1.71
-0.5	-0.75	2.23	1.83	3.54
0	-0.25	5.16	4.24	7.79
0.5	0.25	10.43	8.58	16.36
1	0.75	35.09	28.85	45.21
1.5	1.25	50.39	41.43	86.64
2	1.75	13.99	11.50	98.14
2.5	2.25	2.15	1.77	99.91
3	2.75	0.06	0.05	99.96
3.5	3.25	0.02	0.02	99.98
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.755
5	-0.580
16	0.230
25	0.400
50	0.810
75	1.110
84	1.220
95	1.615
99	1.995

Moment Measures	(phi)	(mm)
Mean	0.946	0.519
Standard Deviation	0.661	0.633
Skewness	-1.436	
Kurtosis	7.185	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.725	0.753
Standard Deviation	0.495	0.580
Skewness (1)	-0.172	-0.219
Skewness (2)	-0.591	
Kurtosis	1.217	1.267



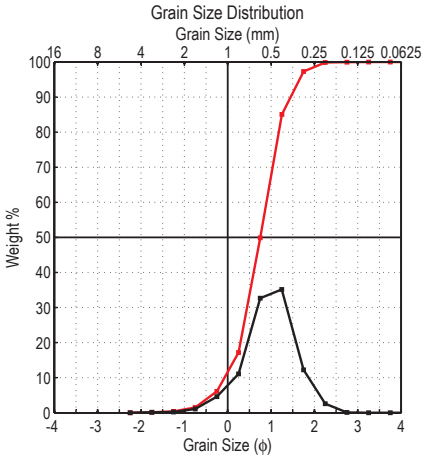
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**B2d**
Interval	**Grab**
Mean	**0.362 mm**
STD	**0.749 mm**
Skewness	**-0.719**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.31
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.73

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.02	0.02	0.02
-1	-1.25	0.03	0.02	0.04
-0.5	-0.75	0.24	0.20	0.24
0	-0.25	0.59	0.49	0.73
0.5	0.25	1.78	1.48	2.21
1	0.75	5.46	4.54	6.75
1.5	1.25	56.81	47.22	53.97
2	1.75	47.13	39.17	93.14
2.5	2.25	7.83	6.51	99.65
3	2.75	0.36	0.30	99.95
3.5	3.25	0.02	0.02	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.160
5	0.555
16	0.850
25	0.945
50	1.210
75	1.520
84	1.635
95	1.895
99	2.200

Moment Measures	(phi)	(mm)
Mean	1.467	0.362
Standard Deviation	0.417	0.749
Skewness	-0.719	
Kurtosis	7.215	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.242	1.232
Standard Deviation	0.392	0.399
Skewness (1)	0.083	0.053
Skewness (2)	0.038	
Kurtosis	0.707	0.955



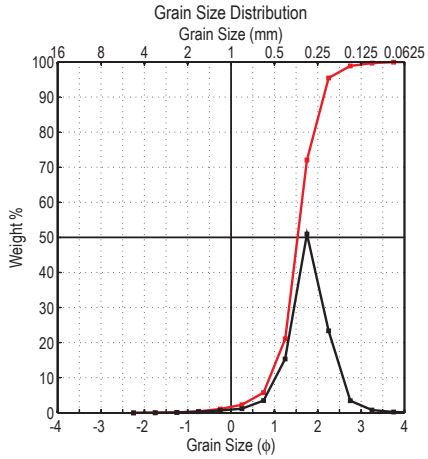
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**B2e**
Interval	**Grab**
Mean	**0.513 mm**
STD	**0.663 mm**
Skewness	**-0.506**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	122.75
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	6.10

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.03	0.02	0.02
-1.5	-1.75	0.18	0.15	0.17
-1	-1.25	0.29	0.24	0.41
-0.5	-0.75	1.35	1.10	1.51
0	-0.25	5.64	4.59	6.10
0.5	0.25	13.62	11.10	17.20
1	0.75	40.09	32.66	49.86
1.5	1.25	43.18	35.18	85.03
2	1.75	15.02	12.24	97.27
2.5	2.25	3.16	2.57	99.85
3	2.75	0.13	0.11	99.95
3.5	3.25	0.02	0.02	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.980
5	-0.370
16	0.195
25	0.370
50	0.750
75	1.105
84	1.235
95	1.655
99	2.085

Moment Measures	(phi)	(mm)
Mean	0.963	0.513
Standard Deviation	0.592	0.663
Skewness	-0.506	
Kurtosis	4.441	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.715	0.727
Standard Deviation	0.520	0.567
Skewness (1)	-0.067	-0.087
Skewness (2)	-0.207	
Kurtosis	0.947	1.129



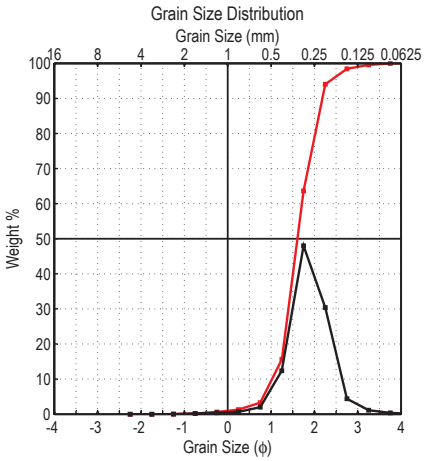
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**B3a**
Interval	**Grab**
Mean	**0.294 mm**
STD	**0.692 mm**
Skewness	**-0.810**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Very Leptokurtic
Total weight (gram)	129.06
% finer than 4.00 phi	0.07
% coarser than -1.00 phi	1.10

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.02	0.02	0.02
-1	-1.25	0.13	0.10	0.12
-0.5	-0.75	0.39	0.30	0.42
0	-0.25	0.88	0.68	1.10
0.5	0.25	1.53	1.19	2.29
1	0.75	4.50	3.49	5.77
1.5	1.25	19.79	15.33	21.11
2	1.75	65.77	50.96	72.07
2.5	2.25	30.15	23.36	95.43
3	2.75	4.46	3.46	98.88
3.5	3.25	1.02	0.79	99.67
4	3.75	0.33	0.26	99.93
>4.0	4.25	0.09	0.07	100.00

Percentiles	
1	-0.325
5	0.640
16	1.085
25	1.290
50	1.535
75	1.815
84	2.005
95	2.240
99	2.825

Moment Measures	(phi)	(mm)
Mean	1.766	0.294
Standard Deviation	0.531	0.692
Skewness	-0.810	
Kurtosis	7.555	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.545	1.542
Standard Deviation	0.460	0.472
Skewness (1)	0.022	-0.049
Skewness (2)	-0.207	
Kurtosis	0.739	1.249



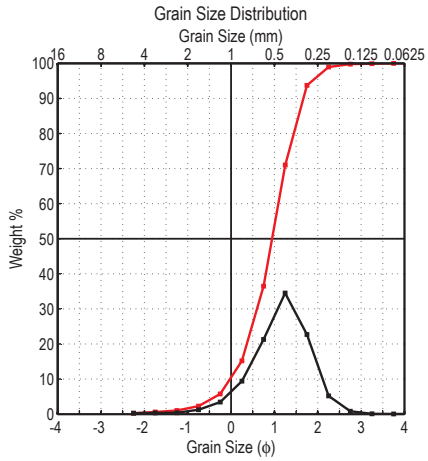
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**B3b**
Interval	**Grab**
Mean	**0.274 mm**
STD	**0.709 mm**
Skewness	**-0.405**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	123.12
% finer than 4.00 phi	0.08
% coarser than -1.00 phi	0.62

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	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
-0.5	-0.75	0.23	0.19	0.19
0	-0.25	0.52	0.42	0.62
0.5	0.25	0.84	0.68	1.30
1	0.75	2.43	1.97	3.27
1.5	1.25	15.23	12.37	15.64
2	1.75	59.08	47.99	63.63
2.5	2.25	37.41	30.38	94.01
3	2.75	5.43	4.41	98.42
3.5	3.25	1.39	1.13	99.55
4	3.75	0.45	0.37	99.92
>4.0	4.25	0.10	0.08	100.00

Percentiles	
1	0.030
5	0.820
16	1.255
25	1.345
50	1.610
75	1.935
84	2.085
95	2.360
99	3.005

Moment Measures	(phi)	(mm)
Mean	1.867	0.274
Standard Deviation	0.497	0.709
Skewness	-0.405	
Kurtosis	6.936	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.670	1.650
Standard Deviation	0.415	0.441
Skewness (1)	0.145	0.059
Skewness (2)	-0.048	
Kurtosis	0.855	1.070



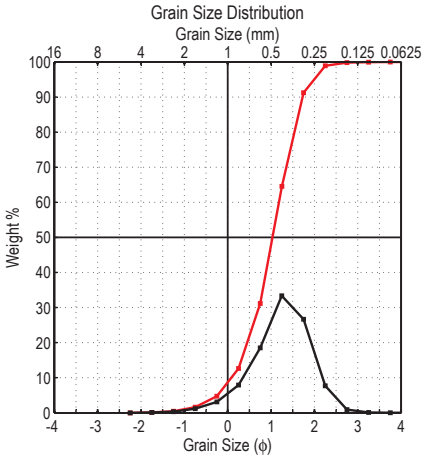
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**B3c**
Interval	**Grab**
Mean	**0.459 mm**
STD	**0.615 mm**
Skewness	**-0.841**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.04
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	5.76

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.32	0.27	0.27
-1.5	-1.75	0.44	0.37	0.63
-1	-1.25	0.49	0.41	1.04
-0.5	-0.75	1.53	1.27	2.32
0	-0.25	4.14	3.45	5.76
0.5	0.25	11.32	9.43	15.19
1	0.75	25.57	21.30	36.50
1.5	1.25	41.43	34.51	71.01
2	1.75	27.26	22.71	93.72
2.5	2.25	6.28	5.23	98.95
3	2.75	1.00	0.83	99.78
3.5	3.25	0.12	0.10	99.88
4	3.75	0.09	0.07	99.96
>4.0	4.25	0.05	0.04	100.00

Percentiles	
1	-1.300
5	-0.360
16	0.270
25	0.480
50	0.945
75	1.340
84	1.535
95	1.870
99	2.280

Moment Measures	(phi)	(mm)
Mean	1.125	0.459
Standard Deviation	0.701	0.615
Skewness	-0.841	
Kurtosis	5.532	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.903	0.917
Standard Deviation	0.633	0.654
Skewness (1)	-0.067	-0.119
Skewness (2)	-0.300	
Kurtosis	0.763	1.063



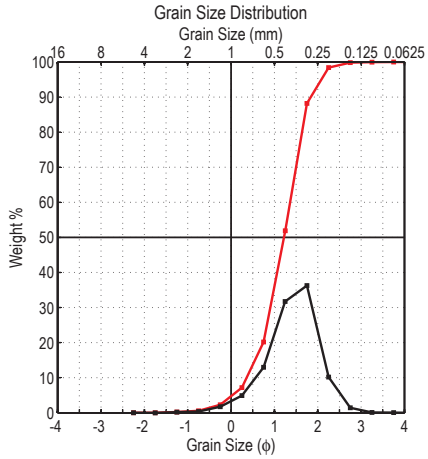
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**B3d**
Interval	**Grab**
Mean	**0.428 mm**
STD	**0.629 mm**
Skewness	**-0.628**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	123.90
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	4.72

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.15	0.12	0.12
-1	-1.25	0.40	0.32	0.44
-0.5	-0.75	1.45	1.17	1.61
0	-0.25	3.85	3.11	4.72
0.5	0.25	9.83	7.93	12.66
1	0.75	22.95	18.52	31.18
1.5	1.25	41.35	33.37	64.55
2	1.75	33.06	26.68	91.23
2.5	2.25	9.52	7.68	98.92
3	2.75	1.12	0.90	99.82
3.5	3.25	0.14	0.11	99.94
4	3.75	0.05	0.04	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-1.010
5	-0.230
16	0.340
25	0.585
50	1.030
75	1.445
84	1.615
95	1.995
99	2.295

Moment Measures	(phi)	(mm)
Mean	1.224	0.428
Standard Deviation	0.668	0.629
Skewness	-0.628	
Kurtosis	4.181	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.977	0.995
Standard Deviation	0.637	0.656
Skewness (1)	-0.082	-0.107
Skewness (2)	-0.231	
Kurtosis	0.745	1.060



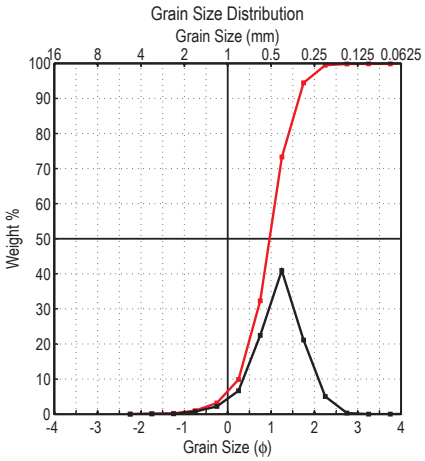
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**B3e**
Interval	**Grab**
Mean	**0.377 mm**
STD	**0.659 mm**
Skewness	**-0.697**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	122.17
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	2.30

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.05	0.04	0.04
-1.5	-1.75	0.00	0.00	0.04
-1	-1.25	0.22	0.18	0.22
-0.5	-0.75	0.44	0.36	0.58
0	-0.25	2.10	1.72	2.30
0.5	0.25	5.98	4.89	7.19
1	0.75	15.86	12.98	20.18
1.5	1.25	38.76	31.73	51.90
2	1.75	44.33	36.29	88.19
2.5	2.25	12.44	10.18	98.37
3	2.75	1.75	1.43	99.80
3.5	3.25	0.15	0.12	99.93
4	3.75	0.06	0.05	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-0.630
5	0.025
16	0.590
25	0.825
50	1.220
75	1.570
84	1.690
95	2.085
99	2.470

Moment Measures	(phi)	(mm)
Mean	1.406	0.377
Standard Deviation	0.601	0.659
Skewness	-0.697	
Kurtosis	4.829	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.140	1.167
Standard Deviation	0.550	0.587
Skewness (1)	-0.145	-0.153
Skewness (2)	-0.300	
Kurtosis	0.873	1.133



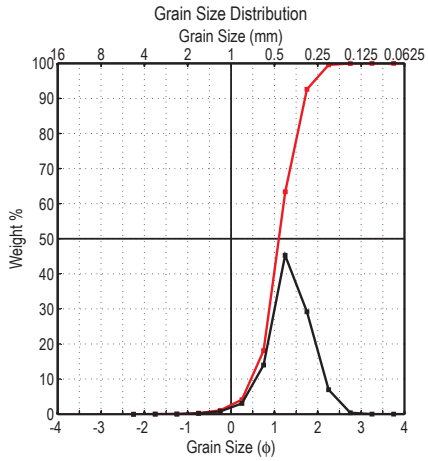
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**BC-E10a**
Interval	**Grab**
Mean	**0.441 mm**
STD	**0.666 mm**
Skewness	**-0.411**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	124.38
% finer than 4.00 phi	0.14
% coarser than -1.00 phi	3.22

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.03	0.02	0.02
-1.5	-1.75	0.13	0.10	0.13
-1	-1.25	0.13	0.10	0.23
-0.5	-0.75	0.95	0.76	1.00
0	-0.25	2.76	2.22	3.22
0.5	0.25	8.32	6.69	9.91
1	0.75	27.91	22.44	32.34
1.5	1.25	50.94	40.96	73.30
2	1.75	26.29	21.14	94.44
2.5	2.25	6.26	5.03	99.47
3	2.75	0.41	0.33	99.80
3.5	3.25	0.05	0.04	99.84
4	3.75	0.02	0.02	99.86
>4.0	4.25	0.18	0.14	100.00

Percentiles	
1	-0.750
5	-0.115
16	0.385
25	0.585
50	0.965
75	1.290
84	1.505
95	1.805
99	2.205

Moment Measures	(phi)	(mm)
Mean	1.182	0.441
Standard Deviation	0.587	0.666
Skewness	-0.411	
Kurtosis	5.538	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.945	0.952
Standard Deviation	0.560	0.571
Skewness (1)	-0.036	-0.080
Skewness (2)	-0.214	
Kurtosis	0.714	1.116



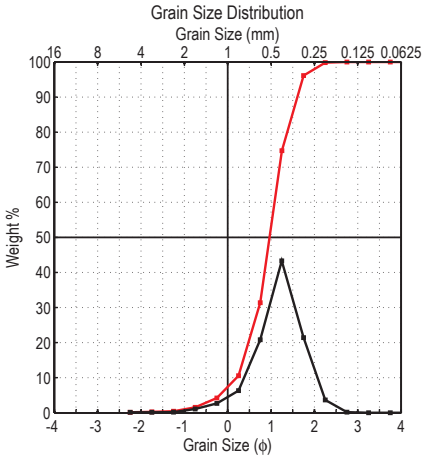
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**BC-E10b**
Interval	**Grab**
Mean	**0.391 mm**
STD	**0.712 mm**
Skewness	**-0.470**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	123.04
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	1.07

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.04	0.03	0.03
-1	-1.25	0.03	0.02	0.06
-0.5	-0.75	0.27	0.22	0.28
0	-0.25	0.98	0.80	1.07
0.5	0.25	3.77	3.06	4.14
1	0.75	17.22	14.00	18.13
1.5	1.25	55.70	45.27	63.40
2	1.75	35.92	29.19	92.60
2.5	2.25	8.57	6.97	99.56
3	2.75	0.48	0.39	99.95
3.5	3.25	0.03	0.02	99.98
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.295
5	0.280
16	0.675
25	0.825
50	1.100
75	1.450
84	1.605
95	1.925
99	2.210

Moment Measures	(phi)	(mm)
Mean	1.354	0.391
Standard Deviation	0.490	0.712
Skewness	-0.470	
Kurtosis	4.900	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.140	1.127
Standard Deviation	0.465	0.482
Skewness (1)	0.086	0.045
Skewness (2)	0.005	
Kurtosis	0.769	1.079



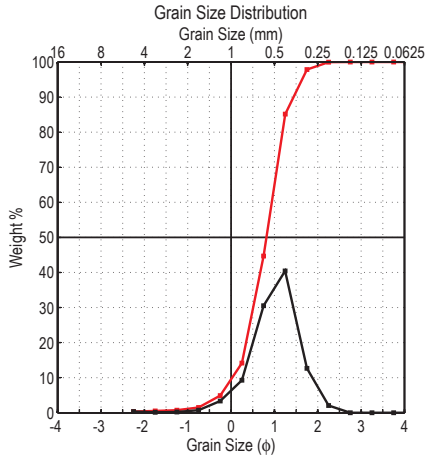
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**BC-E10c**
Interval	**Grab**
Mean	**0.449 mm**
STD	**0.664 mm**
Skewness	**-1.043**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	121.88
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	4.24

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.16	0.13	0.13
-1.5	-1.75	0.17	0.14	0.27
-1	-1.25	0.24	0.20	0.47
-0.5	-0.75	1.34	1.10	1.57
0	-0.25	3.26	2.67	4.24
0.5	0.25	7.72	6.33	10.58
1	0.75	25.37	20.82	31.39
1.5	1.25	52.78	43.30	74.70
2	1.75	26.10	21.41	96.11
2.5	2.25	4.48	3.68	99.79
3	2.75	0.21	0.17	99.96
3.5	3.25	0.01	0.01	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.010
5	-0.190
16	0.380
25	0.595
50	0.965
75	1.255
84	1.465
95	1.725
99	2.145

Moment Measures	(phi)	(mm)
Mean	1.154	0.449
Standard Deviation	0.590	0.664
Skewness	-1.043	
Kurtosis	6.207	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.922	0.937
Standard Deviation	0.542	0.561
Skewness (1)	-0.078	-0.142
Skewness (2)	-0.364	
Kurtosis	0.765	1.189



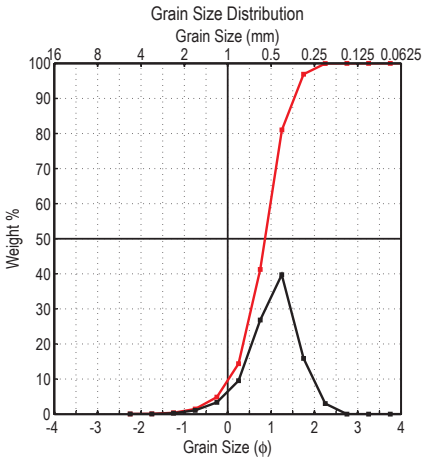
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**BC-E10d**
Interval	**Grab**
Mean	**0.500 mm**
STD	**0.666 mm**
Skewness	**-1.141**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Very Leptokurtic
Total weight (gram)	116.67
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	4.90

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.45	0.39	0.39
-1.5	-1.75	0.17	0.15	0.53
-1	-1.25	0.28	0.24	0.77
-0.5	-0.75	0.88	0.75	1.53
0	-0.25	3.94	3.38	4.90
0.5	0.25	10.83	9.28	14.19
1	0.75	35.59	30.50	44.69
1.5	1.25	47.19	40.45	85.14
2	1.75	14.81	12.69	97.83
2.5	2.25	2.45	2.10	99.93
3	2.75	0.03	0.03	99.96
3.5	3.25	0.02	0.02	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.100
5	-0.245
16	0.280
25	0.425
50	0.815
75	1.125
84	1.235
95	1.640
99	2.030

Moment Measures	(phi)	(mm)
Mean	1.001	0.500
Standard Deviation	0.587	0.666
Skewness	-1.141	
Kurtosis	7.410	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.757	0.777
Standard Deviation	0.478	0.524
Skewness (1)	-0.120	-0.123
Skewness (2)	-0.246	
Kurtosis	0.974	1.104



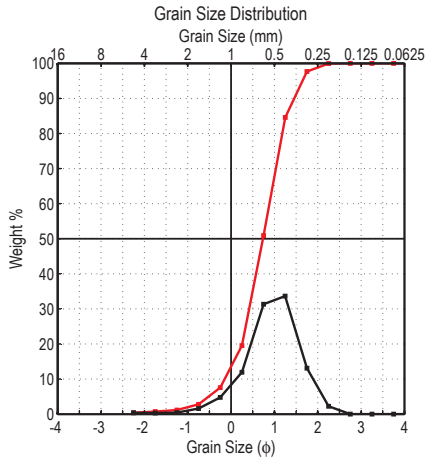
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**BC-E10e**
Interval	**Grab**
Mean	**0.484 mm**
STD	**0.665 mm**
Skewness	**-0.700**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.43
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	4.85

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.09	0.08	0.08
-1.5	-1.75	0.06	0.05	0.13
-1	-1.25	0.33	0.28	0.40
-0.5	-0.75	1.31	1.10	1.50
0	-0.25	4.00	3.35	4.85
0.5	0.25	11.41	9.55	14.40
1	0.75	32.06	26.84	41.25
1.5	1.25	47.48	39.76	81.00
2	1.75	18.98	15.89	96.89
2.5	2.25	3.62	3.03	99.92
3	2.75	0.04	0.03	99.96
3.5	3.25	0.01	0.01	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.975
5	-0.240
16	0.280
25	0.445
50	0.860
75	1.175
84	1.345
95	1.690
99	2.095

Moment Measures	(phi)	(mm)
Mean	1.048	0.484
Standard Deviation	0.588	0.665
Skewness	-0.700	
Kurtosis	4.860	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.812	0.828
Standard Deviation	0.532	0.559
Skewness (1)	-0.089	-0.115
Skewness (2)	-0.254	
Kurtosis	0.812	1.084



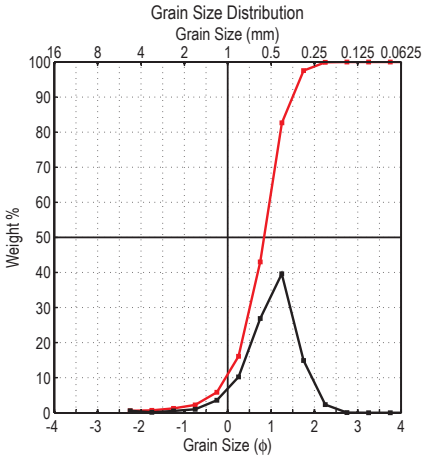
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**BC-E10f**
Interval	**Grab**
Mean	**0.527 mm**
STD	**0.635 mm**
Skewness	**-1.010**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.82
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	7.59

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.51	0.43	0.43
-1.5	-1.75	0.38	0.32	0.74
-1	-1.25	0.53	0.44	1.19
-0.5	-0.75	1.95	1.63	2.81
0	-0.25	5.72	4.77	7.59
0.5	0.25	14.33	11.96	19.55
1	0.75	37.57	31.36	50.90
1.5	1.25	40.33	33.66	84.56
2	1.75	15.72	13.12	97.68
2.5	2.25	2.70	2.25	99.93
3	2.75	0.04	0.03	99.97
3.5	3.25	0.01	0.01	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.460
5	-0.520
16	0.100
25	0.335
50	0.735
75	1.110
84	1.240
95	1.650
99	2.045

Moment Measures	(phi)	(mm)
Mean	0.923	0.527
Standard Deviation	0.656	0.635
Skewness	-1.010	
Kurtosis	5.923	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.670	0.692
Standard Deviation	0.570	0.614
Skewness (1)	-0.114	-0.135
Skewness (2)	-0.298	
Kurtosis	0.904	1.148



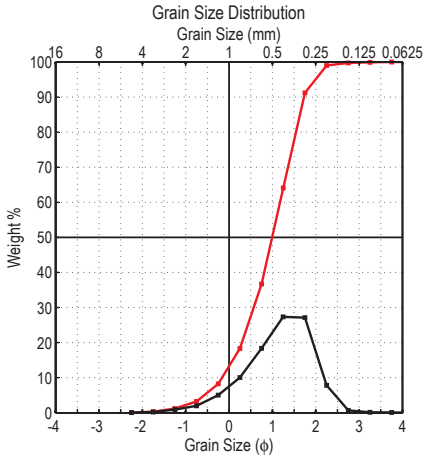
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**BC-E10g**
Interval	**Grab**
Mean	**0.500 mm**
STD	**0.642 mm**
Skewness	**-1.273**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	123.09
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	5.87

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.69	0.56	0.56
-1.5	-1.75	0.19	0.15	0.71
-1	-1.25	0.67	0.54	1.26
-0.5	-0.75	1.24	1.01	2.27
0	-0.25	4.43	3.60	5.87
0.5	0.25	12.61	10.24	16.11
1	0.75	33.10	26.89	43.00
1.5	1.25	48.79	39.64	82.64
2	1.75	18.36	14.92	97.55
2.5	2.25	2.89	2.35	99.90
3	2.75	0.08	0.06	99.97
3.5	3.25	0.01	0.01	99.98
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.490
5	-0.370
16	0.245
25	0.415
50	0.840
75	1.155
84	1.295
95	1.665
99	2.060

Moment Measures	(phi)	(mm)
Mean	1.001	0.500
Standard Deviation	0.640	0.642
Skewness	-1.273	
Kurtosis	7.162	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.770	0.793
Standard Deviation	0.525	0.571
Skewness (1)	-0.133	-0.161
Skewness (2)	-0.367	
Kurtosis	0.938	1.127



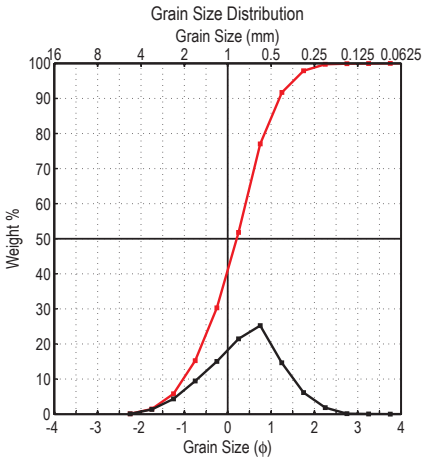
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**BC-E10h**
Interval	**Grab**
Mean	**0.454 mm**
STD	**0.587 mm**
Skewness	**-0.715**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	122.20
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	8.26

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.09	0.07	0.07
-1.5	-1.75	0.29	0.24	0.31
-1	-1.25	1.13	0.92	1.24
-0.5	-0.75	2.44	2.00	3.23
0	-0.25	6.14	5.02	8.26
0.5	0.25	12.31	10.07	18.33
1	0.75	22.45	18.37	36.70
1.5	1.25	33.43	27.36	64.06
2	1.75	33.15	27.13	91.19
2.5	2.25	9.56	7.82	99.01
3	2.75	0.89	0.73	99.74
3.5	3.25	0.17	0.14	99.88
4	3.75	0.11	0.09	99.97
>4.0	4.25	0.04	0.03	100.00

Percentiles	
1	-1.375
5	-0.575
16	0.135
25	0.430
50	0.995
75	1.450
84	1.620
95	1.995
99	2.250

Moment Measures	(phi)	(mm)
Mean	1.140	0.454
Standard Deviation	0.770	0.587
Skewness	-0.715	
Kurtosis	3.933	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.877	0.917
Standard Deviation	0.743	0.761
Skewness (1)	-0.158	-0.190
Skewness (2)	-0.384	
Kurtosis	0.731	1.033



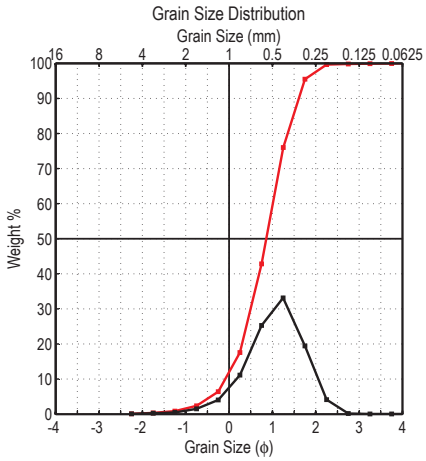
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**BC-E10i**
Interval	**Grab**
Mean	**0.760 mm**
STD	**0.556 mm**
Skewness	**-0.160**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	124.72
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	30.31

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.16	0.13	0.13
-1.5	-1.75	1.66	1.33	1.46
-1	-1.25	5.41	4.34	5.80
-0.5	-0.75	11.81	9.47	15.27
0	-0.25	18.76	15.04	30.31
0.5	0.25	26.79	21.48	51.79
1	0.75	31.50	25.26	77.04
1.5	1.25	18.28	14.66	91.70
2	1.75	7.68	6.16	97.86
2.5	2.25	2.31	1.85	99.71
3	2.75	0.21	0.17	99.88
3.5	3.25	0.08	0.06	99.94
4	3.75	0.05	0.04	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.925
5	-1.340
16	-0.725
25	-0.425
50	0.210
75	0.710
84	0.985
95	1.520
99	2.060

Moment Measures	(phi)	(mm)
Mean	0.396	0.760
Standard Deviation	0.846	0.556
Skewness	-0.160	
Kurtosis	3.006	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.130	0.157
Standard Deviation	0.855	0.861
Skewness (1)	-0.094	-0.089
Skewness (2)	-0.140	
Kurtosis	0.673	1.033



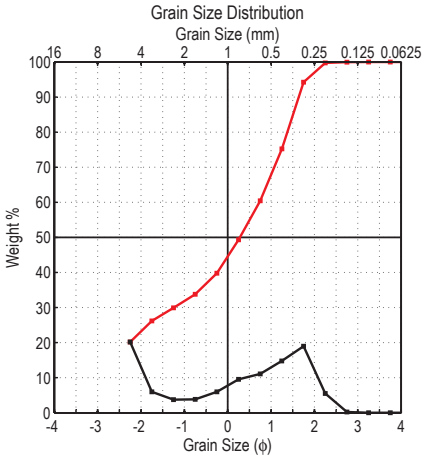
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**BC-E10j**
Interval	**Grab**
Mean	**0.485 mm**
STD	**0.626 mm**
Skewness	**-0.654**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	126.42
% finer than 4.00 phi	0.05
% coarser than -1.00 phi	6.42

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.13	0.10	0.10
-1.5	-1.75	0.33	0.26	0.36
-1	-1.25	0.64	0.51	0.87
-0.5	-0.75	1.91	1.51	2.38
0	-0.25	5.10	4.03	6.42
0.5	0.25	14.08	11.14	17.55
1	0.75	31.99	25.30	42.86
1.5	1.25	41.92	33.16	76.02
2	1.75	24.60	19.46	95.48
2.5	2.25	5.24	4.14	99.62
3	2.75	0.26	0.21	99.83
3.5	3.25	0.08	0.06	99.89
4	3.75	0.08	0.06	99.95
>4.0	4.25	0.06	0.05	100.00

Percentiles	
1	-1.205
5	-0.425
16	0.180
25	0.395
50	0.860
75	1.235
84	1.455
95	1.740
99	2.175

Moment Measures	(phi)	(mm)
Mean	1.043	0.485
Standard Deviation	0.676	0.626
Skewness	-0.654	
Kurtosis	4.747	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.817	0.832
Standard Deviation	0.638	0.647
Skewness (1)	-0.067	-0.127
Skewness (2)	-0.318	
Kurtosis	0.698	1.056



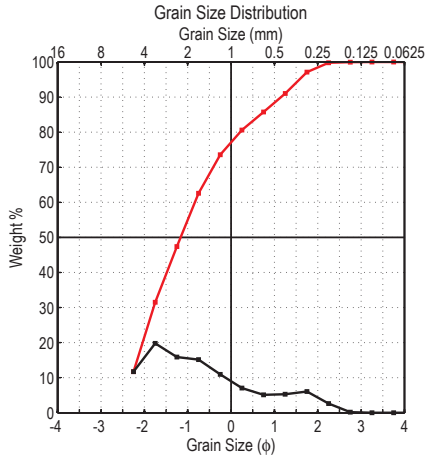
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NSS-01a**
Interval	**Swash**
Mean	**0.929 mm**
STD	**0.337 mm**
Skewness	**-0.373**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	117.64
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	39.77

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	23.73	20.17	20.17
-1.5	-1.75	7.06	6.00	26.17
-1	-1.25	4.40	3.74	29.91
-0.5	-0.75	4.54	3.86	33.77
0	-0.25	7.06	6.00	39.77
0.5	0.25	11.24	9.55	49.33
1	0.75	13.06	11.10	60.43
1.5	1.25	17.40	14.79	75.22
2	1.75	22.35	19.00	94.22
2.5	2.25	6.46	5.49	99.71
3	2.75	0.28	0.24	99.95
3.5	3.25	0.02	0.02	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.850
50	0.280
75	1.245
84	1.480
95	1.820
99	2.185

Moment Measures	(phi)	(mm)
Mean	0.107	0.929
Standard Deviation	1.569	0.337
Skewness	-0.373	
Kurtosis	1.669	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.385	-0.163
Standard Deviation	1.865	1.549
Skewness (1)	-0.357	-0.300
Skewness (2)	-0.265	
Kurtosis	0.091	0.539



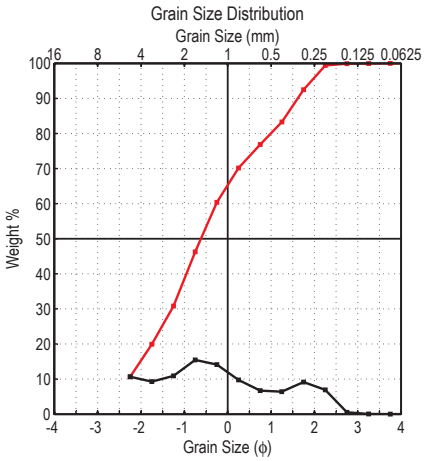
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NSS-01b**
Interval	**LTT**
Mean	**1.574 mm**
STD	**0.420 mm**
Skewness	**0.717**
USCS	**Wentworth**
SW	Very Coarse Sand
Medium Sand	Poorly Sorted
Well Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	120.02
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	73.54

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	14.07	11.72	11.72
-1.5	-1.75	23.74	19.78	31.50
-1	-1.25	19.07	15.89	47.39
-0.5	-0.75	18.22	15.18	62.57
0	-0.25	13.16	10.96	73.54
0.5	0.25	8.48	7.07	80.60
1	0.75	6.17	5.14	85.74
1.5	1.25	6.34	5.28	91.03
2	1.75	7.29	6.07	97.10
2.5	2.25	3.19	2.66	99.76
3	2.75	0.23	0.19	99.95
3.5	3.25	0.02	0.02	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.140
25	-1.915
50	-1.165
75	-0.145
84	0.580
95	1.575
99	2.105

Moment Measures	(phi)	(mm)
Mean	-0.654	1.574
Standard Deviation	1.253	0.420
Skewness	0.717	
Kurtosis	2.586	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.780	-0.908
Standard Deviation	1.360	1.260
Skewness (1)	0.283	0.358
Skewness (2)	0.608	
Kurtosis	0.406	0.886



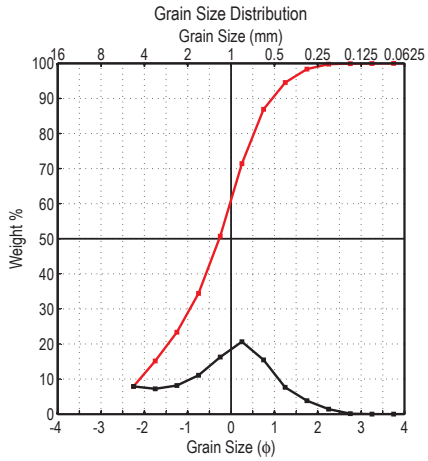
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NSS-02a**
Interval	**Swash**
Mean	**1.149 mm**
STD	**0.387 mm**
Skewness	**0.288**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	121.85
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	60.39

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	12.97	10.64	10.64
-1.5	-1.75	11.30	9.27	19.92
-1	-1.25	13.28	10.90	30.82
-0.5	-0.75	18.84	15.46	46.28
0	-0.25	17.20	14.12	60.39
0.5	0.25	11.89	9.76	70.15
1	0.75	8.17	6.70	76.86
1.5	1.25	7.84	6.43	83.29
2	1.75	11.16	9.16	92.45
2.5	2.25	8.43	6.92	99.37
3	2.75	0.63	0.52	99.89
3.5	3.25	0.07	0.06	99.94
4	3.75	0.04	0.03	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.960
25	-1.515
50	-0.620
75	0.610
84	1.290
95	1.935
99	2.225

Moment Measures	(phi)	(mm)
Mean	-0.200	1.149
Standard Deviation	1.371	0.387
Skewness	0.288	
Kurtosis	2.089	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.335	-0.430
Standard Deviation	1.625	1.447
Skewness (1)	0.175	0.198
Skewness (2)	0.285	
Kurtosis	0.288	0.807



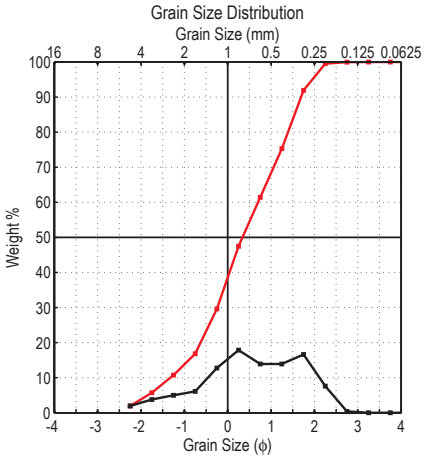
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NSS-02b**
Interval	**LTT**
Mean	**1.119 mm**
STD	**0.464 mm**
Skewness	**-0.176**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	121.44
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	50.74

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	9.63	7.93	7.93
-1.5	-1.75	8.80	7.25	15.18
-1	-1.25	9.95	8.19	23.37
-0.5	-0.75	13.45	11.08	34.44
0	-0.25	19.79	16.30	50.74
0.5	0.25	25.11	20.68	71.42
1	0.75	18.80	15.48	86.90
1.5	1.25	9.28	7.64	94.54
2	1.75	4.64	3.82	98.36
2.5	2.25	1.72	1.42	99.78
3	2.75	0.16	0.13	99.91
3.5	3.25	0.04	0.03	99.94
4	3.75	0.04	0.03	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.700
25	-1.175
50	-0.275
75	0.365
84	0.655
95	1.310
99	1.975

Moment Measures	(phi)	(mm)
Mean	-0.162	1.119
Standard Deviation	1.108	0.464
Skewness	-0.176	
Kurtosis	2.528	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.522	-0.440
Standard Deviation	1.177	1.128
Skewness (1)	-0.210	-0.160
Skewness (2)	-0.166	
Kurtosis	0.512	0.947



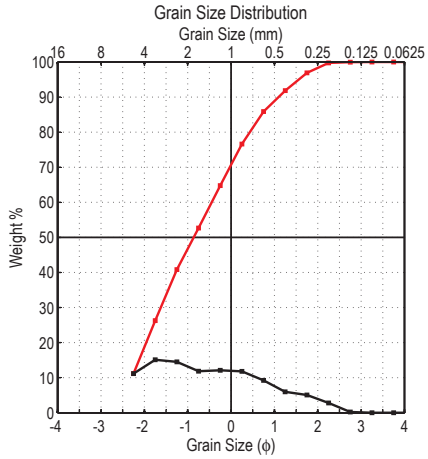
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NSS-03a**
Interval	**Swash**
Mean	**0.684 mm**
STD	**0.457 mm**
Skewness	**-0.422**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	122.50
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	29.61

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.38	1.94	1.94
-1.5	-1.75	4.65	3.80	5.74
-1	-1.25	6.12	5.00	10.73
-0.5	-0.75	7.47	6.10	16.83
0	-0.25	15.65	12.78	29.61
0.5	0.25	21.87	17.85	47.46
1	0.75	17.07	13.93	61.40
1.5	1.25	17.06	13.93	75.32
2	1.75	20.34	16.60	91.93
2.5	2.25	9.31	7.60	99.53
3	2.75	0.51	0.42	99.94
3.5	3.25	0.04	0.03	99.98
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.845
16	-0.820
25	-0.430
50	0.340
75	1.240
84	1.510
95	1.950
99	2.215

Moment Measures	(phi)	(mm)
Mean	0.548	0.684
Standard Deviation	1.129	0.457
Skewness	-0.422	
Kurtosis	2.566	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.345	0.343
Standard Deviation	1.165	1.158
Skewness (1)	0.004	-0.074
Skewness (2)	-0.247	
Kurtosis	0.629	0.931



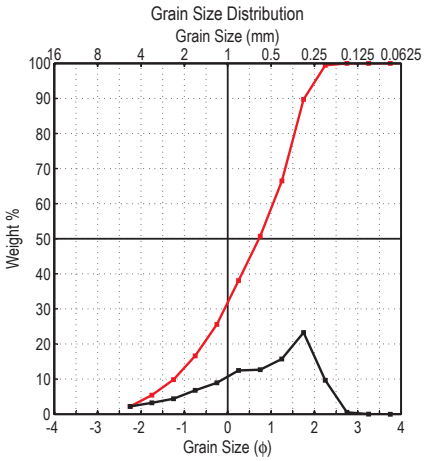
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NSS-03b**
Interval	**LTT**
Mean	**1.397 mm**
STD	**0.419 mm**
Skewness	**0.402**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	122.47
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	64.78

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	13.69	11.18	11.18
-1.5	-1.75	18.51	15.11	26.29
-1	-1.25	17.78	14.52	40.81
-0.5	-0.75	14.51	11.85	52.66
0	-0.25	14.84	12.12	64.78
0.5	0.25	14.49	11.83	76.61
1	0.75	11.32	9.24	85.85
1.5	1.25	7.31	5.97	91.82
2	1.75	6.23	5.09	96.91
2.5	2.25	3.44	2.81	99.71
3	2.75	0.29	0.24	99.95
3.5	3.25	0.03	0.02	99.98
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.090
25	-1.795
50	-0.860
75	0.180
84	0.650
95	1.565
99	2.125

Moment Measures	(phi)	(mm)
Mean	-0.483	1.397
Standard Deviation	1.254	0.419
Skewness	0.402	
Kurtosis	2.245	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.720	-0.767
Standard Deviation	1.370	1.263
Skewness (1)	0.102	0.187
Skewness (2)	0.378	
Kurtosis	0.392	0.792



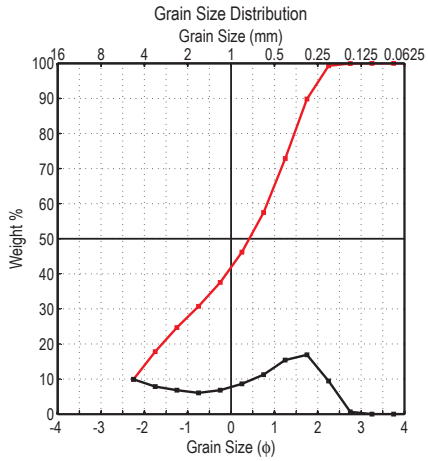
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NSS-04a**
Interval	**Swash**
Mean	**0.603 mm**
STD	**0.445 mm**
Skewness	**-0.675**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	122.88
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	25.59

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.70	2.20	2.20
-1.5	-1.75	3.97	3.23	5.43
-1	-1.25	5.41	4.40	9.83
-0.5	-0.75	8.36	6.80	16.63
0	-0.25	11.00	8.95	25.59
0.5	0.25	15.34	12.48	38.07
1	0.75	15.57	12.67	50.74
1.5	1.25	19.34	15.74	66.48
2	1.75	28.58	23.26	89.74
2.5	2.25	11.91	9.69	99.43
3	2.75	0.65	0.53	99.96
3.5	3.25	0.05	0.04	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.815
16	-0.795
25	-0.285
50	0.720
75	1.435
84	1.625
95	2.020
99	2.230

Moment Measures	(phi)	(mm)
Mean	0.730	0.603
Standard Deviation	1.167	0.445
Skewness	-0.675	
Kurtosis	2.654	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.415	0.517
Standard Deviation	1.210	1.186
Skewness (1)	-0.252	-0.287
Skewness (2)	-0.510	
Kurtosis	0.585	0.914



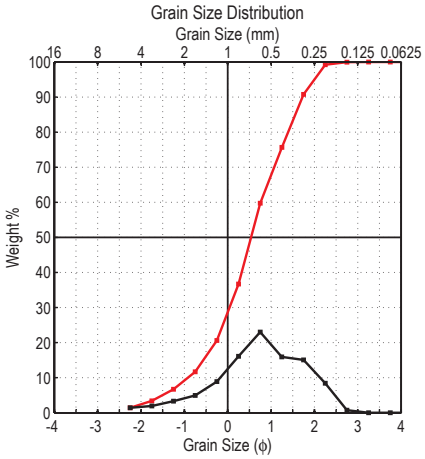
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NSS-04b**
Interval	**LTT**
Mean	**0.802 mm**
STD	**0.362 mm**
Skewness	**-0.414**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	120.52
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	37.55

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	11.97	9.93	9.93
-1.5	-1.75	9.50	7.88	17.81
-1	-1.25	8.26	6.85	24.67
-0.5	-0.75	7.30	6.06	30.73
0	-0.25	8.23	6.83	37.55
0.5	0.25	10.42	8.65	46.20
1	0.75	13.57	11.26	57.46
1.5	1.25	18.59	15.42	72.88
2	1.75	20.42	16.94	89.83
2.5	2.25	11.39	9.45	99.28
3	2.75	0.81	0.67	99.95
3.5	3.25	0.04	0.03	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.865
25	-1.225
50	0.420
75	1.310
84	1.580
95	2.025
99	2.235

Moment Measures	(phi)	(mm)
Mean	0.319	0.802
Standard Deviation	1.467	0.362
Skewness	-0.414	
Kurtosis	1.879	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.142	0.045
Standard Deviation	1.722	1.509
Skewness (1)	-0.327	-0.288
Skewness (2)	-0.309	
Kurtosis	0.241	0.691



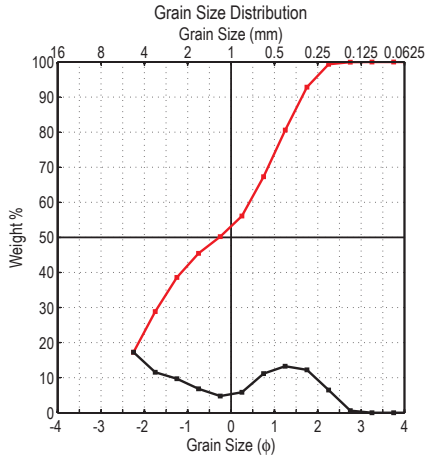
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NSS-05a**
Interval	**Swash**
Mean	**0.607 mm**
STD	**0.493 mm**
Skewness	**-0.585**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	122.89
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	20.60

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.79	1.46	1.46
-1.5	-1.75	2.38	1.94	3.39
-1	-1.25	4.09	3.33	6.72
-0.5	-0.75	6.09	4.96	11.68
0	-0.25	10.96	8.92	20.60
0.5	0.25	19.78	16.10	36.69
1	0.75	28.30	23.03	59.72
1.5	1.25	19.59	15.94	75.66
2	1.75	18.54	15.09	90.75
2.5	2.25	10.37	8.44	99.19
3	2.75	0.93	0.76	99.94
3.5	3.25	0.05	0.04	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.510
16	-0.510
25	-0.115
50	0.540
75	1.230
84	1.525
95	2.000
99	2.240

Moment Measures	(phi)	(mm)
Mean	0.721	0.607
Standard Deviation	1.020	0.493
Skewness	-0.585	
Kurtosis	3.220	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.508	0.518
Standard Deviation	1.017	1.041
Skewness (1)	-0.032	-0.100
Skewness (2)	-0.290	
Kurtosis	0.725	1.070



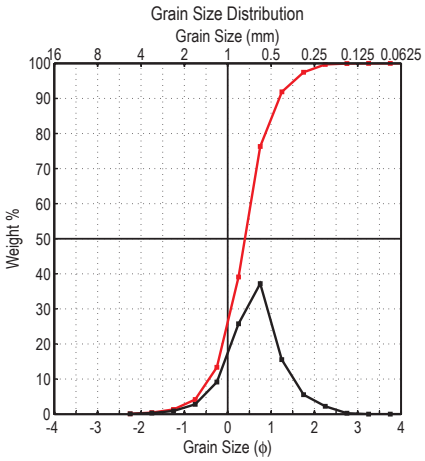
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NSS-05b**
Interval	**LTT**
Mean	**1.096 mm**
STD	**0.339 mm**
Skewness	**0.004**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	121.56
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	50.23

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	21.00	17.28	17.28
-1.5	-1.75	14.06	11.57	28.84
-1	-1.25	11.83	9.73	38.57
-0.5	-0.75	8.34	6.86	45.43
0	-0.25	5.83	4.80	50.23
0.5	0.25	7.13	5.87	56.10
1	0.75	13.60	11.19	67.28
1.5	1.25	16.16	13.29	80.58
2	1.75	14.90	12.26	92.83
2.5	2.25	7.89	6.49	99.33
3	2.75	0.75	0.62	99.94
3.5	3.25	0.05	0.04	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.915
50	-0.275
75	1.040
84	1.390
95	1.915
99	2.225

Moment Measures	(phi)	(mm)
Mean	-0.132	1.096
Standard Deviation	1.561	0.339
Skewness	0.004	
Kurtosis	1.538	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.430	-0.378
Standard Deviation	1.820	1.541
Skewness (1)	-0.085	-0.017
Skewness (2)	0.059	
Kurtosis	0.144	0.578



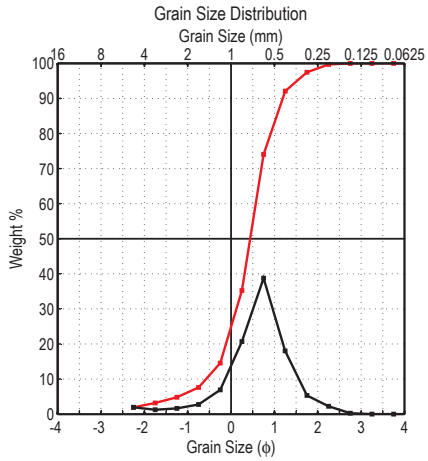
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-01a**
Interval	**Swash**
Mean	**0.646 mm**
STD	**0.633 mm**
Skewness	**-0.105**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	119.87
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	13.36

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.14	0.12	0.12
-1.5	-1.75	0.38	0.32	0.43
-1	-1.25	1.11	0.93	1.36
-0.5	-0.75	3.39	2.83	4.19
0	-0.25	10.99	9.17	13.36
0.5	0.25	30.88	25.76	39.12
1	0.75	44.59	37.20	76.32
1.5	1.25	18.63	15.54	91.86
2	1.75	6.68	5.57	97.43
2.5	2.25	2.68	2.24	99.67
3	2.75	0.33	0.28	99.94
3.5	3.25	0.03	0.03	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.445
5	-0.705
16	-0.200
25	-0.025
50	0.395
75	0.730
84	0.995
95	1.530
99	2.100

Moment Measures	(phi)	(mm)
Mean	0.631	0.646
Standard Deviation	0.659	0.633
Skewness	-0.105	
Kurtosis	4.446	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.398	0.397
Standard Deviation	0.597	0.637
Skewness (1)	0.004	0.010
Skewness (2)	0.029	
Kurtosis	0.870	1.213



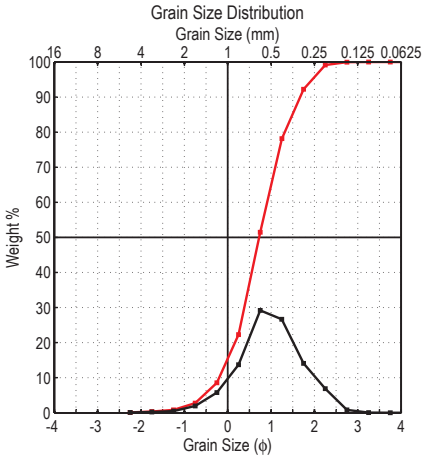
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-01b**
Interval	**LTT**
Mean	**0.661 mm**
STD	**0.573 mm**
Skewness	**-1.088**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.93
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	14.55

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.35	1.96	1.96
-1.5	-1.75	1.50	1.25	3.21
-1	-1.25	1.96	1.63	4.84
-0.5	-0.75	3.32	2.77	7.61
0	-0.25	8.32	6.94	14.55
0.5	0.25	24.84	20.71	35.26
1	0.75	46.51	38.78	74.04
1.5	1.25	21.62	18.03	92.07
2	1.75	6.43	5.36	97.43
2.5	2.25	2.68	2.23	99.67
3	2.75	0.35	0.29	99.96
3.5	3.25	0.03	0.03	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.220
16	-0.215
25	0.000
50	0.440
75	0.775
84	1.025
95	1.525
99	2.100

Moment Measures	(phi)	(mm)
Mean	0.597	0.661
Standard Deviation	0.802	0.573
Skewness	-1.088	
Kurtosis	5.728	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.405	0.417
Standard Deviation	0.620	0.726
Skewness (1)	-0.056	-0.133
Skewness (2)	-0.464	
Kurtosis	1.214	1.452



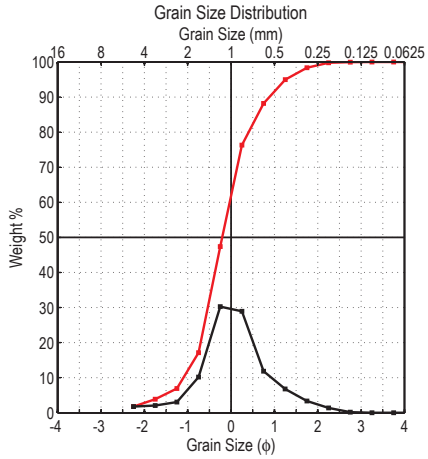
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-02a**
Interval	**Swash**
Mean	**0.510 mm**
STD	**0.603 mm**
Skewness	**-0.320**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	120.00
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	8.57

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.12	0.10	0.10
-1.5	-1.75	0.30	0.25	0.35
-1	-1.25	0.59	0.49	0.84
-0.5	-0.75	2.33	1.94	2.78
0	-0.25	6.94	5.78	8.57
0.5	0.25	16.44	13.70	22.27
1	0.75	35.05	29.21	51.48
1.5	1.25	32.00	26.67	78.14
2	1.75	16.90	14.08	92.23
2.5	2.25	8.25	6.88	99.10
3	2.75	1.00	0.83	99.93
3.5	3.25	0.06	0.05	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.210
5	-0.560
16	0.020
25	0.295
50	0.725
75	1.190
84	1.460
95	1.950
99	2.245

Moment Measures	(phi)	(mm)
Mean	0.971	0.510
Standard Deviation	0.729	0.603
Skewness	-0.320	
Kurtosis	3.703	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.740	0.735
Standard Deviation	0.720	0.740
Skewness (1)	0.021	-0.002
Skewness (2)	-0.042	
Kurtosis	0.743	1.149



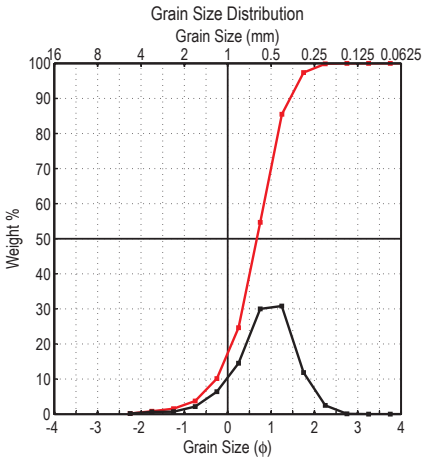
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-02b**
Interval	**LTT**
Mean	**0.948 mm**
STD	**0.569 mm**
Skewness	**0.033**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	119.64
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	47.38

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.13	1.78	1.78
-1.5	-1.75	2.51	2.10	3.88
-1	-1.25	3.67	3.07	6.95
-0.5	-0.75	12.17	10.17	17.12
0	-0.25	36.20	30.26	47.38
0.5	0.25	34.61	28.93	76.30
1	0.75	14.19	11.86	88.16
1.5	1.25	8.15	6.81	94.98
2	1.75	4.02	3.36	98.34
2.5	2.25	1.69	1.41	99.75
3	2.75	0.24	0.20	99.95
3.5	3.25	0.03	0.03	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.565
16	-0.805
25	-0.620
50	-0.205
75	0.225
84	0.575
95	1.255
99	1.985

Moment Measures	(phi)	(mm)
Mean	0.077	0.948
Standard Deviation	0.812	0.569
Skewness	0.033	
Kurtosis	4.174	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.115	-0.145
Standard Deviation	0.690	0.772
Skewness (1)	0.130	0.083
Skewness (2)	0.072	
Kurtosis	1.043	1.368



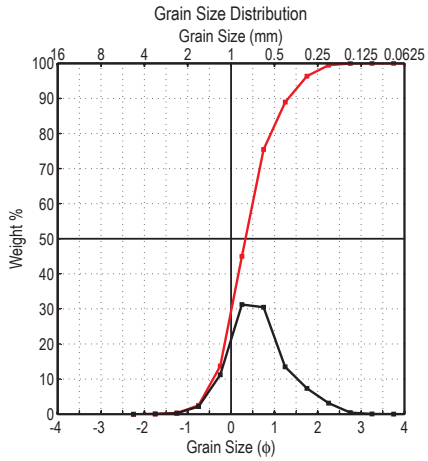
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-03a**
Interval	**Swash**
Mean	**0.552 mm**
STD	**0.618 mm**
Skewness	**-0.793**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.87
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	10.14

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.22	0.18	0.18
-1.5	-1.75	0.79	0.65	0.84
-1	-1.25	0.87	0.72	1.56
-0.5	-0.75	2.64	2.18	3.74
0	-0.25	7.74	6.40	10.14
0.5	0.25	17.54	14.51	24.65
1	0.75	36.27	30.01	54.66
1.5	1.25	37.26	30.83	85.49
2	1.75	14.34	11.86	97.35
2.5	2.25	3.02	2.50	99.85
3	2.75	0.15	0.12	99.98
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.635
5	-0.650
16	-0.050
25	0.255
50	0.670
75	1.080
84	1.225
95	1.650
99	2.080

Moment Measures	(phi)	(mm)
Mean	0.858	0.552
Standard Deviation	0.695	0.618
Skewness	-0.793	
Kurtosis	4.638	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.588	0.615
Standard Deviation	0.637	0.667
Skewness (1)	-0.129	-0.139
Skewness (2)	-0.267	
Kurtosis	0.804	1.143



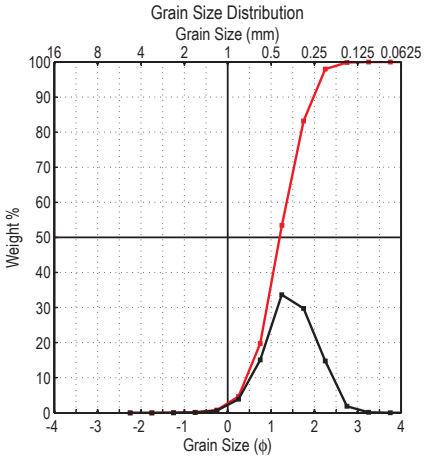
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-03b**
Interval	**LTT**
Mean	**0.641 mm**
STD	**0.630 mm**
Skewness	**0.477**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	120.62
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	13.70

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.06	0.05	0.05
-1	-1.25	0.34	0.28	0.33
-0.5	-0.75	2.62	2.17	2.50
0	-0.25	13.51	11.20	13.70
0.5	0.25	37.70	31.26	44.96
1	0.75	36.79	30.50	75.46
1.5	1.25	16.26	13.48	88.94
2	1.75	8.89	7.37	96.31
2.5	2.25	3.82	3.17	99.48
3	2.75	0.53	0.44	99.92
3.5	3.25	0.06	0.05	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.095
5	-0.640
16	-0.215
25	-0.070
50	0.335
75	0.740
84	1.065
95	1.660
99	2.175

Moment Measures	(phi)	(mm)
Mean	0.642	0.641
Standard Deviation	0.667	0.630
Skewness	0.477	
Kurtosis	3.549	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.425	0.395
Standard Deviation	0.640	0.668
Skewness (1)	0.141	0.146
Skewness (2)	0.273	
Kurtosis	0.797	1.164



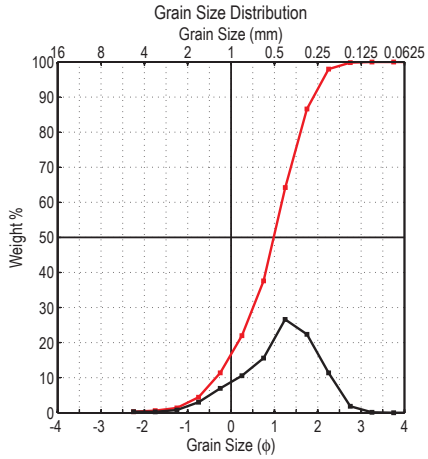
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-04a**
Interval	**Swash**
Mean	**0.366 mm**
STD	**0.672 mm**
Skewness	**-0.194**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	120.66
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	0.79

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	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
-0.5	-0.75	0.14	0.12	0.16
0	-0.25	0.76	0.63	0.79
0.5	0.25	4.69	3.89	4.67
1	0.75	18.20	15.08	19.76
1.5	1.25	40.62	33.66	53.42
2	1.75	35.89	29.74	83.17
2.5	2.25	17.84	14.79	97.95
3	2.75	2.27	1.88	99.83
3.5	3.25	0.16	0.13	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.225
5	0.260
16	0.625
25	0.830
50	1.200
75	1.615
84	1.780
95	2.150
99	2.530

Moment Measures	(phi)	(mm)
Mean	1.451	0.366
Standard Deviation	0.574	0.672
Skewness	-0.194	
Kurtosis	3.332	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.202	1.202
Standard Deviation	0.577	0.575
Skewness (1)	0.004	0.005
Skewness (2)	0.009	
Kurtosis	0.636	0.987



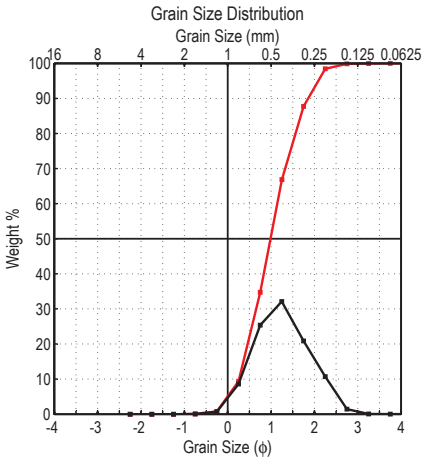
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-04b**
Interval	**LTT**
Mean	**0.461 mm**
STD	**0.551 mm**
Skewness	**-0.674**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.53
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	11.40

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.41	0.34	0.34
-1.5	-1.75	0.33	0.28	0.62
-1	-1.25	0.95	0.79	1.41
-0.5	-0.75	3.60	3.01	4.43
0	-0.25	8.34	6.98	11.40
0.5	0.25	12.64	10.57	21.98
1	0.75	18.66	15.61	37.59
1.5	1.25	31.83	26.63	64.22
2	1.75	26.73	22.36	86.58
2.5	2.25	13.60	11.38	97.96
3	2.75	2.22	1.86	99.82
3.5	3.25	0.18	0.15	99.97
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.510
5	-0.710
16	-0.035
25	0.345
50	0.985
75	1.490
84	1.690
95	2.120
99	2.530

Moment Measures	(phi)	(mm)
Mean	1.118	0.461
Standard Deviation	0.861	0.551
Skewness	-0.674	
Kurtosis	3.564	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.827	0.880
Standard Deviation	0.863	0.860
Skewness (1)	-0.183	-0.190
Skewness (2)	-0.325	
Kurtosis	0.641	1.013



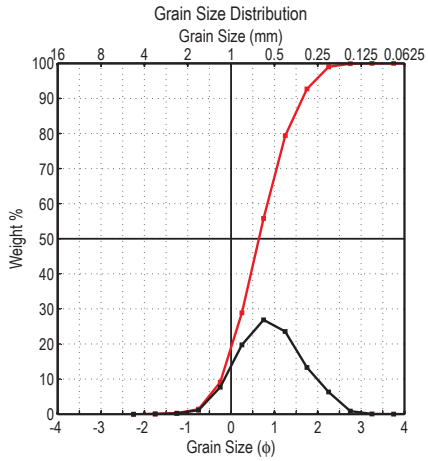
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-05a**
Interval	**Swash**
Mean	**0.417 mm**
STD	**0.657 mm**
Skewness	**0.174**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	119.97
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.78

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	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
-0.5	-0.75	0.09	0.08	0.08
0	-0.25	0.84	0.70	0.78
0.5	0.25	10.31	8.59	9.37
1	0.75	30.42	25.36	34.73
1.5	1.25	38.53	32.12	66.84
2	1.75	25.04	20.87	87.71
2.5	2.25	12.84	10.70	98.42
3	2.75	1.74	1.45	99.87
3.5	3.25	0.10	0.08	99.95
4	3.75	0.04	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.235
5	-0.005
16	0.380
25	0.560
50	0.990
75	1.445
84	1.660
95	2.090
99	2.450

Moment Measures	(phi)	(mm)
Mean	1.261	0.417
Standard Deviation	0.606	0.657
Skewness	0.174	
Kurtosis	2.830	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.020	1.010
Standard Deviation	0.640	0.637
Skewness (1)	0.047	0.048
Skewness (2)	0.082	
Kurtosis	0.637	0.970



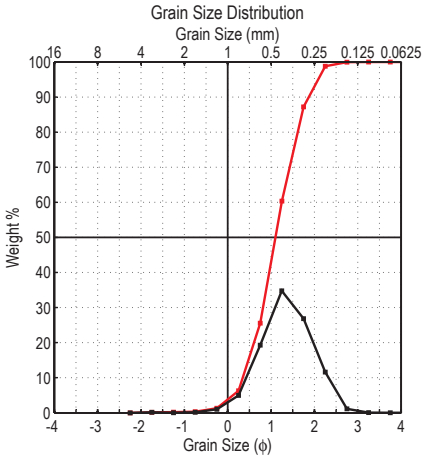
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-05b**
Interval	**LTT**
Mean	**0.530 mm**
STD	**0.608 mm**
Skewness	**0.099**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	120.50
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	9.14

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.07	0.06	0.06
-1	-1.25	0.28	0.23	0.29
-0.5	-0.75	1.37	1.14	1.43
0	-0.25	9.29	7.71	9.14
0.5	0.25	23.82	19.77	28.90
1	0.75	32.41	26.90	55.80
1.5	1.25	28.43	23.59	79.39
2	1.75	16.04	13.31	92.71
2.5	2.25	7.60	6.31	99.01
3	2.75	1.08	0.90	99.91
3.5	3.25	0.07	0.06	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.940
5	-0.520
16	-0.075
25	0.150
50	0.640
75	1.155
84	1.425
95	1.930
99	2.250

Moment Measures	(phi)	(mm)
Mean	0.917	0.530
Standard Deviation	0.717	0.608
Skewness	0.099	
Kurtosis	2.884	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.675	0.663
Standard Deviation	0.750	0.746
Skewness (1)	0.047	0.050
Skewness (2)	0.087	
Kurtosis	0.633	0.999



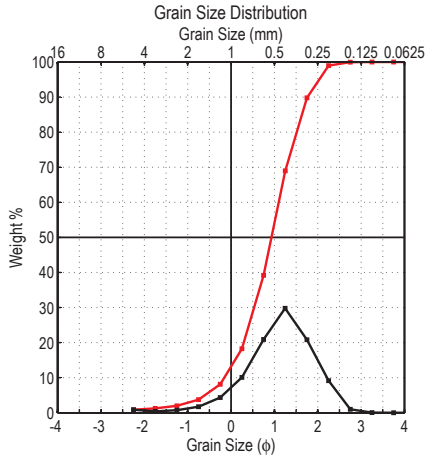
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-06a**
Interval	**Swash**
Mean	**0.392 mm**
STD	**0.666 mm**
Skewness	**-0.344**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	119.69
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	1.33

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.17	0.14	0.14
-1	-1.25	0.04	0.03	0.18
-0.5	-0.75	0.18	0.15	0.33
0	-0.25	1.20	1.00	1.33
0.5	0.25	5.94	4.96	6.29
1	0.75	23.07	19.27	25.57
1.5	1.25	41.64	34.79	60.36
2	1.75	32.13	26.84	87.20
2.5	2.25	13.87	11.59	98.79
3	2.75	1.35	1.13	99.92
3.5	3.25	0.06	0.05	99.97
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.415
5	0.120
16	0.500
25	0.735
50	1.100
75	1.525
84	1.690
95	2.085
99	2.345

Moment Measures	(phi)	(mm)
Mean	1.350	0.392
Standard Deviation	0.587	0.666
Skewness	-0.344	
Kurtosis	4.107	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.095	1.097
Standard Deviation	0.595	0.595
Skewness (1)	-0.008	-0.003
Skewness (2)	0.004	
Kurtosis	0.651	1.019



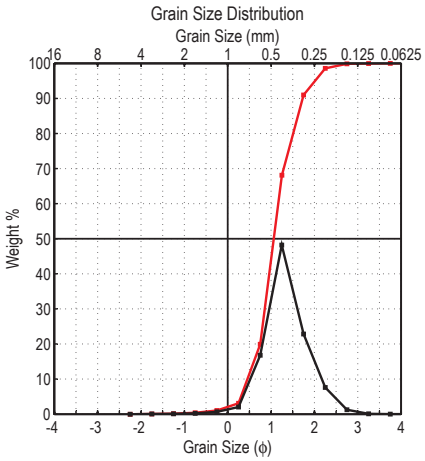
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-06b**
Interval	**LTT**
Mean	**0.468 mm**
STD	**0.570 mm**
Skewness	**-1.027**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.54
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	8.15

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.06	0.88	0.88
-1.5	-1.75	0.47	0.39	1.27
-1	-1.25	0.90	0.75	2.02
-0.5	-0.75	2.12	1.76	3.77
0	-0.25	5.27	4.37	8.15
0.5	0.25	12.20	10.12	18.27
1	0.75	25.21	20.91	39.18
1.5	1.25	35.91	29.79	68.97
2	1.75	25.09	20.81	89.79
2.5	2.25	11.03	9.15	98.94
3	2.75	1.20	1.00	99.93
3.5	3.25	0.06	0.05	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.095
5	-0.610
16	0.140
25	0.410
50	0.930
75	1.395
84	1.610
95	2.035
99	2.280

Moment Measures	(phi)	(mm)
Mean	1.094	0.468
Standard Deviation	0.810	0.570
Skewness	-1.027	
Kurtosis	5.284	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.875	0.893
Standard Deviation	0.735	0.768
Skewness (1)	-0.075	-0.120
Skewness (2)	-0.296	
Kurtosis	0.799	1.101



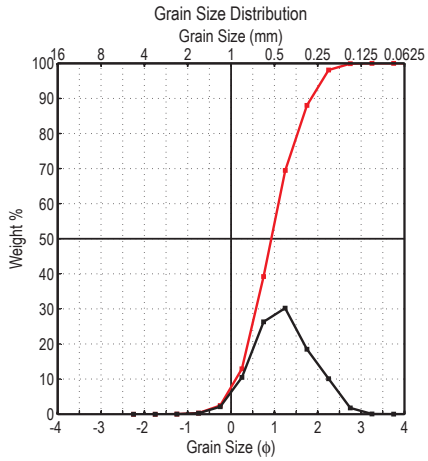
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-07a**
Interval	**Swash**
Mean	**0.395 mm**
STD	**0.701 mm**
Skewness	**-0.139**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	120.85
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	1.07

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.07	0.06	0.06
-1	-1.25	0.13	0.11	0.17
-0.5	-0.75	0.31	0.26	0.42
0	-0.25	0.78	0.65	1.07
0.5	0.25	2.48	2.05	3.12
1	0.75	20.31	16.81	19.93
1.5	1.25	58.23	48.18	68.11
2	1.75	27.61	22.85	90.96
2.5	2.25	9.20	7.61	98.57
3	2.75	1.53	1.27	99.83
3.5	3.25	0.12	0.10	99.93
4	3.75	0.05	0.04	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-0.300
5	0.305
16	0.635
25	0.805
50	1.060
75	1.400
84	1.600
95	2.015
99	2.420

Moment Measures	(phi)	(mm)
Mean	1.339	0.395
Standard Deviation	0.512	0.701
Skewness	-0.139	
Kurtosis	5.754	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.117	1.098
Standard Deviation	0.483	0.500
Skewness (1)	0.119	0.118
Skewness (2)	0.207	
Kurtosis	0.772	1.178



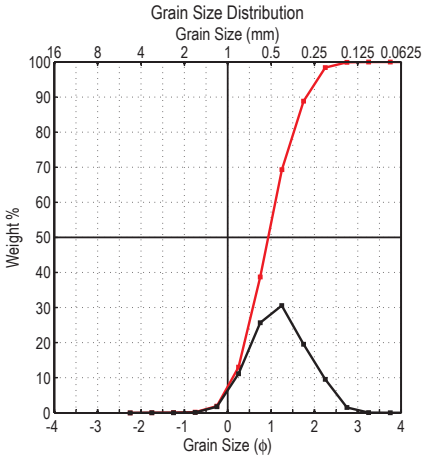
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-07b**
Interval	**LTT**
Mean	**0.436 mm**
STD	**0.637 mm**
Skewness	**0.091**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	120.43
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	2.45

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.04	0.03	0.03
-0.5	-0.75	0.36	0.30	0.33
0	-0.25	2.55	2.12	2.45
0.5	0.25	12.62	10.48	12.93
1	0.75	31.70	26.32	39.25
1.5	1.25	36.42	30.24	69.49
2	1.75	22.31	18.53	88.02
2.5	2.25	12.15	10.09	98.11
3	2.75	2.14	1.78	99.88
3.5	3.25	0.10	0.08	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.590
5	-0.130
16	0.310
25	0.480
50	0.930
75	1.400
84	1.640
95	2.095
99	2.500

Moment Measures	(phi)	(mm)
Mean	1.198	0.436
Standard Deviation	0.650	0.637
Skewness	0.091	
Kurtosis	2.913	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.975	0.960
Standard Deviation	0.665	0.670
Skewness (1)	0.068	0.057
Skewness (2)	0.079	
Kurtosis	0.673	0.991



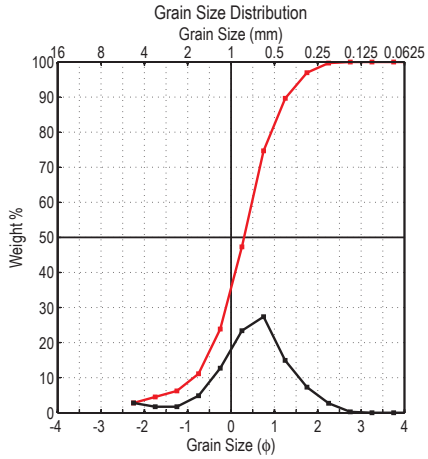
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-08a**
Interval	**Swash**
Mean	**0.436 mm**
STD	**0.643 mm**
Skewness	**0.081**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	120.67
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	1.92

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.04	0.03	0.03
-1	-1.25	0.03	0.02	0.06
-0.5	-0.75	0.15	0.12	0.18
0	-0.25	2.10	1.74	1.92
0.5	0.25	13.41	11.11	13.04
1	0.75	30.99	25.68	38.72
1.5	1.25	36.89	30.57	69.29
2	1.75	23.59	19.55	88.84
2.5	2.25	11.52	9.55	98.38
3	2.75	1.82	1.51	99.89
3.5	3.25	0.09	0.07	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.515
5	-0.110
16	0.310
25	0.485
50	0.935
75	1.395
84	1.625
95	2.075
99	2.455

Moment Measures	(phi)	(mm)
Mean	1.198	0.436
Standard Deviation	0.636	0.643
Skewness	0.081	
Kurtosis	2.940	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.968	0.957
Standard Deviation	0.657	0.660
Skewness (1)	0.049	0.046
Skewness (2)	0.072	
Kurtosis	0.662	0.984



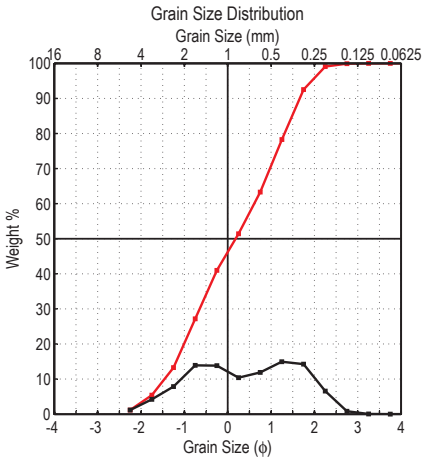
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-08b**
Interval	**LTT**
Mean	**0.724 mm**
STD	**0.532 mm**
Skewness	**-0.714**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.41
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	23.87

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.36	2.79	2.79
-1.5	-1.75	2.09	1.74	4.53
-1	-1.25	2.07	1.72	6.25
-0.5	-0.75	5.88	4.88	11.13
0	-0.25	15.34	12.74	23.87
0.5	0.25	28.19	23.41	47.28
1	0.75	32.96	27.37	74.65
1.5	1.25	18.02	14.97	89.62
2	1.75	8.82	7.32	96.94
2.5	2.25	3.30	2.74	99.68
3	2.75	0.33	0.27	99.96
3.5	3.25	0.03	0.02	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.610
16	-0.560
25	-0.225
50	0.300
75	0.760
84	1.060
95	1.615
99	2.125

Moment Measures	(phi)	(mm)
Mean	0.467	0.724
Standard Deviation	0.911	0.532
Skewness	-0.714	
Kurtosis	4.167	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.250	0.267
Standard Deviation	0.810	0.894
Skewness (1)	-0.062	-0.123
Skewness (2)	-0.367	
Kurtosis	0.991	1.342



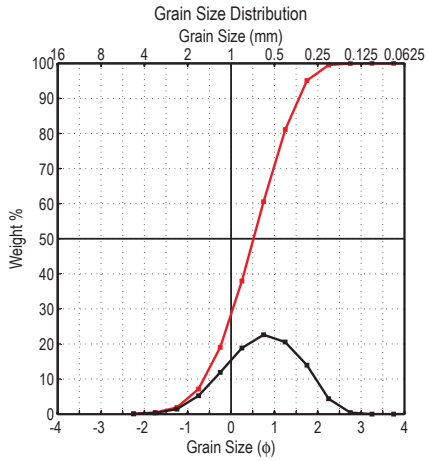
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-09a**
Interval	**Swash**
Mean	**0.764 mm**
STD	**0.441 mm**
Skewness	**-0.116**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	120.07
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	41.01

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.42	1.18	1.18
-1.5	-1.75	5.08	4.23	5.41
-1	-1.25	9.44	7.86	13.28
-0.5	-0.75	16.69	13.90	27.18
0	-0.25	16.61	13.83	41.01
0.5	0.25	12.51	10.42	51.43
1	0.75	14.27	11.88	63.31
1.5	1.25	17.94	14.94	78.25
2	1.75	17.11	14.25	92.50
2.5	2.25	7.90	6.58	99.08
3	2.75	0.99	0.82	99.91
3.5	3.25	0.07	0.06	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.800
16	-1.150
25	-0.830
50	0.180
75	1.140
84	1.450
95	1.940
99	2.245

Moment Measures	(phi)	(mm)
Mean	0.387	0.764
Standard Deviation	1.183	0.441
Skewness	-0.116	
Kurtosis	2.039	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.150	0.160
Standard Deviation	1.300	1.217
Skewness (1)	-0.023	-0.041
Skewness (2)	-0.085	
Kurtosis	0.438	0.778



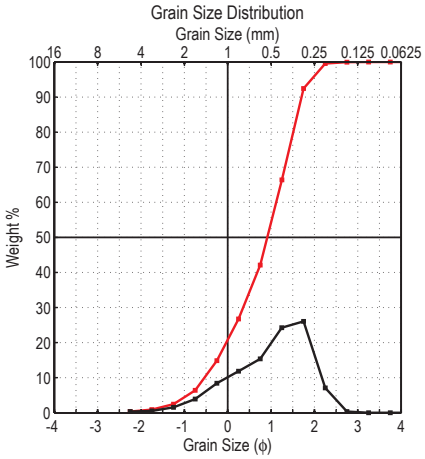
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-09b**
Interval	**LTT**
Mean	**0.601 mm**
STD	**0.563 mm**
Skewness	**-0.222**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	121.37
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	19.09

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.11	0.09	0.09
-1.5	-1.75	0.45	0.37	0.46
-1	-1.25	1.77	1.46	1.92
-0.5	-0.75	6.40	5.27	7.19
0	-0.25	14.44	11.90	19.09
0.5	0.25	22.89	18.86	37.95
1	0.75	27.44	22.61	60.56
1.5	1.25	24.96	20.57	81.12
2	1.75	16.94	13.96	95.08
2.5	2.25	5.36	4.42	99.50
3	2.75	0.53	0.44	99.93
3.5	3.25	0.05	0.04	99.98
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.565
5	-0.960
16	-0.380
25	-0.095
50	0.515
75	1.100
84	1.355
95	1.745
99	2.195

Moment Measures	(phi)	(mm)
Mean	0.736	0.601
Standard Deviation	0.829	0.563
Skewness	-0.222	
Kurtosis	2.815	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.488	0.497
Standard Deviation	0.867	0.844
Skewness (1)	-0.032	-0.061
Skewness (2)	-0.141	
Kurtosis	0.559	0.928



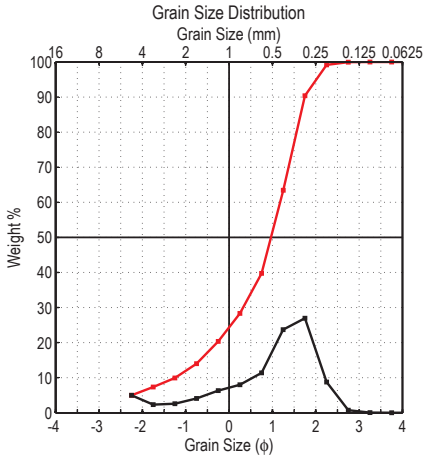
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-10a**
Interval	**Swash**
Mean	**0.504 mm**
STD	**0.543 mm**
Skewness	**-0.778**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	122.17
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	14.86

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.44	0.36	0.36
-1.5	-1.75	0.67	0.55	0.91
-1	-1.25	1.92	1.57	2.48
-0.5	-0.75	4.81	3.94	6.42
0	-0.25	10.32	8.45	14.86
0.5	0.25	14.51	11.88	26.74
1	0.75	18.77	15.36	42.11
1.5	1.25	29.66	24.28	66.38
2	1.75	31.82	26.05	92.43
2.5	2.25	8.70	7.12	99.55
3	2.75	0.46	0.38	99.93
3.5	3.25	0.04	0.03	99.96
4	3.75	0.03	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.720
5	-0.930
16	-0.200
25	0.175
50	0.915
75	1.415
84	1.590
95	1.930
99	2.210

Moment Measures	(phi)	(mm)
Mean	0.989	0.504
Standard Deviation	0.882	0.543
Skewness	-0.778	
Kurtosis	3.377	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.695	0.768
Standard Deviation	0.895	0.881
Skewness (1)	-0.246	-0.268
Skewness (2)	-0.464	
Kurtosis	0.598	0.945



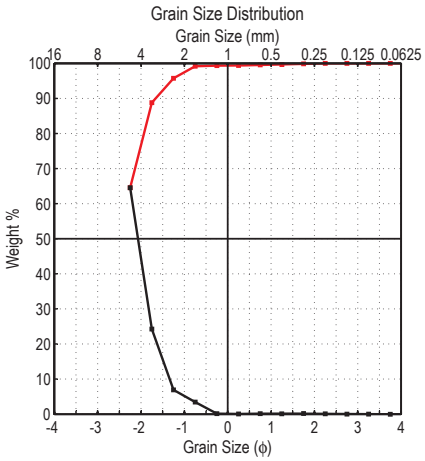
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**NHB-10b**
Interval	**LTT**
Mean	**0.550 mm**
STD	**0.437 mm**
Skewness	**-1.140**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	120.35
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	20.34

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.02	5.00	5.00
-1.5	-1.75	2.81	2.33	7.34
-1	-1.25	3.11	2.58	9.92
-0.5	-0.75	4.92	4.09	14.01
0	-0.25	7.62	6.33	20.34
0.5	0.25	9.63	8.00	28.34
1	0.75	13.73	11.41	39.75
1.5	1.25	28.50	23.68	63.43
2	1.75	32.44	26.95	90.39
2.5	2.25	10.56	8.77	99.16
3	2.75	0.91	0.76	99.92
3.5	3.25	0.06	0.05	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-0.595
25	0.040
50	0.965
75	1.465
84	1.630
95	2.015
99	2.240

Moment Measures	(phi)	(mm)
Mean	0.862	0.550
Standard Deviation	1.194	0.437
Skewness	-1.140	
Kurtosis	3.605	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.518	0.667
Standard Deviation	1.112	1.202
Skewness (1)	-0.402	-0.455
Skewness (2)	-0.973	
Kurtosis	0.917	1.227



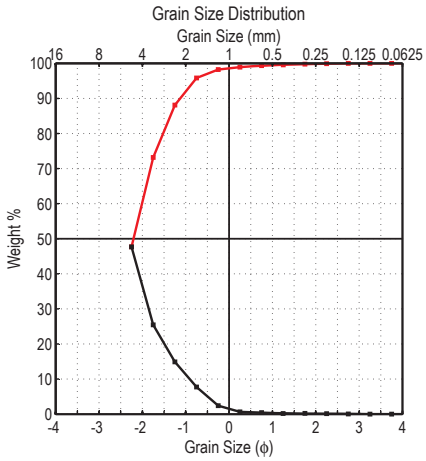
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**KH-01a**
Interval	**Swash**
Mean	**3.944 mm**
STD	**0.714 mm**
Skewness	**3.474**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Well Sorted
Poorly Graded	Strongly Fine Skewed
	Very Leptokurtic
Total weight (gram)	121.18
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	99.32

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	78.19	64.52	64.52
-1.5	-1.75	29.41	24.27	88.79
-1	-1.25	8.40	6.93	95.73
-0.5	-0.75	4.18	3.45	99.17
0	-0.25	0.18	0.15	99.32
0.5	0.25	0.09	0.07	99.40
1	0.75	0.17	0.14	99.54
1.5	1.25	0.14	0.12	99.65
2	1.75	0.23	0.19	99.84
2.5	2.25	0.14	0.12	99.96
3	2.75	0.03	0.02	99.98
3.5	3.25	0.02	0.02	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-2.250
75	-2.035
84	-1.850
95	-1.300
99	-0.775

Moment Measures	(phi)	(mm)
Mean	-1.980	3.944
Standard Deviation	0.487	0.714
Skewness	3.474	
Kurtosis	23.581	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-2.050	-2.117
Standard Deviation	0.200	0.244
Skewness (1)	1.000	1.000
Skewness (2)	2.375	
Kurtosis	1.375	1.811



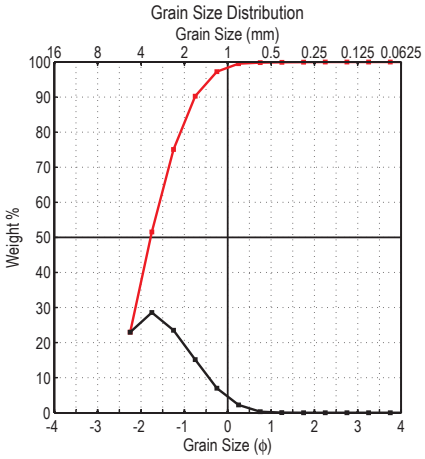
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**KH-01b**
Interval	**LTT**
Mean	**3.367 mm**
STD	**0.634 mm**
Skewness	**2.072**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Strongly Fine Skewed
	Very Leptokurtic
Total weight (gram)	121.00
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	98.21

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	57.69	47.68	47.68
-1.5	-1.75	30.82	25.47	73.15
-1	-1.25	18.06	14.93	88.07
-0.5	-0.75	9.35	7.73	95.80
0	-0.25	2.92	2.41	98.21
0.5	0.25	0.83	0.69	98.90
1	0.75	0.54	0.45	99.35
1.5	1.25	0.22	0.18	99.53
2	1.75	0.27	0.22	99.75
2.5	2.25	0.19	0.16	99.91
3	2.75	0.07	0.06	99.97
3.5	3.25	0.02	0.02	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-2.205
75	-1.690
84	-1.385
95	-0.800
99	0.360

Moment Measures	(phi)	(mm)
Mean	-1.752	3.367
Standard Deviation	0.658	0.634
Skewness	2.072	
Kurtosis	10.142	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.817	-1.947
Standard Deviation	0.433	0.436
Skewness (1)	0.896	0.917
Skewness (2)	1.572	
Kurtosis	0.676	1.061



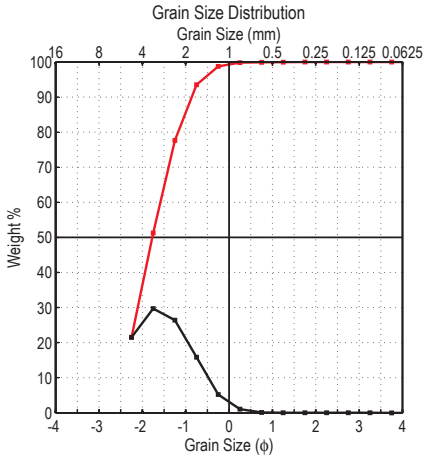
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**KH-02a**
Interval	**Swash**
Mean	**2.695 mm**
STD	**0.625 mm**
Skewness	**0.806**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Fine Skewed
	Leptokurtic
Total weight (gram)	120.56
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	97.24

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	27.68	22.96	22.96
-1.5	-1.75	34.46	28.58	51.54
-1	-1.25	28.35	23.52	75.06
-0.5	-0.75	18.30	15.18	90.24
0	-0.25	8.44	7.00	97.24
0.5	0.25	2.73	2.26	99.50
1	0.75	0.39	0.32	99.83
1.5	1.25	0.07	0.06	99.88
2	1.75	0.05	0.04	99.93
2.5	2.25	0.04	0.03	99.96
3	2.75	0.02	0.02	99.98
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.215
50	-1.775
75	-1.250
84	-0.955
95	-0.410
99	0.140

Moment Measures	(phi)	(mm)
Mean	-1.430	2.695
Standard Deviation	0.678	0.625
Skewness	0.806	
Kurtosis	4.031	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.603	-1.660
Standard Deviation	0.647	0.603
Skewness (1)	0.266	0.375
Skewness (2)	0.687	
Kurtosis	0.421	0.781



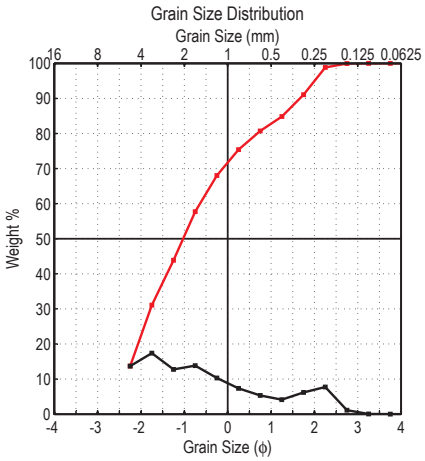
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**KH02b**
Interval	**LTT**
Mean	**2.753 mm**
STD	**0.654 mm**
Skewness	**0.622**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	120.92
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	98.73

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	26.03	21.53	21.53
-1.5	-1.75	35.92	29.71	51.23
-1	-1.25	31.94	26.41	77.65
-0.5	-0.75	19.19	15.87	93.52
0	-0.25	6.30	5.21	98.73
0.5	0.25	1.29	1.07	99.79
1	0.75	0.13	0.11	99.90
1.5	1.25	0.05	0.04	99.94
2	1.75	0.04	0.03	99.98
2.5	2.25	0.01	0.01	99.98
3	2.75	0.01	0.01	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.190
50	-1.770
75	-1.300
84	-1.050
95	-0.610
99	-0.120

Moment Measures	(phi)	(mm)
Mean	-1.461	2.753
Standard Deviation	0.612	0.654
Skewness	0.622	
Kurtosis	3.533	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.650	-1.690
Standard Deviation	0.600	0.548
Skewness (1)	0.200	0.307
Skewness (2)	0.567	
Kurtosis	0.367	0.755



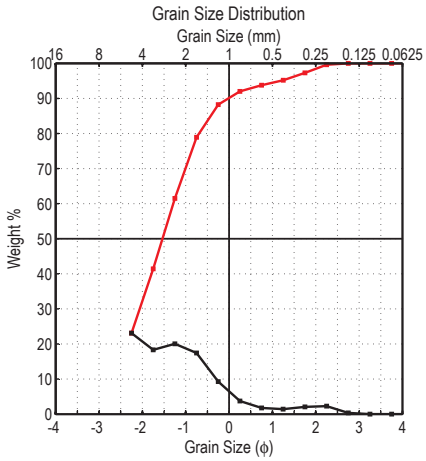
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**KH-03a**
Interval	**Swash**
Mean	**1.390 mm**
STD	**0.370 mm**
Skewness	**0.619**
USCS	**Wentworth**
SW	Very Coarse Sand
Medium Sand	Poorly Sorted
Well Graded	Fine Skewed
	Platykurtic
Total weight (gram)	121.11
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	68.04

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	16.58	13.69	13.69
-1.5	-1.75	21.08	17.41	31.10
-1	-1.25	15.48	12.78	43.88
-0.5	-0.75	16.78	13.86	57.73
0	-0.25	12.48	10.30	68.04
0.5	0.25	8.90	7.35	75.39
1	0.75	6.46	5.33	80.72
1.5	1.25	4.99	4.12	84.84
2	1.75	7.51	6.20	91.04
2.5	2.25	9.40	7.76	98.80
3	2.75	1.36	1.12	99.93
3.5	3.25	0.06	0.05	99.98
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.185
25	-1.925
50	-1.030
75	0.225
84	1.150
95	2.005
99	2.340

Moment Measures	(phi)	(mm)
Mean	-0.476	1.390
Standard Deviation	1.435	0.370
Skewness	0.619	
Kurtosis	2.258	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.518	-0.688
Standard Deviation	1.668	1.478
Skewness (1)	0.307	0.367
Skewness (2)	0.544	
Kurtosis	0.276	0.811



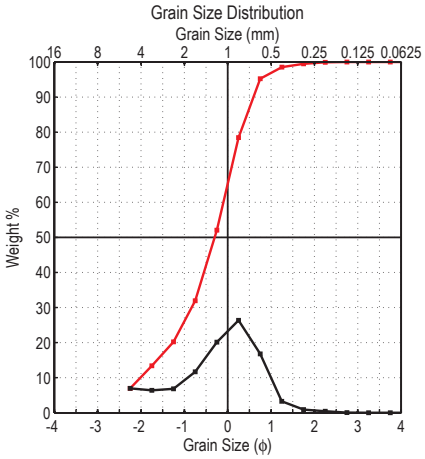
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**KH-03b**
Interval	**LTT**
Mean	**2.150 mm**
STD	**0.471 mm**
Skewness	**1.311**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Poorly Sorted
Poorly Graded	Strongly Fine Skewed
	Leptokurtic
Total weight (gram)	121.87
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	88.23

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	28.14	23.09	23.09
-1.5	-1.75	22.35	18.34	41.43
-1	-1.25	24.44	20.05	61.48
-0.5	-0.75	21.25	17.44	78.92
0	-0.25	11.34	9.30	88.23
0.5	0.25	4.59	3.77	91.99
1	0.75	2.15	1.76	93.76
1.5	1.25	1.75	1.44	95.19
2	1.75	2.53	2.08	97.27
2.5	2.25	2.82	2.31	99.58
3	2.75	0.46	0.38	99.96
3.5	3.25	0.03	0.02	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.200
50	-1.535
75	-0.860
84	-0.475
95	1.185
99	2.125

Moment Measures	(phi)	(mm)
Mean	-1.104	2.150
Standard Deviation	1.085	0.471
Skewness	1.311	
Kurtosis	4.749	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.363	-1.420
Standard Deviation	0.887	0.964
Skewness (1)	0.194	0.389
Skewness (2)	1.130	
Kurtosis	0.935	1.051



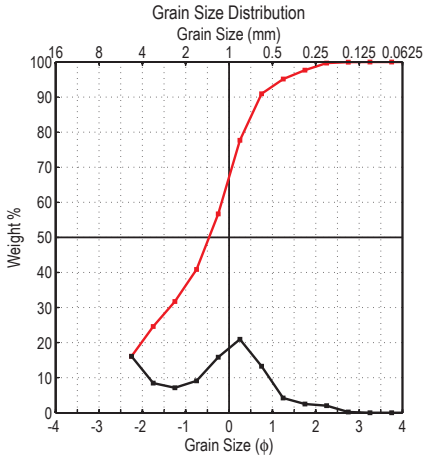
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**KH-04a**
Interval	**Swash**
Mean	**1.173 mm**
STD	**0.517 mm**
Skewness	**-0.479**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	120.06
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	52.07

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	8.39	6.99	6.99
-1.5	-1.75	7.68	6.40	13.38
-1	-1.25	8.23	6.85	20.24
-0.5	-0.75	14.03	11.69	31.93
0	-0.25	24.19	20.15	52.07
0.5	0.25	31.67	26.38	78.45
1	0.75	20.14	16.77	95.23
1.5	1.25	3.95	3.29	98.52
2	1.75	1.12	0.93	99.45
2.5	2.25	0.53	0.44	99.89
3	2.75	0.08	0.07	99.96
3.5	3.25	0.02	0.02	99.98
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.560
25	-1.045
50	-0.300
75	0.185
84	0.415
95	0.745
99	1.510

Moment Measures	(phi)	(mm)
Mean	-0.230	1.173
Standard Deviation	0.952	0.517
Skewness	-0.479	
Kurtosis	2.896	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.573	-0.482
Standard Deviation	0.988	0.948
Skewness (1)	-0.276	-0.289
Skewness (2)	-0.458	
Kurtosis	0.516	0.998



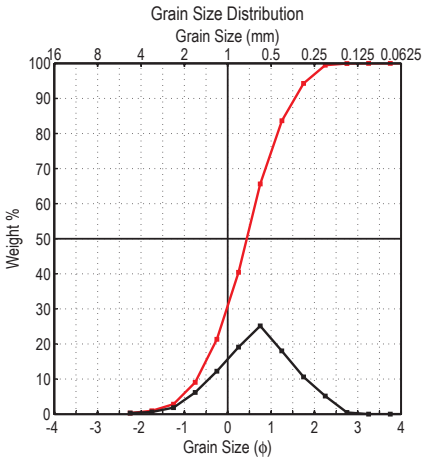
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**KH-04b**
Interval	**LTT**
Mean	**1.324 mm**
STD	**0.435 mm**
Skewness	**-0.034**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	122.54
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	56.71

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	19.74	16.11	16.11
-1.5	-1.75	10.40	8.49	24.60
-1	-1.25	8.76	7.15	31.74
-0.5	-0.75	11.18	9.12	40.87
0	-0.25	19.41	15.84	56.71
0.5	0.25	25.68	20.96	77.66
1	0.75	16.26	13.27	90.93
1.5	1.25	5.16	4.21	95.14
2	1.75	3.06	2.50	97.64
2.5	2.25	2.52	2.06	99.70
3	2.75	0.29	0.24	99.93
3.5	3.25	0.04	0.03	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.720
50	-0.460
75	0.185
84	0.490
95	1.235
99	2.080

Moment Measures	(phi)	(mm)
Mean	-0.405	1.324
Standard Deviation	1.202	0.435
Skewness	-0.034	
Kurtosis	2.270	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.880	-0.740
Standard Deviation	1.370	1.213
Skewness (1)	-0.307	-0.167
Skewness (2)	-0.035	
Kurtosis	0.272	0.750



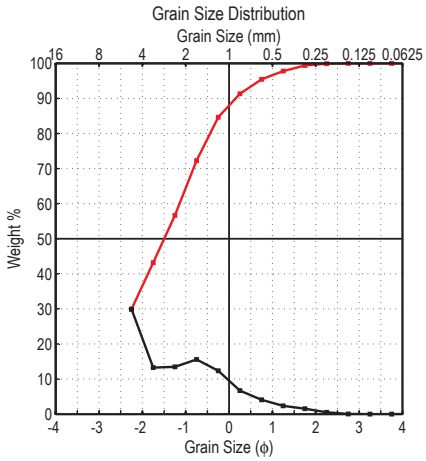
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**KH-05a**
Interval	**Swash**
Mean	**0.633 mm**
STD	**0.551 mm**
Skewness	**-0.217**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	120.71
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	21.32

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.41	0.34	0.34
-1.5	-1.75	0.76	0.63	0.97
-1	-1.25	2.27	1.88	2.85
-0.5	-0.75	7.49	6.20	9.05
0	-0.25	14.81	12.27	21.32
0.5	0.25	23.08	19.12	40.44
1	0.75	30.39	25.18	65.62
1.5	1.25	21.75	18.02	83.64
2	1.75	12.83	10.63	94.27
2.5	2.25	6.25	5.18	99.44
3	2.75	0.59	0.49	99.93
3.5	3.25	0.04	0.03	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.740
5	-1.075
16	-0.465
25	-0.155
50	0.440
75	1.010
84	1.265
95	1.820
99	2.205

Moment Measures	(phi)	(mm)
Mean	0.661	0.633
Standard Deviation	0.860	0.551
Skewness	-0.217	
Kurtosis	3.093	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.400	0.413
Standard Deviation	0.865	0.871
Skewness (1)	-0.046	-0.046
Skewness (2)	-0.078	
Kurtosis	0.673	1.018



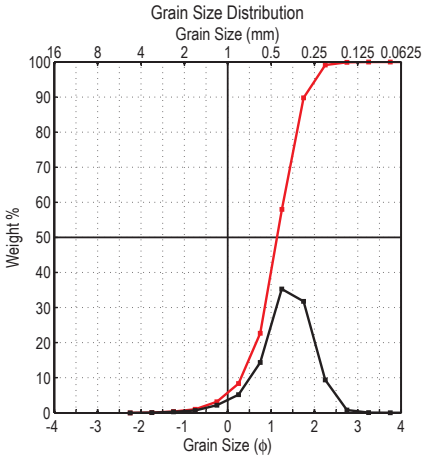
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2013**
Station	**KH-05b**
Interval	**LTT**
Mean	**2.146 mm**
STD	**0.474 mm**
Skewness	**0.772**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	121.80
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	84.61

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	36.43	29.91	29.91
-1.5	-1.75	16.17	13.28	43.19
-1	-1.25	16.41	13.47	56.66
-0.5	-0.75	19.00	15.60	72.26
0	-0.25	15.05	12.36	84.61
0.5	0.25	8.17	6.71	91.32
1	0.75	4.99	4.10	95.42
1.5	1.25	2.90	2.38	97.80
2	1.75	1.91	1.57	99.37
2.5	2.25	0.65	0.53	99.90
3	2.75	0.07	0.06	99.96
3.5	3.25	0.03	0.02	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.495
75	-0.640
84	-0.275
95	0.700
99	1.635

Moment Measures	(phi)	(mm)
Mean	-1.102	2.146
Standard Deviation	1.078	0.474
Skewness	0.772	
Kurtosis	3.012	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.263	-1.340
Standard Deviation	0.988	0.941
Skewness (1)	0.235	0.362
Skewness (2)	0.729	
Kurtosis	0.494	0.751



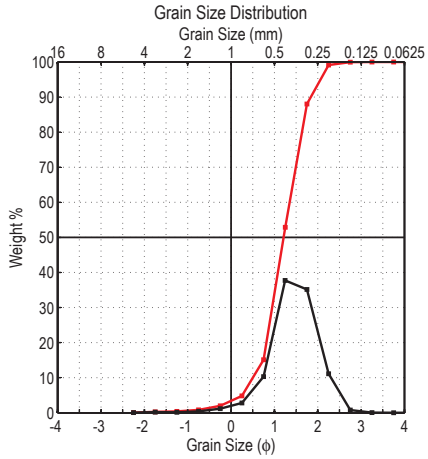
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**B2a**
Interval	**Grab**
Mean	**0.395 mm**
STD	**0.655 mm**
Skewness	**-0.823**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.19
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	3.17
% $CaCO_3$	1.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.08	0.07	0.07
-1	-1.25	0.33	0.28	0.34
-0.5	-0.75	0.81	0.68	1.02
0	-0.25	2.56	2.15	3.17
0.5	0.25	6.17	5.18	8.35
1	0.75	17.08	14.33	22.68
1.5	1.25	42.08	35.30	57.98
2	1.75	37.86	31.76	89.75
2.5	2.25	11.15	9.35	99.10
3	2.75	0.95	0.80	99.90
3.5	3.25	0.10	0.08	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.765
5	-0.075
16	0.515
25	0.785
50	1.135
75	1.520
84	1.660
95	2.030
99	2.245

Moment Measures	(phi)	(mm)
Mean	1.338	0.395
Standard Deviation	0.612	0.655
Skewness	-0.823	
Kurtosis	4.743	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.088	1.103
Standard Deviation	0.573	0.605
Skewness (1)	-0.083	-0.116
Skewness (2)	-0.275	
Kurtosis	0.838	1.174



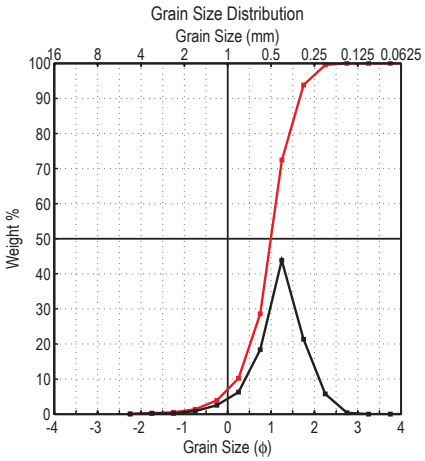
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**B2b**
Interval	**Grab**
Mean	**0.370 mm**
STD	**0.675 mm**
Skewness	**-1.181**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Very Leptokurtic
Total weight (gram)	120.05
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	2.01
% $CaCO_3$	1.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.09	0.07	0.07
-1.5	-1.75	0.24	0.20	0.27
-1	-1.25	0.17	0.14	0.42
-0.5	-0.75	0.51	0.42	0.84
0	-0.25	1.40	1.17	2.01
0.5	0.25	3.39	2.82	4.83
1	0.75	12.38	10.31	15.14
1.5	1.25	45.28	37.72	52.86
2	1.75	42.20	35.15	88.01
2.5	2.25	13.35	11.12	99.13
3	2.75	0.95	0.79	99.93
3.5	3.25	0.07	0.06	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.680
5	0.260
16	0.760
25	0.880
50	1.210
75	1.565
84	1.695
95	2.065
99	2.245

Moment Measures	(phi)	(mm)
Mean	1.433	0.370
Standard Deviation	0.566	0.675
Skewness	-1.181	
Kurtosis	7.549	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.227	1.222
Standard Deviation	0.468	0.507
Skewness (1)	0.037	-0.008
Skewness (2)	-0.102	
Kurtosis	0.930	1.080



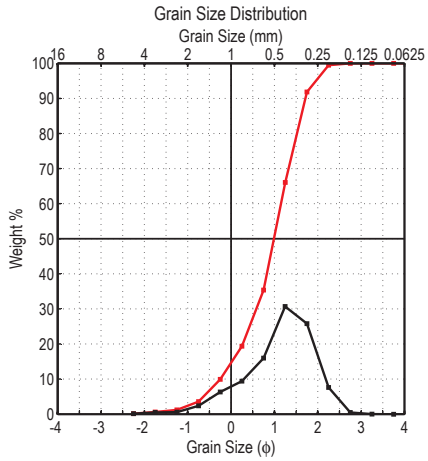
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**B2c**
Interval	**Grab**
Mean	**0.436 mm**
STD	**0.659 mm**
Skewness	**-0.935**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.32
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	3.94
% $CaCO_3$	1.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.07	0.06	0.06
-1.5	-1.75	0.26	0.22	0.27
-1	-1.25	0.30	0.25	0.52
-0.5	-0.75	1.05	0.87	1.40
0	-0.25	3.06	2.54	3.94
0.5	0.25	7.56	6.28	10.22
1	0.75	22.10	18.37	28.59
1.5	1.25	52.78	43.87	72.46
2	1.75	25.67	21.33	93.79
2.5	2.25	6.93	5.76	99.55
3	2.75	0.50	0.42	99.97
3.5	3.25	0.03	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.975
5	-0.165
16	0.405
25	0.650
50	0.995
75	1.310
84	1.520
95	1.855
99	2.200

Moment Measures	(phi)	(mm)
Mean	1.196	0.436
Standard Deviation	0.602	0.659
Skewness	-0.935	
Kurtosis	5.737	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.962	0.973
Standard Deviation	0.558	0.585
Skewness (1)	-0.058	-0.103
Skewness (2)	-0.269	
Kurtosis	0.812	1.254



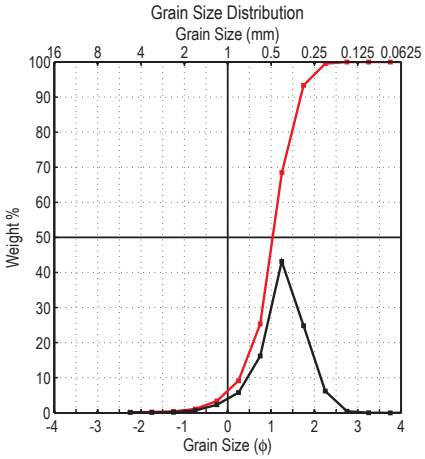
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**B2d**
Interval	**Grab**
Mean	**0.463 mm**
STD	**0.584 mm**
Skewness	**-0.895**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.15
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	9.95
% $CaCO_3$	2.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.16	0.13	0.13
-1.5	-1.75	0.57	0.48	0.61
-1	-1.25	0.71	0.60	1.21
-0.5	-0.75	2.85	2.39	3.60
0	-0.25	7.56	6.34	9.95
0.5	0.25	11.23	9.43	19.37
1	0.75	19.06	16.00	35.37
1.5	1.25	36.56	30.68	66.05
2	1.75	30.73	25.79	91.84
2.5	2.25	9.09	7.63	99.47
3	2.75	0.60	0.50	99.97
3.5	3.25	0.03	0.03	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.425
5	-0.640
16	0.070
25	0.425
50	0.990
75	1.425
84	1.600
95	1.955
99	2.220

Moment Measures	(phi)	(mm)
Mean	1.112	0.463
Standard Deviation	0.777	0.584
Skewness	-0.895	
Kurtosis	3.984	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.835	0.887
Standard Deviation	0.765	0.776
Skewness (1)	-0.203	-0.229
Skewness (2)	-0.435	
Kurtosis	0.696	1.064



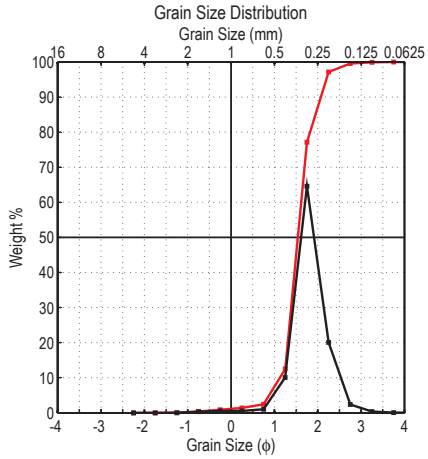
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**B2e**
Interval	**Grab**
Mean	**0.422 mm**
STD	**0.664 mm**
Skewness	**-0.986**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.57
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	3.39
% $CaCO_3$	1.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.17	0.14	0.14
-1.5	-1.75	0.11	0.09	0.23
-1	-1.25	0.19	0.16	0.39
-0.5	-0.75	0.82	0.69	1.08
0	-0.25	2.76	2.31	3.39
0.5	0.25	6.89	5.76	9.15
1	0.75	19.37	16.20	25.35
1.5	1.25	51.57	43.13	68.48
2	1.75	29.70	24.84	93.32
2.5	2.25	7.40	6.19	99.51
3	2.75	0.55	0.46	99.97
3.5	3.25	0.03	0.03	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.810
5	-0.110
16	0.460
25	0.740
50	1.035
75	1.380
84	1.560
95	1.885
99	2.210

Moment Measures	(phi)	(mm)
Mean	1.245	0.422
Standard Deviation	0.591	0.664
Skewness	-0.986	
Kurtosis	6.165	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.010	1.018
Standard Deviation	0.550	0.577
Skewness (1)	-0.045	-0.097
Skewness (2)	-0.268	
Kurtosis	0.814	1.278



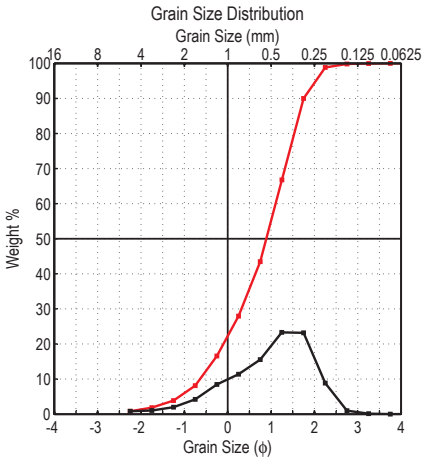
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**B3a**
Interval	**Grab**
Mean	**0.288 mm**
STD	**0.748 mm**
Skewness	**-1.277**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Well Sorted
Poorly Graded	Coarse Skewed
	Very Leptokurtic
Total weight (gram)	120.19
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.87
% $CaCO_3$	1.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.03	0.02	0.02
-0.5	-0.75	0.40	0.33	0.36
0	-0.25	0.62	0.52	0.87
0.5	0.25	0.65	0.54	1.41
1	0.75	1.22	1.02	2.43
1.5	1.25	12.11	10.08	12.51
2	1.75	77.63	64.59	77.09
2.5	2.25	24.12	20.07	97.16
3	2.75	2.85	2.37	99.53
3.5	3.25	0.45	0.37	99.91
4	3.75	0.09	0.07	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.135
5	0.880
16	1.275
25	1.345
50	1.540
75	1.735
84	1.920
95	2.195
99	2.635

Moment Measures	(phi)	(mm)
Mean	1.794	0.288
Standard Deviation	0.419	0.748
Skewness	-1.277	
Kurtosis	11.821	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.597	1.578
Standard Deviation	0.323	0.360
Skewness (1)	0.178	0.087
Skewness (2)	-0.008	
Kurtosis	1.039	1.382



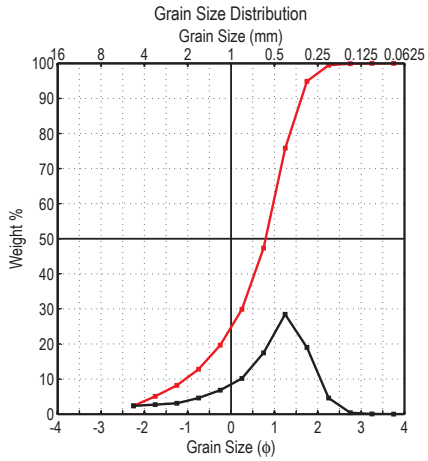
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**B3b**
Interval	**Grab**
Mean	**0.514 mm**
STD	**0.513 mm**
Skewness	**-0.791**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.51
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	16.58
% $CaCO_3$	1.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.01	0.85	0.85
-1.5	-1.75	1.24	1.04	1.88
-1	-1.25	2.39	2.00	3.88
-0.5	-0.75	5.06	4.23	8.12
0	-0.25	10.11	8.46	16.58
0.5	0.25	13.59	11.37	27.95
1	0.75	18.57	15.54	43.49
1.5	1.25	27.85	23.30	66.79
2	1.75	27.71	23.19	89.98
2.5	2.25	10.57	8.84	98.82
3	2.75	1.18	0.99	99.81
3.5	3.25	0.16	0.13	99.94
4	3.75	0.05	0.04	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.175
5	-1.120
16	-0.285
25	0.120
50	0.890
75	1.425
84	1.620
95	2.035
99	2.340

Moment Measures	(phi)	(mm)
Mean	0.960	0.514
Standard Deviation	0.963	0.513
Skewness	-0.791	
Kurtosis	3.514	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.667	0.742
Standard Deviation	0.953	0.954
Skewness (1)	-0.234	-0.254
Skewness (2)	-0.454	
Kurtosis	0.656	0.991



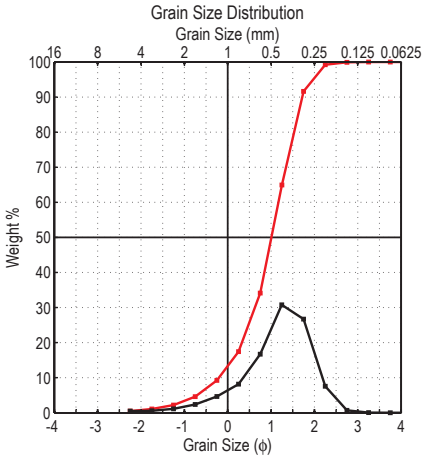
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**B3c**
Interval	**Grab**
Mean	**0.585 mm**
STD	**0.484 mm**
Skewness	**-1.036**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.51
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	19.67
% $CaCO_3$	2.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.84	2.38	2.38
-1.5	-1.75	3.24	2.71	5.09
-1	-1.25	3.74	3.13	8.22
-0.5	-0.75	5.50	4.60	12.82
0	-0.25	8.19	6.85	19.67
0.5	0.25	12.19	10.20	29.87
1	0.75	20.88	17.47	47.34
1.5	1.25	34.04	28.48	75.83
2	1.75	22.74	19.03	94.85
2.5	2.25	5.53	4.63	99.48
3	2.75	0.49	0.41	99.89
3.5	3.25	0.08	0.07	99.96
4	3.75	0.03	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.765
16	-0.520
25	0.010
50	0.795
75	1.235
84	1.465
95	1.765
99	2.200

Moment Measures	(phi)	(mm)
Mean	0.773	0.585
Standard Deviation	1.047	0.484
Skewness	-1.036	
Kurtosis	3.728	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.472	0.580
Standard Deviation	0.992	1.031
Skewness (1)	-0.325	-0.388
Skewness (2)	-0.801	
Kurtosis	0.778	1.181



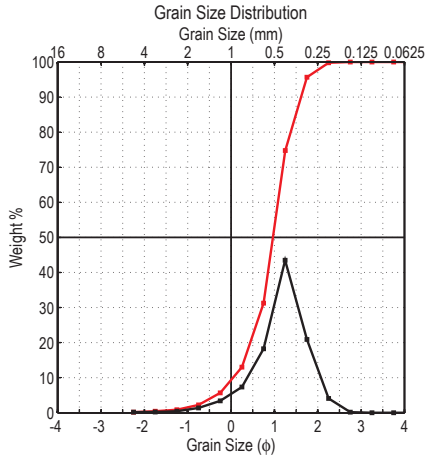
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**B3d**
Interval	**Grab**
Mean	**0.458 mm**
STD	**0.570 mm**
Skewness	**-1.146**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.24
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	9.25
% $CaCO_3$	1.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.60	0.50	0.50
-1.5	-1.75	0.71	0.60	1.10
-1	-1.25	1.34	1.12	2.22
-0.5	-0.75	2.85	2.39	4.61
0	-0.25	5.53	4.64	9.25
0.5	0.25	9.76	8.19	17.44
1	0.75	19.92	16.71	34.14
1.5	1.25	36.70	30.78	64.92
2	1.75	31.84	26.70	91.62
2.5	2.25	9.02	7.56	99.19
3	2.75	0.84	0.70	99.89
3.5	3.25	0.09	0.08	99.97
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.835
5	-0.710
16	0.160
25	0.475
50	1.010
75	1.440
84	1.605
95	1.975
99	2.240

Moment Measures	(phi)	(mm)
Mean	1.126	0.458
Standard Deviation	0.811	0.570
Skewness	-1.146	
Kurtosis	5.043	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.883	0.925
Standard Deviation	0.722	0.768
Skewness (1)	-0.176	-0.229
Skewness (2)	-0.522	
Kurtosis	0.858	1.140



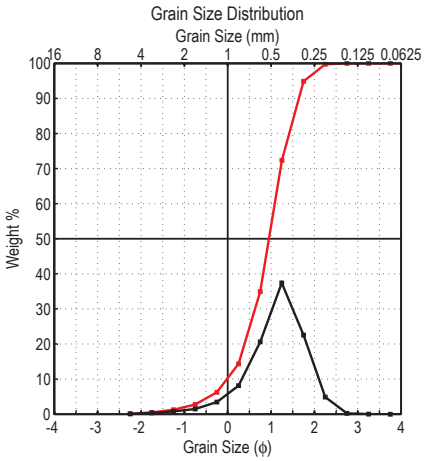
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**B3e**
Interval	**Grab**
Mean	**0.457 mm**
STD	**0.641 mm**
Skewness	**-1.179**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.01
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	5.66
% $CaCO_3$	1.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.23	0.19	0.19
-1.5	-1.75	0.29	0.24	0.44
-1	-1.25	0.53	0.45	0.88
-0.5	-0.75	1.64	1.38	2.26
0	-0.25	4.05	3.40	5.66
0.5	0.25	8.75	7.35	13.02
1	0.75	21.72	18.25	31.27
1.5	1.25	51.74	43.48	74.74
2	1.75	24.88	20.91	95.65
2.5	2.25	4.89	4.11	99.76
3	2.75	0.24	0.20	99.96
3.5	3.25	0.02	0.02	99.97
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.205
5	-0.345
16	0.330
25	0.580
50	0.965
75	1.255
84	1.470
95	1.735
99	2.160

Moment Measures	(phi)	(mm)
Mean	1.131	0.457
Standard Deviation	0.641	0.641
Skewness	-1.179	
Kurtosis	6.167	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.900	0.922
Standard Deviation	0.570	0.600
Skewness (1)	-0.114	-0.187
Skewness (2)	-0.474	
Kurtosis	0.825	1.263



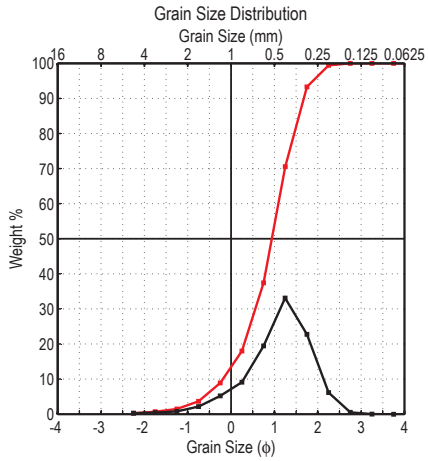
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**BC-E11a**
Interval	**Grab**
Mean	**0.462 mm**
STD	**0.626 mm**
Skewness	**-1.090**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.56
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	6.22
% $CaCO_3$	1.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.12	0.10	0.10
-1.5	-1.75	0.45	0.38	0.48
-1	-1.25	0.94	0.79	1.26
-0.5	-0.75	1.78	1.49	2.75
0	-0.25	4.15	3.47	6.22
0.5	0.25	9.73	8.14	14.36
1	0.75	24.63	20.60	34.96
1.5	1.25	44.72	37.40	72.37
2	1.75	26.94	22.53	94.90
2.5	2.25	5.80	4.85	99.75
3	2.75	0.30	0.25	100.00
3.5	3.25	0.01	0.01	100.01
4	3.75	-0.01	-0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.415
5	-0.425
16	0.290
25	0.510
50	0.950
75	1.310
84	1.510
95	1.760
99	2.175

Moment Measures	(phi)	(mm)
Mean	1.114	0.462
Standard Deviation	0.677	0.626
Skewness	-1.090	
Kurtosis	5.298	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.900	0.917
Standard Deviation	0.610	0.636
Skewness (1)	-0.082	-0.170
Skewness (2)	-0.463	
Kurtosis	0.791	1.119



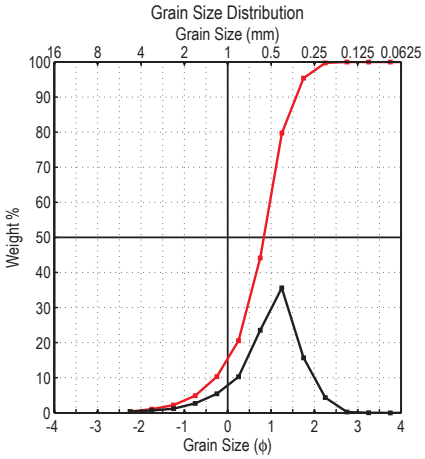
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**BC-E11b**
Interval	**Grab**
Mean	**0.473 mm**
STD	**0.593 mm**
Skewness	**-0.976**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.85
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	8.90
% $CaCO_3$	1.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.31	0.26	0.26
-1.5	-1.75	0.54	0.45	0.71
-1	-1.25	0.94	0.78	1.49
-0.5	-0.75	2.62	2.19	3.68
0	-0.25	6.26	5.22	8.90
0.5	0.25	10.91	9.10	18.01
1	0.75	23.30	19.44	37.45
1.5	1.25	39.65	33.08	70.53
2	1.75	27.28	22.76	93.29
2.5	2.25	7.36	6.14	99.43
3	2.75	0.65	0.54	99.97
3.5	3.25	0.03	0.03	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.565
5	-0.625
16	0.140
25	0.430
50	0.940
75	1.350
84	1.545
95	1.890
99	2.215

Moment Measures	(phi)	(mm)
Mean	1.081	0.473
Standard Deviation	0.754	0.593
Skewness	-0.976	
Kurtosis	4.645	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.843	0.875
Standard Deviation	0.702	0.732
Skewness (1)	-0.139	-0.192
Skewness (2)	-0.438	
Kurtosis	0.790	1.120



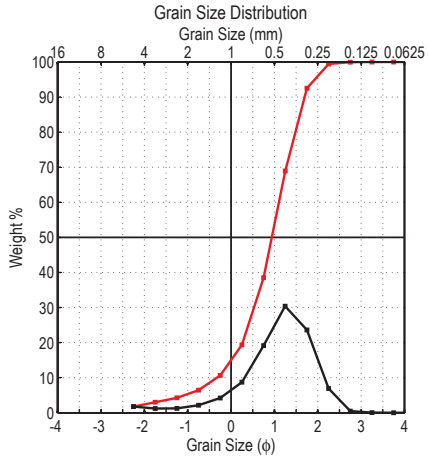
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**BC-E11c**
Interval	**Grab**
Mean	**0.515 mm**
STD	**0.592 mm**
Skewness	**-1.043**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.76
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	10.32
% $CaCO_3$	1.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.44	0.37	0.37
-1.5	-1.75	0.81	0.68	1.04
-1	-1.25	1.40	1.17	2.21
-0.5	-0.75	3.20	2.67	4.88
0	-0.25	6.51	5.44	10.32
0.5	0.25	12.30	10.27	20.59
1	0.75	28.18	23.53	44.12
1.5	1.25	42.64	35.60	79.73
2	1.75	18.77	15.67	95.40
2.5	2.25	5.19	4.33	99.73
3	2.75	0.30	0.25	99.98
3.5	3.25	0.02	0.02	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.780
5	-0.740
16	0.025
25	0.345
50	0.835
75	1.185
84	1.385
95	1.735
99	2.165

Moment Measures	(phi)	(mm)
Mean	0.958	0.515
Standard Deviation	0.757	0.592
Skewness	-1.043	
Kurtosis	4.916	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.705	0.748
Standard Deviation	0.680	0.715
Skewness (1)	-0.191	-0.232
Skewness (2)	-0.496	
Kurtosis	0.820	1.208



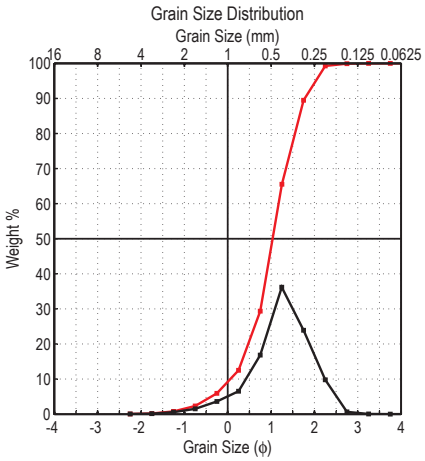
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**BC-E11d**
Interval	**Grab**
Mean	**0.491 mm**
STD	**0.534 mm**
Skewness	**-1.408**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	121.10
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	10.66
% $CaCO_3$	1.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.18	1.80	1.80
-1.5	-1.75	1.50	1.24	3.04
-1	-1.25	1.51	1.25	4.29
-0.5	-0.75	2.62	2.16	6.45
0	-0.25	5.10	4.21	10.66
0.5	0.25	10.56	8.72	19.38
1	0.75	23.18	19.14	38.52
1.5	1.25	36.79	30.38	68.90
2	1.75	28.59	23.61	92.51
2.5	2.25	8.39	6.93	99.44
3	2.75	0.59	0.49	99.93
3.5	3.25	0.07	0.06	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.085
16	0.055
25	0.395
50	0.940
75	1.380
84	1.570
95	1.930
99	2.220

Moment Measures	(phi)	(mm)
Mean	1.026	0.491
Standard Deviation	0.905	0.534
Skewness	-1.408	
Kurtosis	5.655	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.812	0.855
Standard Deviation	0.758	0.836
Skewness (1)	-0.168	-0.256
Skewness (2)	-0.683	
Kurtosis	0.990	1.254



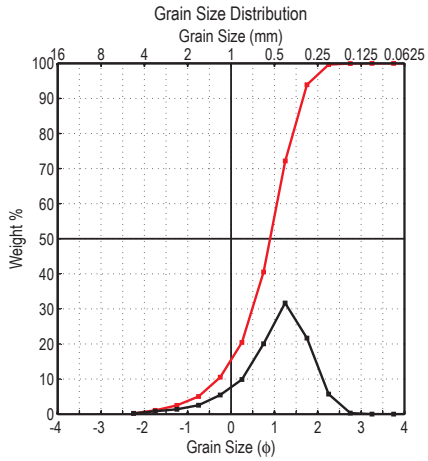
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**BC-E11e**
Interval	**Grab**
Mean	**0.428 mm**
STD	**0.617 mm**
Skewness	**-0.866**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.09
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	5.95
% $CaCO_3$	1.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.09	0.07	0.07
-1.5	-1.75	0.16	0.13	0.21
-1	-1.25	0.71	0.59	0.80
-0.5	-0.75	1.83	1.52	2.32
0	-0.25	4.35	3.62	5.95
0.5	0.25	7.88	6.56	12.51
1	0.75	20.23	16.85	29.35
1.5	1.25	43.45	36.18	65.53
2	1.75	28.72	23.92	89.45
2.5	2.25	11.76	9.79	99.24
3	2.75	0.80	0.67	99.91
3.5	3.25	0.08	0.07	99.98
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.185
5	-0.380
16	0.355
25	0.620
50	1.035
75	1.450
84	1.635
95	2.035
99	2.240

Moment Measures	(phi)	(mm)
Mean	1.223	0.428
Standard Deviation	0.696	0.617
Skewness	-0.866	
Kurtosis	4.647	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.995	1.008
Standard Deviation	0.640	0.686
Skewness (1)	-0.063	-0.117
Skewness (2)	-0.324	
Kurtosis	0.887	1.192



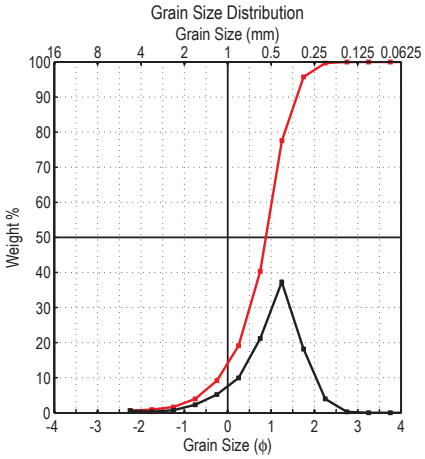
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**BC-E11f**
Interval	**Grab**
Mean	**0.493 mm**
STD	**0.575 mm**
Skewness	**-1.007**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.41
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	10.52
% $CaCO_3$	2.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.29	0.24	0.24
-1.5	-1.75	1.02	0.85	1.09
-1	-1.25	1.69	1.40	2.49
-0.5	-0.75	3.06	2.54	5.03
0	-0.25	6.61	5.49	10.52
0.5	0.25	11.93	9.91	20.43
1	0.75	24.17	20.07	40.50
1.5	1.25	38.16	31.69	72.20
2	1.75	26.13	21.70	93.90
2.5	2.25	6.89	5.72	99.62
3	2.75	0.40	0.33	99.95
3.5	3.25	0.04	0.03	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.800
5	-0.755
16	0.025
25	0.365
50	0.900
75	1.315
84	1.520
95	1.845
99	2.195

Moment Measures	(phi)	(mm)
Mean	1.020	0.493
Standard Deviation	0.798	0.575
Skewness	-1.007	
Kurtosis	4.491	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.772	0.815
Standard Deviation	0.748	0.768
Skewness (1)	-0.171	-0.222
Skewness (2)	-0.475	
Kurtosis	0.739	1.122



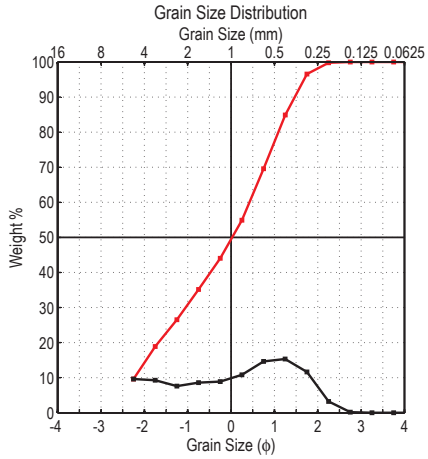
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**BC-E11g**
Interval	**Grab**
Mean	**0.498 mm**
STD	**0.600 mm**
Skewness	**-1.146**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.60
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	9.17
% $CaCO_3$	1.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.73	0.61	0.61
-1.5	-1.75	0.36	0.30	0.91
-1	-1.25	0.90	0.75	1.66
-0.5	-0.75	2.77	2.32	3.98
0	-0.25	6.21	5.19	9.17
0.5	0.25	11.89	9.94	19.11
1	0.75	25.34	21.19	40.30
1.5	1.25	44.58	37.27	77.58
2	1.75	21.71	18.15	95.73
2.5	2.25	4.74	3.96	99.69
3	2.75	0.33	0.28	99.97
3.5	3.25	0.03	0.03	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.690
5	-0.650
16	0.095
25	0.390
50	0.880
75	1.215
84	1.425
95	1.730
99	2.165

Moment Measures	(phi)	(mm)
Mean	1.006	0.498
Standard Deviation	0.738	0.600
Skewness	-1.146	
Kurtosis	5.493	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.760	0.800
Standard Deviation	0.665	0.693
Skewness (1)	-0.180	-0.233
Skewness (2)	-0.511	
Kurtosis	0.789	1.182



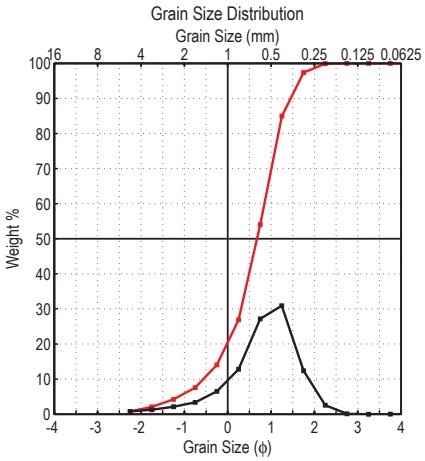
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**BC-E11h**
Interval	**Grab**
Mean	**0.966 mm**
STD	**0.393 mm**
Skewness	**-0.264**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	119.80
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	44.06
% $CaCO_3$	1.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	11.55	9.64	9.64
-1.5	-1.75	11.11	9.27	18.91
-1	-1.25	9.14	7.63	26.54
-0.5	-0.75	10.33	8.62	35.17
0	-0.25	10.65	8.89	44.06
0.5	0.25	12.99	10.84	54.90
1	0.75	17.56	14.66	69.56
1.5	1.25	18.36	15.33	84.88
2	1.75	13.97	11.66	96.54
2.5	2.25	3.88	3.24	99.78
3	2.75	0.22	0.18	99.97
3.5	3.25	0.02	0.02	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.905
25	-1.350
50	0.025
75	0.930
84	1.220
95	1.685
99	2.130

Moment Measures	(phi)	(mm)
Mean	0.050	0.966
Standard Deviation	1.346	0.393
Skewness	-0.264	
Kurtosis	1.881	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.343	-0.220
Standard Deviation	1.562	1.377
Skewness (1)	-0.235	-0.196
Skewness (2)	-0.197	
Kurtosis	0.259	0.707



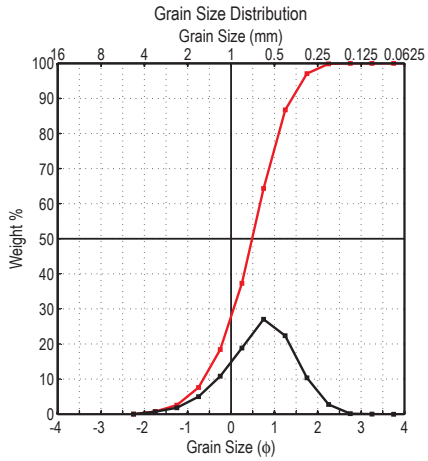
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**BC-E11i**
Interval	**Grab**
Mean	**0.578 mm**
STD	**0.567 mm**
Skewness	**-1.099**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.01
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	14.05
% $CaCO_3$	0.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.95	0.79	0.79
-1.5	-1.75	1.54	1.28	2.07
-1	-1.25	2.57	2.14	4.22
-0.5	-0.75	4.02	3.35	7.57
0	-0.25	7.78	6.48	14.05
0.5	0.25	15.38	12.82	26.86
1	0.75	32.62	27.18	54.05
1.5	1.25	37.11	30.92	84.97
2	1.75	14.85	12.37	97.34
2.5	2.25	3.07	2.56	99.90
3	2.75	0.11	0.09	99.99
3.5	3.25	0.00	0.00	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.170
5	-1.135
16	-0.175
25	0.175
50	0.675
75	1.090
84	1.235
95	1.655
99	2.075

Moment Measures	(phi)	(mm)
Mean	0.791	0.578
Standard Deviation	0.819	0.567
Skewness	-1.099	
Kurtosis	4.699	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.530	0.578
Standard Deviation	0.705	0.775
Skewness (1)	-0.206	-0.252
Skewness (2)	-0.589	
Kurtosis	0.979	1.250



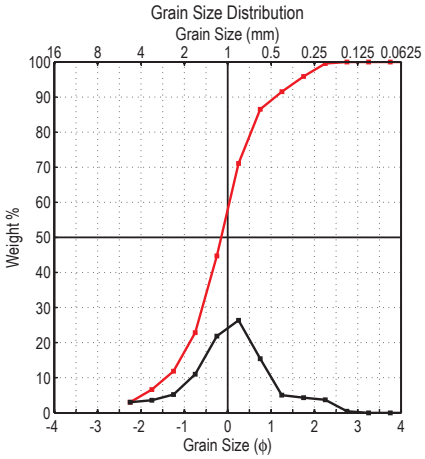
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**BC-E11j**
Interval	**Grab**
Mean	**0.626 mm**
STD	**0.581 mm**
Skewness	**-0.410**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	119.17
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	18.43
% $CaCO_3$	1.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.05	0.04	0.04
-1.5	-1.75	0.86	0.72	0.76
-1	-1.25	2.19	1.84	2.60
-0.5	-0.75	5.97	5.01	7.61
0	-0.25	12.89	10.82	18.43
0.5	0.25	22.48	18.86	37.29
1	0.75	32.23	27.05	64.34
1.5	1.25	26.68	22.39	86.72
2	1.75	12.33	10.35	97.07
2.5	2.25	3.29	2.76	99.83
3	2.75	0.18	0.15	99.98
3.5	3.25	0.02	0.02	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.685
5	-1.010
16	-0.360
25	-0.075
50	0.485
75	0.990
84	1.190
95	1.650
99	2.100

Moment Measures	(phi)	(mm)
Mean	0.677	0.626
Standard Deviation	0.783	0.581
Skewness	-0.410	
Kurtosis	3.170	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.415	0.438
Standard Deviation	0.775	0.791
Skewness (1)	-0.090	-0.107
Skewness (2)	-0.213	
Kurtosis	0.716	1.024



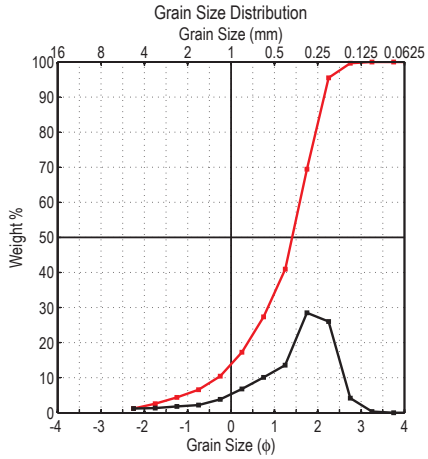
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-01a**
Interval	**Swash**
Mean	**0.945 mm**
STD	**0.509 mm**
Skewness	**-0.011**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	119.88
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	44.71
% $CaCO_3$	3.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.61	3.01	3.01
-1.5	-1.75	4.32	3.60	6.61
-1	-1.25	6.27	5.23	11.85
-0.5	-0.75	13.21	11.02	22.86
0	-0.25	26.19	21.85	44.71
0.5	0.25	31.59	26.35	71.06
1	0.75	18.50	15.43	86.49
1.5	1.25	6.03	5.03	91.52
2	1.75	5.18	4.32	95.85
2.5	2.25	4.46	3.72	99.57
3	2.75	0.52	0.43	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.975
16	-1.060
25	-0.700
50	-0.150
75	0.380
84	0.670
95	1.650
99	2.175

Moment Measures	(phi)	(mm)
Mean	0.082	0.945
Standard Deviation	0.974	0.509
Skewness	-0.011	
Kurtosis	3.352	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.195	-0.180
Standard Deviation	0.865	0.982
Skewness (1)	-0.052	-0.029
Skewness (2)	-0.014	
Kurtosis	1.095	1.376



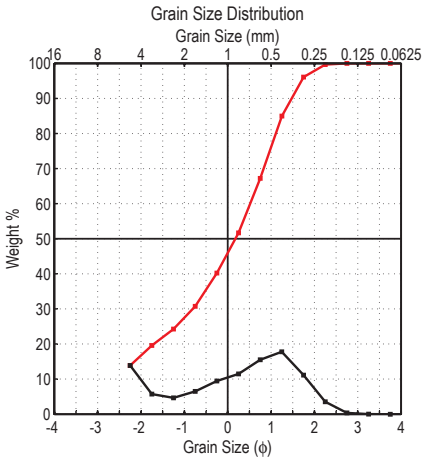
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-01b**
Interval	**LTT**
Mean	**0.386 mm**
STD	**0.487 mm**
Skewness	**-1.336**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	120.35
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	10.46
% $CaCO_3$	1.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.46	1.21	1.21
-1.5	-1.75	1.65	1.37	2.58
-1	-1.25	2.20	1.83	4.41
-0.5	-0.75	2.64	2.19	6.61
0	-0.25	4.64	3.86	10.46
0.5	0.25	8.18	6.80	17.26
1	0.75	12.14	10.09	27.35
1.5	1.25	16.36	13.59	40.94
2	1.75	34.30	28.50	69.44
2.5	2.25	31.33	26.03	95.47
3	2.75	5.01	4.16	99.63
3.5	3.25	0.43	0.36	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.115
16	0.155
25	0.635
50	1.410
75	1.855
84	2.030
95	2.240
99	2.675

Moment Measures	(phi)	(mm)
Mean	1.373	0.386
Standard Deviation	1.039	0.487
Skewness	-1.336	
Kurtosis	4.686	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.093	1.198
Standard Deviation	0.938	0.977
Skewness (1)	-0.339	-0.422
Skewness (2)	-0.904	
Kurtosis	0.789	1.127



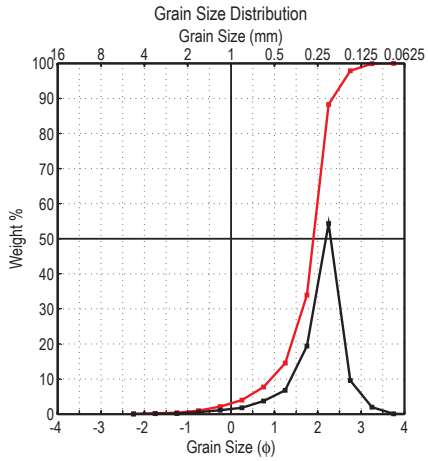
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-02a**
Interval	**Swash**
Mean	**0.927 mm**
STD	**0.384 mm**
Skewness	**-0.433**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	120.03
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	40.20
% $CaCO_3$	2.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	16.66	13.88	13.88
-1.5	-1.75	6.85	5.71	19.59
-1	-1.25	5.60	4.67	24.25
-0.5	-0.75	7.78	6.48	30.73
0	-0.25	11.36	9.46	40.20
0.5	0.25	13.79	11.49	51.69
1	0.75	18.61	15.50	67.19
1.5	1.25	21.32	17.76	84.95
2	1.75	13.37	11.14	96.09
2.5	2.25	4.24	3.53	99.63
3	2.75	0.43	0.36	99.98
3.5	3.25	0.02	0.02	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.065
25	-1.190
50	0.175
75	0.970
84	1.225
95	1.700
99	2.160

Moment Measures	(phi)	(mm)
Mean	0.109	0.927
Standard Deviation	1.379	0.384
Skewness	-0.433	
Kurtosis	2.003	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.420	-0.222
Standard Deviation	1.645	1.421
Skewness (1)	-0.362	-0.295
Skewness (2)	-0.274	
Kurtosis	0.201	0.749



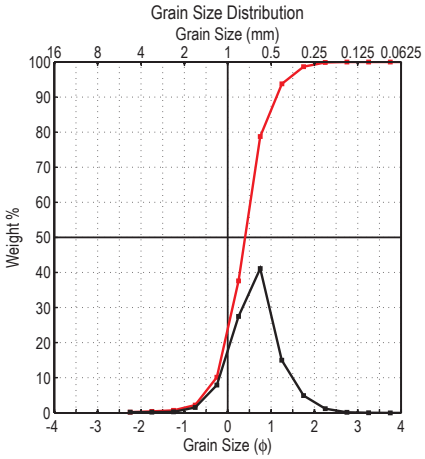
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-02b**
Interval	**Swash**
Mean	**0.250 mm**
STD	**0.629 mm**
Skewness	**-1.893**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	120.16
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	2.16
% $CaCO_3$	1.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.08	0.07	0.07
-1.5	-1.75	0.19	0.16	0.22
-1	-1.25	0.24	0.20	0.42
-0.5	-0.75	0.72	0.60	1.02
0	-0.25	1.37	1.14	2.16
0.5	0.25	2.21	1.84	4.00
1	0.75	4.52	3.76	7.76
1.5	1.25	8.15	6.78	14.55
2	1.75	23.32	19.41	33.95
2.5	2.25	65.28	54.33	88.28
3	2.75	11.54	9.60	97.89
3.5	3.25	2.40	2.00	99.88
4	3.75	0.13	0.11	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.770
5	0.385
16	1.285
25	1.520
50	1.900
75	2.130
84	2.210
95	2.600
99	3.030

Moment Measures	(phi)	(mm)
Mean	1.999	0.250
Standard Deviation	0.668	0.629
Skewness	-1.893	
Kurtosis	8.847	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.748	1.798
Standard Deviation	0.462	0.567
Skewness (1)	-0.330	-0.349
Skewness (2)	-0.881	
Kurtosis	1.395	1.488



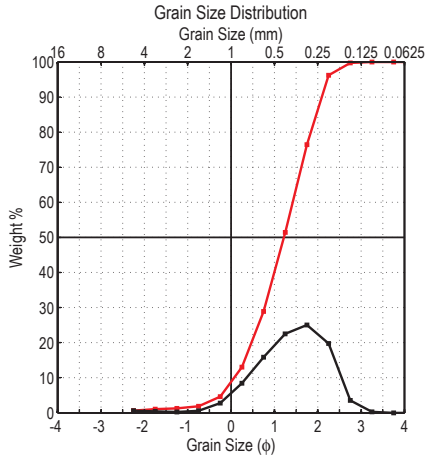
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-03a**
Interval	**LTT**
Mean	**0.642 mm**
STD	**0.671 mm**
Skewness	**-0.216**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	119.22
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	10.13
% $CaCO_3$	2.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.25	0.21	0.21
-1.5	-1.75	0.22	0.18	0.39
-1	-1.25	0.35	0.29	0.69
-0.5	-0.75	1.81	1.52	2.21
0	-0.25	9.45	7.93	10.13
0.5	0.25	32.76	27.48	37.61
1	0.75	49.04	41.13	78.75
1.5	1.25	17.90	15.01	93.76
2	1.75	5.84	4.90	98.66
2.5	2.25	1.42	1.19	99.85
3	2.75	0.17	0.14	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.145
5	-0.575
16	-0.145
25	0.020
50	0.400
75	0.705
84	0.925
95	1.375
99	1.895

Moment Measures	(phi)	(mm)
Mean	0.639	0.642
Standard Deviation	0.576	0.671
Skewness	-0.216	
Kurtosis	5.133	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.390	0.393
Standard Deviation	0.535	0.563
Skewness (1)	-0.019	-0.009
Skewness (2)	0.000	
Kurtosis	0.822	1.167



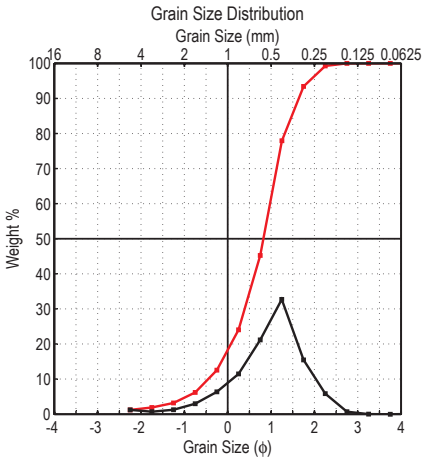
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-03b**
Interval	**Swash**
Mean	**0.386 mm**
STD	**0.567 mm**
Skewness	**-0.987**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.37
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	4.61
% $CaCO_3$	2.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.76	0.63	0.63
-1.5	-1.75	0.49	0.41	1.04
-1	-1.25	0.27	0.22	1.26
-0.5	-0.75	0.71	0.59	1.85
0	-0.25	3.32	2.76	4.61
0.5	0.25	10.13	8.42	13.03
1	0.75	19.10	15.87	28.89
1.5	1.25	27.11	22.52	51.42
2	1.75	30.12	25.02	76.44
2.5	2.25	23.80	19.77	96.21
3	2.75	4.25	3.53	99.74
3.5	3.25	0.31	0.26	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.795
5	-0.225
16	0.345
25	0.625
50	1.220
75	1.720
84	1.940
95	2.220
99	2.645

Moment Measures	(phi)	(mm)
Mean	1.374	0.386
Standard Deviation	0.820	0.567
Skewness	-0.987	
Kurtosis	5.168	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.142	1.168
Standard Deviation	0.798	0.769
Skewness (1)	-0.097	-0.140
Skewness (2)	-0.279	
Kurtosis	0.533	0.915



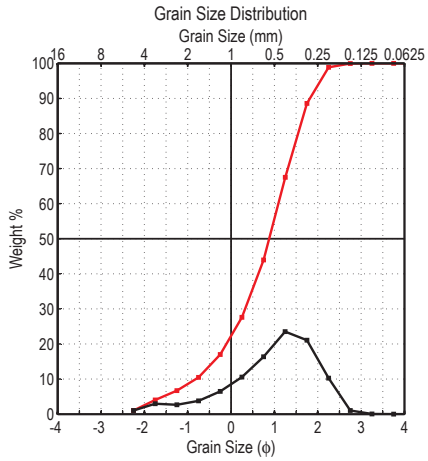
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-04a**
Interval	**LTT**
Mean	**0.527 mm**
STD	**0.552 mm**
Skewness	**-1.045**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.82
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	12.57
% $CaCO_3$	2.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.46	1.22	1.22
-1.5	-1.75	0.85	0.71	1.93
-1	-1.25	1.54	1.29	3.21
-0.5	-0.75	3.56	2.97	6.18
0	-0.25	7.65	6.38	12.57
0.5	0.25	13.75	11.48	24.04
1	0.75	25.39	21.19	45.23
1.5	1.25	39.19	32.71	77.94
2	1.75	18.52	15.46	93.40
2.5	2.25	7.03	5.87	99.27
3	2.75	0.85	0.71	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-0.950
16	-0.100
25	0.275
50	0.825
75	1.205
84	1.445
95	1.885
99	2.225

Moment Measures	(phi)	(mm)
Mean	0.925	0.527
Standard Deviation	0.856	0.552
Skewness	-1.045	
Kurtosis	4.876	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.673	0.723
Standard Deviation	0.772	0.816
Skewness (1)	-0.197	-0.225
Skewness (2)	-0.463	
Kurtosis	0.835	1.249



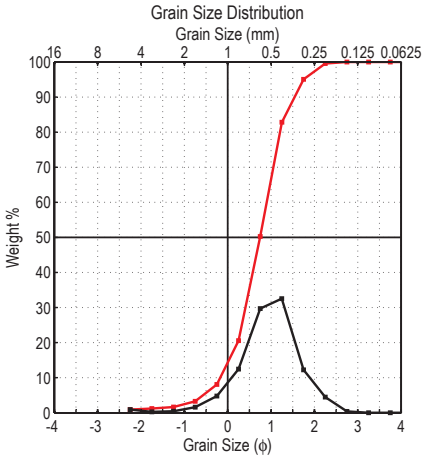
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-04b**
Interval	**Swash**
Mean	**0.528 mm**
STD	**0.486 mm**
Skewness	**-0.926**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.71
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	17.02
% $CaCO_3$	3.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.24	1.04	1.04
-1.5	-1.75	3.59	3.00	4.03
-1	-1.25	3.22	2.69	6.72
-0.5	-0.75	4.53	3.78	10.51
0	-0.25	7.80	6.52	17.02
0.5	0.25	12.67	10.58	27.61
1	0.75	19.58	16.36	43.96
1.5	1.25	28.17	23.53	67.50
2	1.75	25.24	21.08	88.58
2.5	2.25	12.31	10.28	98.86
3	2.75	1.28	1.07	99.93
3.5	3.25	0.06	0.05	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.570
16	-0.330
25	0.125
50	0.880
75	1.430
84	1.640
95	2.060
99	2.315

Moment Measures	(phi)	(mm)
Mean	0.921	0.528
Standard Deviation	1.041	0.486
Skewness	-0.926	
Kurtosis	3.558	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.655	0.730
Standard Deviation	0.985	1.043
Skewness (1)	-0.228	-0.289
Skewness (2)	-0.645	
Kurtosis	0.843	1.140



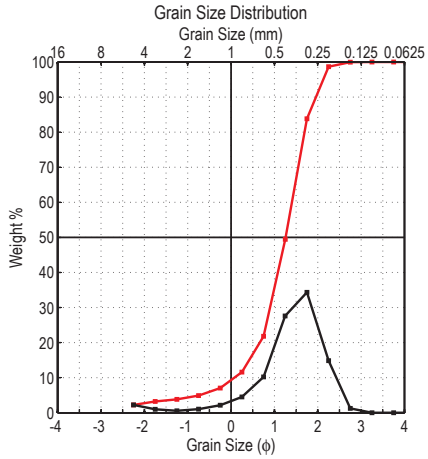
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-05a**
Interval	**LTT**
Mean	**0.524 mm**
STD	**0.605 mm**
Skewness	**-1.026**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	118.96
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	8.07
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.11	0.93	0.93
-1.5	-1.75	0.32	0.27	1.20
-1	-1.25	0.54	0.45	1.66
-0.5	-0.75	1.93	1.62	3.28
0	-0.25	5.70	4.79	8.07
0.5	0.25	14.85	12.48	20.55
1	0.75	35.36	29.72	50.28
1.5	1.25	38.69	32.52	82.80
2	1.75	14.59	12.26	95.07
2.5	2.25	5.34	4.49	99.55
3	2.75	0.50	0.42	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.125
5	-0.570
16	0.070
25	0.325
50	0.745
75	1.130
84	1.300
95	1.745
99	2.190

Moment Measures	(phi)	(mm)
Mean	0.933	0.524
Standard Deviation	0.724	0.605
Skewness	-1.026	
Kurtosis	6.181	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.685	0.705
Standard Deviation	0.615	0.658
Skewness (1)	-0.098	-0.117
Skewness (2)	-0.256	
Kurtosis	0.882	1.179



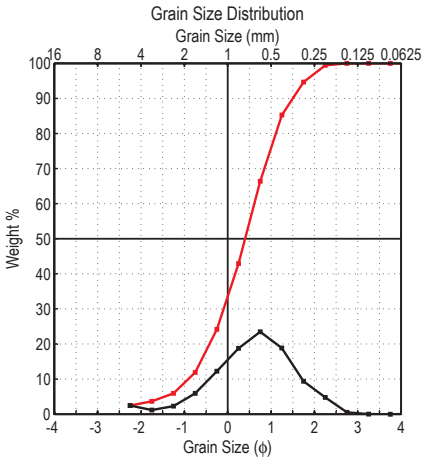
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-05b**
Interval	**Swash**
Mean	**0.401 mm**
STD	**0.533 mm**
Skewness	**-1.961**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	118.45
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.06
% $CaCO_3$	1.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.68	2.26	2.26
-1.5	-1.75	1.18	1.00	3.26
-1	-1.25	0.68	0.57	3.83
-0.5	-0.75	1.26	1.06	4.90
0	-0.25	2.56	2.16	7.06
0.5	0.25	5.37	4.53	11.59
1	0.75	12.12	10.23	21.82
1.5	1.25	32.72	27.62	49.45
2	1.75	40.68	34.34	83.79
2.5	2.25	17.62	14.88	98.67
3	2.75	1.52	1.28	99.95
3.5	3.25	0.05	0.04	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-0.725
16	0.465
25	0.805
50	1.260
75	1.620
84	1.755
95	2.125
99	2.380

Moment Measures	(phi)	(mm)
Mean	1.317	0.401
Standard Deviation	0.909	0.533
Skewness	-1.961	
Kurtosis	7.880	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.110	1.160
Standard Deviation	0.645	0.754
Skewness (1)	-0.233	-0.313
Skewness (2)	-0.868	
Kurtosis	1.209	1.433



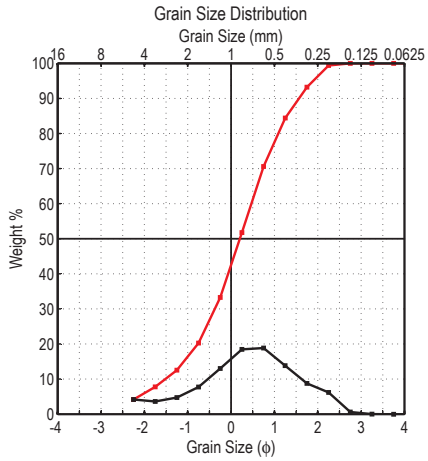
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-06a**
Interval	**LTT**
Mean	**0.676 mm**
STD	**0.512 mm**
Skewness	**-0.599**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.82
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	24.15
% $CaCO_3$	1.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.98	2.49	2.49
-1.5	-1.75	1.43	1.19	3.68
-1	-1.25	2.73	2.28	5.96
-0.5	-0.75	7.12	5.94	11.90
0	-0.25	14.68	12.25	24.15
0.5	0.25	22.47	18.75	42.91
1	0.75	28.16	23.50	66.41
1.5	1.25	22.60	18.86	85.27
2	1.75	11.25	9.39	94.66
2.5	2.25	5.72	4.77	99.43
3	2.75	0.65	0.54	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.460
16	-0.585
25	-0.225
50	0.400
75	0.980
84	1.215
95	1.785
99	2.205

Moment Measures	(phi)	(mm)
Mean	0.566	0.676
Standard Deviation	0.965	0.512
Skewness	-0.599	
Kurtosis	3.631	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.315	0.343
Standard Deviation	0.900	0.942
Skewness (1)	-0.094	-0.120
Skewness (2)	-0.264	
Kurtosis	0.803	1.104



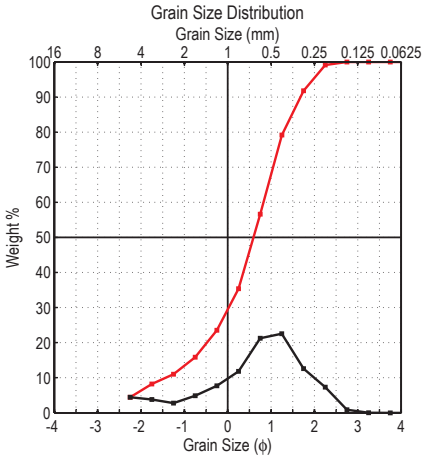
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-06b**
Interval	**Swash**
Mean	**0.777 mm**
STD	**0.457 mm**
Skewness	**-0.400**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	118.04
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	33.29
% $CaCO_3$	3.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	4.92	4.17	4.17
-1.5	-1.75	4.26	3.61	7.78
-1	-1.25	5.62	4.76	12.54
-0.5	-0.75	9.12	7.73	20.26
0	-0.25	15.37	13.02	33.29
0.5	0.25	21.80	18.47	51.75
1	0.75	22.24	18.84	70.59
1.5	1.25	16.31	13.82	84.41
2	1.75	10.35	8.77	93.18
2.5	2.25	7.32	6.20	99.38
3	2.75	0.72	0.61	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.135
16	-1.025
25	-0.570
50	0.205
75	0.910
84	1.235
95	1.895
99	2.220

Moment Measures	(phi)	(mm)
Mean	0.363	0.777
Standard Deviation	1.131	0.457
Skewness	-0.400	
Kurtosis	2.770	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.105	0.138
Standard Deviation	1.130	1.176
Skewness (1)	-0.088	-0.125
Skewness (2)	-0.288	
Kurtosis	0.783	1.116



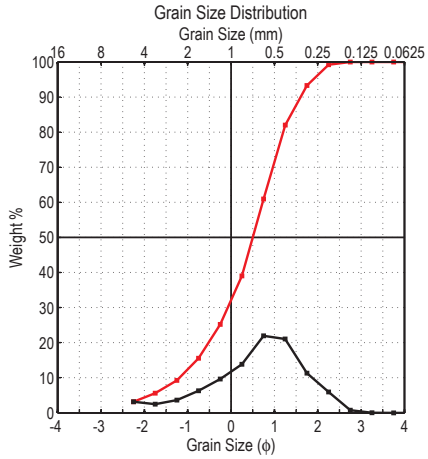
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-07a**
Interval	**LTT**
Mean	**0.649 mm**
STD	**0.450 mm**
Skewness	**-0.841**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	120.05
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	23.55
% $CaCO_3$	4.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.31	4.42	4.42
-1.5	-1.75	4.56	3.80	8.22
-1	-1.25	3.33	2.77	11.00
-0.5	-0.75	5.82	4.85	15.84
0	-0.25	9.25	7.71	23.55
0.5	0.25	14.17	11.80	35.35
1	0.75	25.53	21.27	56.62
1.5	1.25	27.08	22.55	79.17
2	1.75	15.12	12.60	91.77
2.5	2.25	8.80	7.33	99.10
3	2.75	1.07	0.89	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.175
16	-0.740
25	-0.190
50	0.595
75	1.155
84	1.440
95	1.970
99	2.245

Moment Measures	(phi)	(mm)
Mean	0.625	0.649
Standard Deviation	1.153	0.450
Skewness	-0.841	
Kurtosis	3.238	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.350	0.432
Standard Deviation	1.090	1.173
Skewness (1)	-0.225	-0.281
Skewness (2)	-0.640	
Kurtosis	0.901	1.263



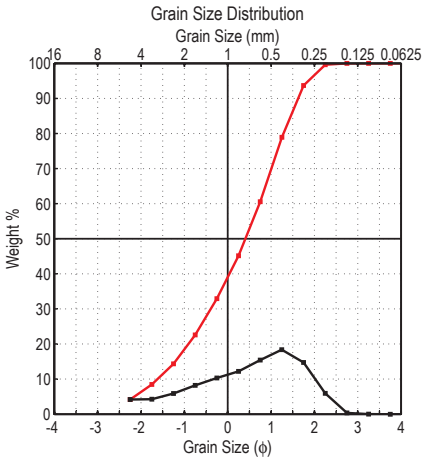
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-07b**
Interval	**Swash**
Mean	**0.667 mm**
STD	**0.474 mm**
Skewness	**-0.695**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.00
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	25.18
% $CaCO_3$	2.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.74	3.14	3.14
-1.5	-1.75	2.94	2.47	5.61
-1	-1.25	4.32	3.63	9.24
-0.5	-0.75	7.50	6.30	15.55
0	-0.25	11.47	9.64	25.18
0.5	0.25	16.44	13.82	39.00
1	0.75	26.09	21.92	60.92
1.5	1.25	25.06	21.06	81.98
2	1.75	13.44	11.29	93.28
2.5	2.25	7.07	5.94	99.22
3	2.75	0.90	0.76	99.97
3.5	3.25	0.03	0.03	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.875
16	-0.725
25	-0.260
50	0.500
75	1.085
84	1.340
95	1.895
99	2.230

Moment Measures	(phi)	(mm)
Mean	0.584	0.667
Standard Deviation	1.077	0.474
Skewness	-0.695	
Kurtosis	3.208	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.307	0.372
Standard Deviation	1.033	1.087
Skewness (1)	-0.186	-0.223
Skewness (2)	-0.475	
Kurtosis	0.826	1.149



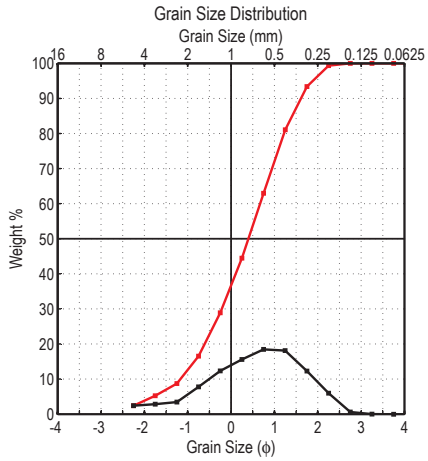
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-08a**
Interval	**LTT**
Mean	**0.733 mm**
STD	**0.434 mm**
Skewness	**-0.528**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	120.24
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	32.92
% $CaCO_3$	2.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.05	4.20	4.20
-1.5	-1.75	5.14	4.27	8.47
-1	-1.25	7.07	5.88	14.35
-0.5	-0.75	9.89	8.23	22.58
0	-0.25	12.43	10.34	32.92
0.5	0.25	14.70	12.23	45.14
1	0.75	18.53	15.41	60.55
1.5	1.25	22.10	18.38	78.93
2	1.75	17.73	14.75	93.68
2.5	2.25	7.13	5.93	99.61
3	2.75	0.46	0.38	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.155
16	-1.150
25	-0.635
50	0.410
75	1.145
84	1.420
95	1.860
99	2.200

Moment Measures	(phi)	(mm)
Mean	0.448	0.733
Standard Deviation	1.204	0.434
Skewness	-0.528	
Kurtosis	2.444	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.135	0.227
Standard Deviation	1.285	1.251
Skewness (1)	-0.214	-0.246
Skewness (2)	-0.434	
Kurtosis	0.562	0.924



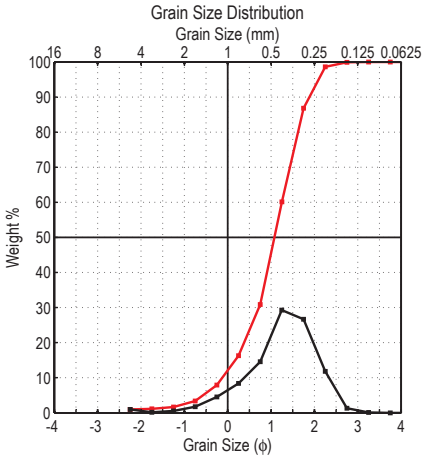
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-08b**
Interval	**Swash**
Mean	**0.690 mm**
STD	**0.475 mm**
Skewness	**-0.502**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.66
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	28.89
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.91	2.43	2.43
-1.5	-1.75	3.40	2.84	5.27
-1	-1.25	4.14	3.46	8.73
-0.5	-0.75	9.34	7.81	16.54
0	-0.25	14.78	12.35	28.89
0.5	0.25	18.66	15.59	44.48
1	0.75	22.12	18.49	62.97
1.5	1.25	21.67	18.11	81.08
2	1.75	14.70	12.28	93.36
2.5	2.25	7.14	5.97	99.33
3	2.75	0.77	0.64	99.97
3.5	3.25	0.03	0.03	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.800
16	-0.785
25	-0.405
50	0.400
75	1.080
84	1.370
95	1.885
99	2.220

Moment Measures	(phi)	(mm)
Mean	0.535	0.690
Standard Deviation	1.075	0.475
Skewness	-0.502	
Kurtosis	2.879	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.292	0.328
Standard Deviation	1.078	1.097
Skewness (1)	-0.100	-0.147
Skewness (2)	-0.332	
Kurtosis	0.710	1.017



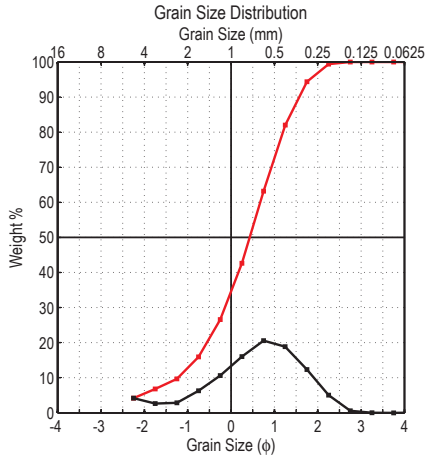
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-09a**
Interval	**LTT**
Mean	**0.432 mm**
STD	**0.566 mm**
Skewness	**-1.181**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.93
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.90
% $CaCO_3$	1.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.16	0.97	0.97
-1.5	-1.75	0.19	0.16	1.13
-1	-1.25	0.62	0.52	1.64
-0.5	-0.75	2.07	1.73	3.37
0	-0.25	5.44	4.54	7.90
0.5	0.25	10.06	8.39	16.29
1	0.75	17.48	14.58	30.87
1.5	1.25	35.10	29.27	60.14
2	1.75	31.97	26.66	86.79
2.5	2.25	14.16	11.81	98.60
3	2.75	1.57	1.31	99.91
3.5	3.25	0.11	0.09	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.145
5	-0.570
16	0.235
25	0.550
50	1.075
75	1.530
84	1.700
95	2.100
99	2.405

Moment Measures	(phi)	(mm)
Mean	1.212	0.432
Standard Deviation	0.820	0.566
Skewness	-1.181	
Kurtosis	5.502	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.967	1.003
Standard Deviation	0.732	0.771
Skewness (1)	-0.147	-0.189
Skewness (2)	-0.423	
Kurtosis	0.823	1.117



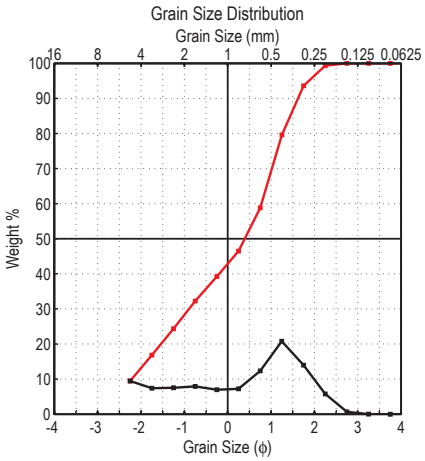
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-09b**
Interval	**Swash**
Mean	**0.694 mm**
STD	**0.468 mm**
Skewness	**-0.697**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.38
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	26.58
% $CaCO_3$	1.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	4.99	4.18	4.18
-1.5	-1.75	3.13	2.62	6.80
-1	-1.25	3.42	2.86	9.67
-0.5	-0.75	7.49	6.27	15.94
0	-0.25	12.70	10.64	26.58
0.5	0.25	19.13	16.02	42.60
1	0.75	24.54	20.56	63.16
1.5	1.25	22.52	18.86	82.02
2	1.75	14.70	12.31	94.34
2.5	2.25	6.03	5.05	99.39
3	2.75	0.69	0.58	99.97
3.5	3.25	0.03	0.03	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.095
16	-0.745
25	-0.325
50	0.430
75	1.065
84	1.330
95	1.815
99	2.210

Moment Measures	(phi)	(mm)
Mean	0.527	0.694
Standard Deviation	1.096	0.468
Skewness	-0.697	
Kurtosis	3.201	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.292	0.338
Standard Deviation	1.038	1.111
Skewness (1)	-0.133	-0.212
Skewness (2)	-0.549	
Kurtosis	0.884	1.153



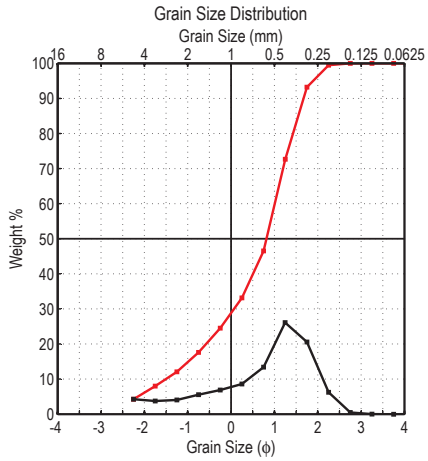
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-10a**
Interval	**LTT**
Mean	**0.841 mm**
STD	**0.377 mm**
Skewness	**-0.413**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	119.78
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	39.23
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	11.31	9.44	9.44
-1.5	-1.75	8.85	7.39	16.83
-1	-1.25	9.01	7.52	24.35
-0.5	-0.75	9.47	7.91	32.26
0	-0.25	8.35	6.97	39.23
0.5	0.25	8.68	7.25	46.48
1	0.75	14.77	12.33	58.81
1.5	1.25	24.91	20.80	79.60
2	1.75	16.73	13.97	93.57
2.5	2.25	6.90	5.76	99.33
3	2.75	0.78	0.65	99.98
3.5	3.25	0.02	0.02	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.805
25	-1.210
50	0.395
75	1.140
84	1.405
95	1.875
99	2.220

Moment Measures	(phi)	(mm)
Mean	0.251	0.841
Standard Deviation	1.406	0.377
Skewness	-0.413	
Kurtosis	1.906	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.200	-0.002
Standard Deviation	1.605	1.428
Skewness (1)	-0.371	-0.327
Skewness (2)	-0.363	
Kurtosis	0.285	0.719



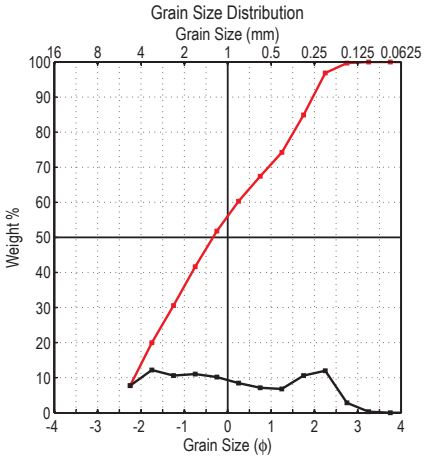
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NHB-10b**
Interval	**Swash**
Mean	**0.619 mm**
STD	**0.437 mm**
Skewness	**-0.932**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.48
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	24.52
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.11	4.28	4.28
-1.5	-1.75	4.47	3.74	8.02
-1	-1.25	4.85	4.06	12.08
-0.5	-0.75	6.63	5.55	17.63
0	-0.25	8.24	6.90	24.52
0.5	0.25	10.27	8.60	33.12
1	0.75	16.02	13.41	46.53
1.5	1.25	31.19	26.10	72.63
2	1.75	24.60	20.59	93.22
2.5	2.25	7.47	6.25	99.47
3	2.75	0.59	0.49	99.97
3.5	3.25	0.03	0.03	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.155
16	-0.895
25	-0.220
50	0.815
75	1.310
84	1.525
95	1.890
99	2.210

Moment Measures	(phi)	(mm)
Mean	0.693	0.619
Standard Deviation	1.195	0.437
Skewness	-0.932	
Kurtosis	3.033	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.315	0.482
Standard Deviation	1.210	1.218
Skewness (1)	-0.413	-0.441
Skewness (2)	-0.783	
Kurtosis	0.671	1.084



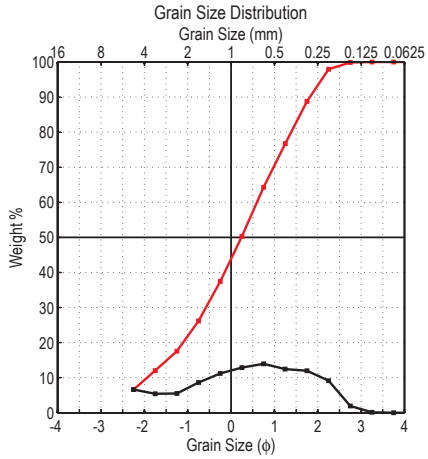
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NSS-01a**
Interval	**LTT**
Mean	**0.949 mm**
STD	**0.347 mm**
Skewness	**0.138**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	120.25
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	51.81
% $CaCO_3$	2.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	9.29	7.73	7.73
-1.5	-1.75	14.70	12.22	19.95
-1	-1.25	12.79	10.64	30.59
-0.5	-0.75	13.28	11.04	41.63
0	-0.25	12.24	10.18	51.81
0.5	0.25	10.19	8.47	60.28
1	0.75	8.57	7.13	67.41
1.5	1.25	8.19	6.81	74.22
2	1.75	12.79	10.64	84.86
2.5	2.25	14.40	11.98	96.83
3	2.75	3.41	2.84	99.67
3.5	3.25	0.37	0.31	99.98
4	3.75	0.03	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.910
25	-1.515
50	-0.340
75	1.285
84	1.710
95	2.175
99	2.630

Moment Measures	(phi)	(mm)
Mean	0.075	0.949
Standard Deviation	1.526	0.347
Skewness	0.138	
Kurtosis	1.745	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.100	-0.180
Standard Deviation	1.810	1.575
Skewness (1)	0.133	0.135
Skewness (2)	0.167	
Kurtosis	0.222	0.648



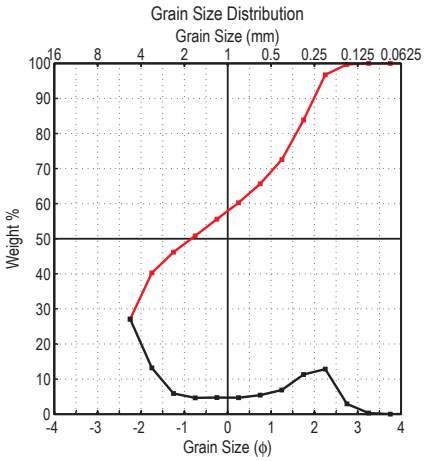
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NSS-01b**
Interval	**Swash**
Mean	**0.778 mm**
STD	**0.396 mm**
Skewness	**-0.305**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	120.29
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	37.41
% $CaCO_3$	4.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	7.96	6.62	6.62
-1.5	-1.75	6.51	5.41	12.03
-1	-1.25	6.64	5.52	17.55
-0.5	-0.75	10.40	8.65	26.20
0	-0.25	13.49	11.21	37.41
0.5	0.25	15.49	12.88	50.29
1	0.75	16.82	13.98	64.27
1.5	1.25	15.01	12.48	76.75
2	1.75	14.43	12.00	88.74
2.5	2.25	11.02	9.16	97.91
3	2.75	2.33	1.94	99.84
3.5	3.25	0.18	0.15	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.390
25	-0.820
50	0.240
75	1.180
84	1.550
95	2.090
99	2.535

Moment Measures	(phi)	(mm)
Mean	0.362	0.778
Standard Deviation	1.337	0.396
Skewness	-0.305	
Kurtosis	2.225	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.080	0.133
Standard Deviation	1.470	1.393
Skewness (1)	-0.109	-0.128
Skewness (2)	-0.218	
Kurtosis	0.476	0.889



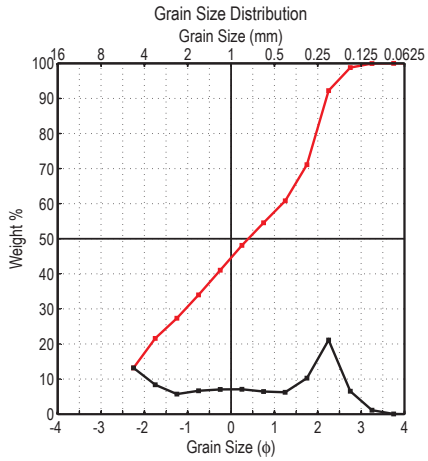
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NSS-02a**
Interval	**LTT**
Mean	**1.184 mm**
STD	**0.287 mm**
Skewness	**0.242**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	119.88
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	55.56
% $CaCO_3$	2.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	32.46	27.08	27.08
-1.5	-1.75	15.83	13.20	40.28
-1	-1.25	7.09	5.91	46.20
-0.5	-0.75	5.56	4.64	50.83
0	-0.25	5.67	4.73	55.56
0.5	0.25	5.61	4.68	60.24
1	0.75	6.51	5.43	65.67
1.5	1.25	8.25	6.88	72.56
2	1.75	13.56	11.31	83.87
2.5	2.25	15.42	12.86	96.73
3	2.75	3.51	2.93	99.66
3.5	3.25	0.39	0.33	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-0.840
75	1.360
84	1.755
95	2.185
99	2.640

Moment Measures	(phi)	(mm)
Mean	-0.243	1.184
Standard Deviation	1.798	0.287
Skewness	0.242	
Kurtosis	1.450	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.248	-0.445
Standard Deviation	2.002	1.673
Skewness (1)	0.296	0.330
Skewness (2)	0.403	
Kurtosis	0.107	0.503



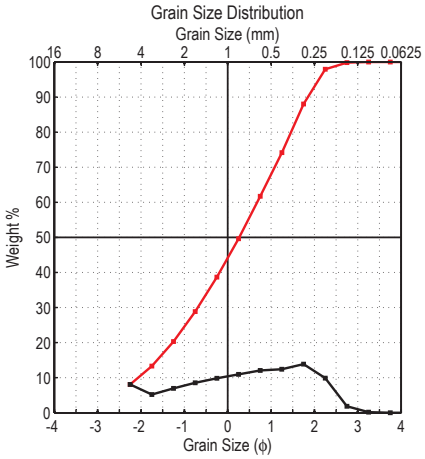
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NSS-02b**
Interval	**Swash**
Mean	**0.739 mm**
STD	**0.300 mm**
Skewness	**-0.234**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	120.28
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	41.02
% $CaCO_3$	3.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	15.89	13.21	13.21
-1.5	-1.75	10.10	8.40	21.61
-1	-1.25	6.88	5.72	27.33
-0.5	-0.75	8.00	6.65	33.98
0	-0.25	8.47	7.04	41.02
0.5	0.25	8.54	7.10	48.12
1	0.75	7.75	6.44	54.56
1.5	1.25	7.50	6.24	60.80
2	1.75	12.38	10.29	71.09
2.5	2.25	25.43	21.14	92.23
3	2.75	7.88	6.55	98.79
3.5	3.25	1.36	1.13	99.92
4	3.75	0.09	0.07	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.085
25	-1.455
50	0.395
75	1.840
84	2.055
95	2.460
99	2.845

Moment Measures	(phi)	(mm)
Mean	0.437	0.739
Standard Deviation	1.737	0.300
Skewness	-0.234	
Kurtosis	1.618	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.015	0.122
Standard Deviation	2.070	1.749
Skewness (1)	-0.198	-0.161
Skewness (2)	-0.140	
Kurtosis	0.138	0.586



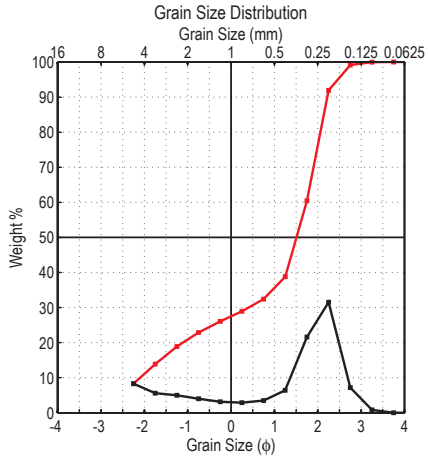
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NSS-03a**
Interval	**LTT**
Mean	**0.786 mm**
STD	**0.378 mm**
Skewness	**-0.305**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	119.99
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	38.68
% $CaCO_3$	2.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	9.72	8.10	8.10
-1.5	-1.75	6.26	5.22	13.32
-1	-1.25	8.37	6.98	20.29
-0.5	-0.75	10.25	8.54	28.84
0	-0.25	11.81	9.84	38.68
0.5	0.25	13.14	10.95	49.63
1	0.75	14.50	12.08	61.71
1.5	1.25	14.92	12.43	74.15
2	1.75	16.63	13.86	88.01
2.5	2.25	11.89	9.91	97.92
3	2.75	2.26	1.88	99.80
3.5	3.25	0.22	0.18	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.560
25	-0.975
50	0.265
75	1.280
84	1.605
95	2.105
99	2.540

Moment Measures	(phi)	(mm)
Mean	0.348	0.786
Standard Deviation	1.404	0.378
Skewness	-0.305	
Kurtosis	2.056	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.022	0.103
Standard Deviation	1.583	1.451
Skewness (1)	-0.153	-0.154
Skewness (2)	-0.213	
Kurtosis	0.376	0.792



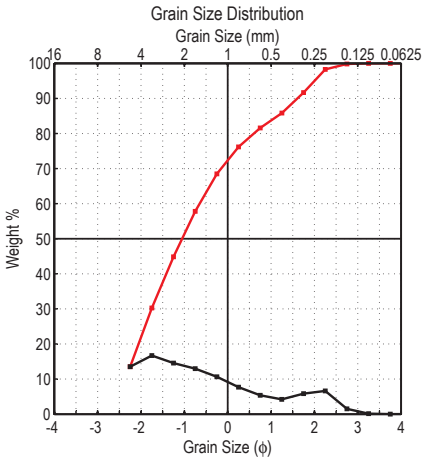
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NSS-03b**
Interval	**Swash**
Mean	**0.486 mm**
STD	**0.325 mm**
Skewness	**-0.941**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	120.08
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	26.04
% $CaCO_3$	4.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	9.95	8.29	8.29
-1.5	-1.75	6.72	5.60	13.88
-1	-1.25	6.00	5.00	18.88
-0.5	-0.75	4.83	4.02	22.90
0	-0.25	3.77	3.14	26.04
0.5	0.25	3.46	2.88	28.92
1	0.75	4.18	3.48	32.40
1.5	1.25	7.70	6.41	38.82
2	1.75	25.94	21.60	60.42
2.5	2.25	37.84	31.51	91.93
3	2.75	8.62	7.18	99.11
3.5	3.25	1.01	0.84	99.95
4	3.75	0.05	0.04	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.540
25	-0.415
50	1.510
75	1.980
84	2.125
95	2.465
99	2.740

Moment Measures	(phi)	(mm)
Mean	1.042	0.486
Standard Deviation	1.620	0.325
Skewness	-0.941	
Kurtosis	2.410	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.292	0.698
Standard Deviation	1.833	1.631
Skewness (1)	-0.664	-0.630
Skewness (2)	-0.765	
Kurtosis	0.286	0.807



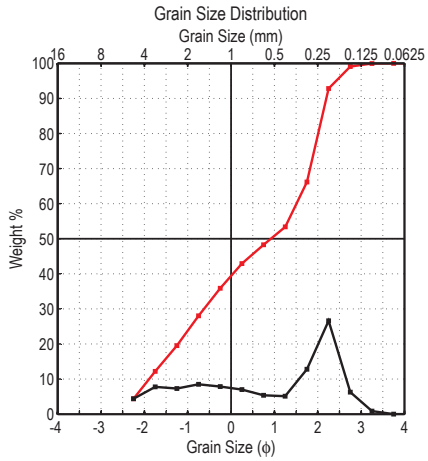
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NSS-04a**
Interval	**LTT**
Mean	**1.405 mm**
STD	**0.374 mm**
Skewness	**0.654**
USCS	**Wentworth**
SW	Very Coarse Sand
Medium Sand	Poorly Sorted
Well Graded	Fine Skewed
	Platykurtic
Total weight (gram)	119.91
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	68.48
% $CaCO_3$	2.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	16.24	13.54	13.54
-1.5	-1.75	20.03	16.70	30.25
-1	-1.25	17.49	14.59	44.83
-0.5	-0.75	15.57	12.98	57.82
0	-0.25	12.78	10.66	68.48
0.5	0.25	9.22	7.69	76.17
1	0.75	6.48	5.40	81.57
1.5	1.25	5.09	4.24	85.81
2	1.75	7.01	5.85	91.66
2.5	2.25	7.93	6.61	98.27
3	2.75	1.84	1.53	99.81
3.5	3.25	0.20	0.17	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.175
25	-1.905
50	-1.050
75	0.175
84	1.035
95	2.000
99	2.485

Moment Measures	(phi)	(mm)
Mean	-0.491	1.405
Standard Deviation	1.420	0.374
Skewness	0.654	
Kurtosis	2.368	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.570	-0.730
Standard Deviation	1.605	1.446
Skewness (1)	0.299	0.367
Skewness (2)	0.576	
Kurtosis	0.324	0.837



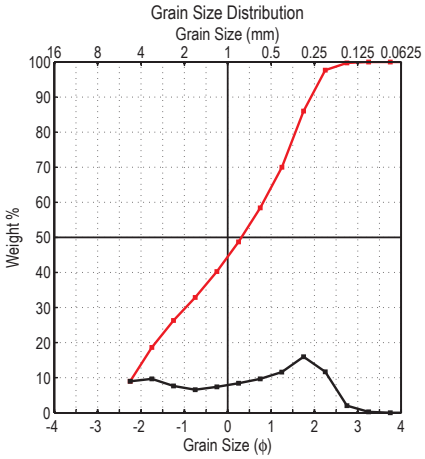
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NSS-04b**
Interval	**Swash**
Mean	**0.600 mm**
STD	**0.333 mm**
Skewness	**-0.397**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	119.86
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	35.88
% $CaCO_3$	2.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.28	4.41	4.41
-1.5	-1.75	9.34	7.79	12.20
-1	-1.25	8.78	7.33	19.52
-0.5	-0.75	10.20	8.51	28.03
0	-0.25	9.41	7.85	35.88
0.5	0.25	8.42	7.02	42.91
1	0.75	6.44	5.37	48.28
1.5	1.25	6.12	5.11	53.39
2	1.75	15.34	12.80	66.19
2.5	2.25	31.90	26.61	92.80
3	2.75	7.51	6.27	99.07
3.5	3.25	1.06	0.88	99.95
4	3.75	0.05	0.04	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.210
16	-1.490
25	-0.930
50	0.920
75	1.915
84	2.085
95	2.425
99	2.745

Moment Measures	(phi)	(mm)
Mean	0.737	0.600
Standard Deviation	1.586	0.333
Skewness	-0.397	
Kurtosis	1.754	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.298	0.505
Standard Deviation	1.787	1.596
Skewness (1)	-0.348	-0.349
Skewness (2)	-0.455	
Kurtosis	0.297	0.668



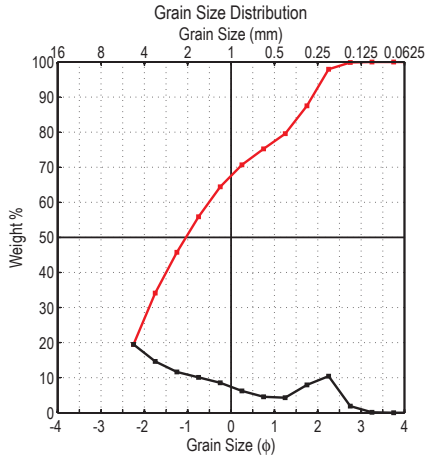
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NSS-05a**
Interval	**LTT**
Mean	**0.805 mm**
STD	**0.348 mm**
Skewness	**-0.266**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	119.80
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	40.28
% $CaCO_3$	2.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	10.75	8.97	8.97
-1.5	-1.75	11.58	9.67	18.64
-1	-1.25	9.18	7.66	26.30
-0.5	-0.75	7.87	6.57	32.87
0	-0.25	8.87	7.40	40.28
0.5	0.25	10.12	8.45	48.72
1	0.75	11.58	9.67	58.39
1.5	1.25	13.92	11.62	70.01
2	1.75	19.13	15.97	85.98
2.5	2.25	14.02	11.70	97.68
3	2.75	2.45	2.05	99.72
3.5	3.25	0.31	0.26	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.885
25	-1.335
50	0.315
75	1.405
84	1.690
95	2.135
99	2.575

Moment Measures	(phi)	(mm)
Mean	0.312	0.805
Standard Deviation	1.524	0.348
Skewness	-0.266	
Kurtosis	1.770	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.097	0.040
Standard Deviation	1.787	1.558
Skewness (1)	-0.231	-0.200
Skewness (2)	-0.208	
Kurtosis	0.227	0.656



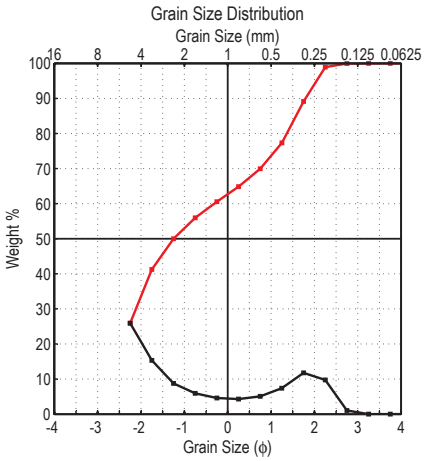
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**NSS-05b**
Interval	**Swash**
Mean	**1.322 mm**
STD	**0.331 mm**
Skewness	**0.501**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Platykurtic
Total weight (gram)	120.34
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	64.43
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	23.47	19.50	19.50
-1.5	-1.75	17.61	14.63	34.14
-1	-1.25	14.00	11.63	45.77
-0.5	-0.75	12.17	10.11	55.88
0	-0.25	10.29	8.55	64.43
0.5	0.25	7.50	6.23	70.67
1	0.75	5.50	4.57	75.24
1.5	1.25	5.20	4.32	79.56
2	1.75	9.56	7.94	87.50
2.5	2.25	12.56	10.44	97.94
3	2.75	2.28	1.89	99.83
3.5	3.25	0.18	0.15	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.060
50	-1.040
75	0.725
84	1.530
95	2.110
99	2.530

Moment Measures	(phi)	(mm)
Mean	-0.402	1.322
Standard Deviation	1.596	0.331
Skewness	0.501	
Kurtosis	1.894	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.360	-0.587
Standard Deviation	1.890	1.606
Skewness (1)	0.360	0.402
Skewness (2)	0.513	
Kurtosis	0.153	0.642



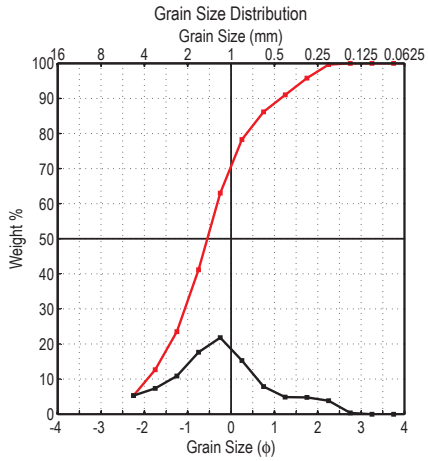
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**KH-01a**
Interval	**Swash**
Mean	**1.337 mm**
STD	**0.309 mm**
Skewness	**0.382**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	120.66
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	60.55
% $CaCO_3$	4.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	31.27	25.92	25.92
-1.5	-1.75	18.51	15.34	41.26
-1	-1.25	10.57	8.76	50.02
-0.5	-0.75	7.15	5.93	55.94
0	-0.25	5.56	4.61	60.55
0.5	0.25	5.20	4.31	64.86
1	0.75	6.12	5.07	69.93
1.5	1.25	8.92	7.39	77.32
2	1.75	14.22	11.79	89.11
2.5	2.25	11.80	9.78	98.89
3	2.75	1.28	1.06	99.95
3.5	3.25	0.05	0.04	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.250
75	1.095
84	1.535
95	2.050
99	2.300

Moment Measures	(phi)	(mm)
Mean	-0.419	1.337
Standard Deviation	1.694	0.309
Skewness	0.382	
Kurtosis	1.562	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.357	-0.655
Standard Deviation	1.893	1.598
Skewness (1)	0.472	0.503
Skewness (2)	0.608	
Kurtosis	0.136	0.527



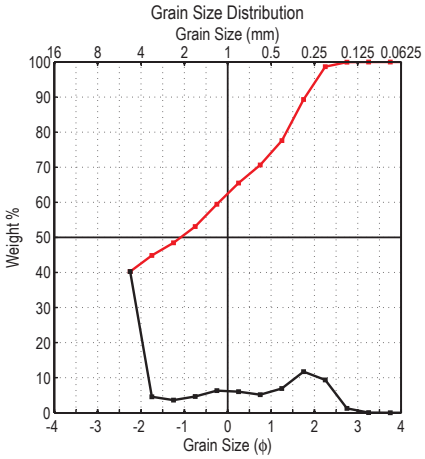
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**KH-01b**
Interval	**LTT**
Mean	**1.175 mm**
STD	**0.465 mm**
Skewness	**0.353**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	120.78
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	62.99
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.40	5.30	5.30
-1.5	-1.75	8.89	7.36	12.66
-1	-1.25	13.13	10.87	23.53
-0.5	-0.75	21.31	17.64	41.17
0	-0.25	26.35	21.82	62.99
0.5	0.25	18.46	15.28	78.27
1	0.75	9.51	7.87	86.15
1.5	1.25	5.86	4.85	91.00
2	1.75	5.78	4.79	95.79
2.5	2.25	4.66	3.86	99.64
3	2.75	0.43	0.36	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.595
25	-1.210
50	-0.550
75	0.145
84	0.615
95	1.670
99	2.165

Moment Measures	(phi)	(mm)
Mean	-0.233	1.175
Standard Deviation	1.105	0.465
Skewness	0.353	
Kurtosis	2.818	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.490	-0.510
Standard Deviation	1.105	1.146
Skewness (1)	0.054	0.093
Skewness (2)	0.235	
Kurtosis	0.774	1.186



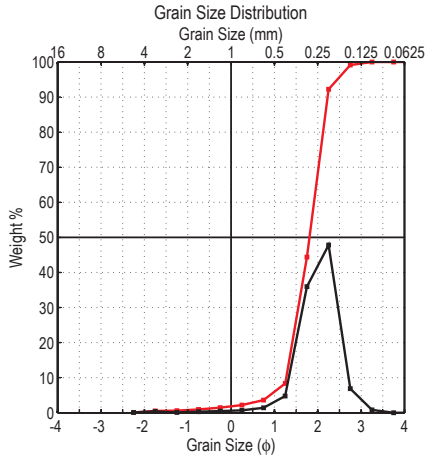
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**KH-02a**
Interval	**Swash**
Mean	**1.403 mm**
STD	**0.295 mm**
Skewness	**0.344**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	119.62
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	59.44
% $CaCO_3$	4.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	48.16	40.26	40.26
-1.5	-1.75	5.48	4.58	44.84
-1	-1.25	4.33	3.62	48.46
-0.5	-0.75	5.55	4.64	53.10
0	-0.25	7.58	6.34	59.44
0.5	0.25	7.22	6.04	65.47
1	0.75	6.18	5.17	70.64
1.5	1.25	8.29	6.93	77.57
2	1.75	14.03	11.73	89.30
2.5	2.25	11.20	9.36	98.66
3	2.75	1.53	1.28	99.94
3.5	3.25	0.06	0.05	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.085
75	1.065
84	1.525
95	2.055
99	2.380

Moment Measures	(phi)	(mm)
Mean	-0.488	1.403
Standard Deviation	1.762	0.295
Skewness	0.344	
Kurtosis	1.507	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.363	-0.603
Standard Deviation	1.888	1.596
Skewness (1)	0.383	0.421
Skewness (2)	0.523	
Kurtosis	0.140	0.532



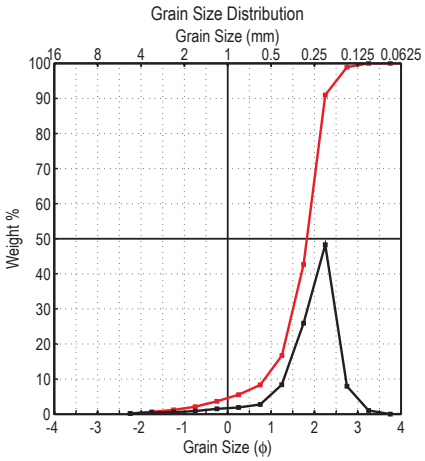
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**KH02b**
Interval	**LTT**
Mean	**0.253 mm**
STD	**0.677 mm**
Skewness	**-2.738**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	120.23
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	1.47
% $CaCO_3$	1.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.14	0.12	0.12
-1.5	-1.75	0.50	0.42	0.53
-1	-1.25	0.12	0.10	0.63
-0.5	-0.75	0.41	0.34	0.97
0	-0.25	0.60	0.50	1.47
0.5	0.25	0.87	0.72	2.20
1	0.75	1.72	1.43	3.63
1.5	1.25	5.73	4.77	8.39
2	1.75	43.27	35.99	44.38
2.5	2.25	57.51	47.83	92.21
3	2.75	8.30	6.90	99.12
3.5	3.25	1.02	0.85	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.725
5	0.895
16	1.355
25	1.480
50	1.810
75	2.070
84	2.165
95	2.450
99	2.740

Moment Measures	(phi)	(mm)
Mean	1.982	0.253
Standard Deviation	0.564	0.677
Skewness	-2.738	
Kurtosis	17.516	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.760	1.777
Standard Deviation	0.405	0.438
Skewness (1)	-0.123	-0.150
Skewness (2)	-0.340	
Kurtosis	0.920	1.080



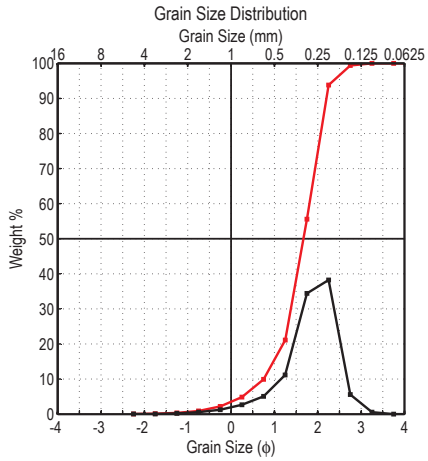
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**KH-03a**
Interval	**Swash**
Mean	**0.269 mm**
STD	**0.598 mm**
Skewness	**-2.203**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	119.65
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	3.65
% $CaCO_3$	4.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.22	0.18	0.18
-1.5	-1.75	0.57	0.48	0.66
-1	-1.25	0.67	0.56	1.22
-0.5	-0.75	1.07	0.89	2.11
0	-0.25	1.84	1.54	3.65
0.5	0.25	2.29	1.91	5.57
1	0.75	3.33	2.78	8.35
1.5	1.25	10.02	8.37	16.72
2	1.75	31.05	25.95	42.67
2.5	2.25	57.76	48.27	90.95
3	2.75	9.51	7.95	98.90
3.5	3.25	1.27	1.06	99.96
4	3.75	0.05	0.04	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.445
5	0.100
16	1.205
25	1.410
50	1.825
75	2.085
84	2.180
95	2.505
99	2.800

Moment Measures	(phi)	(mm)
Mean	1.895	0.269
Standard Deviation	0.743	0.598
Skewness	-2.203	
Kurtosis	9.809	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.692	1.737
Standard Deviation	0.487	0.608
Skewness (1)	-0.272	-0.353
Skewness (2)	-1.072	
Kurtosis	1.467	1.460



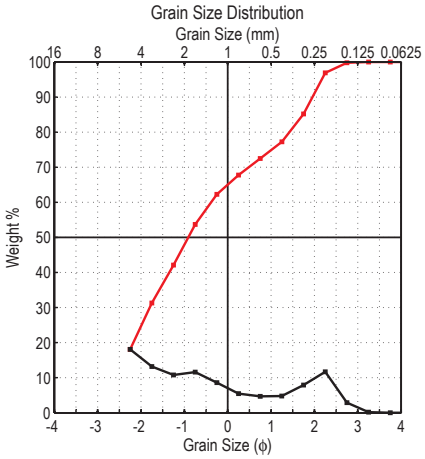
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**KH-03b**
Interval	**LTT**
Mean	**0.286 mm**
STD	**0.635 mm**
Skewness	**-1.547**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	119.87
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	2.19
% $CaCO_3$	2.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.10	0.08	0.08
-1.5	-1.75	0.08	0.07	0.15
-1	-1.25	0.26	0.22	0.37
-0.5	-0.75	0.69	0.58	0.94
0	-0.25	1.50	1.25	2.19
0.5	0.25	3.21	2.68	4.87
1	0.75	6.09	5.08	9.95
1.5	1.25	13.41	11.19	21.14
2	1.75	41.28	34.44	55.58
2.5	2.25	45.82	38.22	93.80
3	2.75	6.71	5.60	99.40
3.5	3.25	0.68	0.57	99.97
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.725
5	0.265
16	1.020
25	1.305
50	1.670
75	2.005
84	2.120
95	2.355
99	2.715

Moment Measures	(phi)	(mm)
Mean	1.808	0.286
Standard Deviation	0.655	0.635
Skewness	-1.547	
Kurtosis	7.162	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.570	1.603
Standard Deviation	0.550	0.592
Skewness (1)	-0.182	-0.263
Skewness (2)	-0.655	
Kurtosis	0.900	1.224



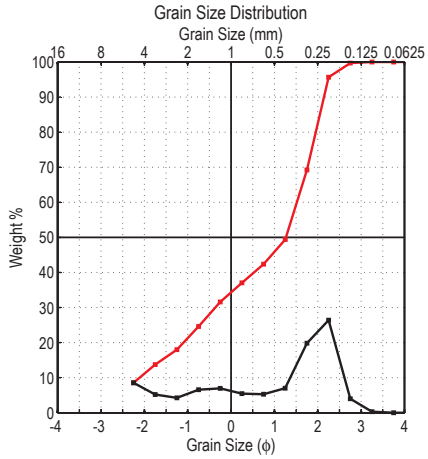
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**KH-04a**
Interval	**Swash**
Mean	**1.217 mm**
STD	**0.323 mm**
Skewness	**0.418**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	120.03
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	62.28
% $CaCO_3$	5.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	21.73	18.10	18.10
-1.5	-1.75	15.85	13.21	31.31
-1	-1.25	12.94	10.78	42.09
-0.5	-0.75	13.92	11.60	53.69
0	-0.25	10.32	8.60	62.28
0.5	0.25	6.56	5.47	67.75
1	0.75	5.66	4.72	72.47
1.5	1.25	5.75	4.79	77.26
2	1.75	9.52	7.93	85.19
2.5	2.25	14.03	11.69	96.88
3	2.75	3.49	2.91	99.78
3.5	3.25	0.23	0.19	99.98
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.990
50	-0.910
75	1.015
84	1.675
95	2.170
99	2.615

Moment Measures	(phi)	(mm)
Mean	-0.284	1.217
Standard Deviation	1.632	0.323
Skewness	0.418	
Kurtosis	1.799	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.288	-0.495
Standard Deviation	1.962	1.651
Skewness (1)	0.317	0.355
Skewness (2)	0.443	
Kurtosis	0.126	0.603



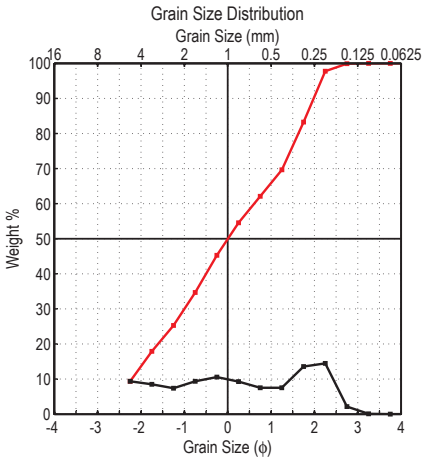
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**KH-04b**
Interval	**LTT**
Mean	**0.574 mm**
STD	**0.335 mm**
Skewness	**-0.680**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	119.58
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	31.59
% $CaCO_3$	2.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	10.23	8.55	8.55
-1.5	-1.75	6.22	5.20	13.76
-1	-1.25	5.09	4.26	18.01
-0.5	-0.75	7.89	6.60	24.61
0	-0.25	8.34	6.97	31.59
0.5	0.25	6.54	5.47	37.05
1	0.75	6.34	5.30	42.36
1.5	1.25	8.40	7.02	49.38
2	1.75	23.74	19.85	69.23
2.5	2.25	31.60	26.43	95.66
3	2.75	4.78	4.00	99.66
3.5	3.25	0.39	0.33	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.485
25	-0.720
50	1.265
75	1.860
84	2.030
95	2.240
99	2.670

Moment Measures	(phi)	(mm)
Mean	0.801	0.574
Standard Deviation	1.577	0.335
Skewness	-0.680	
Kurtosis	2.082	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.273	0.603
Standard Deviation	1.758	1.559
Skewness (1)	-0.565	-0.565
Skewness (2)	-0.723	
Kurtosis	0.277	0.713



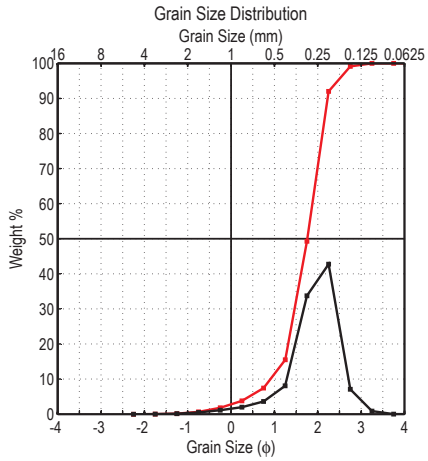
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**KH-05a**
Interval	**Swash**
Mean	**0.840 mm**
STD	**0.346 mm**
Skewness	**-0.123**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	119.87
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	45.27
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	11.24	9.38	9.38
-1.5	-1.75	10.21	8.52	17.89
-1	-1.25	8.89	7.42	25.31
-0.5	-0.75	11.26	9.39	34.70
0	-0.25	12.66	10.56	45.27
0.5	0.25	11.15	9.30	54.57
1	0.75	9.05	7.55	62.12
1.5	1.25	9.05	7.55	69.67
2	1.75	16.27	13.57	83.24
2.5	2.25	17.37	14.49	97.73
3	2.75	2.58	2.15	99.88
3.5	3.25	0.12	0.10	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.860
25	-1.270
50	0.005
75	1.445
84	1.775
95	2.155
99	2.545

Moment Measures	(phi)	(mm)
Mean	0.251	0.840
Standard Deviation	1.529	0.346
Skewness	-0.123	
Kurtosis	1.744	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.042	-0.027
Standard Deviation	1.817	1.576
Skewness (1)	-0.026	-0.025
Skewness (2)	-0.029	
Kurtosis	0.212	0.665



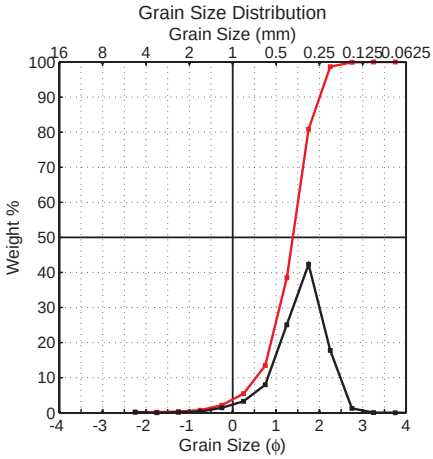
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2013**
Station	**KH-05b**
Interval	**LTT**
Mean	**0.268 mm**
STD	**0.656 mm**
Skewness	**-1.538**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	120.31
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	1.81
% $CaCO_3$	1.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.03	0.02	0.02
-1	-1.25	0.16	0.13	0.16
-0.5	-0.75	0.61	0.51	0.66
0	-0.25	1.38	1.15	1.81
0.5	0.25	2.40	1.99	3.81
1	0.75	4.37	3.63	7.44
1.5	1.25	9.73	8.09	15.53
2	1.75	40.59	33.74	49.26
2.5	2.25	51.42	42.74	92.00
3	2.75	8.54	7.10	99.10
3.5	3.25	1.05	0.87	99.98
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.605
5	0.415
16	1.255
25	1.390
50	1.760
75	2.050
84	2.155
95	2.460
99	2.745

Moment Measures	(phi)	(mm)
Mean	1.901	0.268
Standard Deviation	0.608	0.656
Skewness	-1.538	
Kurtosis	7.128	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.705	1.723
Standard Deviation	0.450	0.535
Skewness (1)	-0.122	-0.219
Skewness (2)	-0.717	
Kurtosis	1.272	1.270



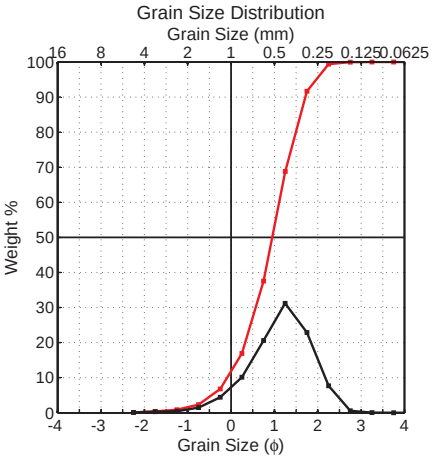
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**B2a**
Interval	**Grab**
Mean	**0.342 mm**
STD	**0.659 mm**
Skewness	**-1.358**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorte
Poorly Graded	Strongly Coarse Skew
	Very Leptokurtic
Total weight (gram)	119.30
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	2.16
% $CaCO_3$	1.6

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.23	0.19	0.19
-1.5	-1.75	0.01	0.01	0.20
-1	-1.25	0.19	0.16	0.36
-0.5	-0.75	0.46	0.39	0.75
0	-0.25	1.69	1.42	2.16
0.5	0.25	3.93	3.29	5.46
1	0.75	9.55	8.01	13.46
1.5	1.25	29.93	25.09	38.55
2	1.75	50.47	42.31	80.85
2.5	2.25	21.23	17.80	98.65
3	2.75	1.49	1.25	99.90
3.5	3.25	0.09	0.08	99.97
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.660
5	0.180
16	0.800
25	0.980
50	1.385
75	1.680
84	1.840
95	2.145
99	2.390

Moment Measures	(phi)	(mm)
Mean	1.548	0.342
Standard Deviation	0.602	0.659
Skewness	-1.358	
Kurtosis	7.432	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.320	1.342
Standard Deviation	0.520	0.558
Skewness (1)	-0.125	-0.176
Skewness (2)	-0.428	
Kurtosis	0.889	1.150



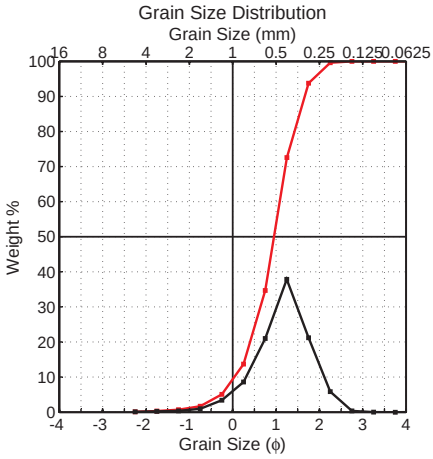
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**B2b**
Interval	**Grab**
Mean	**0.458 mm**
STD	**0.608 mm**
Skewness	**-0.729**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.03
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	6.79
% $CaCO_3$	1.5

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.13	0.11	0.11
-1.5	-1.75	0.38	0.32	0.42
-1	-1.25	0.54	0.45	0.87
-0.5	-0.75	1.77	1.47	2.35
0	-0.25	5.33	4.44	6.79
0.5	0.25	12.17	10.14	16.93
1	0.75	24.76	20.63	37.56
1.5	1.25	37.47	31.22	68.77
2	1.75	27.46	22.88	91.65
2.5	2.25	9.25	7.71	99.36
3	2.75	0.69	0.57	99.93
3.5	3.25	0.06	0.05	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.210
5	-0.450
16	0.205
25	0.445
50	0.950
75	1.385
84	1.585
95	1.965
99	2.225

Moment Measures	(phi)	(mm)
Mean	1.126	0.458
Standard Deviation	0.719	0.608
Skewness	-0.729	
Kurtosis	4.216	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.895	0.913
Standard Deviation	0.690	0.711
Skewness (1)	-0.080	-0.120
Skewness (2)	-0.279	
Kurtosis	0.750	1.053



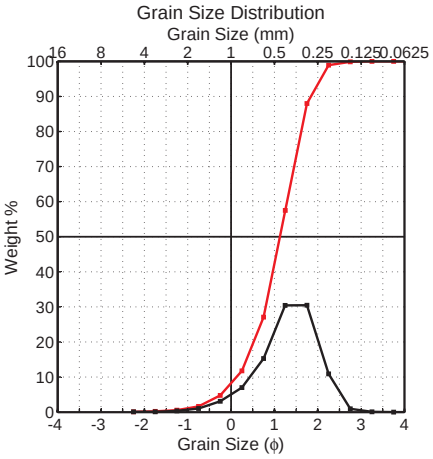
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**B2c**
Interval	**Grab**
Mean	**0.454 mm**
STD	**0.638 mm**
Skewness	**-0.836**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorte
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.98
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	5.08
% $CaCO_3$	1.4

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.12	0.10	0.10
-1.5	-1.75	0.29	0.24	0.34
-1	-1.25	0.44	0.37	0.71
-0.5	-0.75	1.16	0.97	1.68
0	-0.25	4.08	3.40	5.08
0.5	0.25	10.34	8.62	13.69
1	0.75	25.19	21.00	34.69
1.5	1.25	45.42	37.86	72.55
2	1.75	25.44	21.20	93.75
2.5	2.25	7.02	5.85	99.60
3	2.75	0.44	0.37	99.97
3.5	3.25	0.03	0.03	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.100
5	-0.260
16	0.305
25	0.520
50	0.950
75	1.310
84	1.520
95	1.855
99	2.200

Moment Measures	(phi)	(mm)
Mean	1.139	0.454
Standard Deviation	0.648	0.638
Skewness	-0.836	
Kurtosis	5.014	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.912	0.925
Standard Deviation	0.608	0.624
Skewness (1)	-0.062	-0.103
Skewness (2)	-0.251	
Kurtosis	0.741	1.097



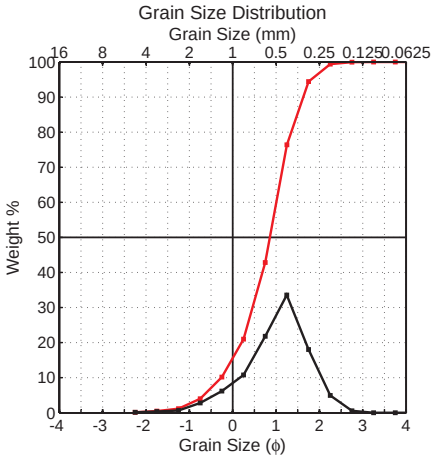
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**B2d**
Interval	**Grab**
Mean	**0.407 mm**
STD	**0.619 mm**
Skewness	**-0.869**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorte
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.49
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	4.77
% $CaCO_3$	1.4

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.13	0.11	0.11
-1.5	-1.75	0.13	0.11	0.22
-1	-1.25	0.44	0.37	0.59
-0.5	-0.75	1.27	1.06	1.65
0	-0.25	3.73	3.12	4.77
0.5	0.25	8.38	7.01	11.78
1	0.75	18.29	15.31	27.09
1.5	1.25	36.35	30.42	57.51
2	1.75	36.41	30.47	87.98
2.5	2.25	13.07	10.94	98.92
3	2.75	1.13	0.95	99.87
3.5	3.25	0.12	0.10	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.055
5	-0.235
16	0.390
25	0.680
50	1.125
75	1.535
84	1.685
95	2.070
99	2.290

Moment Measures	(phi)	(mm)
Mean	1.298	0.407
Standard Deviation	0.692	0.619
Skewness	-0.869	
Kurtosis	4.648	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.038	1.067
Standard Deviation	0.647	0.673
Skewness (1)	-0.135	-0.158
Skewness (2)	-0.320	
Kurtosis	0.780	1.105



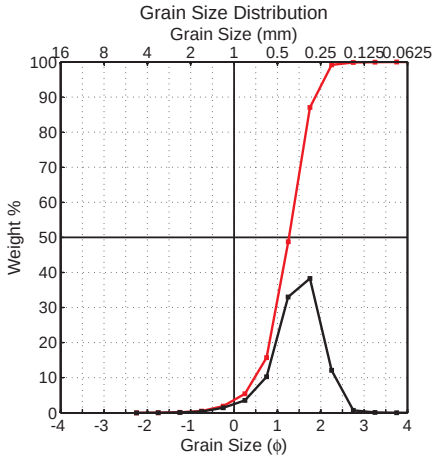
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**B2e**
Interval	**Grab**
Mean	**0.500 mm**
STD	**0.597 mm**
Skewness	**-0.728**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.89
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	10.18
% $CaCO_3$	1.8

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.17	0.14	0.14
-1.5	-1.75	0.42	0.35	0.49
-1	-1.25	0.82	0.68	1.18
-0.5	-0.75	3.38	2.82	4.00
0	-0.25	7.42	6.19	10.18
0.5	0.25	12.95	10.80	20.99
1	0.75	26.17	21.83	42.81
1.5	1.25	40.23	33.56	76.37
2	1.75	21.63	18.04	94.41
2.5	2.25	5.94	4.95	99.37
3	2.75	0.68	0.57	99.93
3.5	3.25	0.05	0.04	99.97
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.380
5	-0.670
16	0.020
25	0.340
50	0.855
75	1.230
84	1.460
95	1.810
99	2.215

Moment Measures	(phi)	(mm)
Mean	1.001	0.500
Standard Deviation	0.745	0.597
Skewness	-0.728	
Kurtosis	4.061	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.740	0.778
Standard Deviation	0.720	0.736
Skewness (1)	-0.160	-0.195
Skewness (2)	-0.396	
Kurtosis	0.722	1.142



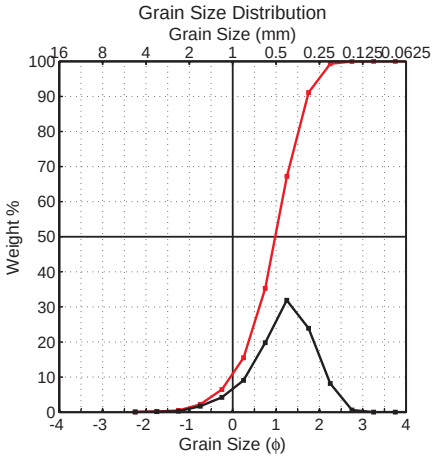
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**B3a**
Interval	**Grab**
Mean	**0.364 mm**
STD	**0.678 mm**
Skewness	**-0.814**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorte
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.54
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	1.92
% $CaCO_3$	1.6

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.03	0.03	0.03
-1	-1.25	0.15	0.13	0.15
-0.5	-0.75	0.42	0.35	0.50
0	-0.25	1.70	1.42	1.92
0.5	0.25	4.21	3.52	5.45
1	0.75	12.29	10.28	15.73
1.5	1.25	39.48	33.03	48.75
2	1.75	45.77	38.29	87.04
2.5	2.25	14.48	12.11	99.16
3	2.75	0.83	0.69	99.85
3.5	3.25	0.11	0.09	99.94
4	3.75	0.04	0.03	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-0.575
5	0.185
16	0.755
25	0.890
50	1.265
75	1.595
84	1.710
95	2.080
99	2.245

Moment Measures	(phi)	(mm)
Mean	1.458	0.364
Standard Deviation	0.561	0.678
Skewness	-0.814	
Kurtosis	5.091	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.232	1.243
Standard Deviation	0.478	0.526
Skewness (1)	-0.068	-0.104
Skewness (2)	-0.277	
Kurtosis	0.984	1.102



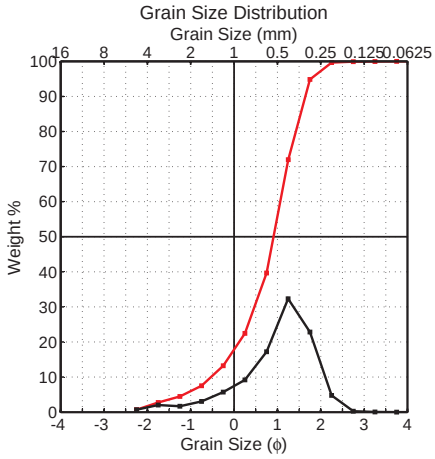
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**B3b**
Interval	**Grab**
Mean	**0.447 mm**
STD	**0.614 mm**
Skewness	**-0.672**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.23
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	6.44
% $CaCO_3$	1.2

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.08	0.07	0.07
-1.5	-1.75	0.17	0.14	0.21
-1	-1.25	0.36	0.30	0.51
-0.5	-0.75	2.04	1.70	2.20
0	-0.25	5.09	4.23	6.44
0.5	0.25	10.92	9.08	15.52
1	0.75	23.78	19.78	35.30
1.5	1.25	38.35	31.90	67.20
2	1.75	28.76	23.92	91.12
2.5	2.25	9.85	8.19	99.31
3	2.75	0.76	0.63	99.94
3.5	3.25	0.04	0.03	99.98
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.105
5	-0.420
16	0.260
25	0.490
50	0.980
75	1.415
84	1.600
95	1.985
99	2.230

Moment Measures	(phi)	(mm)
Mean	1.161	0.447
Standard Deviation	0.703	0.614
Skewness	-0.672	
Kurtosis	3.947	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.930	0.947
Standard Deviation	0.670	0.699
Skewness (1)	-0.075	-0.119
Skewness (2)	-0.295	
Kurtosis	0.795	1.066



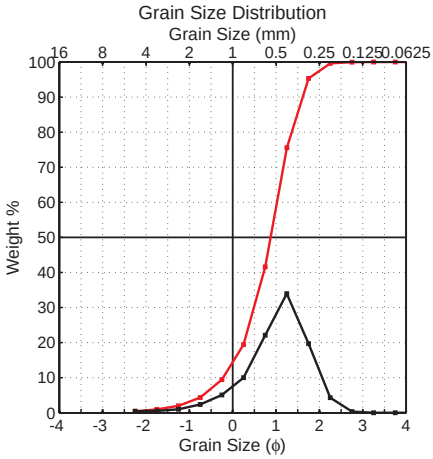
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**B3c**
Interval	**Grab**
Mean	**0.512 mm**
STD	**0.538 mm**
Skewness	**-1.212**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.13
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	13.25
% $CaCO_3$	1.9

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.87	0.72	0.72
-1.5	-1.75	2.44	2.03	2.76
-1	-1.25	2.06	1.71	4.47
-0.5	-0.75	3.69	3.07	7.54
0	-0.25	6.86	5.71	13.25
0.5	0.25	11.05	9.20	22.45
1	0.75	20.68	17.21	39.67
1.5	1.25	38.82	32.31	71.98
2	1.75	27.44	22.84	94.82
2.5	2.25	5.76	4.79	99.62
3	2.75	0.33	0.27	99.89
3.5	3.25	0.07	0.06	99.95
4	3.75	0.03	0.02	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-2.180
5	-1.165
16	-0.100
25	0.325
50	0.910
75	1.315
84	1.515
95	1.770
99	2.185

Moment Measures	(phi)	(mm)
Mean	0.965	0.512
Standard Deviation	0.895	0.538
Skewness	-1.212	
Kurtosis	4.693	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.708	0.775
Standard Deviation	0.807	0.848
Skewness (1)	-0.251	-0.332
Skewness (2)	-0.752	
Kurtosis	0.817	1.215



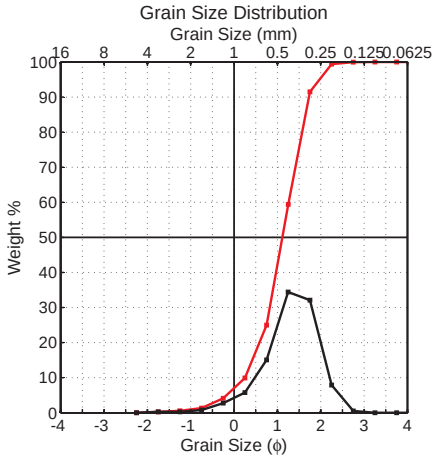
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**B3d**
Interval	**Grab**
Mean	**0.498 mm**
STD	**0.591 mm**
Skewness	**-1.057**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.31
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	9.45
% $CaCO_3$	2.9

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.54	0.45	0.45
-1.5	-1.75	0.62	0.52	0.97
-1	-1.25	1.21	1.02	1.99
-0.5	-0.75	2.83	2.37	4.36
0	-0.25	6.07	5.09	9.45
0.5	0.25	11.96	10.02	19.47
1	0.75	26.41	22.14	41.61
1.5	1.25	40.51	33.95	75.56
2	1.75	23.54	19.73	95.29
2.5	2.25	5.14	4.31	99.60
3	2.75	0.41	0.34	99.94
3.5	3.25	0.04	0.03	99.97
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.735
5	-0.685
16	0.075
25	0.375
50	0.875
75	1.240
84	1.465
95	1.745
99	2.180

Moment Measures	(phi)	(mm)
Mean	1.007	0.498
Standard Deviation	0.758	0.591
Skewness	-1.057	
Kurtosis	5.104	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.770	0.805
Standard Deviation	0.695	0.716
Skewness (1)	-0.151	-0.218
Skewness (2)	-0.496	
Kurtosis	0.748	1.151



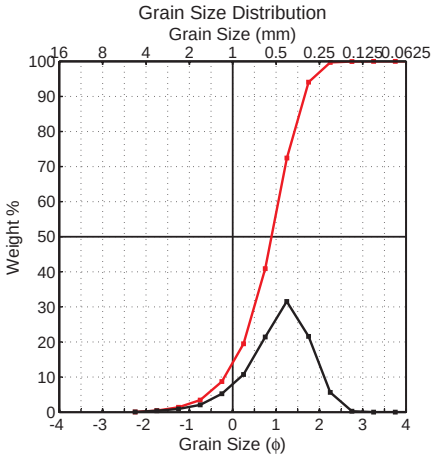
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**B3e**
Interval	**Grab**
Mean	**0.408 mm**
STD	**0.642 mm**
Skewness	**-1.016**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorte
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.73
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	4.15
% $CaCO_3$	1.4

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.03	0.03	0.03
-1.5	-1.75	0.31	0.26	0.28
-1	-1.25	0.33	0.28	0.56
-0.5	-0.75	0.97	0.81	1.37
0	-0.25	3.33	2.78	4.15
0.5	0.25	6.91	5.77	9.92
1	0.75	18.03	15.06	24.98
1.5	1.25	41.20	34.41	59.39
2	1.75	38.43	32.10	91.49
2.5	2.25	9.47	7.91	99.40
3	2.75	0.64	0.53	99.93
3.5	3.25	0.04	0.03	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.980
5	-0.175
16	0.450
25	0.750
50	1.115
75	1.495
84	1.635
95	1.970
99	2.225

Moment Measures	(phi)	(mm)
Mean	1.293	0.408
Standard Deviation	0.638	0.642
Skewness	-1.016	
Kurtosis	5.332	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.042	1.067
Standard Deviation	0.593	0.621
Skewness (1)	-0.122	-0.163
Skewness (2)	-0.367	
Kurtosis	0.810	1.180



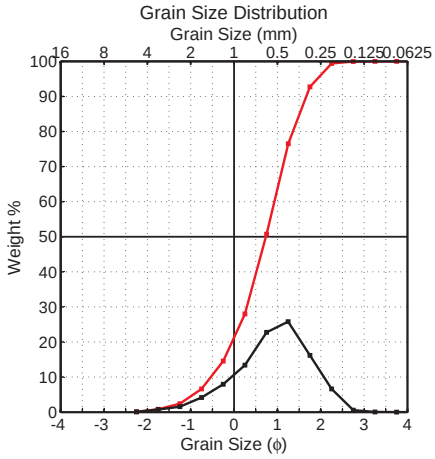
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**BC-E12a**
Interval	**Grab**
Mean	**0.484 mm**
STD	**0.601 mm**
Skewness	**-0.801**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.66
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	8.72
% $CaCO_3$	1.3

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.07	0.06	0.06
-1.5	-1.75	0.48	0.40	0.46
-1	-1.25	1.10	0.92	1.38
-0.5	-0.75	2.49	2.08	3.46
0	-0.25	6.29	5.26	8.72
0.5	0.25	12.88	10.76	19.48
1	0.75	25.63	21.42	40.90
1.5	1.25	37.76	31.56	72.46
2	1.75	25.84	21.59	94.05
2.5	2.25	6.73	5.62	99.67
3	2.75	0.33	0.28	99.95
3.5	3.25	0.04	0.03	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.455
5	-0.605
16	0.090
25	0.380
50	0.895
75	1.310
84	1.515
95	1.835
99	2.190

Moment Measures	(phi)	(mm)
Mean	1.047	0.484
Standard Deviation	0.736	0.601
Skewness	-0.801	
Kurtosis	4.085	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.802	0.833
Standard Deviation	0.713	0.726
Skewness (1)	-0.130	-0.180
Skewness (2)	-0.393	
Kurtosis	0.712	1.075



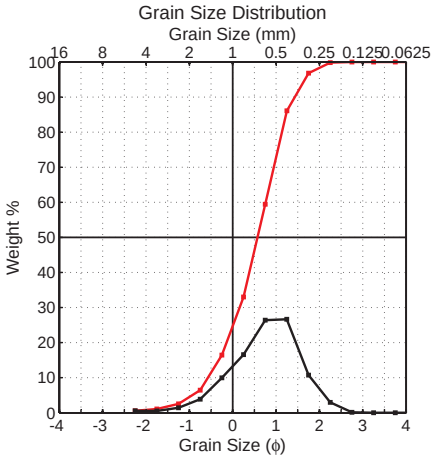
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**BC-E12b**
Interval	**Grab**
Mean	**0.539 mm**
STD	**0.558 mm**
Skewness	**-0.553**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.82
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	14.57
% $CaCO_3$	1.4

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.11	0.09	0.09
-1.5	-1.75	0.91	0.76	0.85
-1	-1.25	1.88	1.57	2.42
-0.5	-0.75	5.02	4.19	6.61
0	-0.25	9.54	7.96	14.57
0.5	0.25	16.08	13.42	27.99
1	0.75	27.25	22.74	50.73
1.5	1.25	30.90	25.79	76.52
2	1.75	19.41	16.20	92.72
2.5	2.25	7.95	6.63	99.36
3	2.75	0.68	0.57	99.92
3.5	3.25	0.06	0.05	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.705
5	-0.940
16	-0.195
25	0.140
50	0.735
75	1.220
84	1.480
95	1.920
99	2.225

Moment Measures	(phi)	(mm)
Mean	0.891	0.539
Standard Deviation	0.843	0.558
Skewness	-0.553	
Kurtosis	3.320	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.643	0.673
Standard Deviation	0.837	0.852
Skewness (1)	-0.110	-0.141
Skewness (2)	-0.293	
Kurtosis	0.707	1.085



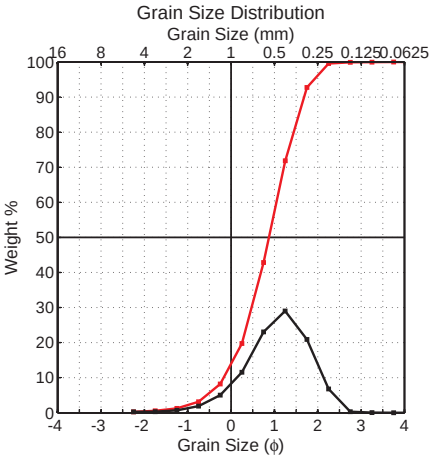
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**BC-E12c**
Interval	**Grab**
Mean	**0.599 mm**
STD	**0.579 mm**
Skewness	**-0.646**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.50
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	16.44
% $CaCO_3$	1.2

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.67	0.56	0.56
-1.5	-1.75	0.63	0.53	1.09
-1	-1.25	1.74	1.46	2.54
-0.5	-0.75	4.66	3.90	6.44
0	-0.25	11.94	9.99	16.44
0.5	0.25	19.82	16.59	33.02
1	0.75	31.55	26.40	59.42
1.5	1.25	31.87	26.67	86.09
2	1.75	12.82	10.73	96.82
2.5	2.25	3.56	2.98	99.80
3	2.75	0.19	0.16	99.96
3.5	3.25	0.02	0.02	99.97
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.835
5	-0.935
16	-0.270
25	0.010
50	0.570
75	1.040
84	1.210
95	1.665
99	2.115

Moment Measures	(phi)	(mm)
Mean	0.739	0.599
Standard Deviation	0.789	0.579
Skewness	-0.646	
Kurtosis	3.945	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.470	0.503
Standard Deviation	0.740	0.764
Skewness (1)	-0.135	-0.146
Skewness (2)	-0.277	
Kurtosis	0.757	1.035



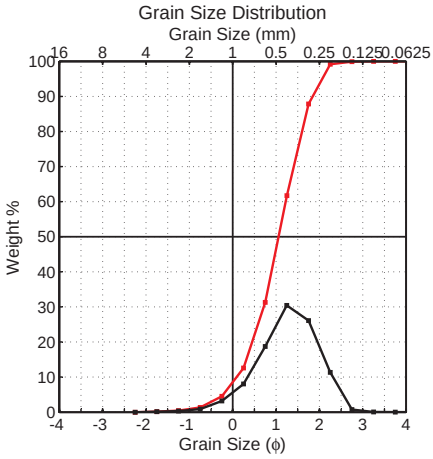
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**BC-E12d**
Interval	**Grab**
Mean	**0.483 mm**
STD	**0.595 mm**
Skewness	**-0.723**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.33
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	8.22
% $CaCO_3$	1.7

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.31	0.26	0.26
-1.5	-1.75	0.37	0.31	0.57
-1	-1.25	0.83	0.69	1.25
-0.5	-0.75	2.29	1.90	3.16
0	-0.25	6.09	5.06	8.22
0.5	0.25	13.89	11.54	19.76
1	0.75	27.74	23.05	42.82
1.5	1.25	34.94	29.04	71.85
2	1.75	25.14	20.89	92.74
2.5	2.25	8.19	6.81	99.55
3	2.75	0.41	0.34	99.89
3.5	3.25	0.07	0.06	99.95
4	3.75	0.02	0.02	99.97
>4.0	4.25	0.04	0.03	100.00

Percentiles	
1	-1.435
5	-0.570
16	0.085
25	0.365
50	0.875
75	1.325
84	1.540
95	1.915
99	2.210

Moment Measures	(phi)	(mm)
Mean	1.050	0.483
Standard Deviation	0.748	0.595
Skewness	-0.723	
Kurtosis	4.336	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.813	0.833
Standard Deviation	0.728	0.740
Skewness (1)	-0.086	-0.124
Skewness (2)	-0.278	
Kurtosis	0.708	1.061



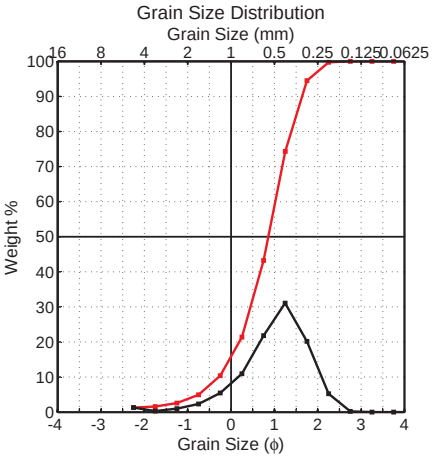
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**BC-E12e**
Interval	**Grab**
Mean	**0.419 mm**
STD	**0.622 mm**
Skewness	**-0.606**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorte
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.62
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	4.54
% $CaCO_3$	1.6

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.17	0.14	0.14
-1	-1.25	0.38	0.32	0.46
-0.5	-0.75	1.07	0.89	1.35
0	-0.25	3.81	3.19	4.54
0.5	0.25	9.61	8.03	12.57
1	0.75	22.39	18.72	31.29
1.5	1.25	36.39	30.42	61.71
2	1.75	31.24	26.12	87.83
2.5	2.25	13.56	11.34	99.16
3	2.75	0.89	0.74	99.91
3.5	3.25	0.06	0.05	99.96
4	3.75	0.02	0.02	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-0.950
5	-0.220
16	0.340
25	0.580
50	1.060
75	1.505
84	1.675
95	2.065
99	2.245

Moment Measures	(phi)	(mm)
Mean	1.255	0.419
Standard Deviation	0.684	0.622
Skewness	-0.606	
Kurtosis	3.846	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.007	1.025
Standard Deviation	0.667	0.680
Skewness (1)	-0.079	-0.100
Skewness (2)	-0.206	
Kurtosis	0.712	1.012



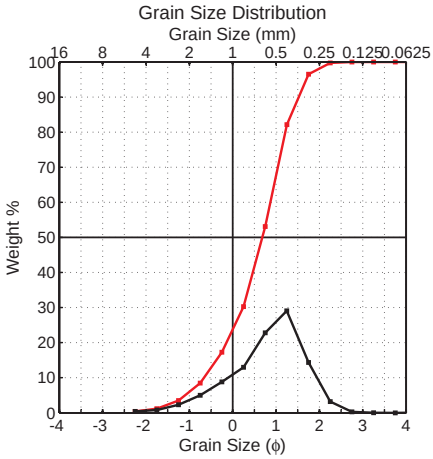
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**BC-E12f**
Interval	**Grab**
Mean	**0.507 mm**
STD	**0.567 mm**
Skewness	**-1.201**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.18
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	10.42
% $CaCO_3$	1.2

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.57	1.31	1.31
-1.5	-1.75	0.38	0.32	1.62
-1	-1.25	1.19	0.99	2.61
-0.5	-0.75	2.83	2.35	4.97
0	-0.25	6.55	5.45	10.42
0.5	0.25	13.19	10.98	21.39
1	0.75	26.24	21.83	43.23
1.5	1.25	37.35	31.08	74.31
2	1.75	24.24	20.17	94.47
2.5	2.25	6.32	5.26	99.73
3	2.75	0.27	0.22	99.96
3.5	3.25	0.03	0.02	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-0.745
16	0.005
25	0.335
50	0.860
75	1.265
84	1.490
95	1.800
99	2.180

Moment Measures	(phi)	(mm)
Mean	0.980	0.507
Standard Deviation	0.818	0.567
Skewness	-1.201	
Kurtosis	5.502	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.747	0.785
Standard Deviation	0.742	0.757
Skewness (1)	-0.152	-0.206
Skewness (2)	-0.448	
Kurtosis	0.714	1.122



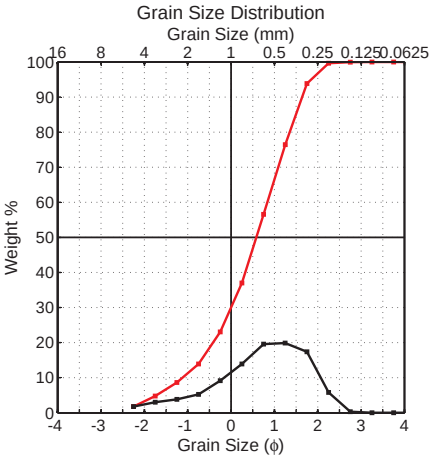
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**BC-E12g**
Interval	**Grab**
Mean	**0.579 mm**
STD	**0.558 mm**
Skewness	**-0.751**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	120.28
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	17.27
% $CaCO_3$	1.2

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.47	0.39	0.39
-1.5	-1.75	0.93	0.77	1.16
-1	-1.25	2.78	2.31	3.48
-0.5	-0.75	5.99	4.98	8.46
0	-0.25	10.60	8.81	17.27
0.5	0.25	15.62	12.99	30.25
1	0.75	27.44	22.81	53.07
1.5	1.25	34.98	29.08	82.15
2	1.75	17.24	14.33	96.48
2.5	2.25	3.87	3.22	99.70
3	2.75	0.32	0.27	99.97
3.5	3.25	0.03	0.02	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.855
5	-1.095
16	-0.320
25	0.050
50	0.685
75	1.125
84	1.315
95	1.700
99	2.140

Moment Measures	(phi)	(mm)
Mean	0.788	0.579
Standard Deviation	0.842	0.558
Skewness	-0.751	
Kurtosis	3.559	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.498	0.560
Standard Deviation	0.817	0.832
Skewness (1)	-0.229	-0.252
Skewness (2)	-0.468	
Kurtosis	0.709	1.066



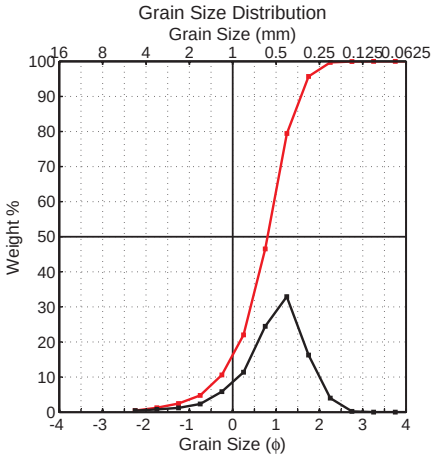
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**BC-E12h**
Interval	**Grab**
Mean	**0.628 mm**
STD	**0.481 mm**
Skewness	**-0.731**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.94
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	23.04
% $CaCO_3$	2.1

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.14	1.78	1.78
-1.5	-1.75	3.62	3.02	4.80
-1	-1.25	4.62	3.85	8.65
-0.5	-0.75	6.30	5.25	13.91
0	-0.25	10.96	9.14	23.04
0.5	0.25	16.72	13.94	36.99
1	0.75	23.47	19.57	56.55
1.5	1.25	23.85	19.88	76.44
2	1.75	20.87	17.40	93.84
2.5	2.25	6.96	5.80	99.64
3	2.75	0.37	0.31	99.95
3.5	3.25	0.04	0.03	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.725
16	-0.635
25	-0.180
50	0.585
75	1.215
84	1.465
95	1.850
99	2.195

Moment Measures	(phi)	(mm)
Mean	0.672	0.628
Standard Deviation	1.055	0.481
Skewness	-0.731	
Kurtosis	3.122	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.415	0.472
Standard Deviation	1.050	1.067
Skewness (1)	-0.162	-0.227
Skewness (2)	-0.498	
Kurtosis	0.702	1.050



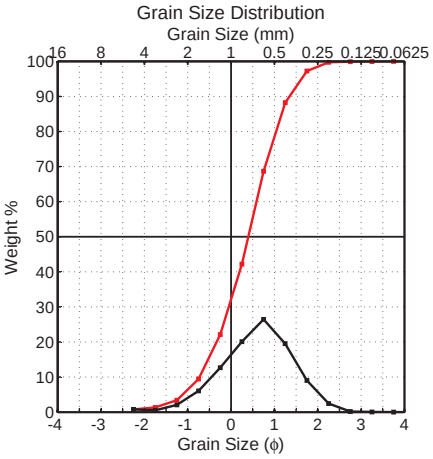
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**BC-E12i**
Interval	**Grab**
Mean	**0.523 mm**
STD	**0.586 mm**
Skewness	**-1.007**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.29
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	10.64
% $CaCO_3$	1.0

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.54	0.45	0.45
-1.5	-1.75	0.96	0.80	1.26
-1	-1.25	1.45	1.22	2.47
-0.5	-0.75	2.77	2.32	4.80
0	-0.25	6.97	5.84	10.64
0.5	0.25	13.60	11.40	22.04
1	0.75	29.19	24.47	46.51
1.5	1.25	39.26	32.91	79.42
2	1.75	19.41	16.27	95.69
2.5	2.25	4.78	4.01	99.70
3	2.75	0.30	0.25	99.95
3.5	3.25	0.03	0.03	99.97
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.910
5	-0.730
16	-0.015
25	0.310
50	0.805
75	1.185
84	1.390
95	1.730
99	2.165

Moment Measures	(phi)	(mm)
Mean	0.936	0.523
Standard Deviation	0.771	0.586
Skewness	-1.007	
Kurtosis	4.946	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.688	0.727
Standard Deviation	0.702	0.724
Skewness (1)	-0.167	-0.208
Skewness (2)	-0.434	
Kurtosis	0.751	1.152



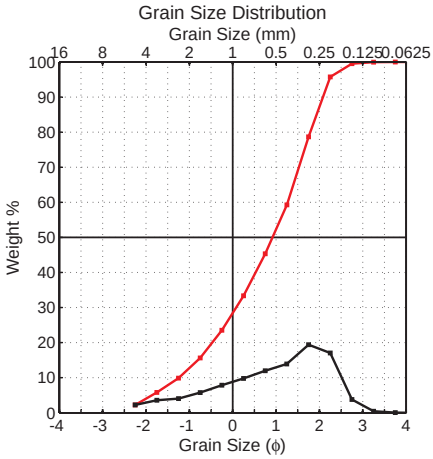
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**BC-E12j**
Interval	**Grab**
Mean	**0.667 mm**
STD	**0.563 mm**
Skewness	**-0.418**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	120.32
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	22.13
% $CaCO_3$	2.7

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.96	0.80	0.80
-1.5	-1.75	0.65	0.54	1.34
-1	-1.25	2.50	2.08	3.42
-0.5	-0.75	7.28	6.05	9.47
0	-0.25	15.24	12.67	22.13
0.5	0.25	24.16	20.08	42.21
1	0.75	31.84	26.46	68.68
1.5	1.25	23.51	19.54	88.21
2	1.75	10.84	9.01	97.22
2.5	2.25	2.99	2.49	99.71
3	2.75	0.22	0.18	99.89
3.5	3.25	0.06	0.05	99.94
4	3.75	0.04	0.03	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-2.065
5	-1.120
16	-0.490
25	-0.180
50	0.395
75	0.910
84	1.140
95	1.625
99	2.105

Moment Measures	(phi)	(mm)
Mean	0.585	0.667
Standard Deviation	0.828	0.563
Skewness	-0.418	
Kurtosis	3.629	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.325	0.348
Standard Deviation	0.815	0.823
Skewness (1)	-0.086	-0.095
Skewness (2)	-0.175	
Kurtosis	0.684	1.032



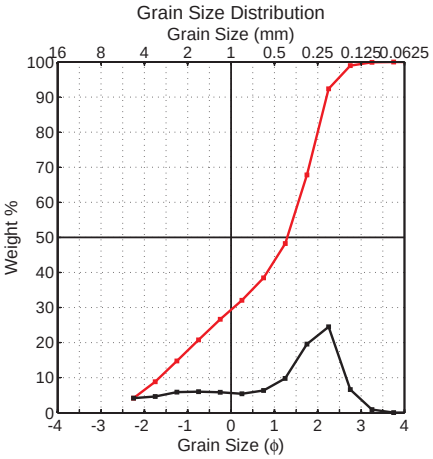
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NSS-01a**
Interval	**Swash**
Mean	**0.534 mm**
STD	**0.417 mm**
Skewness	**-0.669**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	120.39
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	23.53
% $CaCO_3$	2.9

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.70	2.24	2.24
-1.5	-1.75	4.30	3.57	5.81
-1	-1.25	4.88	4.05	9.87
-0.5	-0.75	6.96	5.78	15.65
0	-0.25	9.49	7.88	23.53
0.5	0.25	11.81	9.81	33.34
1	0.75	14.44	11.99	45.34
1.5	1.25	16.76	13.92	59.26
2	1.75	23.35	19.40	78.65
2.5	2.25	20.54	17.06	95.71
3	2.75	4.55	3.78	99.49
3.5	3.25	0.53	0.44	99.93
4	3.75	0.07	0.06	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.865
16	-0.730
25	-0.175
50	0.920
75	1.655
84	1.905
95	2.230
99	2.685

Moment Measures	(phi)	(mm)
Mean	0.906	0.534
Standard Deviation	1.263	0.417
Skewness	-0.669	
Kurtosis	2.656	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.587	0.698
Standard Deviation	1.317	1.279
Skewness (1)	-0.252	-0.306
Skewness (2)	-0.560	
Kurtosis	0.554	0.917



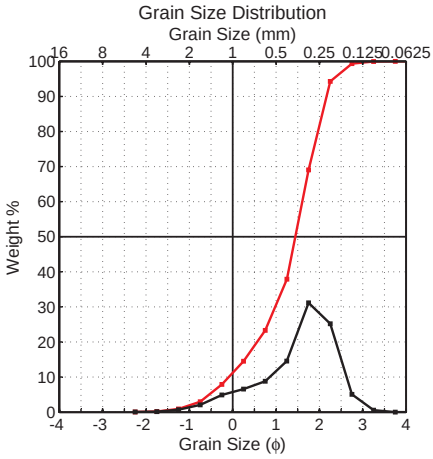
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NSS-01b**
Interval	**LTT**
Mean	**0.505 mm**
STD	**0.361 mm**
Skewness	**-0.754**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	120.06
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	26.65
% $CaCO_3$	8.9

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.04	4.20	4.20
-1.5	-1.75	5.61	4.67	8.87
-1	-1.25	7.08	5.90	14.77
-0.5	-0.75	7.25	6.04	20.81
0	-0.25	7.02	5.85	26.65
0.5	0.25	6.51	5.42	32.08
1	0.75	7.64	6.36	38.44
1.5	1.25	11.78	9.81	48.25
2	1.75	23.49	19.57	67.82
2.5	2.25	29.44	24.52	92.34
3	2.75	7.96	6.63	98.97
3.5	3.25	1.13	0.94	99.91
4	3.75	0.09	0.07	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.165
16	-1.150
25	-0.390
50	1.295
75	1.895
84	2.080
95	2.450
99	2.765

Moment Measures	(phi)	(mm)
Mean	0.985	0.505
Standard Deviation	1.471	0.361
Skewness	-0.754	
Kurtosis	2.357	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.465	0.742
Standard Deviation	1.615	1.507
Skewness (1)	-0.514	-0.507
Skewness (2)	-0.714	
Kurtosis	0.429	0.828



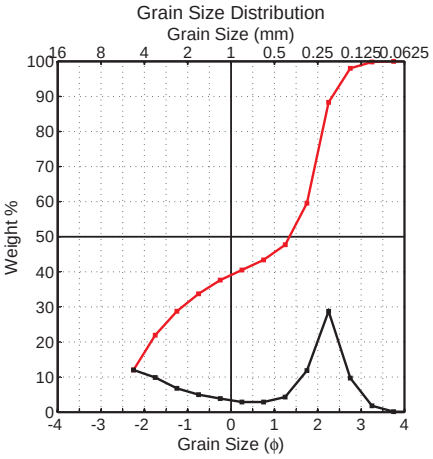
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NSS-02a**
Interval	**Swash**
Mean	**0.354 mm**
STD	**0.547 mm**
Skewness	**-0.973**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.60
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	7.93
% $CaCO_3$	2.2

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.07	0.06	0.06
-1.5	-1.75	0.16	0.13	0.19
-1	-1.25	0.86	0.72	0.91
-0.5	-0.75	2.49	2.08	2.99
0	-0.25	5.90	4.93	7.93
0.5	0.25	7.88	6.59	14.52
1	0.75	10.54	8.81	23.33
1.5	1.25	17.42	14.57	37.89
2	1.75	37.26	31.15	69.05
2.5	2.25	30.15	25.21	94.26
3	2.75	6.10	5.10	99.36
3.5	3.25	0.70	0.59	99.94
4	3.75	0.05	0.04	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.230
5	-0.545
16	0.335
25	0.805
50	1.445
75	1.870
84	2.045
95	2.325
99	2.715

Moment Measures	(phi)	(mm)
Mean	1.498	0.354
Standard Deviation	0.870	0.547
Skewness	-0.973	
Kurtosis	3.729	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.190	1.275
Standard Deviation	0.855	0.862
Skewness (1)	-0.298	-0.343
Skewness (2)	-0.649	
Kurtosis	0.678	1.104



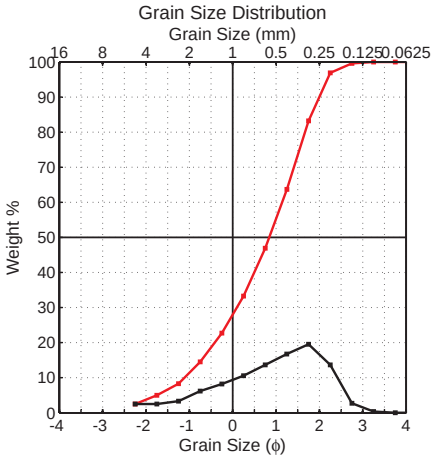
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NSS-02b**
Interval	**LTT**
Mean	**0.619 mm**
STD	**0.277 mm**
Skewness	**-0.436**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Very Platykurtic
Total weight (gram)	117.50
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	37.63
% $CaCO_3$	3.3

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	14.15	12.04	12.04
-1.5	-1.75	11.64	9.91	21.95
-1	-1.25	7.99	6.80	28.75
-0.5	-0.75	5.87	5.00	33.74
0	-0.25	4.56	3.88	37.63
0.5	0.25	3.39	2.89	40.51
1	0.75	3.39	2.89	43.40
1.5	1.25	5.07	4.31	47.71
2	1.75	13.92	11.85	59.56
2.5	2.25	33.78	28.75	88.31
3	2.75	11.41	9.71	98.02
3.5	3.25	2.12	1.80	99.82
4	3.75	0.19	0.16	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.050
25	-1.525
50	1.345
75	2.020
84	2.175
95	2.595
99	3.020

Moment Measures	(phi)	(mm)
Mean	0.693	0.619
Standard Deviation	1.850	0.277
Skewness	-0.436	
Kurtosis	1.561	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.063	0.490
Standard Deviation	2.112	1.790
Skewness (1)	-0.607	-0.546
Skewness (2)	-0.555	
Kurtosis	0.147	0.560



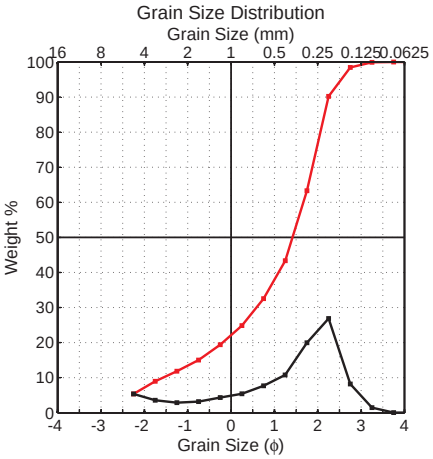
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NSS-03a**
Interval	**Swash**
Mean	**0.548 mm**
STD	**0.437 mm**
Skewness	**-0.689**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	120.06
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	22.70
% $CaCO_3$	4.5

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.99	2.49	2.49
-1.5	-1.75	2.99	2.49	4.98
-1	-1.25	3.99	3.32	8.30
-0.5	-0.75	7.44	6.20	14.50
0	-0.25	9.84	8.20	22.70
0.5	0.25	12.70	10.58	33.28
1	0.75	16.39	13.65	46.93
1.5	1.25	20.12	16.76	63.68
2	1.75	23.46	19.54	83.23
2.5	2.25	16.39	13.65	96.88
3	2.75	3.27	2.72	99.60
3.5	3.25	0.44	0.37	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.745
16	-0.660
25	-0.140
50	0.840
75	1.540
84	1.780
95	2.180
99	2.640

Moment Measures	(phi)	(mm)
Mean	0.867	0.548
Standard Deviation	1.194	0.437
Skewness	-0.689	
Kurtosis	2.883	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.560	0.653
Standard Deviation	1.220	1.205
Skewness (1)	-0.230	-0.273
Skewness (2)	-0.510	
Kurtosis	0.609	0.958



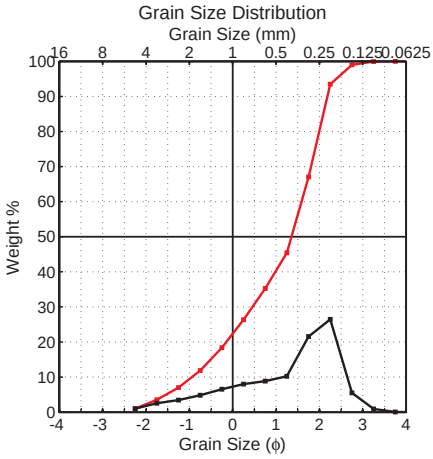
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NSS-03b**
Interval	**LTT**
Mean	**0.440 mm**
STD	**0.373 mm**
Skewness	**-1.069**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	120.16
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	19.40
% $CaCO_3$	8.7

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.48	5.39	5.39
-1.5	-1.75	4.30	3.58	8.97
-1	-1.25	3.46	2.88	11.85
-0.5	-0.75	3.85	3.20	15.05
0	-0.25	5.22	4.34	19.40
0.5	0.25	6.54	5.44	24.84
1	0.75	9.23	7.68	32.52
1.5	1.25	12.99	10.81	43.33
2	1.75	24.00	19.97	63.31
2.5	2.25	32.30	26.88	90.19
3	2.75	9.89	8.23	98.42
3.5	3.25	1.78	1.48	99.90
4	3.75	0.10	0.08	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-0.640
25	0.260
50	1.415
75	1.965
84	2.135
95	2.540
99	2.945

Moment Measures	(phi)	(mm)
Mean	1.184	0.440
Standard Deviation	1.424	0.373
Skewness	-1.069	
Kurtosis	3.167	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.747	0.970
Standard Deviation	1.388	1.420
Skewness (1)	-0.481	-0.506
Skewness (2)	-0.915	
Kurtosis	0.726	1.151



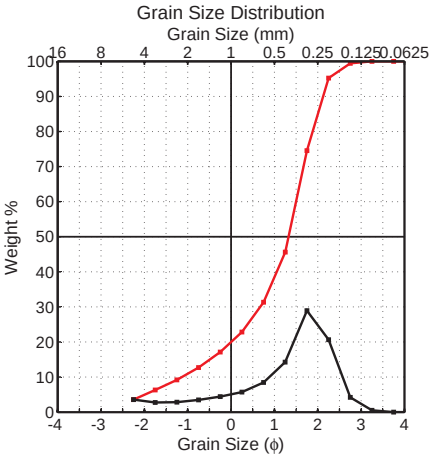
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NSS-04a**
Interval	**Swash**
Mean	**0.433 mm**
STD	**0.429 mm**
Skewness	**-0.877**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.81
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	18.40
% $CaCO_3$	2.3

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.19	0.99	0.99
-1.5	-1.75	3.04	2.54	3.53
-1	-1.25	4.16	3.47	7.00
-0.5	-0.75	5.80	4.84	11.84
0	-0.25	7.85	6.55	18.40
0.5	0.25	9.57	7.99	26.38
1	0.75	10.60	8.85	35.23
1.5	1.25	12.25	10.22	45.46
2	1.75	25.85	21.58	67.03
2.5	2.25	31.67	26.43	93.46
3	2.75	6.61	5.52	98.98
3.5	3.25	1.12	0.93	99.92
4	3.75	0.08	0.07	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.540
16	-0.435
25	0.165
50	1.355
75	1.900
84	2.070
95	2.390
99	2.760

Moment Measures	(phi)	(mm)
Mean	1.209	0.433
Standard Deviation	1.222	0.429
Skewness	-0.877	
Kurtosis	2.940	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.818	0.997
Standard Deviation	1.253	1.222
Skewness (1)	-0.429	-0.451
Skewness (2)	-0.743	
Kurtosis	0.569	0.928



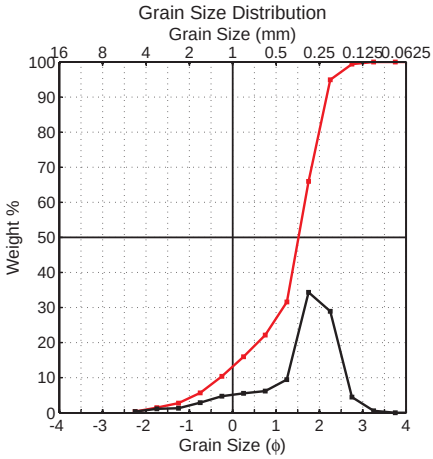
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NSS-04b**
Interval	**LTT**
Mean	**0.447 mm**
STD	**0.419 mm**
Skewness	**-1.199**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.53
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	17.13
% $CaCO_3$	2.7

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	4.28	3.58	3.58
-1.5	-1.75	3.30	2.76	6.34
-1	-1.25	3.42	2.86	9.20
-0.5	-0.75	4.19	3.51	12.71
0	-0.25	5.29	4.43	17.13
0.5	0.25	6.85	5.73	22.86
1	0.75	10.12	8.47	31.33
1.5	1.25	17.07	14.28	45.61
2	1.75	34.58	28.93	74.54
2.5	2.25	24.69	20.66	95.20
3	2.75	5.06	4.23	99.43
3.5	3.25	0.65	0.54	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.995
16	-0.380
25	0.375
50	1.325
75	1.760
84	1.980
95	2.245
99	2.700

Moment Measures	(phi)	(mm)
Mean	1.160	0.447
Standard Deviation	1.255	0.419
Skewness	-1.199	
Kurtosis	3.710	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.800	0.975
Standard Deviation	1.180	1.232
Skewness (1)	-0.445	-0.505
Skewness (2)	-1.017	
Kurtosis	0.797	1.255



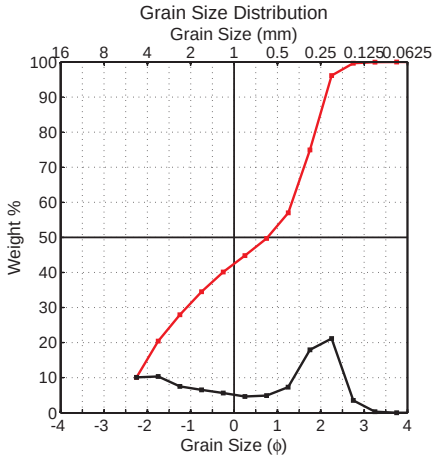
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NSS-05a**
Interval	**Swash**
Mean	**0.354 mm**
STD	**0.507 mm**
Skewness	**-1.383**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skew
	Leptokurtic
Total weight (gram)	119.97
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	10.42
% $CaCO_3$	3.0

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.42	0.35	0.35
-1.5	-1.75	1.35	1.13	1.48
-1	-1.25	1.57	1.31	2.78
-0.5	-0.75	3.46	2.88	5.67
0	-0.25	5.70	4.75	10.42
0.5	0.25	6.67	5.56	15.98
1	0.75	7.42	6.18	22.16
1.5	1.25	11.34	9.45	31.62
2	1.75	41.19	34.33	65.95
2.5	2.25	34.73	28.95	94.90
3	2.75	5.37	4.48	99.37
3.5	3.25	0.71	0.59	99.97
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.960
5	-0.865
16	0.250
25	0.900
50	1.520
75	1.905
84	2.060
95	2.260
99	2.710

Moment Measures	(phi)	(mm)
Mean	1.497	0.354
Standard Deviation	0.980	0.507
Skewness	-1.383	
Kurtosis	4.650	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.155	1.277
Standard Deviation	0.905	0.926
Skewness (1)	-0.403	-0.465
Skewness (2)	-0.909	
Kurtosis	0.727	1.274



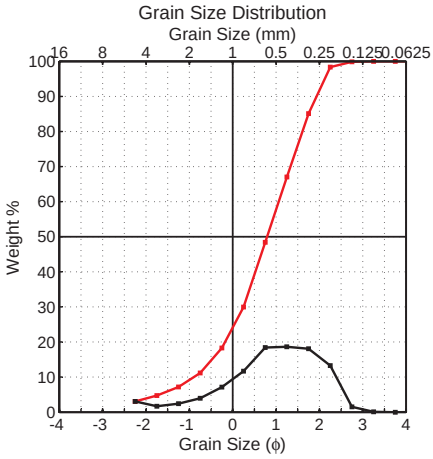
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NSS-05b**
Interval	**LTT**
Mean	**0.720 mm**
STD	**0.311 mm**
Skewness	**-0.336**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	119.94
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	40.15
% $CaCO_3$	6.1

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	12.10	10.09	10.09
-1.5	-1.75	12.42	10.36	20.44
-1	-1.25	9.01	7.51	27.96
-0.5	-0.75	7.87	6.56	34.52
0	-0.25	6.75	5.63	40.15
0.5	0.25	5.58	4.65	44.80
1	0.75	5.89	4.91	49.71
1.5	1.25	8.75	7.30	57.00
2	1.75	21.51	17.93	74.94
2.5	2.25	25.40	21.18	96.11
3	2.75	4.22	3.52	99.63
3.5	3.25	0.38	0.32	99.95
4	3.75	0.03	0.03	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.965
25	-1.445
50	0.770
75	1.750
84	1.965
95	2.225
99	2.660

Moment Measures	(phi)	(mm)
Mean	0.474	0.720
Standard Deviation	1.684	0.311
Skewness	-0.336	
Kurtosis	1.585	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.000	0.257
Standard Deviation	1.965	1.661
Skewness (1)	-0.392	-0.371
Skewness (2)	-0.398	
Kurtosis	0.139	0.574



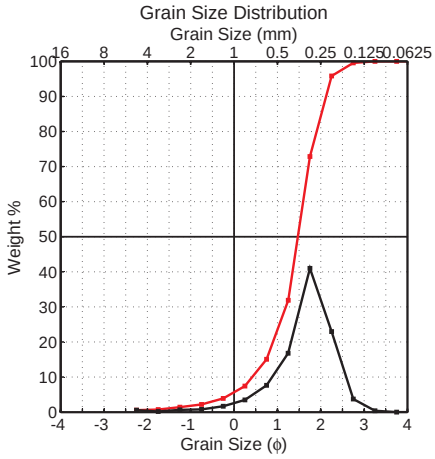
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-01a**
Interval	**Swash**
Mean	**0.542 mm**
STD	**0.461 mm**
Skewness	**-0.873**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.71
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	18.31
% $CaCO_3$	4.6

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.65	3.05	3.05
-1.5	-1.75	2.03	1.70	4.74
-1	-1.25	2.92	2.44	7.18
-0.5	-0.75	4.77	3.98	11.17
0	-0.25	8.55	7.14	18.31
0.5	0.25	13.97	11.67	29.98
1	0.75	22.06	18.43	48.41
1.5	1.25	22.29	18.62	67.03
2	1.75	21.64	18.08	85.11
2.5	2.25	15.87	13.26	98.36
3	2.75	1.80	1.50	99.87
3.5	3.25	0.15	0.13	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.700
16	-0.410
25	0.035
50	0.795
75	1.470
84	1.720
95	2.125
99	2.460

Moment Measures	(phi)	(mm)
Mean	0.884	0.542
Standard Deviation	1.116	0.461
Skewness	-0.873	
Kurtosis	3.539	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.655	0.702
Standard Deviation	1.065	1.112
Skewness (1)	-0.131	-0.218
Skewness (2)	-0.547	
Kurtosis	0.796	1.092



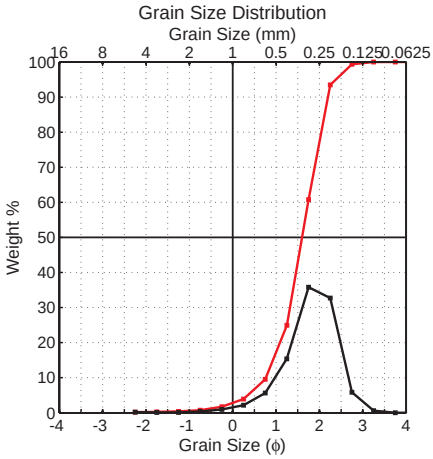
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-01b**
Interval	**LTT**
Mean	**0.332 mm**
STD	**0.592 mm**
Skewness	**-1.741**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skew
	Very Leptokurtic
Total weight (gram)	120.28
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	3.94
% $CaCO_3$	2.8

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.71	0.59	0.59
-1.5	-1.75	0.21	0.17	0.76
-1	-1.25	0.81	0.67	1.44
-0.5	-0.75	0.95	0.79	2.23
0	-0.25	2.06	1.71	3.94
0.5	0.25	4.23	3.52	7.46
1	0.75	9.19	7.64	15.10
1.5	1.25	20.18	16.78	31.88
2	1.75	49.29	40.98	72.86
2.5	2.25	27.62	22.96	95.82
3	2.75	4.51	3.75	99.57
3.5	3.25	0.49	0.41	99.98
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.575
5	-0.100
16	0.775
25	1.045
50	1.470
75	1.795
84	1.995
95	2.230
99	2.675

Moment Measures	(phi)	(mm)
Mean	1.592	0.332
Standard Deviation	0.756	0.592
Skewness	-1.741	
Kurtosis	8.195	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.385	1.413
Standard Deviation	0.610	0.658
Skewness (1)	-0.139	-0.243
Skewness (2)	-0.664	
Kurtosis	0.910	1.273



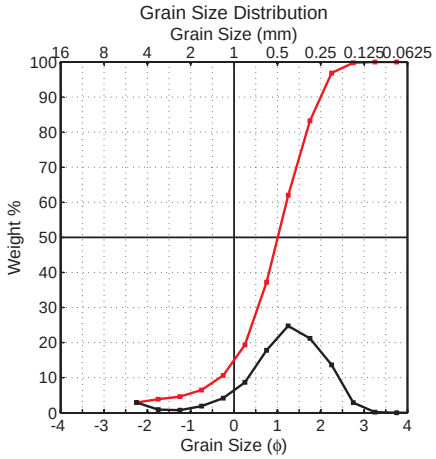
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-02a**
Interval	**Swash**
Mean	**0.293 mm**
STD	**0.640 mm**
Skewness	**-1.440**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorte
Poorly Graded	Strongly Coarse Skew
	Very Leptokurtic
Total weight (gram)	120.00
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	1.74
% $CaCO_3$	3.1

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.22	0.18	0.18
-1.5	-1.75	0.14	0.12	0.30
-1	-1.25	0.12	0.10	0.40
-0.5	-0.75	0.43	0.36	0.76
0	-0.25	1.18	0.98	1.74
0.5	0.25	2.60	2.17	3.91
1	0.75	6.79	5.66	9.57
1.5	1.25	18.46	15.38	24.95
2	1.75	42.96	35.80	60.75
2.5	2.25	39.27	32.73	93.47
3	2.75	7.03	5.86	99.33
3.5	3.25	0.77	0.64	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.625
5	0.345
16	0.960
25	1.250
50	1.600
75	1.970
84	2.105
95	2.380
99	2.720

Moment Measures	(phi)	(mm)
Mean	1.773	0.293
Standard Deviation	0.643	0.640
Skewness	-1.440	
Kurtosis	7.894	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.533	1.555
Standard Deviation	0.573	0.595
Skewness (1)	-0.118	-0.176
Skewness (2)	-0.415	
Kurtosis	0.777	1.158



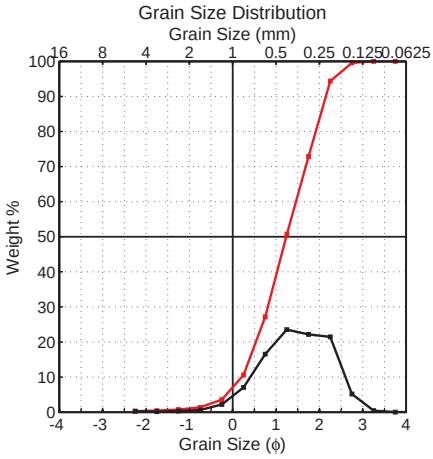
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-02b**
Interval	**LTT**
Mean	**0.462 mm**
STD	**0.494 mm**
Skewness	**-1.246**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.90
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	10.68
% $CaCO_3$	3.1

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.50	2.92	2.92
-1.5	-1.75	1.13	0.94	3.86
-1	-1.25	0.88	0.73	4.60
-0.5	-0.75	2.28	1.90	6.50
0	-0.25	5.01	4.18	10.68
0.5	0.25	10.44	8.71	19.38
1	0.75	21.39	17.84	37.22
1.5	1.25	29.70	24.77	61.99
2	1.75	25.43	21.21	83.20
2.5	2.25	16.38	13.66	96.86
3	2.75	3.47	2.89	99.76
3.5	3.25	0.25	0.21	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.145
16	0.055
25	0.405
50	1.010
75	1.555
84	1.780
95	2.180
99	2.620

Moment Measures	(phi)	(mm)
Mean	1.115	0.462
Standard Deviation	1.019	0.494
Skewness	-1.246	
Kurtosis	5.176	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.917	0.948
Standard Deviation	0.863	0.935
Skewness (1)	-0.107	-0.202
Skewness (2)	-0.571	
Kurtosis	0.928	1.185



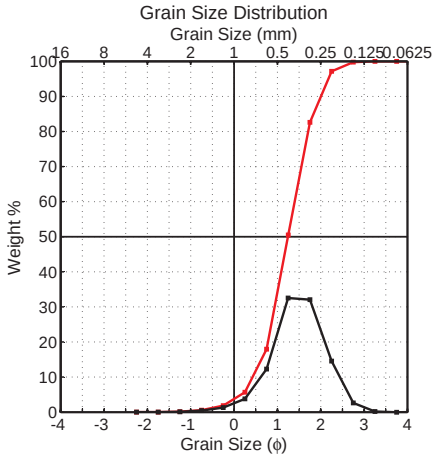
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-03a**
Interval	**Swash**
Mean	**0.368 mm**
STD	**0.578 mm**
Skewness	**-0.677**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.76
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	3.58
% $CaCO_3$	2.7

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.33	0.28	0.28
-1.5	-1.75	0.19	0.16	0.43
-1	-1.25	0.37	0.31	0.74
-0.5	-0.75	0.76	0.63	1.38
0	-0.25	2.64	2.20	3.58
0.5	0.25	8.43	7.04	10.62
1	0.75	19.83	16.56	27.18
1.5	1.25	28.18	23.53	50.71
2	1.75	26.54	22.16	72.87
2.5	2.25	25.73	21.48	94.36
3	2.75	6.20	5.18	99.53
3.5	3.25	0.52	0.43	99.97
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.050
5	-0.150
16	0.410
25	0.685
50	1.235
75	1.800
84	2.010
95	2.310
99	2.700

Moment Measures	(phi)	(mm)
Mean	1.442	0.368
Standard Deviation	0.790	0.578
Skewness	-0.677	
Kurtosis	4.241	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.210	1.218
Standard Deviation	0.800	0.773
Skewness (1)	-0.031	-0.079
Skewness (2)	-0.194	
Kurtosis	0.538	0.904



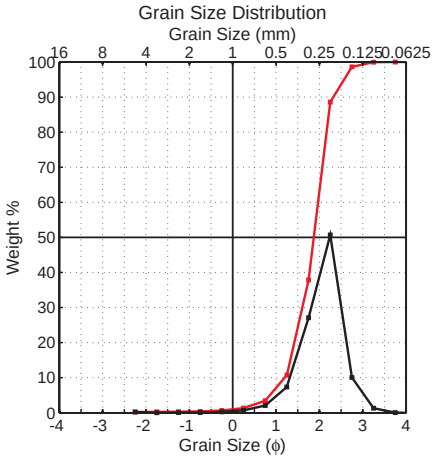
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-03b**
Interval	**LTT**
Mean	**0.361 mm**
STD	**0.655 mm**
Skewness	**-0.523**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorte
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.53
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	1.87
% $CaCO_3$	2.7

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.02	0.02	0.02
-1.5	-1.75	0.01	0.01	0.03
-1	-1.25	0.13	0.11	0.13
-0.5	-0.75	0.54	0.45	0.59
0	-0.25	1.54	1.29	1.87
0.5	0.25	4.56	3.81	5.69
1	0.75	14.67	12.27	17.96
1.5	1.25	38.92	32.56	50.52
2	1.75	38.35	32.08	82.61
2.5	2.25	17.39	14.55	97.16
3	2.75	3.13	2.62	99.77
3.5	3.25	0.25	0.21	99.98
4	3.75	0.00	0.00	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.590
5	0.160
16	0.670
25	0.860
50	1.240
75	1.630
84	1.800
95	2.175
99	2.600

Moment Measures	(phi)	(mm)
Mean	1.468	0.361
Standard Deviation	0.610	0.655
Skewness	-0.523	
Kurtosis	4.313	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.235	1.237
Standard Deviation	0.565	0.588
Skewness (1)	-0.009	-0.040
Skewness (2)	-0.128	
Kurtosis	0.783	1.072



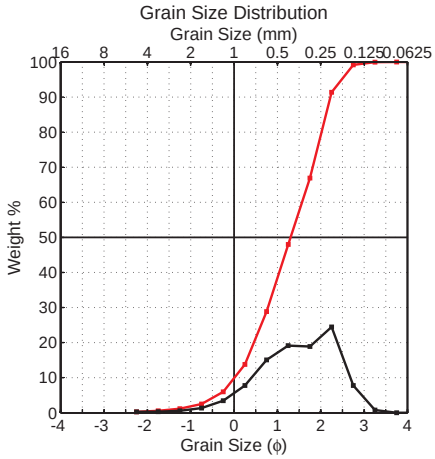
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-04a**
Interval	**Swash**
Mean	**0.244 mm**
STD	**0.687 mm**
Skewness	**-2.078**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorte
Poorly Graded	Strongly Coarse Skew
	Very Leptokurtic
Total weight (gram)	120.22
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	0.66
% $CaCO_3$	1.8

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.30	0.25	0.25
-1.5	-1.75	0.02	0.02	0.27
-1	-1.25	0.06	0.05	0.32
-0.5	-0.75	0.09	0.07	0.39
0	-0.25	0.32	0.27	0.66
0.5	0.25	0.86	0.72	1.37
1	0.75	2.48	2.06	3.44
1.5	1.25	8.83	7.34	10.78
2	1.75	32.58	27.10	37.88
2.5	2.25	60.94	50.69	88.57
3	2.75	12.08	10.05	98.62
3.5	3.25	1.59	1.32	99.94
4	3.75	0.06	0.05	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.010
5	0.855
16	1.345
25	1.510
50	1.870
75	2.115
84	2.205
95	2.570
99	2.895

Moment Measures	(phi)	(mm)
Mean	2.038	0.244
Standard Deviation	0.542	0.687
Skewness	-2.078	
Kurtosis	14.797	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.775	1.807
Standard Deviation	0.430	0.475
Skewness (1)	-0.221	-0.202
Skewness (2)	-0.366	
Kurtosis	0.994	1.162



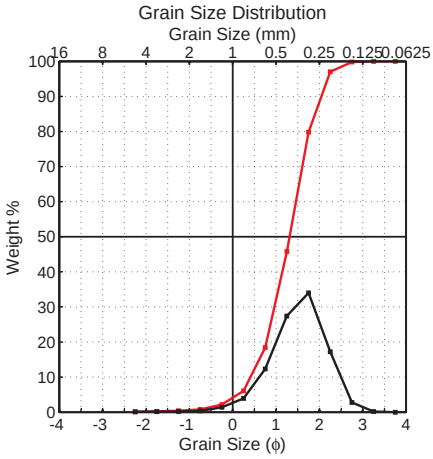
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-04b**
Interval	**LTT**
Mean	**0.364 mm**
STD	**0.537 mm**
Skewness	**-0.721**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.75
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	5.99
% $CaCO_3$	1.6

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.32	0.27	0.27
-1.5	-1.75	0.39	0.33	0.59
-1	-1.25	0.71	0.59	1.19
-0.5	-0.75	1.60	1.34	2.52
0	-0.25	4.15	3.47	5.99
0.5	0.25	9.33	7.79	13.78
1	0.75	18.05	15.07	28.85
1.5	1.25	22.92	19.14	47.99
2	1.75	22.65	18.91	66.91
2.5	2.25	29.29	24.46	91.37
3	2.75	9.34	7.80	99.16
3.5	3.25	0.94	0.78	99.95
4	3.75	0.04	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.405
5	-0.390
16	0.325
25	0.620
50	1.305
75	1.915
84	2.100
95	2.485
99	2.740

Moment Measures	(phi)	(mm)
Mean	1.457	0.364
Standard Deviation	0.898	0.537
Skewness	-0.721	
Kurtosis	3.698	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.212	1.243
Standard Deviation	0.887	0.879
Skewness (1)	-0.104	-0.142
Skewness (2)	-0.290	
Kurtosis	0.620	0.910



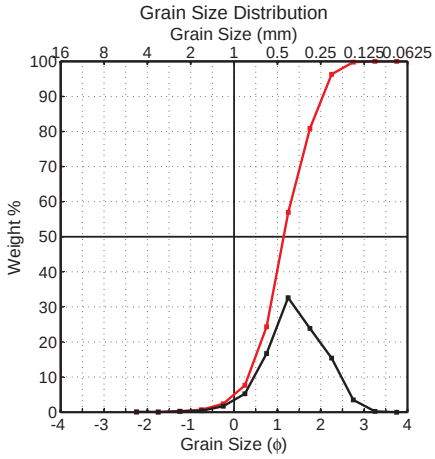
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-05a**
Interval	**Swash**
Mean	**0.354 mm**
STD	**0.638 mm**
Skewness	**-0.886**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorte
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.38
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	2.16
% $CaCO_3$	1.4

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.13	0.11	0.11
-1.5	-1.75	0.16	0.13	0.24
-1	-1.25	0.22	0.18	0.43
-0.5	-0.75	0.43	0.36	0.79
0	-0.25	1.64	1.37	2.16
0.5	0.25	4.69	3.92	6.09
1	0.75	14.71	12.32	18.41
1.5	1.25	32.72	27.41	45.81
2	1.75	40.59	34.00	79.81
2.5	2.25	20.54	17.20	97.02
3	2.75	3.31	2.77	99.79
3.5	3.25	0.24	0.20	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.675
5	0.110
16	0.650
25	0.870
50	1.310
75	1.680
84	1.870
95	2.190
99	2.605

Moment Measures	(phi)	(mm)
Mean	1.497	0.354
Standard Deviation	0.648	0.638
Skewness	-0.886	
Kurtosis	5.517	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.260	1.277
Standard Deviation	0.610	0.620
Skewness (1)	-0.082	-0.118
Skewness (2)	-0.262	
Kurtosis	0.705	1.052



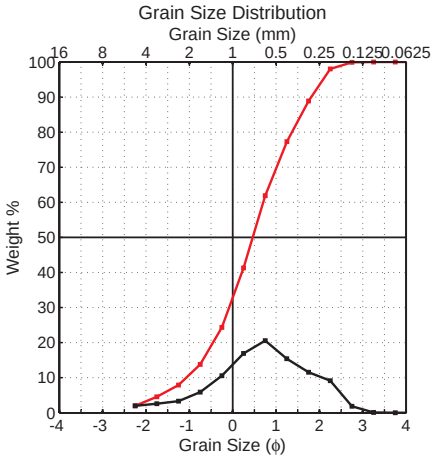
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-05b**
Interval	**LTT**
Mean	**0.378 mm**
STD	**0.628 mm**
Skewness	**-0.367**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorte
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	119.67
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	2.39
% $CaCO_3$	1.1

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.06	0.05	0.05
-1.5	-1.75	0.01	0.01	0.06
-1	-1.25	0.27	0.23	0.28
-0.5	-0.75	0.50	0.42	0.70
0	-0.25	2.02	1.69	2.39
0.5	0.25	6.29	5.26	7.65
1	0.75	19.98	16.70	24.34
1.5	1.25	39.03	32.61	56.96
2	1.75	28.57	23.87	80.83
2.5	2.25	18.48	15.44	96.27
3	2.75	4.17	3.48	99.76
3.5	3.25	0.28	0.23	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.660
5	0.000
16	0.500
25	0.760
50	1.145
75	1.630
84	1.855
95	2.210
99	2.640

Moment Measures	(phi)	(mm)
Mean	1.404	0.378
Standard Deviation	0.670	0.628
Skewness	-0.367	
Kurtosis	3.865	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.178	1.167
Standard Deviation	0.677	0.674
Skewness (1)	0.048	0.006
Skewness (2)	-0.059	
Kurtosis	0.631	1.041



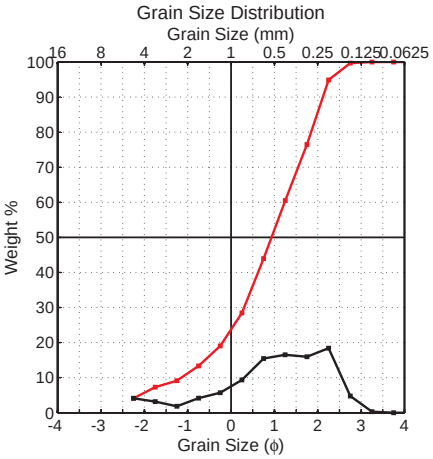
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-06a**
Interval	**Swash**
Mean	**0.637 mm**
STD	**0.470 mm**
Skewness	**-0.440**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	120.18
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	24.36
% $CaCO_3$	1.9

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.40	2.00	2.00
-1.5	-1.75	3.10	2.58	4.58
-1	-1.25	4.00	3.33	7.90
-0.5	-0.75	7.08	5.89	13.80
0	-0.25	12.70	10.57	24.36
0.5	0.25	20.36	16.94	41.30
1	0.75	24.74	20.59	61.89
1.5	1.25	18.52	15.41	77.30
2	1.75	13.91	11.57	88.88
2.5	2.25	10.99	9.14	98.02
3	2.75	2.26	1.88	99.90
3.5	3.25	0.11	0.09	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.685
16	-0.645
25	-0.230
50	0.460
75	1.175
84	1.540
95	2.085
99	2.510

Moment Measures	(phi)	(mm)
Mean	0.650	0.637
Standard Deviation	1.089	0.470
Skewness	-0.440	
Kurtosis	2.989	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.448	0.452
Standard Deviation	1.093	1.117
Skewness (1)	-0.011	-0.075
Skewness (2)	-0.238	
Kurtosis	0.725	1.100



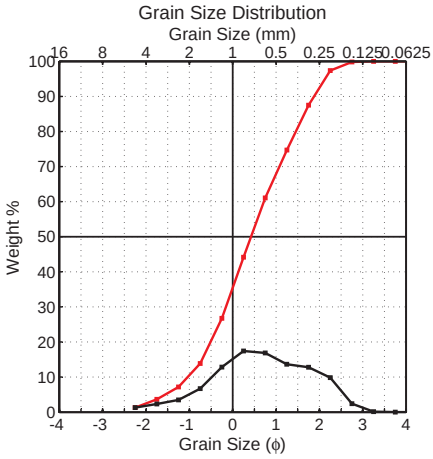
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-06b**
Interval	**LTT**
Mean	**0.512 mm**
STD	**0.416 mm**
Skewness	**-0.874**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.70
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	19.09
% $CaCO_3$	1.6

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	4.93	4.12	4.12
-1.5	-1.75	3.82	3.19	7.31
-1	-1.25	2.23	1.86	9.17
-0.5	-0.75	5.03	4.20	13.38
0	-0.25	6.84	5.71	19.09
0.5	0.25	11.24	9.39	28.48
1	0.75	18.52	15.47	43.95
1.5	1.25	19.81	16.55	60.50
2	1.75	19.11	15.96	76.47
2.5	2.25	22.05	18.42	94.89
3	2.75	5.71	4.77	99.66
3.5	3.25	0.38	0.32	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.110
16	-0.520
25	0.065
50	0.935
75	1.705
84	1.955
95	2.260
99	2.680

Moment Measures	(phi)	(mm)
Mean	0.965	0.512
Standard Deviation	1.266	0.416
Skewness	-0.874	
Kurtosis	3.214	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.718	0.790
Standard Deviation	1.238	1.281
Skewness (1)	-0.176	-0.285
Skewness (2)	-0.695	
Kurtosis	0.766	1.092



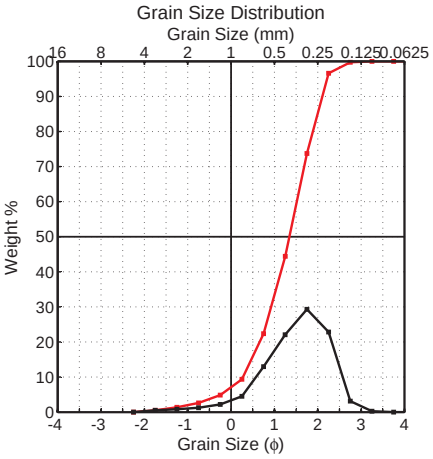
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-07a**
Interval	**Swash**
Mean	**0.631 mm**
STD	**0.465 mm**
Skewness	**-0.260**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	120.25
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	26.74
% $CaCO_3$	1.6

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.59	1.32	1.32
-1.5	-1.75	2.82	2.35	3.67
-1	-1.25	4.21	3.50	7.17
-0.5	-0.75	8.09	6.73	13.90
0	-0.25	15.45	12.85	26.74
0.5	0.25	20.97	17.44	44.18
1	0.75	20.29	16.87	61.06
1.5	1.25	16.41	13.65	74.70
2	1.75	15.39	12.80	87.50
2.5	2.25	11.84	9.85	97.35
3	2.75	2.94	2.44	99.79
3.5	3.25	0.20	0.17	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-2.250
5	-1.560
16	-0.670
25	-0.320
50	0.420
75	1.260
84	1.615
95	2.130
99	2.590

Moment Measures	(phi)	(mm)
Mean	0.663	0.631
Standard Deviation	1.104	0.465
Skewness	-0.260	
Kurtosis	2.692	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.472	0.455
Standard Deviation	1.142	1.130
Skewness (1)	0.046	-0.014
Skewness (2)	-0.118	
Kurtosis	0.615	0.957



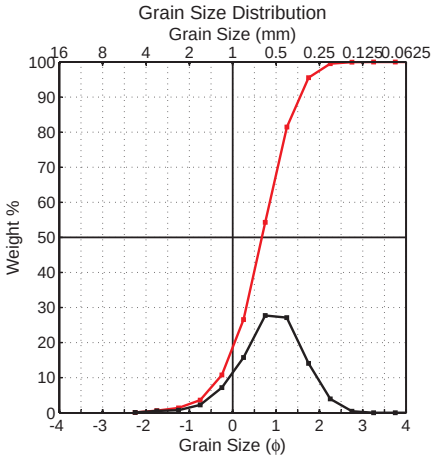
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-07b**
Interval	**LTT**
Mean	**0.360 mm**
STD	**0.581 mm**
Skewness	**-1.122**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.83
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	4.85
% $CaCO_3$	1.1

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.01	0.01	0.01
-1.5	-1.75	0.64	0.53	0.54
-1	-1.25	1.00	0.83	1.38
-0.5	-0.75	1.52	1.27	2.65
0	-0.25	2.64	2.20	4.85
0.5	0.25	5.41	4.51	9.36
1	0.75	15.57	12.99	22.36
1.5	1.25	26.45	22.07	44.43
2	1.75	35.12	29.31	73.74
2.5	2.25	27.37	22.84	96.58
3	2.75	3.77	3.15	99.72
3.5	3.25	0.31	0.26	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.475
5	-0.235
16	0.505
25	0.810
50	1.345
75	1.780
84	1.975
95	2.215
99	2.635

Moment Measures	(phi)	(mm)
Mean	1.472	0.360
Standard Deviation	0.784	0.581
Skewness	-1.122	
Kurtosis	5.019	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.240	1.275
Standard Deviation	0.735	0.739
Skewness (1)	-0.143	-0.216
Skewness (2)	-0.483	
Kurtosis	0.667	1.035



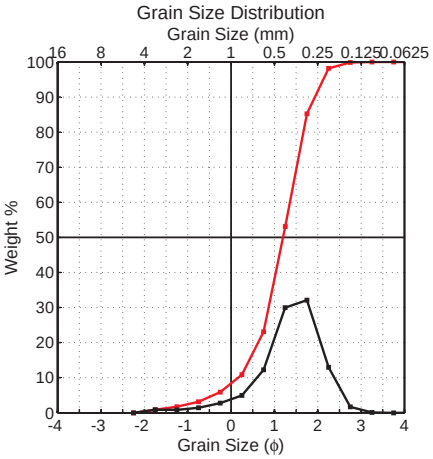
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-08a**
Interval	**Swash**
Mean	**0.543 mm**
STD	**0.602 mm**
Skewness	**-0.499**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.57
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	10.79
% $CaCO_3$	1.3

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.11	0.09	0.09
-1.5	-1.75	0.64	0.54	0.63
-1	-1.25	0.91	0.76	1.39
-0.5	-0.75	2.67	2.23	3.62
0	-0.25	8.57	7.17	10.79
0.5	0.25	18.86	15.77	26.56
1	0.75	33.15	27.72	54.29
1.5	1.25	32.46	27.15	81.43
2	1.75	16.84	14.08	95.52
2.5	2.25	4.77	3.99	99.51
3	2.75	0.53	0.44	99.95
3.5	3.25	0.05	0.04	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.505
5	-0.655
16	-0.085
25	0.200
50	0.675
75	1.130
84	1.340
95	1.730
99	2.185

Moment Measures	(phi)	(mm)
Mean	0.881	0.543
Standard Deviation	0.732	0.602
Skewness	-0.499	
Kurtosis	3.833	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.627	0.643
Standard Deviation	0.712	0.718
Skewness (1)	-0.067	-0.091
Skewness (2)	-0.193	
Kurtosis	0.674	1.051



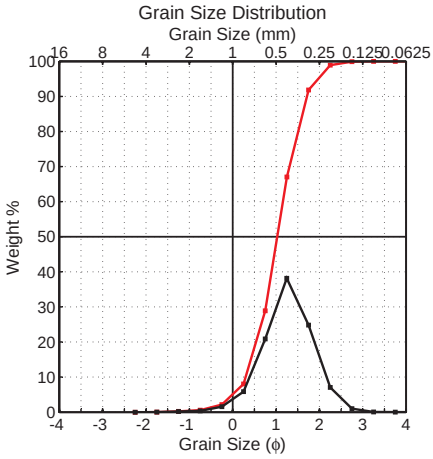
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-08b**
Interval	**LTT**
Mean	**0.395 mm**
STD	**0.590 mm**
Skewness	**-1.280**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.32
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	5.92
% $CaCO_3$	1.3

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	1.07	0.90	0.90
-1	-1.25	1.01	0.85	1.74
-0.5	-0.75	1.70	1.42	3.17
0	-0.25	3.28	2.75	5.92
0.5	0.25	5.92	4.96	10.88
1	0.75	14.61	12.24	23.12
1.5	1.25	35.74	29.95	53.08
2	1.75	38.34	32.13	85.21
2.5	2.25	15.46	12.96	98.16
3	2.75	2.03	1.70	99.87
3.5	3.25	0.15	0.13	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.690
5	-0.415
16	0.460
25	0.780
50	1.200
75	1.590
84	1.730
95	2.130
99	2.495

Moment Measures	(phi)	(mm)
Mean	1.340	0.395
Standard Deviation	0.761	0.590
Skewness	-1.280	
Kurtosis	5.732	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.095	1.130
Standard Deviation	0.635	0.703
Skewness (1)	-0.165	-0.217
Skewness (2)	-0.539	
Kurtosis	1.004	1.288



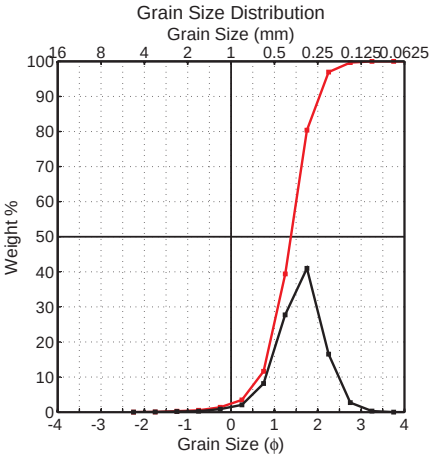
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-09a**
Interval	**Swash**
Mean	**0.417 mm**
STD	**0.669 mm**
Skewness	**-0.372**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorte
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	119.34
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	2.16
% $CaCO_3$	1.0

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.04	0.03	0.03
-1	-1.25	0.22	0.18	0.22
-0.5	-0.75	0.45	0.38	0.59
0	-0.25	1.87	1.57	2.16
0.5	0.25	7.00	5.87	8.03
1	0.75	24.90	20.86	28.89
1.5	1.25	45.52	38.14	67.04
2	1.75	29.61	24.81	91.85
2.5	2.25	8.42	7.06	98.90
3	2.75	1.19	1.00	99.90
3.5	3.25	0.10	0.08	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.620
5	-0.010
16	0.440
25	0.655
50	1.025
75	1.410
84	1.590
95	1.975
99	2.300

Moment Measures	(phi)	(mm)
Mean	1.262	0.417
Standard Deviation	0.579	0.669
Skewness	-0.372	
Kurtosis	4.216	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.015	1.018
Standard Deviation	0.575	0.588
Skewness (1)	-0.017	-0.030
Skewness (2)	-0.074	
Kurtosis	0.726	1.078



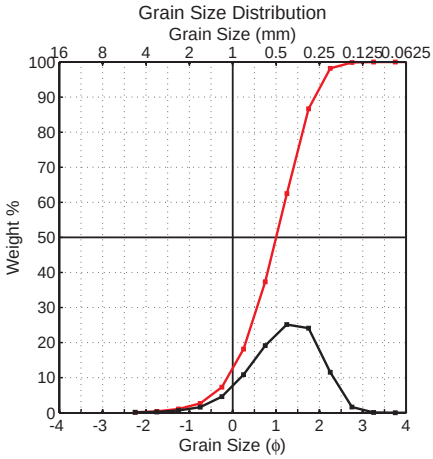
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-09b**
Interval	**LTT**
Mean	**0.334 mm**
STD	**0.673 mm**
Skewness	**-0.833**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorte
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.46
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	1.41
% $CaCO_3$	1.2

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.03	0.02	0.02
-1.5	-1.75	0.06	0.05	0.07
-1	-1.25	0.23	0.19	0.27
-0.5	-0.75	0.32	0.27	0.53
0	-0.25	1.06	0.88	1.41
0.5	0.25	2.49	2.07	3.48
1	0.75	9.86	8.19	11.66
1.5	1.25	33.40	27.73	39.39
2	1.75	49.37	40.98	80.38
2.5	2.25	19.92	16.54	96.91
3	2.75	3.28	2.72	99.63
3.5	3.25	0.40	0.33	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.485
5	0.345
16	0.830
25	0.990
50	1.380
75	1.685
84	1.860
95	2.190
99	2.635

Moment Measures	(phi)	(mm)
Mean	1.581	0.334
Standard Deviation	0.571	0.673
Skewness	-0.833	
Kurtosis	6.047	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.345	1.357
Standard Deviation	0.515	0.537
Skewness (1)	-0.068	-0.095
Skewness (2)	-0.218	
Kurtosis	0.791	1.088



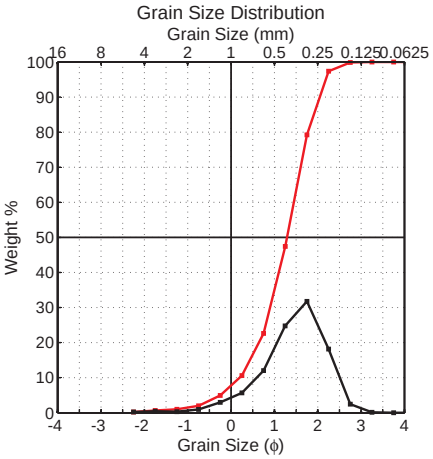
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-10a**
Interval	**Swash**
Mean	**0.442 mm**
STD	**0.579 mm**
Skewness	**-0.622**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.22
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.32
% $CaCO_3$	1.4

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.18	0.15	0.15
-1.5	-1.75	0.29	0.24	0.39
-1	-1.25	0.82	0.68	1.07
-0.5	-0.75	1.94	1.61	2.69
0	-0.25	5.57	4.63	7.32
0.5	0.25	13.05	10.86	18.18
1	0.75	23.03	19.16	37.33
1.5	1.25	30.24	25.15	62.49
2	1.75	29.02	24.14	86.62
2.5	2.25	13.90	11.56	98.19
3	2.75	2.01	1.67	99.86
3.5	3.25	0.15	0.12	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.305
5	-0.500
16	0.150
25	0.430
50	1.000
75	1.510
84	1.695
95	2.110
99	2.495

Moment Measures	(phi)	(mm)
Mean	1.179	0.442
Standard Deviation	0.789	0.579
Skewness	-0.622	
Kurtosis	3.705	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.922	0.948
Standard Deviation	0.772	0.782
Skewness (1)	-0.100	-0.125
Skewness (2)	-0.252	
Kurtosis	0.689	0.990



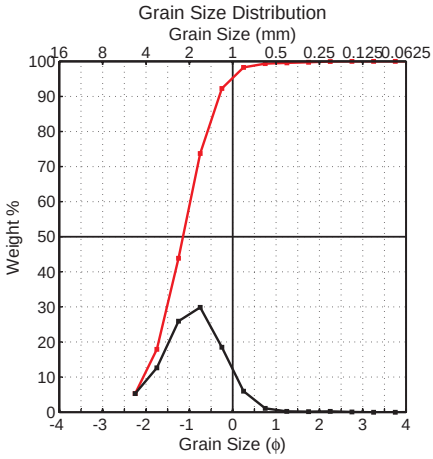
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**NHB-10b**
Interval	**LTT**
Mean	**0.374 mm**
STD	**0.591 mm**
Skewness	**-1.145**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.49
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	4.95
% $CaCO_3$	1.4

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.28	0.23	0.23
-1.5	-1.75	0.54	0.45	0.69
-1	-1.25	0.40	0.33	1.02
-0.5	-0.75	1.15	0.96	1.98
0	-0.25	3.55	2.97	4.95
0.5	0.25	6.77	5.67	10.62
1	0.75	14.37	12.03	22.65
1.5	1.25	29.62	24.79	47.43
2	1.75	37.97	31.78	79.21
2.5	2.25	21.70	18.16	97.37
3	2.75	2.95	2.47	99.84
3.5	3.25	0.16	0.13	99.97
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.280
5	-0.245
16	0.475
25	0.795
50	1.290
75	1.685
84	1.880
95	2.185
99	2.580

Moment Measures	(phi)	(mm)
Mean	1.420	0.374
Standard Deviation	0.760	0.591
Skewness	-1.145	
Kurtosis	5.467	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.178	1.215
Standard Deviation	0.702	0.719
Skewness (1)	-0.160	-0.212
Skewness (2)	-0.456	
Kurtosis	0.730	1.119



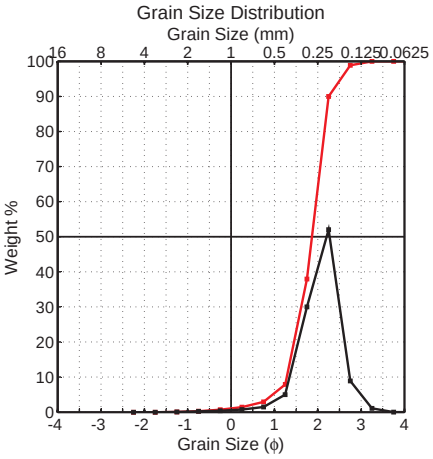
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**KH-01a**
Interval	**Swash**
Mean	**1.865 mm**
STD	**0.623 mm**
Skewness	**0.415**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Moderately Well Sorte
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	120.32
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	92.26
% $CaCO_3$	3.0

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.36	5.29	5.29
-1.5	-1.75	15.21	12.64	17.93
-1	-1.25	31.22	25.95	43.87
-0.5	-0.75	35.94	29.87	73.75
0	-0.25	22.28	18.52	92.26
0.5	0.25	7.21	5.99	98.25
1	0.75	1.31	1.09	99.34
1.5	1.25	0.27	0.22	99.57
2	1.75	0.17	0.14	99.71
2.5	2.25	0.26	0.22	99.93
3	2.75	0.08	0.07	99.99
3.5	3.25	0.00	0.00	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.825
25	-1.615
50	-1.145
75	-0.715
84	-0.475
95	-0.020
99	0.590

Moment Measures	(phi)	(mm)
Mean	-0.899	1.865
Standard Deviation	0.683	0.623
Skewness	0.415	
Kurtosis	4.468	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.150	-1.148
Standard Deviation	0.675	0.675
Skewness (1)	-0.007	0.001
Skewness (2)	0.015	
Kurtosis	0.652	1.015



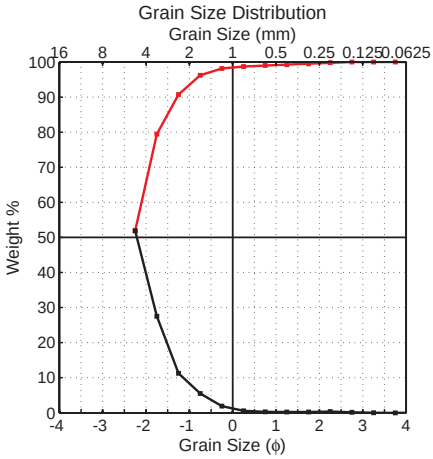
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**KH-01b**
Interval	**LTT**
Mean	**0.242 mm**
STD	**0.713 mm**
Skewness	**-1.554**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Well Sorted
Poorly Graded	Strongly Coarse Skev
	Very Leptokurtic
Total weight (gram)	120.36
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	0.70
% $CaCO_3$	1.5

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.10	0.08	0.08
-0.5	-0.75	0.26	0.22	0.30
0	-0.25	0.48	0.40	0.70
0.5	0.25	0.91	0.76	1.45
1	0.75	1.79	1.49	2.94
1.5	1.25	6.01	4.99	7.93
2	1.75	36.14	30.03	37.96
2.5	2.25	62.59	52.00	89.96
3	2.75	10.71	8.90	98.86
3.5	3.25	1.32	1.10	99.96
4	3.75	0.04	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.050
5	0.955
16	1.385
25	1.535
50	1.865
75	2.105
84	2.195
95	2.535
99	2.815

Moment Measures	(phi)	(mm)
Mean	2.049	0.242
Standard Deviation	0.487	0.713
Skewness	-1.554	
Kurtosis	9.536	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.790	1.815
Standard Deviation	0.405	0.442
Skewness (1)	-0.185	-0.169
Skewness (2)	-0.296	
Kurtosis	0.951	1.136



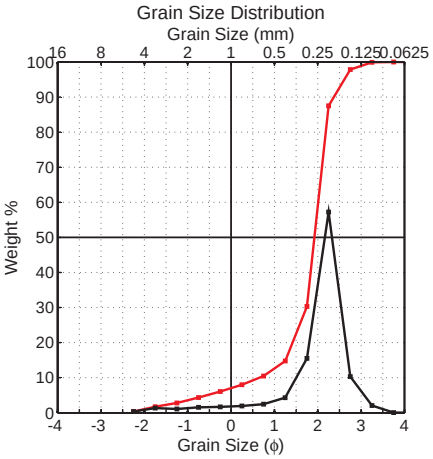
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**KH-02a**
Interval	**Swash**
Mean	**3.512 mm**
STD	**0.631 mm**
Skewness	**2.831**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorte
Poorly Graded	Strongly Fine Skewed
	Very Leptokurtic
Total weight (gram)	110.40
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	98.13
% $CaCO_3$	1.1

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	57.29	51.89	51.89
-1.5	-1.75	30.40	27.54	79.43
-1	-1.25	12.44	11.27	90.70
-0.5	-0.75	6.10	5.53	96.22
0	-0.25	2.10	1.90	98.13
0.5	0.25	0.63	0.57	98.70
1	0.75	0.31	0.28	98.98
1.5	1.25	0.24	0.22	99.19
2	1.75	0.28	0.25	99.45
2.5	2.25	0.41	0.37	99.82
3	2.75	0.16	0.14	99.96
3.5	3.25	0.03	0.03	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-2.250
75	-1.830
84	-1.545
95	-0.860
99	0.805

Moment Measures	**(phi)**	**(mm)**
Mean	-1.812	3.512
Standard Deviation	0.665	0.631
Skewness	2.831	
Kurtosis	15.247	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-1.898	-2.015
Standard Deviation	0.353	0.387
Skewness (1)	1.000	1.000
Skewness (2)	1.972	
Kurtosis	0.972	1.356



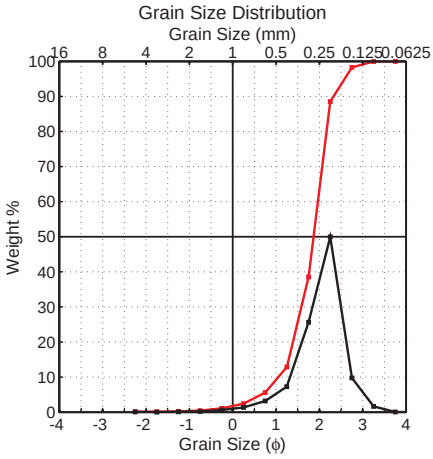
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**KH02b**
Interval	**LTT**
Mean	**0.263 mm**
STD	**0.531 mm**
Skewness	**-2.354**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skew
	Very Leptokurtic
Total weight (gram)	119.70
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	6.06
% $CaCO_3$	1.7

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.45	0.38	0.38
-1.5	-1.75	1.63	1.36	1.74
-1	-1.25	1.30	1.09	2.82
-0.5	-0.75	1.85	1.55	4.37
0	-0.25	2.02	1.69	6.06
0.5	0.25	2.33	1.95	8.00
1	0.75	2.96	2.47	10.48
1.5	1.25	5.16	4.31	14.79
2	1.75	18.56	15.51	30.29
2.5	2.25	68.49	57.22	87.51
3	2.75	12.35	10.32	97.83
3.5	3.25	2.49	2.08	99.91
4	3.75	0.09	0.08	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.020
5	-0.565
16	1.290
25	1.580
50	1.920
75	2.140
84	2.220
95	2.615
99	3.030

Moment Measures	**(phi)**	**(mm)**
Mean	1.929	0.263
Standard Deviation	0.913	0.531
Skewness	-2.354	
Kurtosis	9.035	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.755	1.810
Standard Deviation	0.465	0.714
Skewness (1)	-0.355	-0.459
Skewness (2)	-1.925	
Kurtosis	2.419	2.327



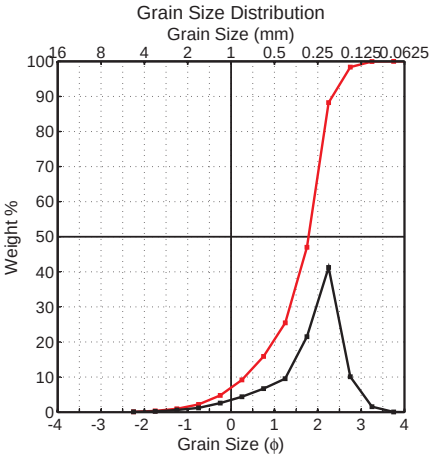
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**KH-03a**
Interval	**Swash**
Mean	**0.248 mm**
STD	**0.665 mm**
Skewness	**-1.709**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorte
Poorly Graded	Strongly Coarse Skew
	Very Leptokurtic
Total weight (gram)	120.74
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	1.08
% $CaCO_3$	2.1

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.13	0.11	0.11
-1.5	-1.75	0.05	0.04	0.15
-1	-1.25	0.13	0.11	0.26
-0.5	-0.75	0.24	0.20	0.46
0	-0.25	0.75	0.62	1.08
0.5	0.25	1.64	1.36	2.43
1	0.75	3.84	3.18	5.62
1.5	1.25	8.79	7.28	12.90
2	1.75	30.97	25.65	38.55
2.5	2.25	60.34	49.98	88.52
3	2.75	11.77	9.75	98.27
3.5	3.25	2.02	1.67	99.94
4	3.75	0.06	0.05	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.310
5	0.655
16	1.310
25	1.485
50	1.865
75	2.115
84	2.205
95	2.580
99	2.970

Moment Measures	**(phi)**	**(mm)**
Mean	2.009	0.248
Standard Deviation	0.588	0.665
Skewness	-1.709	
Kurtosis	9.615	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.758	1.793
Standard Deviation	0.448	0.515
Skewness (1)	-0.240	-0.249
Skewness (2)	-0.553	
Kurtosis	1.151	1.252



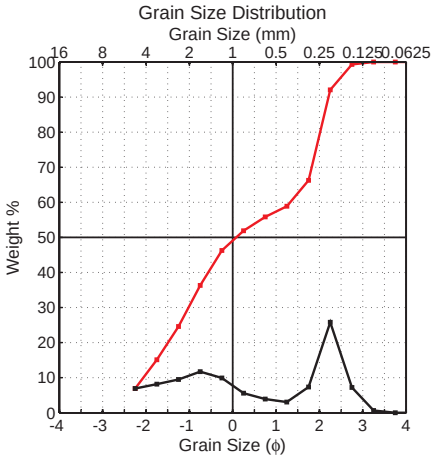
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**KH-03b**
Interval	**LTT**
Mean	**0.290 mm**
STD	**0.556 mm**
Skewness	**-1.386**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skew
	Leptokurtic
Total weight (gram)	119.72
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	4.79
% $CaCO_3$	2.2

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.14	0.12	0.12
-1.5	-1.75	0.29	0.24	0.36
-1	-1.25	0.74	0.62	0.98
-0.5	-0.75	1.47	1.23	2.21
0	-0.25	3.10	2.59	4.79
0.5	0.25	5.29	4.42	9.21
1	0.75	8.02	6.70	15.91
1.5	1.25	11.44	9.56	25.47
2	1.75	25.78	21.53	47.00
2.5	2.25	49.37	41.24	88.24
3	2.75	12.12	10.12	98.36
3.5	3.25	1.87	1.56	99.92
4	3.75	0.07	0.06	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.240
5	-0.225
16	0.755
25	1.225
50	1.785
75	2.090
84	2.200
95	2.585
99	2.955

Moment Measures	**(phi)**	**(mm)**
Mean	1.787	0.290
Standard Deviation	0.846	0.556
Skewness	-1.386	
Kurtosis	5.256	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.478	1.580
Standard Deviation	0.723	0.787
Skewness (1)	-0.426	-0.428
Skewness (2)	-0.837	
Kurtosis	0.945	1.331



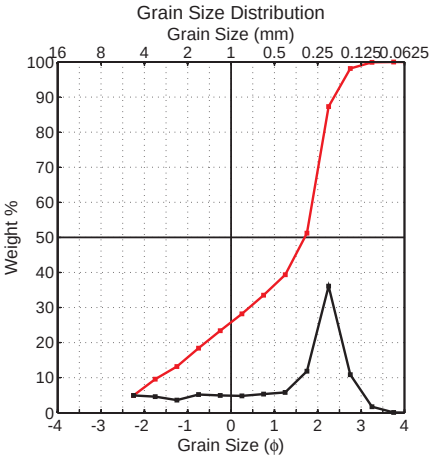
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**KH-04a**
Interval	**Swash**
Mean	**0.716 mm**
STD	**0.312 mm**
Skewness	**-0.104**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	120.12
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	46.28
% $CaCO_3$	5.7

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	8.34	6.94	6.94
-1.5	-1.75	9.82	8.18	15.12
-1	-1.25	11.41	9.50	24.62
-0.5	-0.75	14.07	11.71	36.33
0	-0.25	11.95	9.95	46.28
0.5	0.25	6.74	5.61	51.89
1	0.75	4.73	3.94	55.83
1.5	1.25	3.69	3.07	58.90
2	1.75	8.85	7.37	66.27
2.5	2.25	30.98	25.79	92.06
3	2.75	8.67	7.22	99.28
3.5	3.25	0.82	0.68	99.96
4	3.75	0.04	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.705
25	-1.235
50	0.080
75	1.920
84	2.095
95	2.455
99	2.730

Moment Measures	(phi)	(mm)
Mean	0.483	0.716
Standard Deviation	1.679	0.312
Skewness	-0.104	
Kurtosis	1.528	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.195	0.157
Standard Deviation	1.900	1.663
Skewness (1)	0.061	0.035
Skewness (2)	0.012	
Kurtosis	0.238	0.611



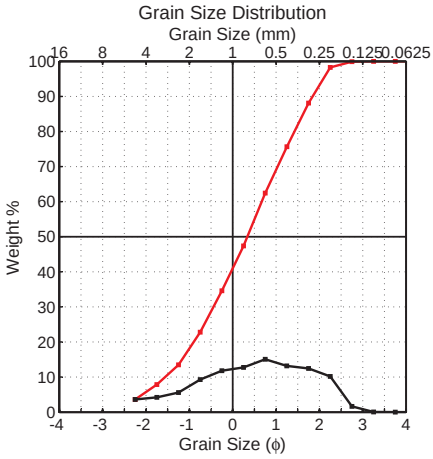
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**KH-04b**
Interval	**LTT**
Mean	**0.431 mm**
STD	**0.346 mm**
Skewness	**-0.955**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	119.85
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	23.40
% $CaCO_3$	3.3

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.92	4.94	4.94
-1.5	-1.75	5.55	4.63	9.57
-1	-1.25	4.35	3.63	13.20
-0.5	-0.75	6.27	5.23	18.43
0	-0.25	5.95	4.96	23.40
0.5	0.25	5.76	4.81	28.20
1	0.75	6.40	5.34	33.54
1.5	1.25	6.95	5.80	39.34
2	1.75	14.20	11.85	51.19
2.5	2.25	43.26	36.10	87.28
3	2.75	13.01	10.86	98.14
3.5	3.25	2.08	1.74	99.87
4	3.75	0.13	0.11	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.245
16	-0.980
25	-0.085
50	1.700
75	2.080
84	2.205
95	2.605
99	3.000

Moment Measures	(phi)	(mm)
Mean	1.215	0.431
Standard Deviation	1.530	0.346
Skewness	-0.955	
Kurtosis	2.637	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.613	0.975
Standard Deviation	1.593	1.531
Skewness (1)	-0.683	-0.655
Skewness (2)	-0.954	
Kurtosis	0.523	0.918



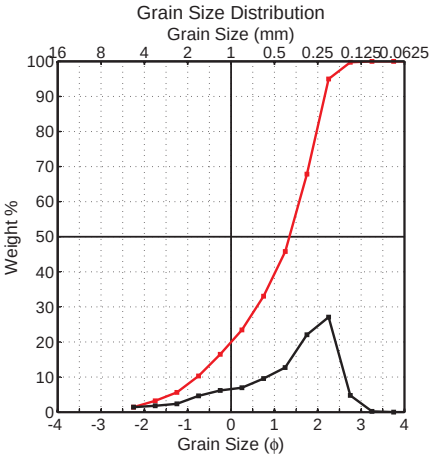
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**KH-05a**
Interval	**Swash**
Mean	**0.717 mm**
STD	**0.421 mm**
Skewness	**-0.317**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	120.00
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	34.58
% $CaCO_3$	3.8

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	4.36	3.63	3.63
-1.5	-1.75	5.07	4.22	7.86
-1	-1.25	6.74	5.62	13.48
-0.5	-0.75	11.17	9.31	22.78
0	-0.25	14.16	11.80	34.58
0.5	0.25	15.34	12.78	47.37
1	0.75	18.10	15.08	62.45
1.5	1.25	15.84	13.20	75.65
2	1.75	14.93	12.44	88.09
2.5	2.25	12.21	10.17	98.27
3	2.75	1.96	1.63	99.90
3.5	3.25	0.09	0.07	99.98
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.090
16	-1.115
25	-0.655
50	0.335
75	1.225
84	1.585
95	2.090
99	2.475

Moment Measures	(phi)	(mm)
Mean	0.480	0.717
Standard Deviation	1.250	0.421
Skewness	-0.317	
Kurtosis	2.340	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.235	0.268
Standard Deviation	1.350	1.308
Skewness (1)	-0.074	-0.117
Skewness (2)	-0.248	
Kurtosis	0.548	0.911



Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2013**
Station	**KH-05b**
Interval	**LTT**
Mean	**0.423 mm**
STD	**0.446 mm**
Skewness	**-1.026**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	120.43
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	16.48
% $CaCO_3$	3.3

Class Limit (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.71	1.42	1.42
-1.5	-1.75	2.21	1.84	3.26
-1	-1.25	2.89	2.40	5.65
-0.5	-0.75	5.59	4.64	10.30
0	-0.25	7.45	6.19	16.48
0.5	0.25	8.39	6.97	23.45
1	0.75	11.56	9.60	33.05
1.5	1.25	15.34	12.74	45.79
2	1.75	26.56	22.05	67.84
2.5	2.25	32.64	27.10	94.94
3	2.75	5.74	4.77	99.71
3.5	3.25	0.30	0.25	99.96
4	3.75	0.03	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

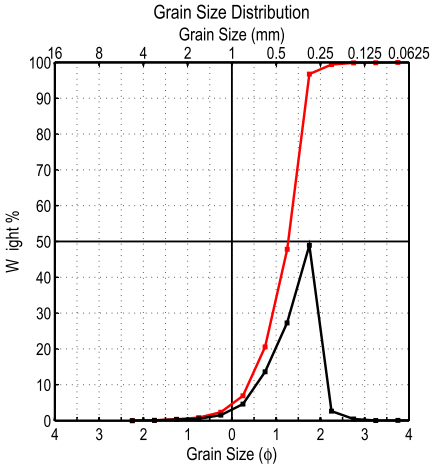
Percentiles	
1	-2.250
5	-1.385
16	-0.290
25	0.330
50	1.345
75	1.880
84	2.050
95	2.255
99	2.675

Moment Measures	(phi)	(mm)
Mean	1.241	0.423
Standard Deviation	1.164	0.446
Skewness	-1.026	
Kurtosis	3.391	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.880	1.035
Standard Deviation	1.170	1.137
Skewness (1)	-0.397	-0.449
Skewness (2)	-0.778	
Kurtosis	0.556	0.962

Appendix B – Part 2

Pre-nourishment Sediment Analyses Results



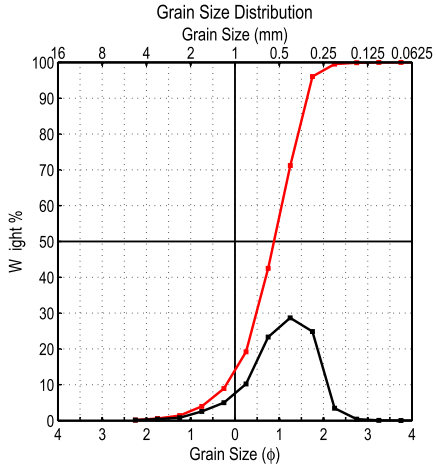
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**B2a**
Interval	**Grab**
Mean	**0.385 mm**
STD	**0.680 mm**
Skewness	**-1.215**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	104.93
% finer than 4.00 phi	0.02
% coarser than 1.00 phi	2.34
% $CaCO_3$	1.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.06	0.06	0.06
-1	-1.25	0.32	0.30	0.36
-0.5	-0.75	0.50	0.48	0.84
0	-0.25	1.58	1.51	2.34
0.5	0.25	4.83	4.60	6.95
1	0.75	14.28	13.61	20.56
1.5	1.25	28.59	27.25	47.80
2	1.75	51.34	48.93	96.73
2.5	2.25	2.79	2.66	99.39
3	2.75	0.49	0.47	99.86
3.5	3.25	0.04	0.04	99.90
4	3.75	0.09	0.09	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.695
5	0.040
16	0.585
25	0.830
50	1.270
75	1.530
84	1.620
95	1.730
99	2.175

Moment Measures	(phi)	(mm)
Mean	1.376	0.385
Standard Deviation	0.556	0.680
Skewness	-1.215	
Kurtosis	6.105	
Dispersion		
Standard Deviation		
D viation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.103	1.158
Standard Deviation	0.518	0.515
Skewness (1)	-0.324	-0.390
Skewness (2)	-0.744	
Kurtosis	0.633	0.989



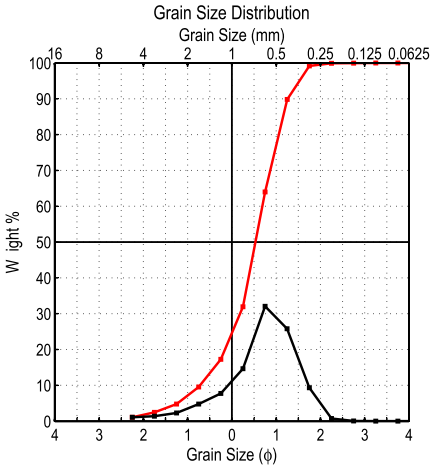
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**B2b**
Interval	**Grab**
Mean	**0.489 mm**
STD	**0.599 mm**
Skewness	**-0.883**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.31
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	8.96
% $CaCO_3$	1.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.17	0.16	0.16
-1.5	-1.75	0.42	0.41	0.57
-1	-1.25	0.84	0.81	1.38
-0.5	-0.75	2.65	2.57	3.95
0	-0.25	5.18	5.01	8.96
0.5	0.25	10.56	10.22	19.18
1	0.75	24.10	23.33	42.51
1.5	1.25	29.62	28.67	71.18
2	1.75	25.68	24.86	96.04
2.5	2.25	3.56	3.45	99.49
3	2.75	0.44	0.43	99.91
3.5	3.25	0.06	0.06	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.485
5	-0.645
16	0.095
25	0.375
50	0.880
75	1.325
84	1.510
95	1.730
99	2.180

Moment Measures	(phi)	(mm)
Mean	1.033	0.489
Standard Deviation	0.740	0.599
Skewness	-0.883	
Kurtosis	4.360	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.802	0.828
Standard Deviation	0.708	0.714
Skewness (1)	-0.110	-0.197
Skewness (2)	-0.477	
Kurtosis	0.678	1.025



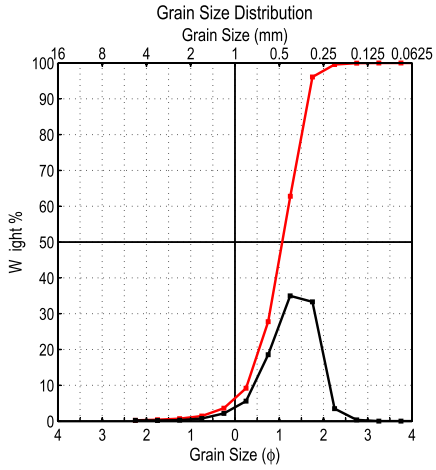
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**B2c**
Interval	**Grab**
Mean	**0.637 mm**
STD	**0.567 mm**
Skewness	**-1.063**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	117.77
% finer than 4.00 phi	0.01
% coarser than 1.00 phi	17.29
% $CaCO_3$	1.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.29	1.10	1.10
-1.5	-1.75	1.63	1.38	2.48
-1	-1.25	2.72	2.31	4.79
-0.5	-0.75	5.62	4.77	9.56
0	-0.25	9.10	7.73	17.29
0.5	0.25	17.26	14.66	31.94
1	0.75	37.76	32.06	64.01
1.5	1.25	30.39	25.80	89.81
2	1.75	10.99	9.33	99.14
2.5	2.25	0.88	0.75	99.89
3	2.75	0.07	0.06	99.95
3.5	3.25	0.02	0.02	99.97
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.230
16	-0.335
25	0.015
50	0.530
75	0.965
84	1.135
95	1.530
99	1.740

Moment Measures	(phi)	(mm)
Mean	0.650	0.637
Standard Deviation	0.819	0.567
Skewness	-1.063	
Kurtosis	4.563	
Dispersion		
Standard Deviation		
D viation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.400	0.443
Standard Deviation	0.735	0.786
Skewness (1)	-0.177	-0.226
Skewness (2)	-0.517	
Kurtosis	0.878	1.191



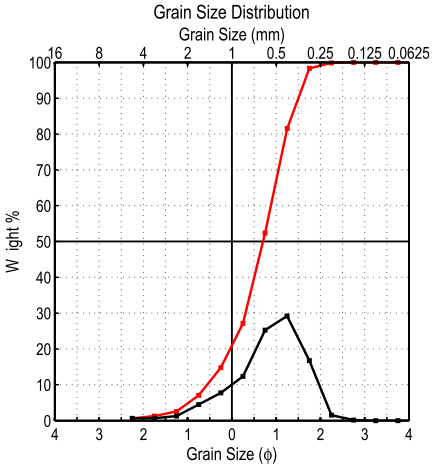
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**B2d**
Interval	**Grab**
Mean	**0.423 mm**
STD	**0.654 mm**
Skewness	**-1.294**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	100.88
% finer than 4.00 phi	0.02
% coarser than 1.00 phi	3.62
% $CaCO_3$	1.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.24	0.24	0.24
-1.5	-1.75	0.18	0.18	0.42
-1	-1.25	0.28	0.28	0.69
-0.5	-0.75	0.76	0.75	1.45
0	-0.25	2.19	2.17	3.62
0.5	0.25	5.64	5.59	9.21
1	0.75	18.72	18.56	27.77
1.5	1.25	35.31	35.00	62.77
2	1.75	33.60	33.31	96.07
2.5	2.25	3.52	3.49	99.56
3	2.75	0.36	0.36	99.92
3.5	3.25	0.04	0.04	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.045
5	-0.125
16	0.435
25	0.675
50	1.070
75	1.435
84	1.570
95	1.735
99	2.170

Moment Measures	(phi)	(mm)
Mean	1.242	0.423
Standard Deviation	0.612	0.654
Skewness	-1.294	
Kurtosis	7.141	
Dispersion		
Standard Deviation		
D viation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.002	1.025
Standard Deviation	0.567	0.566
Skewness (1)	-0.119	-0.202
Skewness (2)	-0.467	
Kurtosis	0.639	1.003



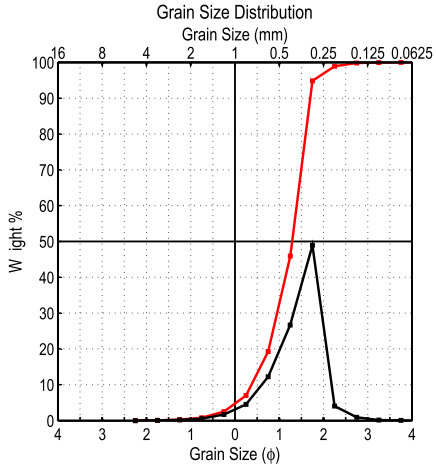
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**B2e**
Interval	**Grab**
Mean	**0.565 mm**
STD	**0.576 mm**
Skewness	**-0.970**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	110.83
% finer than 4.00 phi	0.00
% coarser than 1.00 phi	14.79
% $CaCO_3$	1.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.70	0.63	0.63
-1.5	-1.75	0.72	0.65	1.28
-1	-1.25	1.42	1.28	2.56
-0.5	-0.75	4.99	4.50	7.06
0	-0.25	8.56	7.72	14.79
0.5	0.25	13.66	12.33	27.11
1	0.75	27.96	25.23	52.34
1.5	1.25	32.37	29.21	81.55
2	1.75	18.58	16.76	98.31
2.5	2.25	1.71	1.54	99.86
3	2.75	0.16	0.14	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.965
5	-0.980
16	-0.200
25	0.165
50	0.705
75	1.140
84	1.325
95	1.650
99	1.975

Moment Measures	(phi)	(mm)
Mean	0.822	0.565
Standard Deviation	0.796	0.576
Skewness	-0.970	
Kurtosis	4.211	
Dispersion		
Standard Deviation		
D viation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.563	0.610
Standard Deviation	0.762	0.780
Skewness (1)	-0.187	-0.234
Skewness (2)	-0.485	
Kurtosis	0.725	1.106



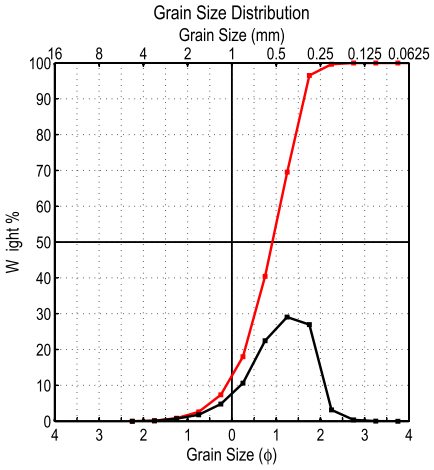
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**B3a**
Interval	**Grab**
Mean	**0.378 mm**
STD	**0.674 mm**
Skewness	**-1.137**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.12
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	2.50
% $CaCO_3$	1.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.08	0.08	0.08
-1	-1.25	0.20	0.19	0.27
-0.5	-0.75	0.55	0.53	0.80
0	-0.25	1.75	1.70	2.50
0.5	0.25	4.66	4.52	7.02
1	0.75	12.63	12.25	19.27
1.5	1.25	27.50	26.67	45.94
2	1.75	50.44	48.91	94.85
2.5	2.25	4.17	4.04	98.89
3	2.75	0.93	0.90	99.80
3.5	3.25	0.14	0.14	99.93
4	3.75	0.06	0.06	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.695
5	0.025
16	0.615
25	0.855
50	1.290
75	1.545
84	1.640
95	1.770
99	2.310

Moment Measures	(phi)	(mm)
Mean	1.403	0.378
Standard Deviation	0.569	0.674
Skewness	-1.137	
Kurtosis	5.853	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.127	1.182
Standard Deviation	0.513	0.521
Skewness (1)	-0.317	-0.383
Skewness (2)	-0.766	
Kurtosis	0.702	1.036



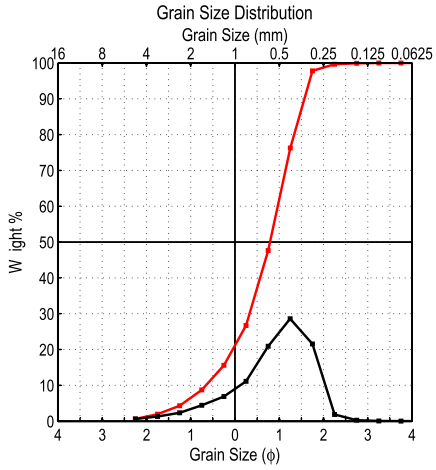
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**B3b**
Interval	**Grab**
Mean	**0.475 mm**
STD	**0.621 mm**
Skewness	**-0.765**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	101.65
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.38
% $CaCO_3$	0.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.12	0.12	0.12
-1	-1.25	0.71	0.70	0.82
-0.5	-0.75	1.81	1.78	2.60
0	-0.25	4.86	4.78	7.38
0.5	0.25	10.78	10.61	17.98
1	0.75	22.83	22.46	40.44
1.5	1.25	29.56	29.08	69.52
2	1.75	27.41	26.97	96.49
2.5	2.25	3.20	3.15	99.64
3	2.75	0.36	0.35	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.200
5	-0.500
16	0.155
25	0.405
50	0.915
75	1.350
84	1.520
95	1.720
99	2.150

Moment Measures	(phi)	(mm)
Mean	1.075	0.475
Standard Deviation	0.687	0.621
Skewness	-0.765	
Kurtosis	3.692	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.837	0.863
Standard Deviation	0.683	0.678
Skewness (1)	-0.114	-0.194
Skewness (2)	-0.447	
Kurtosis	0.626	0.963



Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**B3c**
Interval	**Grab**
Mean	**0.553 mm**
STD	**0.546 mm**
Skewness	**-1.026**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.97
% finer than 4.00 phi	0.01
% coarser than 1.00 phi	15.60
% $CaCO_3$	1.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.66	0.64	0.64
-1.5	-1.75	1.35	1.31	1.95
-1	-1.25	2.41	2.34	4.29
-0.5	-0.75	4.55	4.42	8.71
0	-0.25	7.09	6.89	15.60
0.5	0.25	11.46	11.13	26.73
1	0.75	21.54	20.92	47.64
1.5	1.25	29.46	28.61	76.26
2	1.75	22.18	21.54	97.80
2.5	2.25	1.91	1.85	99.65
3	2.75	0.27	0.26	99.91
3.5	3.25	0.07	0.07	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.115
5	-1.170
16	-0.230
25	0.170
50	0.790
75	1.230
84	1.430
95	1.685
99	2.075

Moment Measures	(phi)	(mm)
Mean	0.854	0.553
Standard Deviation	0.874	0.546
Skewness	-1.026	
Kurtosis	4.042	
Dispersion		
Standard Deviation		
D viation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.600	0.663
Standard Deviation	0.830	0.848
Skewness (1)	-0.229	-0.301
Skewness (2)	-0.642	
Kurtosis	0.720	1.104

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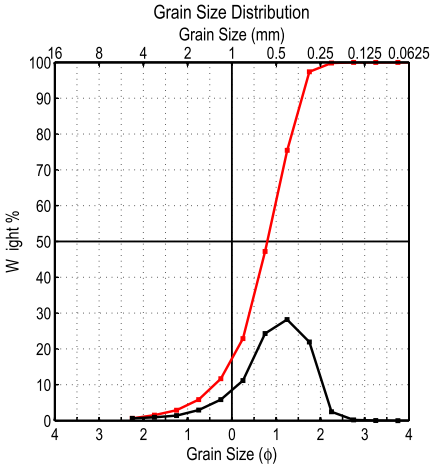


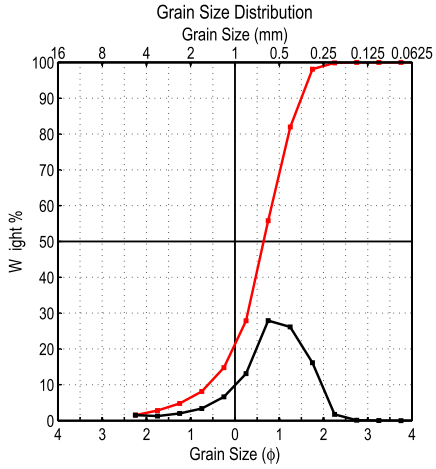
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**B3d**
Interval	**Grab**
Mean	**0.527 mm**
STD	**0.574 mm**
Skewness	**-1.115**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.32
% finer than 4.00 phi	0.00
% coarser than 1.00 phi	11.69
% $CaCO_3$	1.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.63	0.61	0.61
-1.5	-1.75	0.94	0.91	1.52
-1	-1.25	1.42	1.37	2.89
-0.5	-0.75	3.04	2.94	5.84
0	-0.25	6.05	5.86	11.69
0.5	0.25	11.56	11.19	22.88
1	0.75	25.13	24.32	47.20
1.5	1.25	29.16	28.22	75.43
2	1.75	22.65	21.92	97.35
2.5	2.25	2.53	2.45	99.80
3	2.75	0.19	0.18	99.98
3.5	3.25	0.02	0.02	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.035
5	-0.890
16	-0.055
25	0.295
50	0.800
75	1.240
84	1.445
95	1.695
99	2.085

Moment Measures	(phi)	(mm)
Mean	0.924	0.527
Standard Deviation	0.802	0.574
Skewness	-1.115	
Kurtosis	4.756	
Dispersion		
Standard Deviation		
D viation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.695	0.730
Standard Deviation	0.750	0.767
Skewness (1)	-0.140	-0.224
Skewness (2)	-0.530	
Kurtosis	0.723	1.121



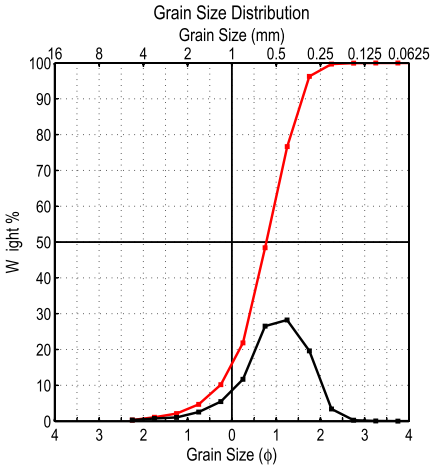
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**B3e**
Interval	**Grab**
Mean	**0.586 mm**
STD	**0.550 mm**
Skewness	**-1.173**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	112.15
% finer than 4.00 phi	0.00
% coarser than 1.00 phi	14.77
% $CaCO_3$	0.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.72	1.53	1.53
-1.5	-1.75	1.44	1.28	2.82
-1	-1.25	2.22	1.98	4.80
-0.5	-0.75	3.76	3.35	8.15
0	-0.25	7.43	6.63	14.77
0.5	0.25	14.70	13.11	27.88
1	0.75	31.31	27.92	55.80
1.5	1.25	29.33	26.15	81.95
2	1.75	18.12	16.16	98.11
2.5	2.25	1.97	1.76	99.87
3	2.75	0.14	0.12	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.220
16	-0.205
25	0.140
50	0.645
75	1.115
84	1.315
95	1.655
99	2.005

Moment Measures	(phi)	(mm)
Mean	0.772	0.586
Standard Deviation	0.862	0.550
Skewness	-1.173	
Kurtosis	4.809	
Dispersion		
Standard Deviation		
D viation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.555	0.585
Standard Deviation	0.760	0.816
Skewness (1)	-0.118	-0.208
Skewness (2)	-0.563	
Kurtosis	0.891	1.208



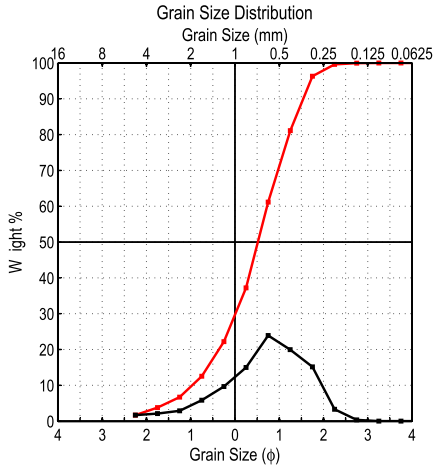
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**BC-E1a**
Interval	**Grab**
Mean	**0.520 mm**
STD	**0.589 mm**
Skewness	**-0.935**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.80
% finer than 4.00 phi	0.00
% coarser than 1.00 phi	10.17
% $CaCO_3$	1.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.35	0.34	0.34
-1.5	-1.75	0.77	0.74	1.08
-1	-1.25	1.10	1.06	2.14
-0.5	-0.75	2.66	2.56	4.70
0	-0.25	5.68	5.47	10.17
0.5	0.25	12.14	11.70	21.87
1	0.75	27.55	26.54	48.41
1.5	1.25	29.31	28.24	76.65
2	1.75	20.36	19.61	96.26
2.5	2.25	3.53	3.40	99.66
3	2.75	0.29	0.28	99.94
3.5	3.25	0.05	0.05	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.805
5	-0.725
16	0.000
25	0.310
50	0.780
75	1.220
84	1.435
95	1.720
99	2.155

Moment Measures	(phi)	(mm)
Mean	0.944	0.520
Standard Deviation	0.763	0.589
Skewness	-0.935	
Kurtosis	4.645	
Dispersion		
Standard Deviation		
D viation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.718	0.738
Standard Deviation	0.718	0.729
Skewness (1)	-0.087	-0.159
Skewness (2)	-0.394	
Kurtosis	0.704	1.101



Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**BC-E1b**
Interval	**Grab**
Mean	**0.642 mm**
STD	**0.509 mm**
Skewness	**-0.745**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	103.20
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	22.21
% $CaCO_3$	3.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.73	1.68	1.68
-1.5	-1.75	2.19	2.12	3.80
-1	-1.25	3.00	2.91	6.71
-0.5	-0.75	6.03	5.84	12.55
0	-0.25	9.97	9.66	22.21
0.5	0.25	15.48	15.00	37.21
1	0.75	24.70	23.93	61.14
1.5	1.25	20.59	19.95	81.09
2	1.75	15.66	15.17	96.27
2.5	2.25	3.43	3.32	99.59
3	2.75	0.37	0.36	99.95
3.5	3.25	0.04	0.04	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.545
16	-0.570
25	-0.155
50	0.515
75	1.095
84	1.345
95	1.710
99	2.160

Moment Measures	(phi)	(mm)
Mean	0.639	0.642
Standard Deviation	0.973	0.509
Skewness	-0.745	
Kurtosis	3.447	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.387	0.430
Standard Deviation	0.957	0.972
Skewness (1)	-0.133	-0.199
Skewness (2)	-0.452	
Kurtosis	0.700	1.067

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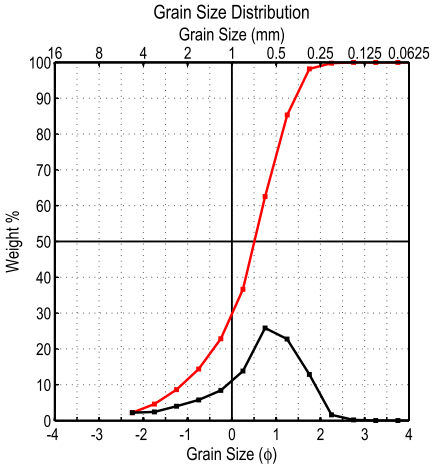


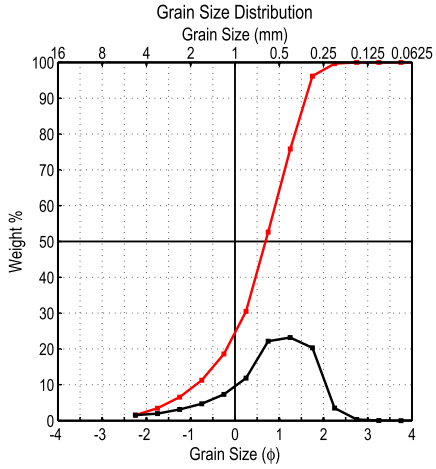
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**BC-E1c**
Interval	**Grab**
Mean	**0.672 mm**
STD	**0.507 mm**
Skewness	**-0.902**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	100.41
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	22.83
% $CaCO_3$	1.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.21	2.20	2.20
-1.5	-1.75	2.44	2.43	4.63
-1	-1.25	4.02	4.00	8.63
-0.5	-0.75	5.80	5.78	14.41
0	-0.25	8.45	8.42	22.83
0.5	0.25	13.90	13.84	36.67
1	0.75	25.97	25.86	62.53
1.5	1.25	22.85	22.76	85.29
2	1.75	12.94	12.89	98.18
2.5	2.25	1.61	1.60	99.78
3	2.75	0.19	0.19	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.705
16	-0.655
25	-0.170
50	0.510
75	1.025
84	1.220
95	1.625
99	2.005

Moment Measures	(phi)	(mm)
Mean	0.574	0.672
Standard Deviation	0.980	0.507
Skewness	-0.902	
Kurtosis	3.535	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.282	0.358
Standard Deviation	0.937	0.973
Skewness (1)	-0.243	-0.286
Skewness (2)	-0.587	
Kurtosis	0.776	1.142



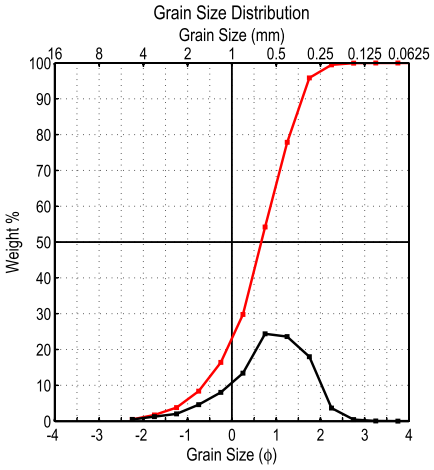
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**BC-E1d**
Interval	**Grab**
Mean	**0.586 mm**
STD	**0.510 mm**
Skewness	**-0.956**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	109.05
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	18.59
% $CaCO_3$	1.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.64	1.50	1.50
-1.5	-1.75	2.14	1.96	3.47
-1	-1.25	3.37	3.09	6.56
-0.5	-0.75	5.14	4.71	11.27
0	-0.25	7.98	7.32	18.59
0.5	0.25	12.95	11.88	30.46
1	0.75	24.16	22.15	52.62
1.5	1.25	25.29	23.19	75.81
2	1.75	22.17	20.33	96.14
2.5	2.25	3.83	3.51	99.65
3	2.75	0.34	0.31	99.96
3.5	3.25	0.03	0.03	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.500
16	-0.425
25	0.020
50	0.690
75	1.235
84	1.450
95	1.720
99	2.155

Moment Measures	(phi)	(mm)
Mean	0.770	0.586
Standard Deviation	0.972	0.510
Skewness	-0.956	
Kurtosis	3.730	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.512	0.572
Standard Deviation	0.937	0.957
Skewness (1)	-0.189	-0.275
Skewness (2)	-0.619	
Kurtosis	0.717	1.086



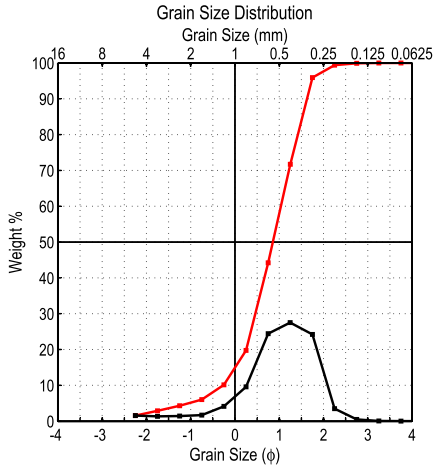
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**BC-E1e**
Interval	**Grab**
Mean	**0.570 mm**
STD	**0.546 mm**
Skewness	**-0.750**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	107.00
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	16.41
% $CaCO_3$	2.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.51	0.48	0.48
-1.5	-1.75	1.35	1.26	1.74
-1	-1.25	2.18	2.04	3.78
-0.5	-0.75	4.92	4.60	8.37
0	-0.25	8.60	8.04	16.41
0.5	0.25	14.33	13.39	29.80
1	0.75	26.11	24.40	54.21
1.5	1.25	25.27	23.62	77.82
2	1.75	19.24	17.98	95.80
2.5	2.25	3.92	3.66	99.47
3	2.75	0.50	0.47	99.93
3.5	3.25	0.05	0.05	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.045
5	-1.115
16	-0.275
25	0.070
50	0.665
75	1.190
84	1.420
95	1.730
99	2.185

Moment Measures	(phi)	(mm)
Mean	0.811	0.570
Standard Deviation	0.873	0.546
Skewness	-0.750	
Kurtosis	3.655	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.573	0.603
Standard Deviation	0.847	0.855
Skewness (1)	-0.109	-0.180
Skewness (2)	-0.422	
Kurtosis	0.678	1.041



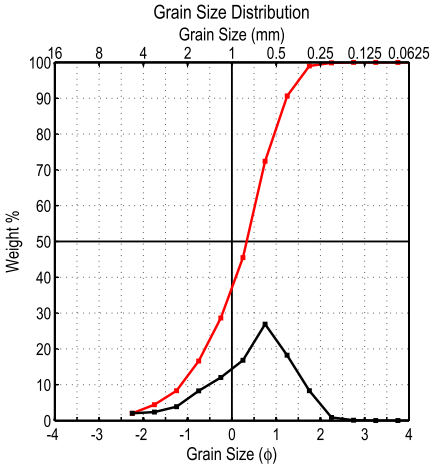
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**BC-E1f**
Interval	**Grab**
Mean	**0.510 mm**
STD	**0.548 mm**
Skewness	**-1.388**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	123.98
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	10.15
% $CaCO_3$	0.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.93	1.56	1.56
-1.5	-1.75	1.65	1.33	2.89
-1	-1.25	1.76	1.42	4.31
-0.5	-0.75	2.11	1.70	6.01
0	-0.25	5.14	4.15	10.15
0.5	0.25	11.91	9.61	19.76
1	0.75	30.29	24.43	44.19
1.5	1.25	34.11	27.51	71.71
2	1.75	30.00	24.20	95.90
2.5	2.25	4.33	3.49	99.40
3	2.75	0.62	0.50	99.90
3.5	3.25	0.08	0.06	99.96
4	3.75	0.03	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.045
16	0.055
25	0.355
50	0.855
75	1.320
84	1.505
95	1.730
99	2.195

Moment Measures	(phi)	(mm)
Mean	0.971	0.510
Standard Deviation	0.867	0.548
Skewness	-1.388	
Kurtosis	5.839	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.780	0.805
Standard Deviation	0.725	0.783
Skewness (1)	-0.103	-0.236
Skewness (2)	-0.707	
Kurtosis	0.914	1.179



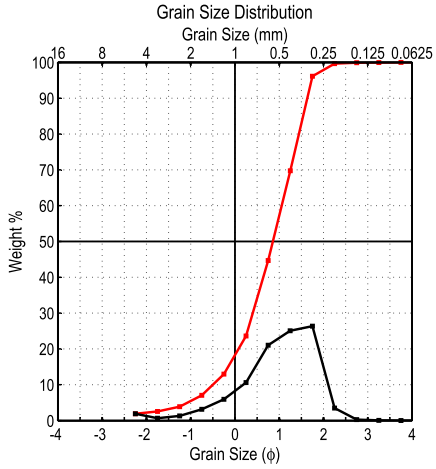
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**BC-E1g**
Interval	**Grab**
Mean	**0.751 mm**
STD	**0.522 mm**
Skewness	**-0.704**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	102.53
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	28.66
% $CaCO_3$	3.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.09	2.04	2.04
-1.5	-1.75	2.46	2.40	4.44
-1	-1.25	4.00	3.90	8.34
-0.5	-0.75	8.51	8.30	16.64
0	-0.25	12.32	12.02	28.66
0.5	0.25	17.27	16.84	45.50
1	0.75	27.58	26.90	72.40
1.5	1.25	18.71	18.25	90.65
2	1.75	8.57	8.36	99.01
2.5	2.25	0.88	0.86	99.86
3	2.75	0.11	0.11	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.680
16	-0.790
25	-0.400
50	0.335
75	0.820
84	1.070
95	1.510
99	1.750

Moment Measures	(phi)	(mm)
Mean	0.413	0.751
Standard Deviation	0.938	0.522
Skewness	-0.704	
Kurtosis	3.280	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.140	0.205
Standard Deviation	0.930	0.948
Skewness (1)	-0.210	-0.237
Skewness (2)	-0.452	
Kurtosis	0.715	1.072



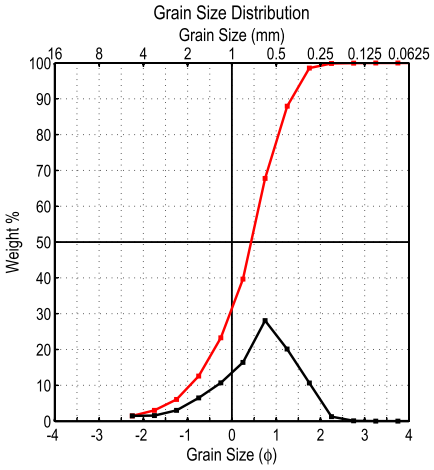
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**BC-E1h**
Interval	**Grab**
Mean	**0.521 mm**
STD	**0.536 mm**
Skewness	**-1.251**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.37
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	12.98
% $CaCO_3$	1.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.97	1.91	1.91
-1.5	-1.75	0.69	0.67	2.57
-1	-1.25	1.37	1.33	3.90
-0.5	-0.75	3.25	3.14	7.04
0	-0.25	6.14	5.94	12.98
0.5	0.25	10.99	10.63	23.61
1	0.75	21.76	21.05	44.66
1.5	1.25	25.93	25.08	69.75
2	1.75	27.26	26.37	96.12
2.5	2.25	3.63	3.51	99.63
3	2.75	0.28	0.27	99.90
3.5	3.25	0.05	0.05	99.95
4	3.75	0.03	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.075
16	-0.110
25	0.285
50	0.855
75	1.350
84	1.520
95	1.730
99	2.160

Moment Measures	(phi)	(mm)
Mean	0.940	0.521
Standard Deviation	0.901	0.536
Skewness	-1.251	
Kurtosis	5.062	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.705	0.755
Standard Deviation	0.815	0.833
Skewness (1)	-0.184	-0.280
Skewness (2)	-0.647	
Kurtosis	0.721	1.079



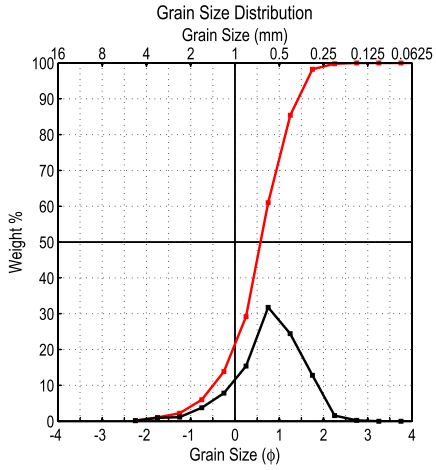
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**BC-E1i**
Interval	**Grab**
Mean	**0.683 mm**
STD	**0.538 mm**
Skewness	**-0.763**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	106.89
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	23.28
% $CaCO_3$	1.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.58	1.48	1.48
-1.5	-1.75	1.66	1.55	3.03
-1	-1.25	3.23	3.02	6.05
-0.5	-0.75	6.97	6.52	12.57
0	-0.25	11.44	10.70	23.28
0.5	0.25	17.52	16.39	39.67
1	0.75	30.03	28.09	67.76
1.5	1.25	21.55	20.16	87.92
2	1.75	11.38	10.65	98.57
2.5	2.25	1.37	1.28	99.85
3	2.75	0.11	0.10	99.95
3.5	3.25	0.02	0.02	99.97
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.425
16	-0.590
25	-0.195
50	0.435
75	0.930
84	1.155
95	1.580
99	1.920

Moment Measures	(phi)	(mm)
Mean	0.550	0.683
Standard Deviation	0.894	0.538
Skewness	-0.763	
Kurtosis	3.670	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.282	0.333
Standard Deviation	0.872	0.892
Skewness (1)	-0.175	-0.206
Skewness (2)	-0.410	
Kurtosis	0.722	1.095



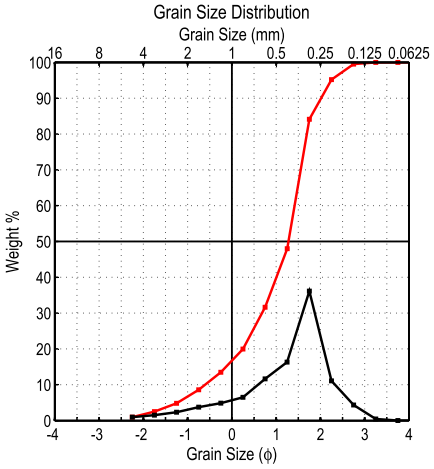
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**BC-E1j**
Interval	**Grab**
Mean	**0.588 mm**
STD	**0.598 mm**
Skewness	**-0.724**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.72
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	13.82
% $CaCO_3$	1.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.14	0.13	0.13
-1.5	-1.75	0.97	0.94	1.07
-1	-1.25	1.19	1.15	2.22
-0.5	-0.75	3.90	3.76	5.98
0	-0.25	8.13	7.84	13.82
0.5	0.25	15.97	15.40	29.21
1	0.75	32.93	31.75	60.96
1.5	1.25	25.35	24.44	85.40
2	1.75	13.28	12.80	98.21
2.5	2.25	1.63	1.57	99.78
3	2.75	0.23	0.22	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.790
5	-0.880
16	-0.180
25	0.115
50	0.575
75	1.035
84	1.220
95	1.625
99	2.000

Moment Measures	(phi)	(mm)
Mean	0.766	0.588
Standard Deviation	0.742	0.598
Skewness	-0.724	
Kurtosis	3.995	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.520	0.538
Standard Deviation	0.700	0.730
Skewness (1)	-0.079	-0.120
Skewness (2)	-0.289	
Kurtosis	0.789	1.116



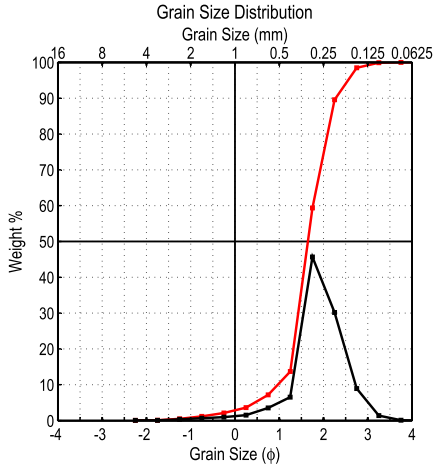
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NSS-01a**
Interval	**Swash**
Mean	**0.433 mm**
STD	**0.488 mm**
Skewness	**-1.128**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.80
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	13.48
% $CaCO_3$	3.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.16	0.97	0.97
-1.5	-1.75	1.83	1.53	2.50
-1	-1.25	2.81	2.35	4.84
-0.5	-0.75	4.51	3.76	8.61
0	-0.25	5.84	4.87	13.48
0.5	0.25	7.79	6.50	19.98
1	0.75	13.96	11.65	31.64
1.5	1.25	19.56	16.33	47.96
2	1.75	43.29	36.14	84.10
2.5	2.25	13.26	11.07	95.17
3	2.75	5.21	4.35	99.52
3.5	3.25	0.55	0.46	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.240
5	-1.230
16	-0.055
25	0.465
50	1.280
75	1.625
84	1.750
95	2.240
99	2.690

Moment Measures	**(phi)**	**(mm)**
Mean	1.206	0.433
Standard Deviation	1.036	0.488
Skewness	-1.128	
Kurtosis	4.103	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.848	0.992
Standard Deviation	0.902	0.977
Skewness (1)	-0.479	-0.463
Skewness (2)	-0.859	
Kurtosis	0.922	1.226



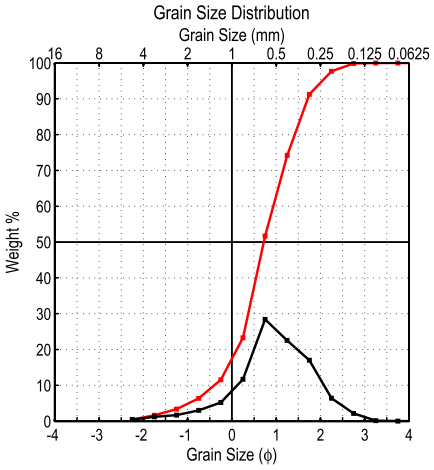
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NSS-01b**
Interval	**LTT**
Mean	**0.273 mm**
STD	**0.644 mm**
Skewness	**-1.581**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	112.18
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	2.10
% $CaCO_3$	1.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.08	0.07	0.07
-1.5	-1.75	0.06	0.05	0.12
-1	-1.25	0.40	0.36	0.48
-0.5	-0.75	0.76	0.68	1.16
0	-0.25	1.06	0.94	2.10
0.5	0.25	1.69	1.51	3.61
1	0.75	3.99	3.56	7.17
1.5	1.25	7.35	6.55	13.72
2	1.75	51.21	45.65	59.37
2.5	2.25	33.87	30.19	89.56
3	2.75	10.02	8.93	98.49
3.5	3.25	1.56	1.39	99.88
4	3.75	0.10	0.09	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-0.865
5	0.445
16	1.275
25	1.375
50	1.645
75	2.010
84	2.160
95	2.555
99	2.930

Moment Measures	**(phi)**	**(mm)**
Mean	1.871	0.273
Standard Deviation	0.635	0.644
Skewness	-1.581	
Kurtosis	8.927	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.718	1.693
Standard Deviation	0.443	0.541
Skewness (1)	0.164	0.013
Skewness (2)	-0.328	
Kurtosis	1.384	1.362



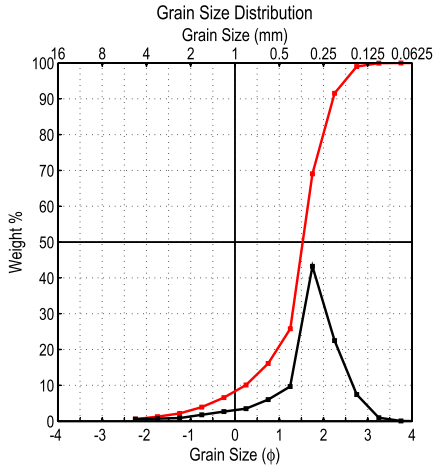
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NSS-02a**
Interval	**Swash**
Mean	**0.520 mm**
STD	**0.545 mm**
Skewness	**-0.666**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	106.20
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	11.57
% $CaCO_3$	3.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.48	0.45	0.45
-1.5	-1.75	1.28	1.21	1.66
-1	-1.25	1.81	1.70	3.36
-0.5	-0.75	3.20	3.01	6.37
0	-0.25	5.52	5.20	11.57
0.5	0.25	12.43	11.70	23.28
1	0.75	30.17	28.41	51.69
1.5	1.25	23.92	22.52	74.21
2	1.75	18.08	17.02	91.23
2.5	2.25	6.81	6.41	97.65
3	2.75	2.32	2.18	99.83
3.5	3.25	0.15	0.14	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.025
5	-0.980
16	-0.060
25	0.280
50	0.720
75	1.275
84	1.540
95	2.045
99	2.560

Moment Measures	**(phi)**	**(mm)**
Mean	0.944	0.520
Standard Deviation	0.875	0.545
Skewness	-0.666	
Kurtosis	4.157	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.740	0.733
Standard Deviation	0.800	0.858
Skewness (1)	0.025	-0.049
Skewness (2)	-0.234	
Kurtosis	0.891	1.246



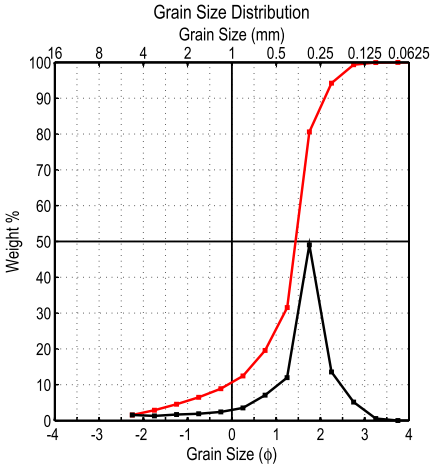
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NSS-02b**
Interval	**LTT**
Mean	**0.325 mm**
STD	**0.543 mm**
Skewness	**-1.669**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	103.35
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	6.60
% $CaCO_3$	1.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.60	0.58	0.58
-1.5	-1.75	0.72	0.70	1.28
-1	-1.25	0.90	0.87	2.15
-0.5	-0.75	1.82	1.76	3.91
0	-0.25	2.78	2.69	6.60
0.5	0.25	3.62	3.50	10.10
1	0.75	6.21	6.01	16.11
1.5	1.25	10.01	9.69	25.80
2	1.75	44.69	43.24	69.04
2.5	2.25	23.24	22.49	91.52
3	2.75	7.70	7.45	98.97
3.5	3.25	0.99	0.96	99.93
4	3.75	0.06	0.06	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.950
5	-0.545
16	0.740
25	1.210
50	1.530
75	1.885
84	2.085
95	2.485
99	2.765

Moment Measures	**(phi)**	**(mm)**
Mean	1.620	0.325
Standard Deviation	0.881	0.543
Skewness	-1.669	
Kurtosis	6.776	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.412	1.452
Standard Deviation	0.673	0.795
Skewness (1)	-0.175	-0.272
Skewness (2)	-0.833	
Kurtosis	1.253	1.840



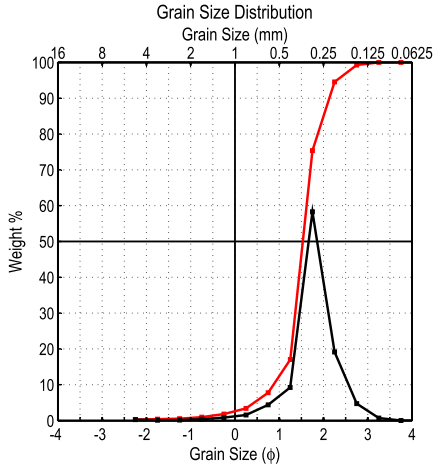
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NSS-03a**
Interval	**Swash**
Mean	**0.369 mm**
STD	**0.506 mm**
Skewness	**-1.788**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	101.70
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	8.92
% $CaCO_3$	2.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.59	1.56	1.56
-1.5	-1.75	1.35	1.33	2.89
-1	-1.25	1.72	1.69	4.58
-0.5	-0.75	1.94	1.91	6.49
0	-0.25	2.47	2.43	8.92
0.5	0.25	3.59	3.53	12.45
1	0.75	7.24	7.12	19.57
1.5	1.25	12.19	11.99	31.55
2	1.75	49.87	49.04	80.59
2.5	2.25	13.82	13.59	94.18
3	2.75	5.26	5.17	99.35
3.5	3.25	0.61	0.60	99.95
4	3.75	0.04	0.04	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.140
16	0.500
25	0.975
50	1.440
75	1.695
84	1.875
95	2.330
99	2.715

Moment Measures	**(phi)**	**(mm)**
Mean	1.440	0.369
Standard Deviation	0.983	0.506
Skewness	-1.788	
Kurtosis	6.606	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.188	1.272
Standard Deviation	0.688	0.870
Skewness (1)	-0.367	-0.427
Skewness (2)	-1.229	
Kurtosis	1.524	1.975



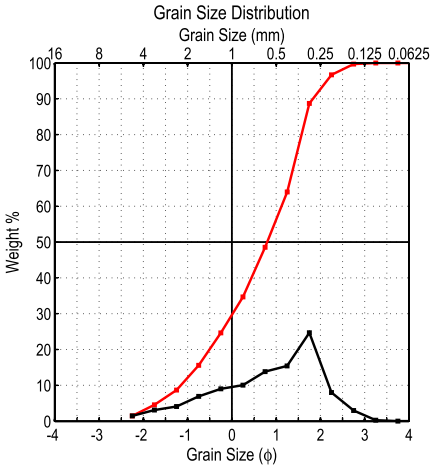
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NSS-03b**
Interval	**LTT**
Mean	**0.299 mm**
STD	**0.664 mm**
Skewness	**-1.989**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	106.44
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	1.82
% $CaCO_3$	1.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.31	0.29	0.29
-1.5	-1.75	0.11	0.10	0.39
-1	-1.25	0.16	0.15	0.54
-0.5	-0.75	0.45	0.42	0.97
0	-0.25	0.91	0.85	1.82
0.5	0.25	1.67	1.57	3.39
1	0.75	4.70	4.42	7.81
1.5	1.25	9.86	9.26	17.07
2	1.75	62.02	58.27	75.34
2.5	2.25	20.41	19.18	94.51
3	2.75	5.06	4.75	99.27
3.5	3.25	0.74	0.70	99.96
4	3.75	0.04	0.04	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.730
5	0.430
16	1.190
25	1.320
50	1.535
75	1.745
84	1.975
95	2.300
99	2.720

Moment Measures	**(phi)**	**(mm)**
Mean	1.743	0.299
Standard Deviation	0.590	0.664
Skewness	-1.989	
Kurtosis	12.698	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.583	1.567
Standard Deviation	0.393	0.480
Skewness (1)	0.121	-0.030
Skewness (2)	-0.433	
Kurtosis	1.382	1.803



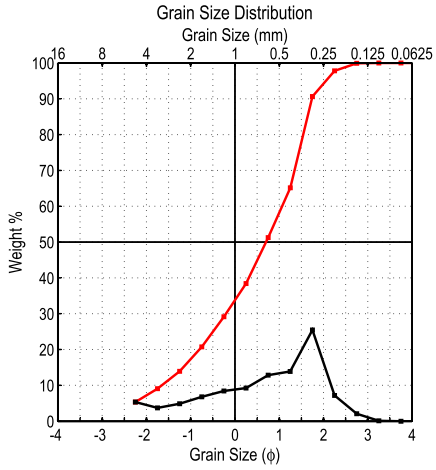
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NSS-04a**
Interval	**Swash**
Mean	**0.569 mm**
STD	**0.445 mm**
Skewness	**-0.614**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	102.52
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	24.65
% $CaCO_3$	3.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.51	1.47	1.47
-1.5	-1.75	3.18	3.10	4.57
-1	-1.25	4.20	4.10	8.67
-0.5	-0.75	7.11	6.94	15.61
0	-0.25	9.27	9.04	24.65
0.5	0.25	10.31	10.06	34.71
1	0.75	14.20	13.85	48.56
1.5	1.25	15.80	15.41	63.97
2	1.75	25.33	24.71	88.68
2.5	2.25	8.22	8.02	96.69
3	2.75	3.07	2.99	99.69
3.5	3.25	0.29	0.28	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.700
16	-0.730
25	-0.235
50	0.795
75	1.475
84	1.655
95	2.145
99	2.635

Moment Measures	**(phi)**	**(mm)**
Mean	0.814	0.569
Standard Deviation	1.168	0.445
Skewness	-0.614	
Kurtosis	2.690	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.462	0.573
Standard Deviation	1.192	1.179
Skewness (1)	-0.279	-0.288
Skewness (2)	-0.480	
Kurtosis	0.612	0.922



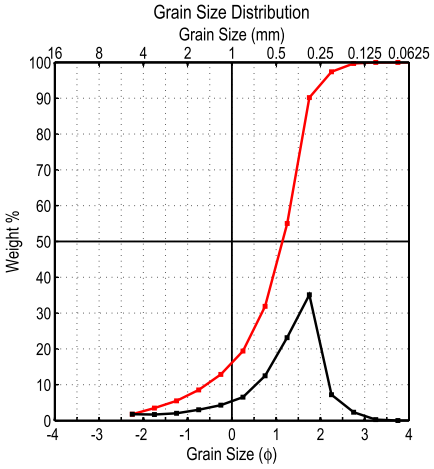
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NSS-04b**
Interval	**LTT**
Mean	**0.640 mm**
STD	**0.405 mm**
Skewness	**-0.675**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	111.74
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	29.17
% $CaCO_3$	3.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.99	5.36	5.36
-1.5	-1.75	4.14	3.71	9.07
-1	-1.25	5.42	4.85	13.92
-0.5	-0.75	7.61	6.81	20.73
0	-0.25	9.43	8.44	29.17
0.5	0.25	10.35	9.26	38.43
1	0.75	14.34	12.83	51.26
1.5	1.25	15.53	13.90	65.16
2	1.75	28.44	25.45	90.61
2.5	2.25	8.04	7.20	97.81
3	2.75	2.31	2.07	99.87
3.5	3.25	0.14	0.13	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.095
25	-0.495
50	0.700
75	1.445
84	1.620
95	2.055
99	2.540

Moment Measures	**(phi)**	**(mm)**
Mean	0.643	0.640
Standard Deviation	1.303	0.405
Skewness	-0.675	
Kurtosis	2.512	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.263	0.408
Standard Deviation	1.357	1.331
Skewness (1)	-0.322	-0.346
Skewness (2)	-0.587	
Kurtosis	0.586	0.909



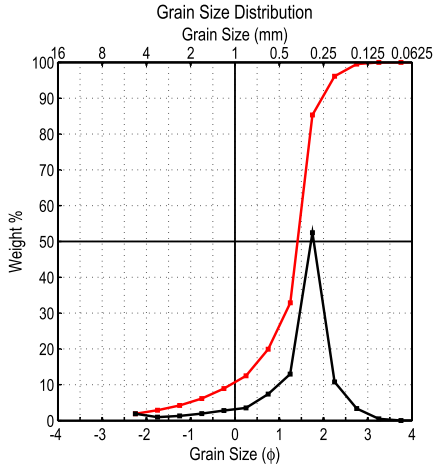
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NSS-05a**
Interval	**Swash**
Mean	**0.460 mm**
STD	**0.496 mm**
Skewness	**-1.343**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	104.04
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	12.87
% $CaCO_3$	3.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.85	1.78	1.78
-1.5	-1.75	1.78	1.71	3.49
-1	-1.25	2.10	2.02	5.51
-0.5	-0.75	3.16	3.04	8.54
0	-0.25	4.50	4.33	12.87
0.5	0.25	6.80	6.54	19.41
1	0.75	13.01	12.50	31.91
1.5	1.25	24.06	23.13	55.04
2	1.75	36.52	35.10	90.14
2.5	2.25	7.50	7.21	97.35
3	2.75	2.43	2.34	99.68
3.5	3.25	0.29	0.28	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.375
16	-0.010
25	0.475
50	1.140
75	1.535
84	1.665
95	2.085
99	2.605

Moment Measures	(phi)	(mm)
Mean	1.122	0.460
Standard Deviation	1.012	0.496
Skewness	-1.343	
Kurtosis	4.855	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.828	0.932
Standard Deviation	0.837	0.943
Skewness (1)	-0.373	-0.413
Skewness (2)	-0.937	
Kurtosis	1.066	1.338



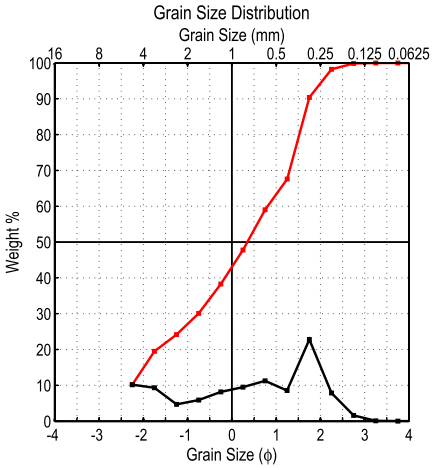
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NSS-05b**
Interval	**LTT**
Mean	**0.379 mm**
STD	**0.515 mm**
Skewness	**-1.903**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	105.84
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	8.96
% $CaCO_3$	3.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.02	1.91	1.91
-1.5	-1.75	1.04	0.98	2.89
-1	-1.25	1.40	1.32	4.21
-0.5	-0.75	2.05	1.94	6.15
0	-0.25	2.97	2.81	8.96
0.5	0.25	3.76	3.55	12.51
1	0.75	7.85	7.42	19.93
1.5	1.25	13.72	12.96	32.89
2	1.75	55.49	52.43	85.32
2.5	2.25	11.44	10.81	96.13
3	2.75	3.56	3.36	99.49
3.5	3.25	0.50	0.47	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.045
16	0.485
25	0.945
50	1.415
75	1.650
84	1.735
95	2.200
99	2.675

Moment Measures	(phi)	(mm)
Mean	1.398	0.379
Standard Deviation	0.956	0.515
Skewness	-1.903	
Kurtosis	7.111	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.110	1.212
Standard Deviation	0.625	0.804
Skewness (1)	-0.488	-0.502
Skewness (2)	-1.340	
Kurtosis	1.596	1.886



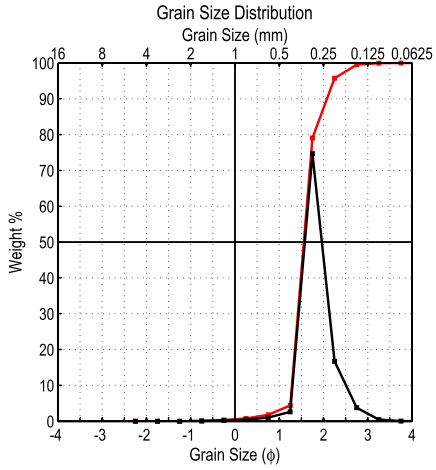
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-01a**
Interval	**Swash**
Mean	**0.798 mm**
STD	**0.354 mm**
Skewness	**-0.377**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	125.29
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	38.30
% $CaCO_3$	3.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	12.77	10.19	10.19
-1.5	-1.75	11.67	9.31	19.51
-1	-1.25	5.87	4.69	24.19
-0.5	-0.75	7.41	5.91	30.11
0	-0.25	10.26	8.19	38.30
0.5	0.25	11.88	9.48	47.78
1	0.75	14.09	11.25	59.02
1.5	1.25	10.71	8.55	67.57
2	1.75	28.57	22.80	90.37
2.5	2.25	9.84	7.85	98.23
3	2.75	2.04	1.63	99.86
3.5	3.25	0.13	0.10	99.96
4	3.75	0.03	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.940
25	-1.180
50	0.350
75	1.415
84	1.610
95	2.045
99	2.485

Moment Measures	(phi)	(mm)
Mean	0.325	0.798
Standard Deviation	1.499	0.354
Skewness	-0.377	
Kurtosis	1.858	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.165	0.007
Standard Deviation	1.775	1.538
Skewness (1)	-0.290	-0.250
Skewness (2)	-0.255	
Kurtosis	0.210	0.678



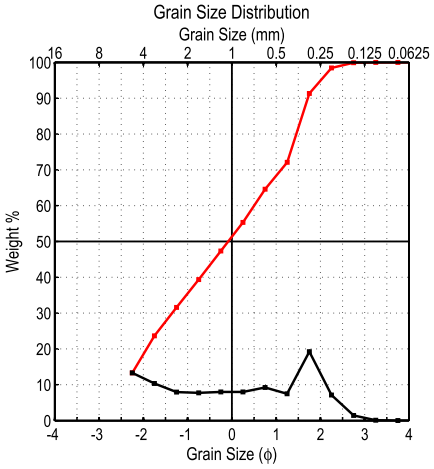
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-01b**
Interval	**LTT**
Mean	**0.279 mm**
STD	**0.783 mm**
Skewness	**-0.366**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Well Sorted
Poorly Graded	Symmetrical
	Very Leptokurtic
Total weight (gram)	103.27
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	0.32
% $CaCO_3$	1.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	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
-0.5	-0.75	0.07	0.07	0.07
0	-0.25	0.26	0.25	0.32
0.5	0.25	0.46	0.45	0.76
1	0.75	1.06	1.03	1.79
1.5	1.25	2.68	2.60	4.39
2	1.75	77.10	74.66	79.05
2.5	2.25	17.24	16.69	95.74
3	2.75	3.88	3.76	99.50
3.5	3.25	0.47	0.46	99.95
4	3.75	0.04	0.04	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	0.365
5	1.255
16	1.330
25	1.390
50	1.555
75	1.725
84	1.900
95	2.230
99	2.685

Moment Measures	(phi)	(mm)
Mean	1.842	0.279
Standard Deviation	0.353	0.783
Skewness	-0.366	
Kurtosis	11.766	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.615	1.595
Standard Deviation	0.285	0.290
Skewness (1)	0.211	0.298
Skewness (2)	0.658	
Kurtosis	0.711	1.193



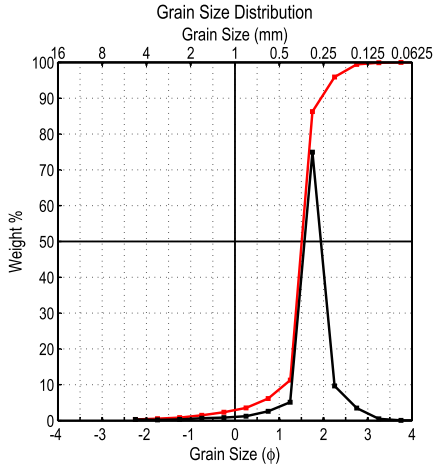
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-02a**
Interval	**Swash**
Mean	**0.956 mm**
STD	**0.341 mm**
Skewness	**-0.097**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	109.87
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	47.34
% $CaCO_3$	4.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	14.62	13.31	13.31
-1.5	-1.75	11.37	10.35	23.66
-1	-1.25	8.73	7.95	31.60
-0.5	-0.75	8.52	7.75	39.36
0	-0.25	8.77	7.98	47.34
0.5	0.25	8.79	8.00	55.34
1	0.75	10.16	9.25	64.59
1.5	1.25	8.23	7.49	72.08
2	1.75	21.13	19.23	91.31
2.5	2.25	7.84	7.14	98.44
3	2.75	1.58	1.44	99.88
3.5	3.25	0.11	0.10	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.120
25	-1.665
50	-0.085
75	1.325
84	1.560
95	2.010
99	2.445

Moment Measures	(phi)	(mm)
Mean	0.066	0.956
Standard Deviation	1.551	0.341
Skewness	-0.097	
Kurtosis	1.633	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.280	-0.215
Standard Deviation	1.840	1.565
Skewness (1)	-0.106	-0.061
Skewness (2)	-0.019	
Kurtosis	0.158	0.584



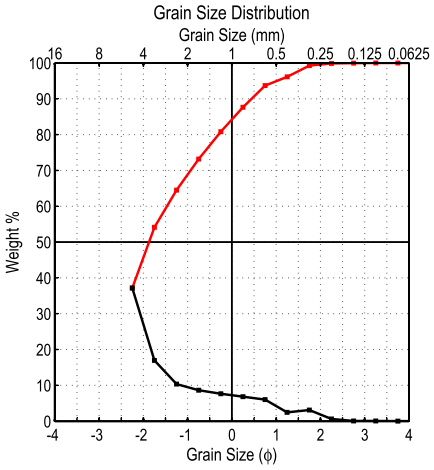
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-02b**
Interval	**LTT**
Mean	**0.306 mm**
STD	**0.677 mm**
Skewness	**-2.825**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	102.51
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	2.32
% $CaCO_3$	1.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.33	0.32	0.32
-1.5	-1.75	0.21	0.20	0.53
-1	-1.25	0.31	0.30	0.83
-0.5	-0.75	0.66	0.64	1.47
0	-0.25	0.87	0.85	2.32
0.5	0.25	1.26	1.23	3.55
1	0.75	2.67	2.60	6.16
1.5	1.25	5.27	5.14	11.30
2	1.75	76.82	74.94	86.24
2.5	2.25	9.91	9.67	95.90
3	2.75	3.60	3.51	99.41
3.5	3.25	0.51	0.50	99.91
4	3.75	0.05	0.05	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-1.115
5	0.530
16	1.280
25	1.340
50	1.510
75	1.675
84	1.735
95	2.205
99	2.690

Moment Measures	(phi)	(mm)
Mean	1.710	0.306
Standard Deviation	0.564	0.677
Skewness	-2.825	
Kurtosis	18.425	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.507	1.508
Standard Deviation	0.228	0.368
Skewness (1)	-0.011	-0.091
Skewness (2)	-0.626	
Kurtosis	2.681	2.049



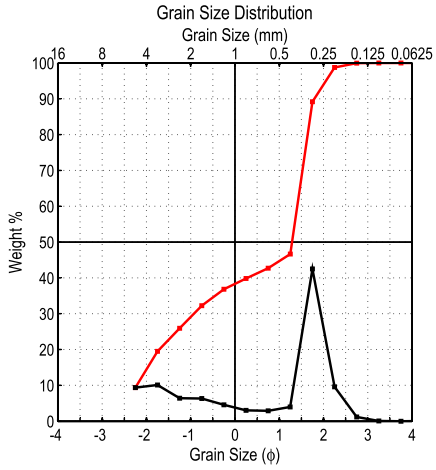
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-03a**
Interval	**Swash**
Mean	**2.267 mm**
STD	**0.435 mm**
Skewness	**1.002**
USCS	**Wentworth**
SW	Granule
Coarse Sand	Poorly Sorted
Well Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	110.30
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	80.80
% $CaCO_3$	5.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	40.99	37.16	37.16
-1.5	-1.75	18.71	16.96	54.13
-1	-1.25	11.45	10.38	64.51
-0.5	-0.75	9.54	8.65	73.16
0	-0.25	8.43	7.64	80.80
0.5	0.25	7.53	6.83	87.62
1	0.75	6.65	6.03	93.65
1.5	1.25	2.72	2.47	96.12
2	1.75	3.44	3.12	99.24
2.5	2.25	0.69	0.63	99.86
3	2.75	0.06	0.05	99.92
3.5	3.25	0.05	0.05	99.96
4	3.75	0.01	0.01	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.870
75	-0.630
84	-0.015
95	1.025
99	1.710

Moment Measures	(phi)	(mm)
Mean	-1.181	2.267
Standard Deviation	1.201	0.435
Skewness	1.002	
Kurtosis	3.035	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.132	-1.378
Standard Deviation	1.118	1.055
Skewness (1)	0.660	0.714
Skewness (2)	1.125	
Kurtosis	0.465	0.829



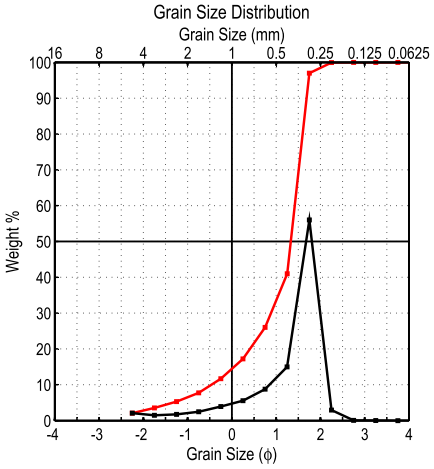
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-03b**
Interval	**LTT**
Mean	**0.685 mm**
STD	**0.328 mm**
Skewness	**-0.583**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	106.88
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	36.82
% $CaCO_3$	2.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	10.01	9.37	9.37
-1.5	-1.75	10.82	10.12	19.49
-1	-1.25	6.87	6.43	25.92
-0.5	-0.75	6.78	6.34	32.26
0	-0.25	4.87	4.56	36.82
0.5	0.25	3.21	3.00	39.82
1	0.75	3.10	2.90	42.72
1.5	1.25	4.22	3.95	46.67
2	1.75	45.40	42.48	89.15
2.5	2.25	10.26	9.60	98.75
3	2.75	1.28	1.20	99.94
3.5	3.25	0.05	0.05	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.920
25	-1.320
50	1.290
75	1.585
84	1.690
95	2.055
99	2.355

Moment Measures	(phi)	(mm)
Mean	0.546	0.685
Standard Deviation	1.609	0.328
Skewness	-0.583	
Kurtosis	1.706	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.115	0.353
Standard Deviation	1.805	1.555
Skewness (1)	-0.778	-0.711
Skewness (2)	-0.769	
Kurtosis	0.193	0.607



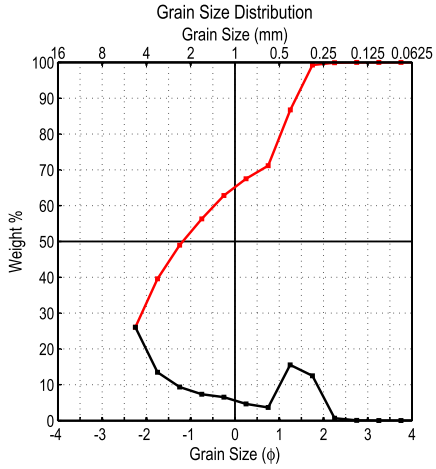
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-04a**
Interval	**Swash**
Mean	**0.437 mm**
STD	**0.513 mm**
Skewness	**-1.893**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	112.03
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	11.68
% $CaCO_3$	2.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.32	2.07	2.07
-1.5	-1.75	1.65	1.47	3.54
-1	-1.25	1.95	1.74	5.28
-0.5	-0.75	2.76	2.46	7.75
0	-0.25	4.41	3.94	11.68
0.5	0.25	6.23	5.56	17.25
1	0.75	9.82	8.77	26.01
1.5	1.25	16.78	14.98	40.99
2	1.75	62.73	55.99	96.98
2.5	2.25	3.29	2.94	99.92
3	2.75	0.08	0.07	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.330
16	0.140
25	0.690
50	1.330
75	1.555
84	1.635
95	1.730
99	2.095

Moment Measures	(phi)	(mm)
Mean	1.193	0.437
Standard Deviation	0.963	0.513
Skewness	-1.893	
Kurtosis	6.156	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.887	1.035
Standard Deviation	0.747	0.837
Skewness (1)	-0.592	-0.665
Skewness (2)	-1.512	
Kurtosis	1.047	1.450



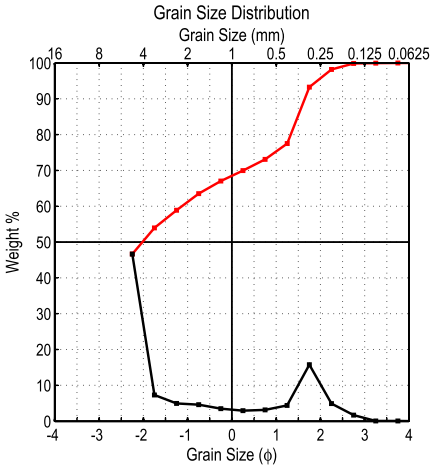
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-04b**
Interval	**LTT**
Mean	**1.455 mm**
STD	**0.347 mm**
Skewness	**0.316**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	105.41
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	62.84
% $CaCO_3$	5.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	27.48	26.07	26.07
-1.5	-1.75	14.23	13.50	39.57
-1	-1.25	9.89	9.38	48.95
-0.5	-0.75	7.74	7.34	56.29
0	-0.25	6.90	6.55	62.84
0.5	0.25	4.90	4.65	67.49
1	0.75	3.88	3.68	71.17
1.5	1.25	16.39	15.55	86.72
2	1.75	13.20	12.52	99.24
2.5	2.25	0.69	0.65	99.90
3	2.75	0.07	0.07	99.96
3.5	3.25	0.02	0.02	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.180
75	0.875
84	1.165
95	1.580
99	1.740

Moment Measures	(phi)	(mm)
Mean	-0.541	1.455
Standard Deviation	1.525	0.347
Skewness	0.316	
Kurtosis	1.535	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.542	-0.755
Standard Deviation	1.708	1.434
Skewness (1)	0.373	0.407
Skewness (2)	0.495	
Kurtosis	0.122	0.502



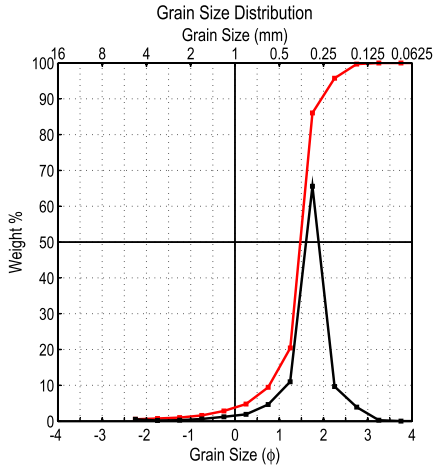
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-05a**
Interval	**Swash**
Mean	**1.692 mm**
STD	**0.296 mm**
Skewness	**0.657**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Platykurtic
Total weight (gram)	105.44
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	67.02
% $CaCO_3$	4.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	49.18	46.64	46.64
-1.5	-1.75	7.70	7.30	53.95
-1	-1.25	5.21	4.94	58.89
-0.5	-0.75	4.88	4.63	63.51
0	-0.25	3.70	3.51	67.02
0.5	0.25	3.09	2.93	69.95
1	0.75	3.31	3.14	73.09
1.5	1.25	4.64	4.40	77.49
2	1.75	16.61	15.75	93.25
2.5	2.25	5.19	4.92	98.17
3	2.75	1.79	1.70	99.87
3.5	3.25	0.06	0.06	99.92
4	3.75	0.05	0.05	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-2.020
75	0.965
84	1.455
95	1.930
99	2.495

Moment Measures	(phi)	(mm)
Mean	-0.759	1.692
Standard Deviation	1.755	0.296
Skewness	0.657	
Kurtosis	1.755	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.397	-0.938
Standard Deviation	1.853	1.560
Skewness (1)	0.876	0.883
Skewness (2)	1.004	
Kurtosis	0.128	0.533



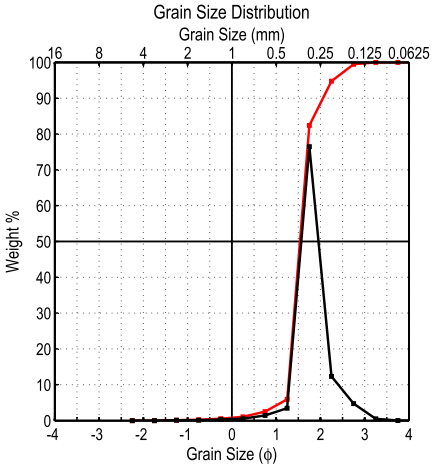
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-05b**
Interval	**LTT**
Mean	**0.322 mm**
STD	**0.645 mm**
Skewness	**-2.447**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	101.36
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	2.87
% $CaCO_3$	1.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.54	0.53	0.53
-1.5	-1.75	0.20	0.20	0.73
-1	-1.25	0.29	0.29	1.02
-0.5	-0.75	0.62	0.61	1.63
0	-0.25	1.26	1.24	2.87
0.5	0.25	1.95	1.92	4.79
1	0.75	4.72	4.66	9.45
1.5	1.25	11.16	11.01	20.46
2	1.75	66.48	65.59	86.05
2.5	2.25	9.81	9.68	95.73
3	2.75	3.99	3.94	99.66
3.5	3.25	0.30	0.30	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.280
5	0.270
16	1.045
25	1.285
50	1.475
75	1.665
84	1.735
95	2.210
99	2.665

Moment Measures	(phi)	(mm)
Mean	1.636	0.322
Standard Deviation	0.632	0.645
Skewness	-2.447	
Kurtosis	14.007	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.390	1.418
Standard Deviation	0.345	0.466
Skewness (1)	-0.246	-0.244
Skewness (2)	-0.681	
Kurtosis	1.812	2.092



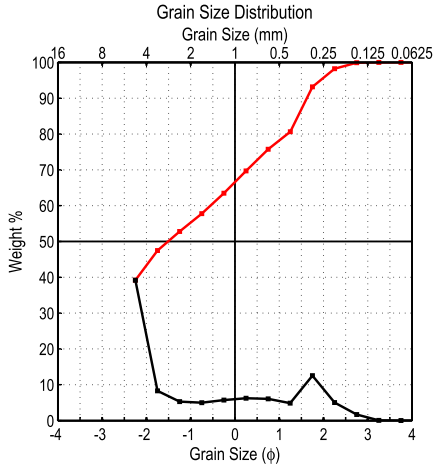
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-06a**
Interval	**Swash**
Mean	**0.284 mm**
STD	**0.764 mm**
Skewness	**-0.914**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Well Sorted
Poorly Graded	Coarse Skewed
	Very Leptokurtic
Total weight (gram)	102.08
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.52
% $CaCO_3$	1.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.11	0.11	0.11
-0.5	-0.75	0.11	0.11	0.22
0	-0.25	0.31	0.30	0.52
0.5	0.25	0.56	0.55	1.07
1	0.75	1.46	1.43	2.50
1.5	1.25	3.52	3.45	5.95
2	1.75	78.05	76.46	82.41
2.5	2.25	12.58	12.32	94.73
3	2.75	4.85	4.75	99.48
3.5	3.25	0.49	0.48	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	0.190
5	1.115
16	1.315
25	1.375
50	1.540
75	1.700
84	1.815
95	2.280
99	2.700

Moment Measures	**(phi)**	**(mm)**
Mean	1.815	0.284
Standard Deviation	0.388	0.764
Skewness	-0.914	
Kurtosis	14.206	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.565	1.557
Standard Deviation	0.250	0.302
Skewness (1)	0.100	0.185
Skewness (2)	0.630	
Kurtosis	1.330	1.469



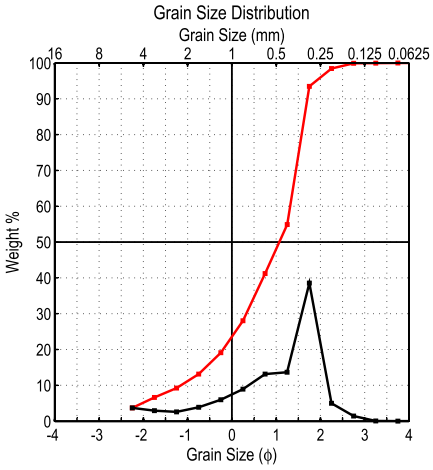
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-06b**
Interval	**LTT**
Mean	**1.559 mm**
STD	**0.311 mm**
Skewness	**0.510**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Platykurtic
Total weight (gram)	116.87
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	63.49
% $CaCO_3$	8.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	45.79	39.18	39.18
-1.5	-1.75	9.70	8.30	47.48
-1	-1.25	6.19	5.30	52.78
-0.5	-0.75	5.85	5.01	57.78
0	-0.25	6.67	5.71	63.49
0.5	0.25	7.27	6.22	69.71
1	0.75	7.07	6.05	75.76
1.5	1.25	5.67	4.85	80.61
2	1.75	14.68	12.56	93.17
2.5	2.25	5.90	5.05	98.22
3	2.75	1.97	1.69	99.91
3.5	3.25	0.08	0.07	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.510
75	0.685
84	1.385
95	1.930
99	2.480

Moment Measures	**(phi)**	**(mm)**
Mean	-0.640	1.559
Standard Deviation	1.684	0.311
Skewness	0.510	
Kurtosis	1.713	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-0.433	-0.792
Standard Deviation	1.817	1.542
Skewness (1)	0.593	0.619
Skewness (2)	0.743	
Kurtosis	0.150	0.584



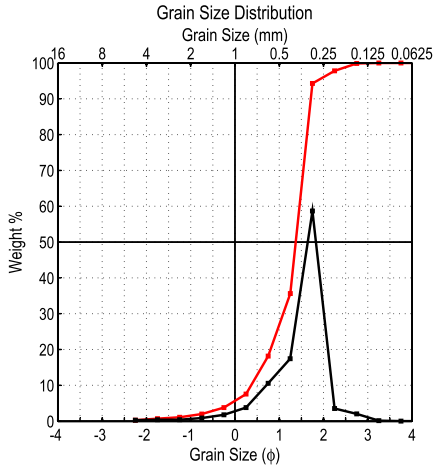
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-07a**
Interval	**Swash**
Mean	**0.532 mm**
STD	**0.445 mm**
Skewness	**-1.144**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	102.03
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	19.11
% $CaCO_3$	4.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.77	3.69	3.69
-1.5	-1.75	3.00	2.94	6.64
-1	-1.25	2.66	2.61	9.24
-0.5	-0.75	3.97	3.89	13.13
0	-0.25	6.10	5.98	19.11
0.5	0.25	9.11	8.93	28.04
1	0.75	13.43	13.16	41.20
1.5	1.25	13.95	13.67	54.88
2	1.75	39.35	38.57	93.44
2.5	2.25	5.11	5.01	98.45
3	2.75	1.47	1.44	99.89
3.5	3.25	0.06	0.06	99.95
4	3.75	0.03	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.030
16	-0.510
25	0.080
50	1.070
75	1.510
84	1.630
95	1.905
99	2.440

Moment Measures	**(phi)**	**(mm)**
Mean	0.912	0.532
Standard Deviation	1.167	0.445
Skewness	-1.144	
Kurtosis	3.627	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.560	0.730
Standard Deviation	1.070	1.131
Skewness (1)	-0.477	-0.526
Skewness (2)	-1.058	
Kurtosis	0.839	1.128



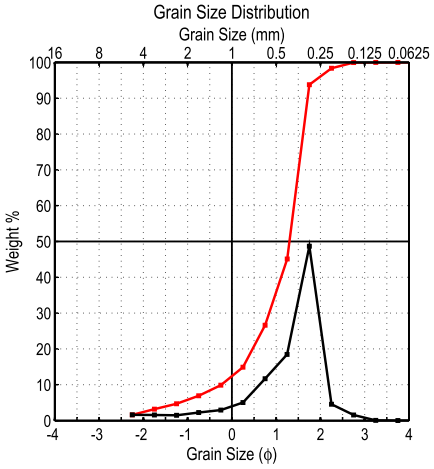
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-07b**
Interval	**LTT**
Mean	**0.367 mm**
STD	**0.633 mm**
Skewness	**-1.909**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	101.83
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	3.78
% $CaCO_3$	1.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.30	0.29	0.29
-1.5	-1.75	0.40	0.39	0.69
-1	-1.25	0.42	0.41	1.10
-0.5	-0.75	0.91	0.89	1.99
0	-0.25	1.82	1.79	3.78
0.5	0.25	3.88	3.81	7.59
1	0.75	10.77	10.58	18.17
1.5	1.25	17.77	17.45	35.62
2	1.75	59.72	58.65	94.26
2.5	2.25	3.59	3.53	97.79
3	2.75	2.08	2.04	99.83
3.5	3.25	0.15	0.15	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.370
5	-0.090
16	0.650
25	0.945
50	1.375
75	1.585
84	1.660
95	1.855
99	2.545

Moment Measures	**(phi)**	**(mm)**
Mean	1.445	0.367
Standard Deviation	0.660	0.633
Skewness	-1.909	
Kurtosis	9.171	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.155	1.228
Standard Deviation	0.505	0.547
Skewness (1)	-0.436	-0.471
Skewness (2)	-0.975	
Kurtosis	0.926	1.246



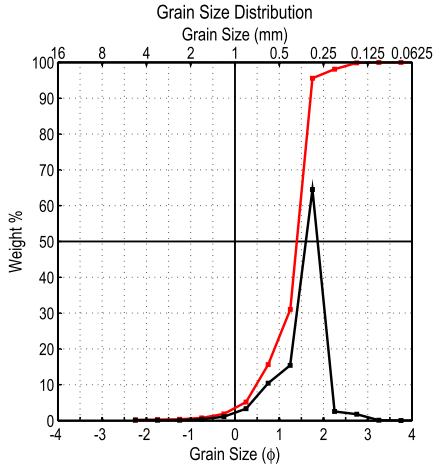
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-08a**
Interval	**Swash**
Mean	**0.428 mm**
STD	**0.523 mm**
Skewness	**-1.790**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	110.71
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	9.87
% $CaCO_3$	2.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.80	1.63	1.63
-1.5	-1.75	1.75	1.58	3.21
-1	-1.25	1.65	1.49	4.70
-0.5	-0.75	2.48	2.24	6.94
0	-0.25	3.25	2.94	9.87
0.5	0.25	5.59	5.05	14.92
1	0.75	12.94	11.69	26.61
1.5	1.25	20.47	18.49	45.10
2	1.75	53.88	48.67	93.77
2.5	2.25	5.08	4.59	98.36
3	2.75	1.73	1.56	99.92
3.5	3.25	0.07	0.06	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.180
16	0.295
25	0.680
50	1.300
75	1.555
84	1.650
95	1.885
99	2.455

Moment Measures	(phi)	(mm)
Mean	1.225	0.428
Standard Deviation	0.936	0.523
Skewness	-1.790	
Kurtosis	6.377	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.972	1.082
Standard Deviation	0.677	0.803
Skewness (1)	-0.483	-0.551
Skewness (2)	-1.399	
Kurtosis	1.262	1.436



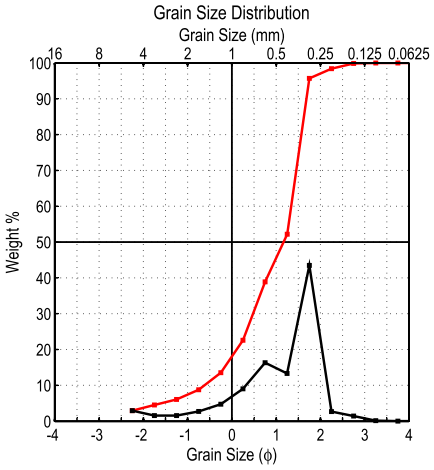
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-08b**
Interval	**LTT**
Mean	**0.352 mm**
STD	**0.683 mm**
Skewness	**-1.781**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	101.86
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	1.87
% $CaCO_3$	1.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.15	0.15	0.15
-1.5	-1.75	0.13	0.13	0.27
-1	-1.25	0.10	0.10	0.37
-0.5	-0.75	0.39	0.38	0.76
0	-0.25	1.13	1.11	1.87
0.5	0.25	3.38	3.32	5.18
1	0.75	10.65	10.46	15.64
1.5	1.25	15.69	15.40	31.04
2	1.75	65.70	64.50	95.54
2.5	2.25	2.59	2.54	98.09
3	2.75	1.81	1.78	99.86
3.5	3.25	0.11	0.11	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.640
5	0.220
16	0.760
25	1.055
50	1.395
75	1.590
84	1.660
95	1.745
99	2.505

Moment Measures	(phi)	(mm)
Mean	1.506	0.352
Standard Deviation	0.550	0.683
Skewness	-1.781	
Kurtosis	9.704	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.210	1.272
Standard Deviation	0.450	0.456
Skewness (1)	-0.411	-0.476
Skewness (2)	-0.917	
Kurtosis	0.694	1.168



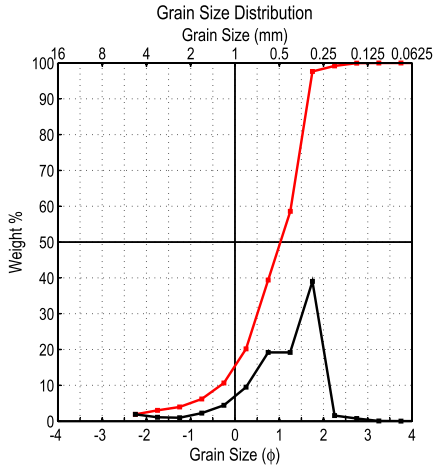
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-09a**
Interval	**Swash**
Mean	**0.489 mm**
STD	**0.488 mm**
Skewness	**-1.403**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	104.08
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	13.52
% $CaCO_3$	3.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.07	2.95	2.95
-1.5	-1.75	1.62	1.56	4.51
-1	-1.25	1.61	1.55	6.05
-0.5	-0.75	2.82	2.71	8.76
0	-0.25	4.95	4.76	13.52
0.5	0.25	9.42	9.05	22.57
1	0.75	16.97	16.30	38.87
1.5	1.25	13.87	13.33	52.20
2	1.75	45.27	43.50	95.70
2.5	2.25	2.80	2.69	98.39
3	2.75	1.51	1.45	99.84
3.5	3.25	0.14	0.13	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.590
16	-0.115
25	0.325
50	1.165
75	1.510
84	1.615
95	1.740
99	2.460

Moment Measures	(phi)	(mm)
Mean	1.033	0.489
Standard Deviation	1.036	0.488
Skewness	-1.403	
Kurtosis	4.837	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.750	0.888
Standard Deviation	0.865	0.937
Skewness (1)	-0.480	-0.567
Skewness (2)	-1.260	
Kurtosis	0.925	1.152



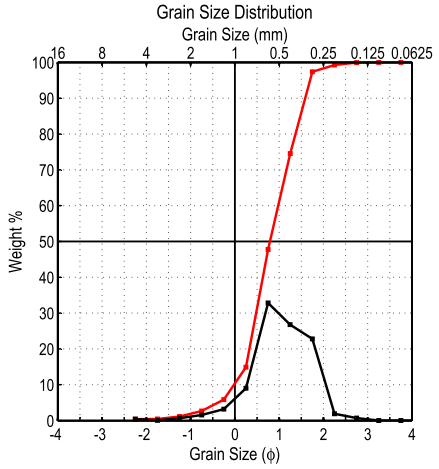
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-09b**
Interval	**LTT**
Mean	**0.484 mm**
STD	**0.534 mm**
Skewness	**-1.502**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	105.18
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	10.66
% $CaCO_3$	2.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.02	1.92	1.92
-1.5	-1.75	1.15	1.09	3.01
-1	-1.25	1.00	0.95	3.96
-0.5	-0.75	2.36	2.24	6.21
0	-0.25	4.68	4.45	10.66
0.5	0.25	10.01	9.52	20.17
1	0.75	20.21	19.21	39.39
1.5	1.25	20.18	19.19	58.58
2	1.75	41.05	39.03	97.60
2.5	2.25	1.64	1.56	99.16
3	2.75	0.81	0.77	99.93
3.5	3.25	0.05	0.05	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.020
16	0.030
25	0.375
50	1.025
75	1.460
84	1.575
95	1.715
99	2.200

Moment Measures	(phi)	(mm)
Mean	1.047	0.484
Standard Deviation	0.905	0.534
Skewness	-1.502	
Kurtosis	5.698	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.802	0.877
Standard Deviation	0.772	0.801
Skewness (1)	-0.288	-0.392
Skewness (2)	-0.877	
Kurtosis	0.770	1.033



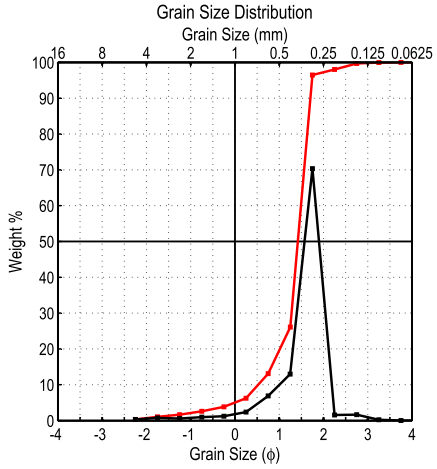
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-10a**
Interval	**Swash**
Mean	**0.490 mm**
STD	**0.629 mm**
Skewness	**-0.905**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	107.98
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	5.85
% $CaCO_3$	3.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.45	0.42	0.42
-1.5	-1.75	0.05	0.05	0.46
-1	-1.25	0.71	0.66	1.12
-0.5	-0.75	1.67	1.55	2.67
0	-0.25	3.44	3.19	5.85
0.5	0.25	9.77	9.05	14.90
1	0.75	35.47	32.85	47.75
1.5	1.25	28.94	26.80	74.55
2	1.75	24.63	22.81	97.36
2.5	2.25	2.04	1.89	99.25
3	2.75	0.76	0.70	99.95
3.5	3.25	0.03	0.03	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.340
5	-0.385
16	0.265
25	0.405
50	0.790
75	1.260
84	1.455
95	1.700
99	2.185

Moment Measures	(phi)	(mm)
Mean	1.029	0.490
Standard Deviation	0.669	0.629
Skewness	-0.905	
Kurtosis	5.734	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.860	0.837
Standard Deviation	0.595	0.613
Skewness (1)	0.118	-0.005
Skewness (2)	-0.223	
Kurtosis	0.752	0.999



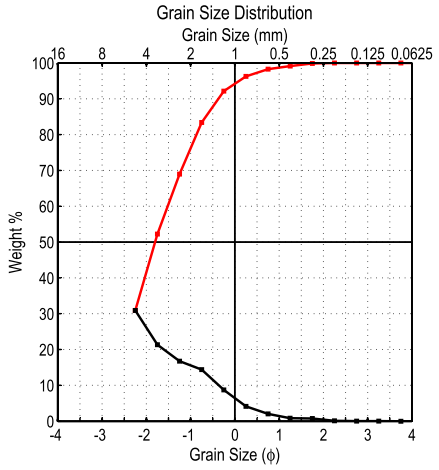
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**NHB-10b**
Interval	**LTT**
Mean	**0.352 mm**
STD	**0.635 mm**
Skewness	**-2.620**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	110.17
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	3.84
% $CaCO_3$	1.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.36	0.33	0.33
-1.5	-1.75	0.81	0.74	1.06
-1	-1.25	0.65	0.59	1.65
-0.5	-0.75	1.06	0.96	2.61
0	-0.25	1.35	1.23	3.84
0.5	0.25	2.63	2.39	6.23
1	0.75	7.59	6.89	13.12
1.5	1.25	14.30	12.98	26.10
2	1.75	77.50	70.35	96.44
2.5	2.25	1.74	1.58	98.02
3	2.75	1.84	1.67	99.69
3.5	3.25	0.28	0.25	99.95
4	3.75	0.04	0.04	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.790
5	-0.005
16	0.860
25	1.210
50	1.420
75	1.600
84	1.660
95	1.740
99	2.545

Moment Measures	(phi)	(mm)
Mean	1.505	0.352
Standard Deviation	0.655	0.635
Skewness	-2.620	
Kurtosis	12.809	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.260	1.313
Standard Deviation	0.400	0.464
Skewness (1)	-0.400	-0.517
Skewness (2)	-1.381	
Kurtosis	1.181	1.834



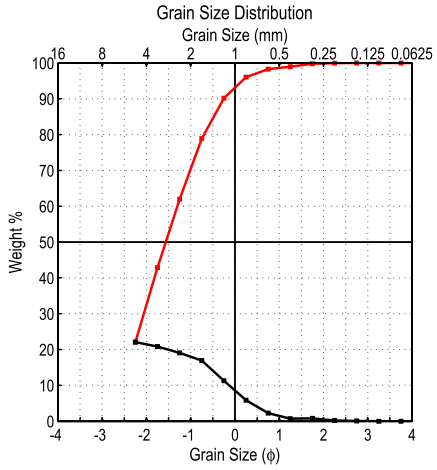
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**KH-01a**
Interval	**Swash**
Mean	**2.558 mm**
STD	**0.541 mm**
Skewness	**1.036**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Sorted
Poorly Graded	Fine Skewed
	Leptokurtic
Total weight (gram)	107.33
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	92.11
% $CaCO_3$	3.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	33.17	30.90	30.90
-1.5	-1.75	22.89	21.33	52.23
-1	-1.25	17.97	16.74	68.97
-0.5	-0.75	15.46	14.40	83.38
0	-0.25	9.37	8.73	92.11
0.5	0.25	4.44	4.14	96.25
1	0.75	2.18	2.03	98.28
1.5	1.25	0.89	0.83	99.11
2	1.75	0.82	0.76	99.87
2.5	2.25	0.10	0.09	99.96
3	2.75	0.03	0.03	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.800
75	-1.040
84	-0.715
95	0.100
99	1.185

Moment Measures	(phi)	(mm)
Mean	-1.355	2.558
Standard Deviation	0.887	0.541
Skewness	1.036	
Kurtosis	3.868	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.482	-1.588
Standard Deviation	0.768	0.740
Skewness (1)	0.414	0.515
Skewness (2)	0.945	
Kurtosis	0.531	0.796



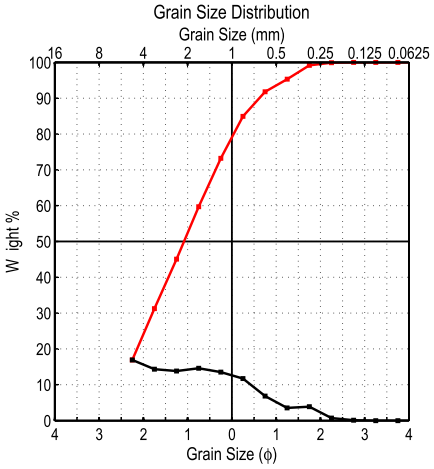
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**KH-01b**
Interval	**LTT**
Mean	**2.289 mm**
STD	**0.539 mm**
Skewness	**0.809**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	106.40
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	90.17
% $CaCO_3$	4.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	23.48	22.07	22.07
-1.5	-1.75	22.16	20.83	42.89
-1	-1.25	20.29	19.07	61.96
-0.5	-0.75	17.99	16.91	78.87
0	-0.25	12.02	11.30	90.17
0.5	0.25	6.22	5.85	96.02
1	0.75	2.38	2.24	98.25
1.5	1.25	0.76	0.71	98.97
2	1.75	0.85	0.80	99.77
2.5	2.25	0.19	0.18	99.94
3	2.75	0.06	0.06	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.180
50	-1.565
75	-0.865
84	-0.525
95	0.165
99	1.270

Moment Measures	(phi)	(mm)
Mean	-1.195	2.289
Standard Deviation	0.891	0.539
Skewness	0.809	
Kurtosis	3.508	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.388	-1.447
Standard Deviation	0.863	0.797
Skewness (1)	0.206	0.319
Skewness (2)	0.606	
Kurtosis	0.400	0.753



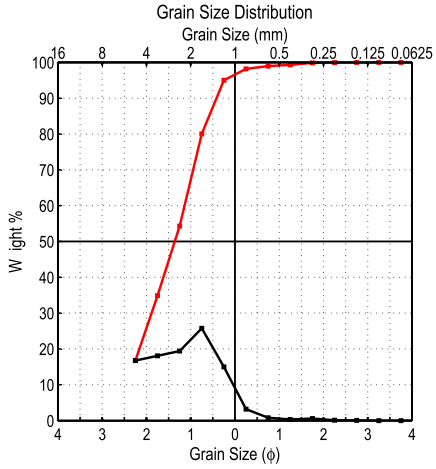
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**KH-02a**
Interval	**Swash**
Mean	**1.666 mm**
STD	**0.450 mm**
Skewness	**0.463**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Platykurtic
Total weight (gram)	106.24
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	73.21
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	17.98	16.92	16.92
-1.5	-1.75	15.23	14.34	31.26
-1	-1.25	14.68	13.82	45.08
-0.5	-0.75	15.53	14.62	59.70
0	-0.25	14.36	13.52	73.21
0.5	0.25	12.46	11.73	84.94
1	0.75	7.25	6.82	91.76
1.5	1.25	3.76	3.54	95.30
2	1.75	4.12	3.88	99.18
2.5	2.25	0.75	0.71	99.89
3	2.75	0.12	0.11	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.970
50	-1.080
75	-0.175
84	0.210
95	1.205
99	1.725

Moment Measures	(phi)	(mm)
Mean	-0.736	1.666
Standard Deviation	1.151	0.450
Skewness	0.463	
Kurtosis	2.430	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.020	-1.040
Standard Deviation	1.230	1.138
Skewness (1)	0.049	0.186
Skewness (2)	0.453	
Kurtosis	0.404	0.789



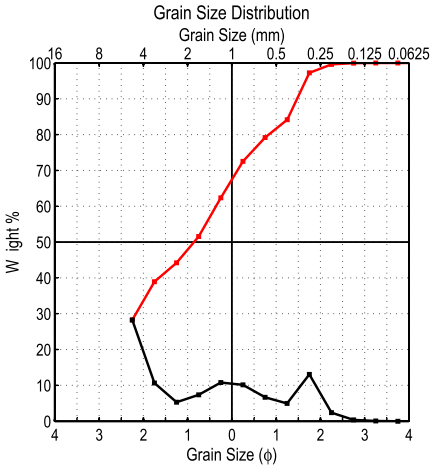
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**KH02b**
Interval	**LTT**
Mean	**2.197 mm**
STD	**0.582 mm**
Skewness	**0.488**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	104.33
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	95.00
% $CaCO_3$	3.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	17.50	16.77	16.77
-1.5	-1.75	18.87	18.09	34.86
-1	-1.25	20.25	19.41	54.27
-0.5	-0.75	26.86	25.75	80.02
0	-0.25	15.63	14.98	95.00
0.5	0.25	3.32	3.18	98.18
1	0.75	0.82	0.79	98.96
1.5	1.25	0.32	0.31	99.27
2	1.75	0.59	0.57	99.84
2.5	2.25	0.12	0.12	99.95
3	2.75	0.05	0.05	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.025
50	-1.360
75	-0.845
84	-0.615
95	-0.250
99	0.805

Moment Measures	(phi)	(mm)
Mean	-1.136	2.197
Standard Deviation	0.780	0.582
Skewness	0.488	
Kurtosis	3.643	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.432	-1.408
Standard Deviation	0.818	0.712
Skewness (1)	-0.089	0.011
Skewness (2)	0.135	
Kurtosis	0.223	0.695



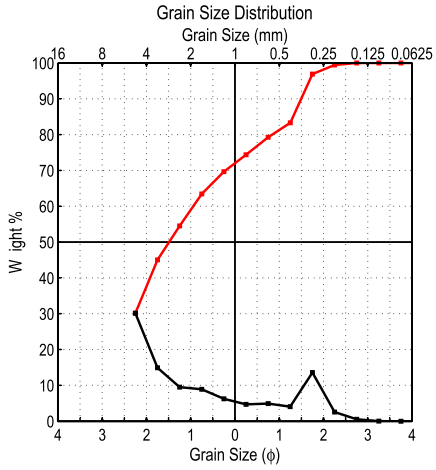
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**KH-03a**
Interval	**Swash**
Mean	**1.454 mm**
STD	**0.352 mm**
Skewness	**0.320**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	114.64
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	62.34
% $CaCO_3$	4.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	32.41	28.27	28.27
-1.5	-1.75	12.23	10.67	38.94
-1	-1.25	6.06	5.29	44.23
-0.5	-0.75	8.41	7.34	51.56
0	-0.25	12.36	10.78	62.34
0.5	0.25	11.65	10.16	72.51
1	0.75	7.64	6.66	79.17
1.5	1.25	5.69	4.96	84.13
2	1.75	15.00	13.08	97.22
2.5	2.25	2.73	2.38	99.60
3	2.75	0.41	0.36	99.96
3.5	3.25	0.05	0.04	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-0.855
75	0.435
84	1.235
95	1.665
99	2.125

Moment Measures	(phi)	(mm)
Mean	-0.540	1.454
Standard Deviation	1.507	0.352
Skewness	0.320	
Kurtosis	1.733	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.508	-0.623
Standard Deviation	1.742	1.464
Skewness (1)	0.199	0.243
Skewness (2)	0.323	
Kurtosis	0.123	0.598



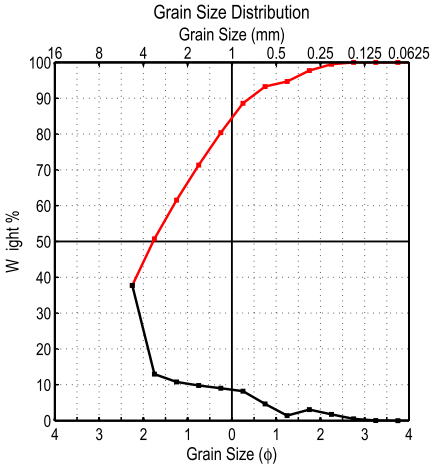
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**KH-03b**
Interval	**LTT**
Mean	**1.659 mm**
STD	**0.347 mm**
Skewness	**0.641**
USCS	**Wentworth**
SW	Very Coarse Sand
Medium Sand	Poorly Sorted
Well Graded	Fine Skewed
	Platykurtic
Total weight (gram)	115.05
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	69.66
% $CaCO_3$	3.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	34.67	30.13	30.13
-1.5	-1.75	17.13	14.89	45.02
-1	-1.25	10.93	9.50	54.52
-0.5	-0.75	10.23	8.89	63.42
0	-0.25	7.18	6.24	69.66
0.5	0.25	5.42	4.71	74.37
1	0.75	5.63	4.89	79.26
1.5	1.25	4.66	4.05	83.31
2	1.75	15.62	13.58	96.89
2.5	2.25	2.93	2.55	99.44
3	2.75	0.62	0.54	99.97
3.5	3.25	0.03	0.03	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.490
75	0.315
84	1.275
95	1.680
99	2.165

Moment Measures	(phi)	(mm)
Mean	-0.730	1.659
Standard Deviation	1.527	0.347
Skewness	0.641	
Kurtosis	1.962	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.488	-0.822
Standard Deviation	1.763	1.477
Skewness (1)	0.569	0.591
Skewness (2)	0.684	
Kurtosis	0.115	0.628



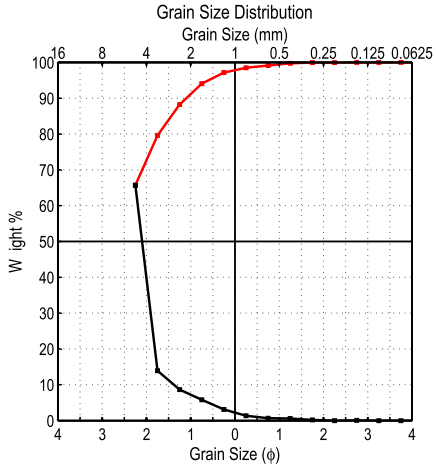
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**KH-04a**
Interval	**Swash**
Mean	**2.184 mm**
STD	**0.422 mm**
Skewness	**1.007**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	117.71
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	80.37
% $CaCO_3$	4.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	44.43	37.75	37.75
-1.5	-1.75	15.30	13.00	50.74
-1	-1.25	12.71	10.80	61.54
-0.5	-0.75	11.53	9.80	71.34
0	-0.25	10.63	9.03	80.37
0.5	0.25	9.67	8.22	88.58
1	0.75	5.50	4.67	93.25
1.5	1.25	1.65	1.40	94.66
2	1.75	3.61	3.07	97.72
2.5	2.25	2.04	1.73	99.46
3	2.75	0.60	0.51	99.97
3.5	3.25	0.04	0.03	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.780
75	-0.545
84	-0.030
95	1.305
99	2.120

Moment Measures	(phi)	(mm)
Mean	-1.127	2.184
Standard Deviation	1.243	0.422
Skewness	1.007	
Kurtosis	3.193	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.140	-1.353
Standard Deviation	1.110	1.094
Skewness (1)	0.577	0.656
Skewness (2)	1.178	
Kurtosis	0.601	0.855



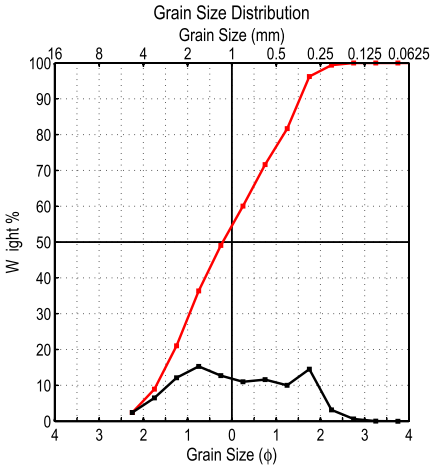
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**KH-04b**
Interval	**LTT**
Mean	**3.628 mm**
STD	**0.615 mm**
Skewness	**2.285**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Sorted
Poorly Graded	Strongly Fine Skewed
	Very Leptokurtic
Total weight (gram)	116.89
% finer than 4.00 phi	0.00
% coarser than 1.00 phi	97.13
% $CaCO_3$	5.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	76.79	65.69	65.69
-1.5	-1.75	16.25	13.90	79.60
-1	-1.25	10.08	8.62	88.22
-0.5	-0.75	6.80	5.82	94.04
0	-0.25	3.62	3.10	97.13
0.5	0.25	1.57	1.34	98.48
1	0.75	0.76	0.65	99.13
1.5	1.25	0.67	0.57	99.70
2	1.75	0.25	0.21	99.91
2.5	2.25	0.00	0.00	99.91
3	2.75	0.10	0.09	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-2.250
75	-1.915
84	-1.495
95	-0.595
99	0.650

Moment Measures	(phi)	(mm)
Mean	-1.859	3.628
Standard Deviation	0.701	0.615
Skewness	2.285	
Kurtosis	9.011	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.873	-1.998
Standard Deviation	0.377	0.440
Skewness (1)	1.000	1.000
Skewness (2)	2.192	
Kurtosis	1.192	2.025



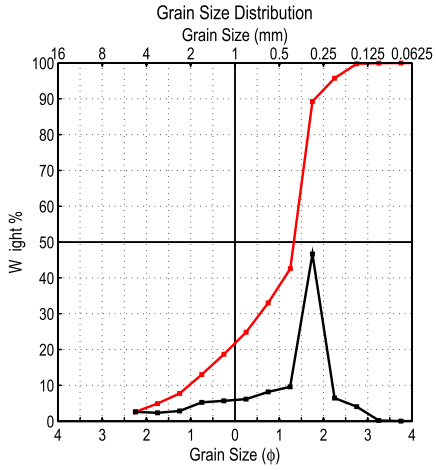
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**KH-05a**
Interval	**Swash**
Mean	**0.922 mm**
STD	**0.431 mm**
Skewness	**0.041**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	109.60
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	49.04
% $CaCO_3$	2.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.66	2.43	2.43
-1.5	-1.75	7.12	6.50	8.92
-1	-1.25	13.30	12.14	21.06
-0.5	-0.75	16.75	15.28	36.34
0	-0.25	13.92	12.70	49.04
0.5	0.25	12.04	10.99	60.03
1	0.75	12.73	11.61	71.64
1.5	1.25	10.99	10.03	81.67
2	1.75	15.93	14.53	96.20
2.5	2.25	3.46	3.16	99.36
3	2.75	0.69	0.63	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.050
16	-1.460
25	-1.120
50	-0.205
75	0.915
84	1.330
95	1.710
99	2.195

Moment Measures	(phi)	(mm)
Mean	0.117	0.922
Standard Deviation	1.214	0.431
Skewness	0.041	
Kurtosis	1.954	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.065	-0.112
Standard Deviation	1.395	1.267
Skewness (1)	0.100	0.059
Skewness (2)	0.025	
Kurtosis	0.348	0.757



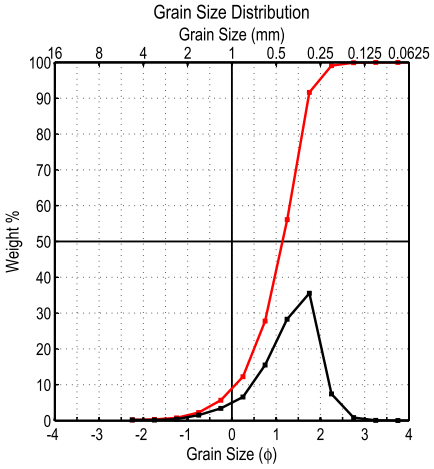
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2010**
Station	**KH-05b**
Interval	**LTT**
Mean	**0.470 mm**
STD	**0.443 mm**
Skewness	**-1.177**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	106.11
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	18.70
% $CaCO_3$	2.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.74	2.58	2.58
-1.5	-1.75	2.46	2.32	4.90
-1	-1.25	3.03	2.86	7.76
-0.5	-0.75	5.57	5.25	13.01
0	-0.25	6.04	5.69	18.70
0.5	0.25	6.51	6.14	24.83
1	0.75	8.66	8.16	32.99
1.5	1.25	10.19	9.60	42.60
2	1.75	49.52	46.67	89.27
2.5	2.25	6.86	6.46	95.73
3	2.75	4.28	4.03	99.76
3.5	3.25	0.19	0.18	99.94
4	3.75	0.04	0.04	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.735
16	-0.485
25	0.260
50	1.330
75	1.595
84	1.695
95	2.195
99	2.655

Moment Measures	(phi)	(mm)
Mean	1.090	0.470
Standard Deviation	1.175	0.443
Skewness	-1.177	
Kurtosis	3.661	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.605	0.847
Standard Deviation	1.090	1.140
Skewness (1)	-0.665	-0.612
Skewness (2)	-1.009	
Kurtosis	0.803	1.206



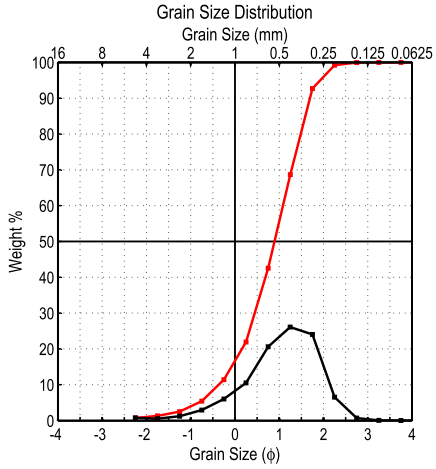
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**B2a**
Interval	**Grab**
Mean	**0.414 mm**
STD	**0.616 mm**
Skewness	**-1.088**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	104.05
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	5.67

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.18	0.17	0.17
-1.5	-1.75	0.17	0.16	0.34
-1	-1.25	0.41	0.39	0.73
-0.5	-0.75	1.58	1.52	2.25
0	-0.25	3.56	3.42	5.67
0.5	0.25	6.85	6.58	12.25
1	0.75	16.15	15.52	27.78
1.5	1.25	29.46	28.31	56.09
2	1.75	36.97	35.53	91.62
2.5	2.25	7.74	7.44	99.06
3	2.75	0.86	0.83	99.88
3.5	3.25	0.08	0.08	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.160
5	-0.350
16	0.370
25	0.660
50	1.140
75	1.515
84	1.645
95	1.975
99	2.245

Moment Measures	(phi)	(mm)
Mean	1.271	0.414
Standard Deviation	0.700	0.616
Skewness	-1.088	
Kurtosis	5.154	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.008	1.052
Standard Deviation	0.637	0.671
Skewness (1)	-0.208	-0.245
Skewness (2)	-0.514	
Kurtosis	0.824	1.114



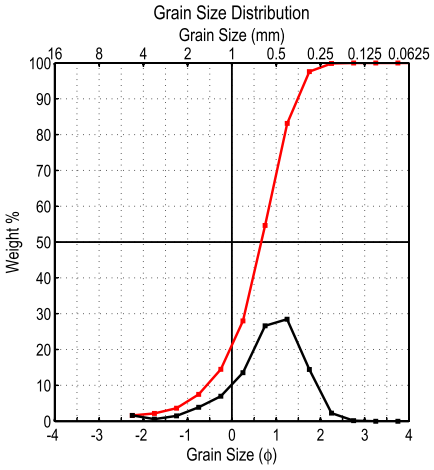
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**B2b**
Interval	**Grab**
Mean	**0.494 mm**
STD	**0.556 mm**
Skewness	**-0.965**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.78
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	11.44

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.78	0.75	0.75
-1.5	-1.75	0.56	0.54	1.29
-1	-1.25	1.25	1.20	2.50
-0.5	-0.75	3.04	2.93	5.42
0	-0.25	6.24	6.01	11.44
0.5	0.25	10.91	10.51	21.95
1	0.75	21.38	20.60	42.55
1.5	1.25	27.08	26.09	68.65
2	1.75	24.96	24.05	92.70
2.5	2.25	6.77	6.52	99.22
3	2.75	0.73	0.70	99.92
3.5	3.25	0.05	0.05	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.020
5	-0.825
16	-0.035
25	0.325
50	0.895
75	1.380
84	1.570
95	1.925
99	2.235

Moment Measures	(phi)	(mm)
Mean	1.018	0.494
Standard Deviation	0.846	0.556
Skewness	-0.965	
Kurtosis	4.459	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.767	0.810
Standard Deviation	0.802	0.818
Skewness (1)	-0.159	-0.205
Skewness (2)	-0.430	
Kurtosis	0.713	1.068



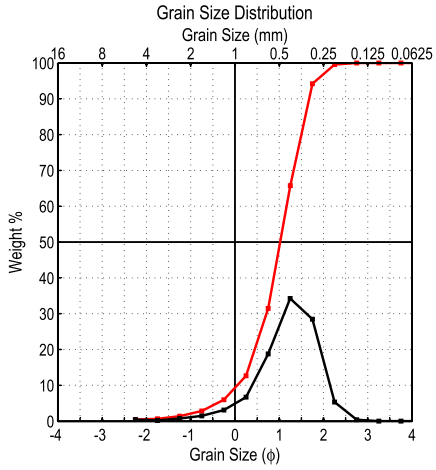
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**B2c**
Interval	**Grab**
Mean	**0.579 mm**
STD	**0.560 mm**
Skewness	**-1.131**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	101.68
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	14.47

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.62	1.59	1.59
-1.5	-1.75	0.57	0.56	2.15
-1	-1.25	1.49	1.47	3.62
-0.5	-0.75	3.93	3.87	7.48
0	-0.25	7.10	6.98	14.47
0.5	0.25	13.77	13.54	28.01
1	0.75	27.07	26.62	54.63
1.5	1.25	28.96	28.48	83.11
2	1.75	14.70	14.46	97.57
2.5	2.25	2.31	2.27	99.84
3	2.75	0.16	0.16	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.070
16	-0.195
25	0.140
50	0.665
75	1.110
84	1.280
95	1.660
99	2.065

Moment Measures	(phi)	(mm)
Mean	0.788	0.579
Standard Deviation	0.836	0.560
Skewness	-1.131	
Kurtosis	4.934	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.542	0.583
Standard Deviation	0.737	0.782
Skewness (1)	-0.166	-0.219
Skewness (2)	-0.502	
Kurtosis	0.851	1.153



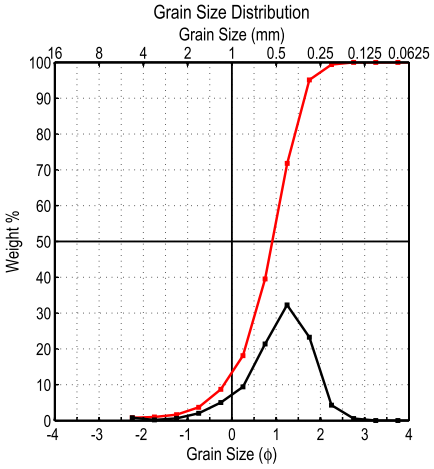
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**B2d**
Interval	**Grab**
Mean	**0.443 mm**
STD	**0.615 mm**
Skewness	**-1.329**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	100.65
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	5.97

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.45	0.45	0.45
-1.5	-1.75	0.21	0.21	0.66
-1	-1.25	0.74	0.74	1.39
-0.5	-0.75	1.49	1.48	2.87
0	-0.25	3.12	3.10	5.97
0.5	0.25	6.77	6.73	12.70
1	0.75	18.91	18.79	31.49
1.5	1.25	34.47	34.25	65.73
2	1.75	28.65	28.46	94.20
2.5	2.25	5.39	5.36	99.55
3	2.75	0.42	0.42	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.515
5	-0.405
16	0.340
25	0.575
50	1.020
75	1.415
84	1.570
95	1.825
99	2.200

Moment Measures	(phi)	(mm)
Mean	1.175	0.443
Standard Deviation	0.702	0.615
Skewness	-1.329	
Kurtosis	6.368	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.955	0.977
Standard Deviation	0.615	0.645
Skewness (1)	-0.106	-0.192
Skewness (2)	-0.504	
Kurtosis	0.813	1.088



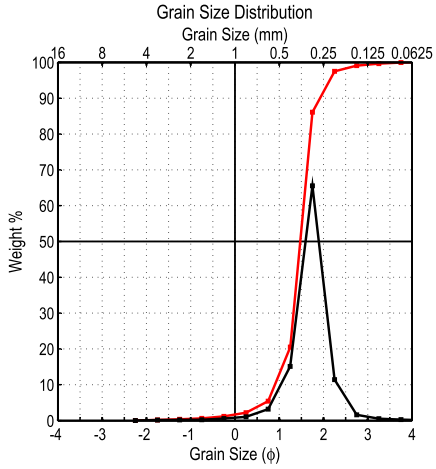
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**B2e**
Interval	**Grab**
Mean	**0.483 mm**
STD	**0.591 mm**
Skewness	**-1.162**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	100.04
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	8.74

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.81	0.81	0.81
-1.5	-1.75	0.20	0.20	1.01
-1	-1.25	0.64	0.64	1.65
-0.5	-0.75	2.05	2.05	3.70
0	-0.25	5.04	5.04	8.74
0.5	0.25	9.41	9.41	18.14
1	0.75	21.38	21.37	39.51
1.5	1.25	32.28	32.27	71.78
2	1.75	23.30	23.29	95.07
2.5	2.25	4.30	4.30	99.37
3	2.75	0.60	0.60	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.775
5	-0.620
16	0.135
25	0.410
50	0.910
75	1.320
84	1.510
95	1.750
99	2.205

Moment Measures	(phi)	(mm)
Mean	1.051	0.483
Standard Deviation	0.759	0.591
Skewness	-1.162	
Kurtosis	5.623	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.822	0.852
Standard Deviation	0.688	0.703
Skewness (1)	-0.127	-0.209
Skewness (2)	-0.502	
Kurtosis	0.724	1.067



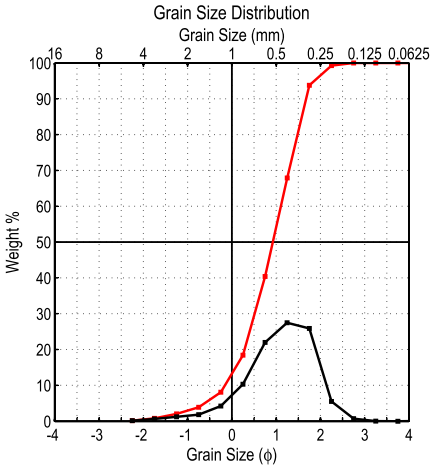
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**B3a**
Interval	**Grab**
Mean	**0.311 mm**
STD	**0.712 mm**
Skewness	**-1.483**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	107.36
% finer than 4.00 phi	0.07
% coarser than -1.00 phi	1.18

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.02	0.02	0.02
-1.5	-1.75	0.17	0.16	0.18
-1	-1.25	0.22	0.20	0.38
-0.5	-0.75	0.25	0.23	0.61
0	-0.25	0.61	0.57	1.18
0.5	0.25	1.11	1.03	2.22
1	0.75	3.43	3.19	5.41
1.5	1.25	16.24	15.13	20.54
2	1.75	70.36	65.54	86.07
2.5	2.25	12.27	11.43	97.50
3	2.75	1.71	1.59	99.10
3.5	3.25	0.58	0.54	99.64
4	3.75	0.32	0.30	99.93
>4.0	4.25	0.07	0.07	100.00

Percentiles	
1	-0.410
5	0.685
16	1.100
25	1.285
50	1.475
75	1.665
84	1.735
95	2.140
99	2.720

Moment Measures	(phi)	(mm)
Mean	1.686	0.311
Standard Deviation	0.490	0.712
Skewness	-1.483	
Kurtosis	13.926	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.418	1.437
Standard Deviation	0.317	0.379
Skewness (1)	-0.181	-0.134
Skewness (2)	-0.197	
Kurtosis	1.291	1.569



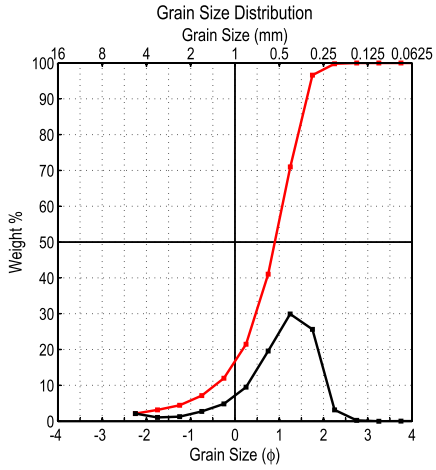
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**B3b**
Interval	**Grab**
Mean	**0.474 mm**
STD	**0.588 mm**
Skewness	**-0.944**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	100.15
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	8.10

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.15	0.15	0.15
-1.5	-1.75	0.64	0.64	0.79
-1	-1.25	1.24	1.24	2.03
-0.5	-0.75	1.84	1.84	3.86
0	-0.25	4.24	4.23	8.10
0.5	0.25	10.34	10.32	18.42
1	0.75	22.01	21.98	40.40
1.5	1.25	27.52	27.48	67.88
2	1.75	25.93	25.89	93.77
2.5	2.25	5.50	5.49	99.26
3	2.75	0.71	0.71	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.665
5	-0.615
16	0.135
25	0.400
50	0.925
75	1.390
84	1.560
95	1.860
99	2.225

Moment Measures	(phi)	(mm)
Mean	1.077	0.474
Standard Deviation	0.767	0.588
Skewness	-0.944	
Kurtosis	4.545	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.847	0.873
Standard Deviation	0.713	0.731
Skewness (1)	-0.109	-0.177
Skewness (2)	-0.425	
Kurtosis	0.737	1.025



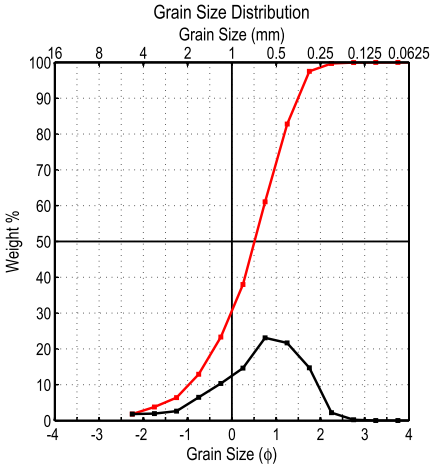
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**B3c**
Interval	**Grab**
Mean	**0.515 mm**
STD	**0.536 mm**
Skewness	**-1.474**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	105.74
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	11.99

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.23	2.11	2.11
-1.5	-1.75	1.12	1.06	3.17
-1	-1.25	1.35	1.28	4.44
-0.5	-0.75	2.86	2.70	7.15
0	-0.25	5.12	4.84	11.99
0.5	0.25	10.03	9.49	21.48
1	0.75	20.69	19.57	41.04
1.5	1.25	31.65	29.93	70.98
2	1.75	27.10	25.63	96.60
2.5	2.25	3.33	3.15	99.75
3	2.75	0.26	0.25	100.00
3.5	3.25	-0.03	-0.03	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.145
16	-0.040
25	0.340
50	0.900
75	1.330
84	1.505
95	1.720
99	2.130

Moment Measures	(phi)	(mm)
Mean	0.957	0.515
Standard Deviation	0.900	0.536
Skewness	-1.474	
Kurtosis	5.619	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.732	0.788
Standard Deviation	0.772	0.820
Skewness (1)	-0.217	-0.322
Skewness (2)	-0.793	
Kurtosis	0.854	1.186



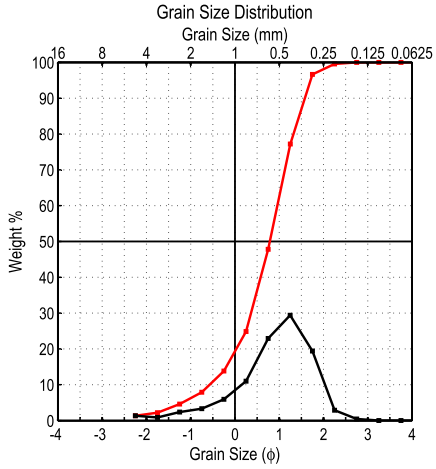
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**B3d**
Interval	**Grab**
Mean	**0.653 mm**
STD	**0.513 mm**
Skewness	**-0.774**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	105.86
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	23.31

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.93	1.82	1.82
-1.5	-1.75	2.07	1.96	3.78
-1	-1.25	2.80	2.65	6.42
-0.5	-0.75	6.90	6.52	12.94
0	-0.25	10.98	10.37	23.31
0.5	0.25	15.53	14.67	37.98
1	0.75	24.45	23.10	61.08
1.5	1.25	22.97	21.70	82.78
2	1.75	15.59	14.73	97.51
2.5	2.25	2.32	2.19	99.70
3	2.75	0.27	0.26	99.95
3.5	3.25	0.02	0.02	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.520
16	-0.605
25	-0.195
50	0.510
75	1.070
84	1.290
95	1.665
99	2.090

Moment Measures	(phi)	(mm)
Mean	0.614	0.653
Standard Deviation	0.962	0.513
Skewness	-0.774	
Kurtosis	3.474	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.343	0.398
Standard Deviation	0.948	0.956
Skewness (1)	-0.177	-0.226
Skewness (2)	-0.462	
Kurtosis	0.681	1.032



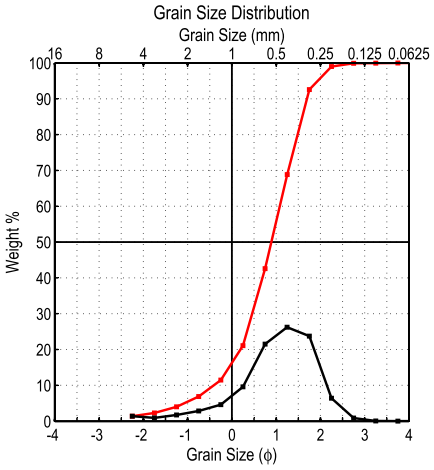
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**B3e**
Interval	**Grab**
Mean	**0.547 mm**
STD	**0.544 mm**
Skewness	**-1.161**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	100.14
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	13.85

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.36	1.36	1.36
-1.5	-1.75	0.86	0.86	2.22
-1	-1.25	2.39	2.39	4.60
-0.5	-0.75	3.32	3.32	7.92
0	-0.25	5.94	5.93	13.85
0.5	0.25	11.02	11.00	24.86
1	0.75	22.98	22.95	47.80
1.5	1.25	29.44	29.40	77.20
2	1.75	19.46	19.43	96.63
2.5	2.25	2.90	2.90	99.53
3	2.75	0.43	0.43	99.96
3.5	3.25	0.03	0.03	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.190
16	-0.150
25	0.255
50	0.785
75	1.215
84	1.425
95	1.710
99	2.160

Moment Measures	(phi)	(mm)
Mean	0.870	0.547
Standard Deviation	0.878	0.544
Skewness	-1.161	
Kurtosis	4.725	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.637	0.687
Standard Deviation	0.787	0.833
Skewness (1)	-0.187	-0.275
Skewness (2)	-0.667	
Kurtosis	0.841	1.238



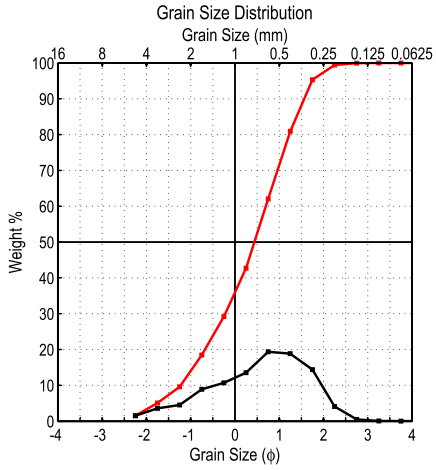
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**BC-E2a**
Interval	**Grab**
Mean	**0.500 mm**
STD	**0.535 mm**
Skewness	**-1.160**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.21
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	11.49

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.43	1.40	1.40
-1.5	-1.75	0.93	0.91	2.31
-1	-1.25	1.76	1.72	4.03
-0.5	-0.75	2.90	2.84	6.87
0	-0.25	4.72	4.62	11.49
0.5	0.25	9.80	9.59	21.07
1	0.75	21.98	21.50	42.58
1.5	1.25	26.83	26.25	68.83
2	1.75	24.27	23.75	92.57
2.5	2.25	6.55	6.41	98.98
3	2.75	0.92	0.90	99.88
3.5	3.25	0.07	0.07	99.95
4	3.75	0.03	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.080
16	-0.015
25	0.340
50	0.890
75	1.380
84	1.570
95	1.940
99	2.260

Moment Measures	(phi)	(mm)
Mean	1.000	0.500
Standard Deviation	0.903	0.535
Skewness	-1.160	
Kurtosis	4.971	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.778	0.815
Standard Deviation	0.792	0.854
Skewness (1)	-0.142	-0.223
Skewness (2)	-0.580	
Kurtosis	0.905	1.190



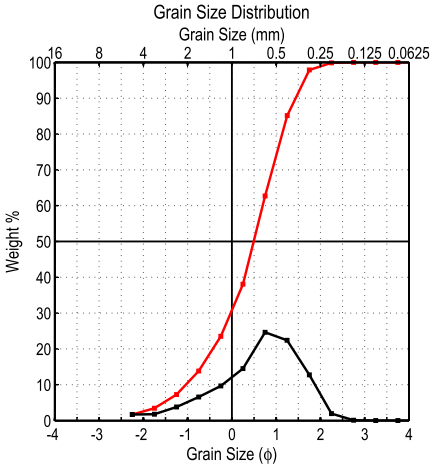
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**BC-E2b**
Interval	**Grab**
Mean	**0.693 mm**
STD	**0.477 mm**
Skewness	**-0.509**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	102.42
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	29.17

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.55	1.51	1.51
-1.5	-1.75	3.66	3.57	5.09
-1	-1.25	4.62	4.51	9.60
-0.5	-0.75	9.10	8.88	18.48
0	-0.25	10.95	10.69	29.17
0.5	0.25	13.87	13.54	42.72
1	0.75	19.82	19.35	62.07
1.5	1.25	19.31	18.85	80.92
2	1.75	14.75	14.40	95.32
2.5	2.25	4.19	4.09	99.41
3	2.75	0.52	0.51	99.92
3.5	3.25	0.05	0.05	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.760
16	-0.890
25	-0.445
50	0.440
75	1.095
84	1.355
95	1.740
99	2.200

Moment Measures	(phi)	(mm)
Mean	0.529	0.693
Standard Deviation	1.068	0.477
Skewness	-0.509	
Kurtosis	2.700	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.232	0.302
Standard Deviation	1.123	1.092
Skewness (1)	-0.185	-0.221
Skewness (2)	-0.401	
Kurtosis	0.559	0.931



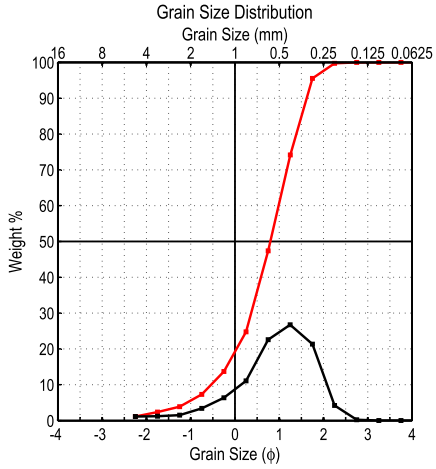
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**BC-E2c**
Interval	**Grab**
Mean	**0.668 mm**
STD	**0.518 mm**
Skewness	**-0.794**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	102.09
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	23.52

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.71	1.67	1.67
-1.5	-1.75	1.81	1.77	3.45
-1	-1.25	3.89	3.81	7.26
-0.5	-0.75	6.73	6.59	13.85
0	-0.25	9.87	9.67	23.52
0.5	0.25	14.84	14.54	38.05
1	0.75	25.18	24.66	62.72
1.5	1.25	22.90	22.43	85.15
2	1.75	13.01	12.74	97.89
2.5	2.25	2.01	1.97	99.86
3	2.75	0.12	0.12	99.98
3.5	3.25	0.01	0.01	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.545
16	-0.640
25	-0.200
50	0.490
75	1.025
84	1.225
95	1.635
99	2.030

Moment Measures	(phi)	(mm)
Mean	0.583	0.668
Standard Deviation	0.949	0.518
Skewness	-0.794	
Kurtosis	3.402	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.292	0.358
Standard Deviation	0.933	0.948
Skewness (1)	-0.212	-0.246
Skewness (2)	-0.477	
Kurtosis	0.705	1.064



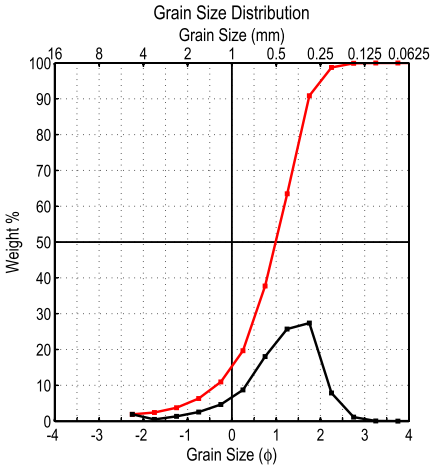
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**BC-E2d**
Interval	**Grab**
Mean	**0.536 mm**
STD	**0.543 mm**
Skewness	**-1.104**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	105.80
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	13.71

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.21	1.14	1.14
-1.5	-1.75	1.30	1.23	2.37
-1	-1.25	1.62	1.53	3.90
-0.5	-0.75	3.63	3.43	7.33
0	-0.25	6.75	6.38	13.71
0.5	0.25	11.72	11.08	24.79
1	0.75	23.91	22.60	47.39
1.5	1.25	28.31	26.76	74.15
2	1.75	22.59	21.35	95.50
2.5	2.25	4.48	4.23	99.74
3	2.75	0.24	0.23	99.96
3.5	3.25	0.02	0.02	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.090
16	-0.145
25	0.255
50	0.800
75	1.270
84	1.480
95	1.740
99	2.165

Moment Measures	(phi)	(mm)
Mean	0.900	0.536
Standard Deviation	0.880	0.543
Skewness	-1.104	
Kurtosis	4.575	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.667	0.712
Standard Deviation	0.813	0.835
Skewness (1)	-0.163	-0.249
Skewness (2)	-0.585	
Kurtosis	0.742	1.143



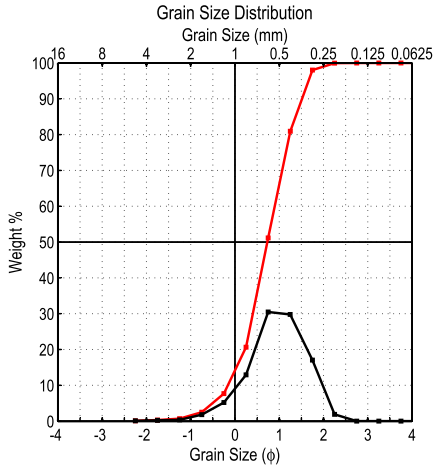
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**BC-E2e**
Interval	**Grab**
Mean	**0.476 mm**
STD	**0.528 mm**
Skewness	**-1.291**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	101.88
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	10.96

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.96	1.92	1.92
-1.5	-1.75	0.49	0.48	2.40
-1	-1.25	1.39	1.36	3.77
-0.5	-0.75	2.60	2.55	6.32
0	-0.25	4.73	4.64	10.96
0.5	0.25	8.89	8.73	19.69
1	0.75	18.38	18.04	37.73
1.5	1.25	26.22	25.74	63.47
2	1.75	27.91	27.39	90.86
2.5	2.25	8.01	7.86	98.72
3	2.75	1.18	1.16	99.88
3.5	3.25	0.08	0.08	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.010
16	0.040
25	0.395
50	0.990
75	1.460
84	1.625
95	2.015
99	2.370

Moment Measures	(phi)	(mm)
Mean	1.072	0.476
Standard Deviation	0.922	0.528
Skewness	-1.291	
Kurtosis	5.327	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.833	0.885
Standard Deviation	0.792	0.855
Skewness (1)	-0.199	-0.261
Skewness (2)	-0.615	
Kurtosis	0.909	1.164



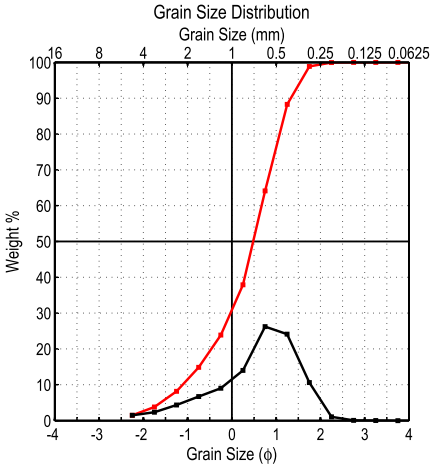
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**BC-E2f**
Interval	**Grab**
Mean	**0.521 mm**
STD	**0.638 mm**
Skewness	**-0.690**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	100.42
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.72

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.11	0.11	0.11
-1.5	-1.75	0.22	0.22	0.33
-1	-1.25	0.37	0.37	0.70
-0.5	-0.75	1.83	1.82	2.52
0	-0.25	5.22	5.20	7.72
0.5	0.25	13.00	12.95	20.66
1	0.75	30.61	30.48	51.15
1.5	1.25	29.93	29.80	80.95
2	1.75	17.14	17.07	98.02
2.5	2.25	1.93	1.92	99.94
3	2.75	0.03	0.03	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.165
5	-0.510
16	0.070
25	0.320
50	0.730
75	1.150
84	1.340
95	1.660
99	2.005

Moment Measures	(phi)	(mm)
Mean	0.940	0.521
Standard Deviation	0.648	0.638
Skewness	-0.690	
Kurtosis	4.225	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.705	0.713
Standard Deviation	0.635	0.646
Skewness (1)	-0.039	-0.091
Skewness (2)	-0.244	
Kurtosis	0.709	1.071



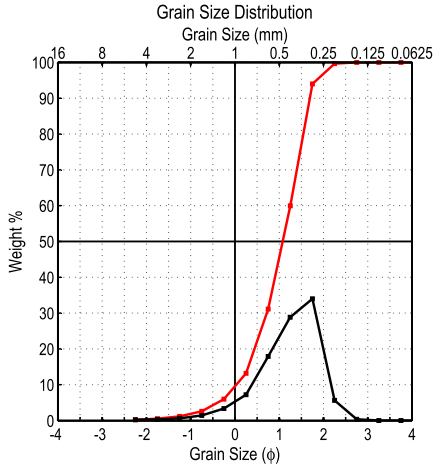
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**BC-E2g**
Interval	**Grab**
Mean	**0.686 mm**
STD	**0.522 mm**
Skewness	**-0.867**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	114.29
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	23.89

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.67	1.46	1.46
-1.5	-1.75	2.69	2.35	3.81
-1	-1.25	4.99	4.37	8.18
-0.5	-0.75	7.65	6.69	14.87
0	-0.25	10.30	9.01	23.89
0.5	0.25	16.00	14.00	37.89
1	0.75	29.97	26.22	64.11
1.5	1.25	27.60	24.15	88.26
2	1.75	12.14	10.62	98.88
2.5	2.25	1.22	1.07	99.95
3	2.75	0.05	0.04	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.615
16	-0.690
25	-0.210
50	0.480
75	0.975
84	1.160
95	1.565
99	1.805

Moment Measures	(phi)	(mm)
Mean	0.544	0.686
Standard Deviation	0.938	0.522
Skewness	-0.867	
Kurtosis	3.374	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.235	0.317
Standard Deviation	0.925	0.944
Skewness (1)	-0.265	-0.291
Skewness (2)	-0.546	
Kurtosis	0.719	1.100



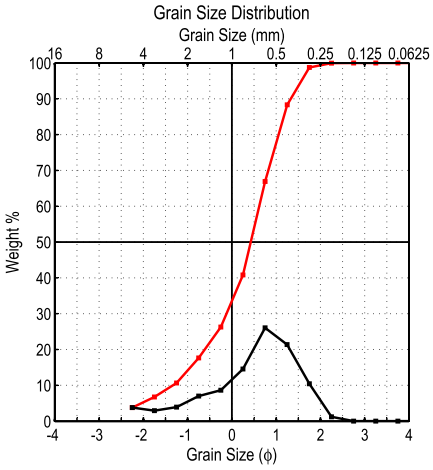
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**BC-E2h**
Interval	**Grab**
Mean	**0.433 mm**
STD	**0.614 mm**
Skewness	**-1.227**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	101.59
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	5.97

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.25	0.25	0.25
-1.5	-1.75	0.31	0.31	0.55
-1	-1.25	0.63	0.62	1.17
-0.5	-0.75	1.45	1.43	2.60
0	-0.25	3.42	3.37	5.97
0.5	0.25	7.36	7.24	13.21
1	0.75	18.19	17.91	31.12
1.5	1.25	29.30	28.84	59.96
2	1.75	34.56	34.02	93.98
2.5	2.25	5.73	5.64	99.62
3	2.75	0.35	0.34	99.96
3.5	3.25	0.02	0.02	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.390
5	-0.395
16	0.330
25	0.580
50	1.075
75	1.470
84	1.605
95	1.840
99	2.195

Moment Measures	(phi)	(mm)
Mean	1.208	0.433
Standard Deviation	0.704	0.614
Skewness	-1.227	
Kurtosis	5.583	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.968	1.003
Standard Deviation	0.637	0.657
Skewness (1)	-0.169	-0.242
Skewness (2)	-0.553	
Kurtosis	0.753	1.029



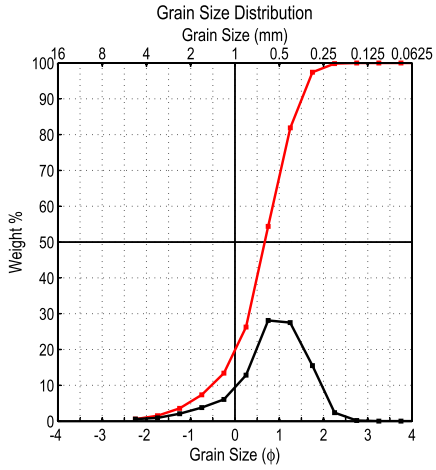
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**BC-E2i**
Interval	**Grab**
Mean	**0.731 mm**
STD	**0.490 mm**
Skewness	**-0.895**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	103.75
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	26.28

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.94	3.80	3.80
-1.5	-1.75	3.05	2.94	6.74
-1	-1.25	4.06	3.91	10.65
-0.5	-0.75	7.26	7.00	17.65
0	-0.25	8.96	8.64	26.28
0.5	0.25	15.09	14.54	40.83
1	0.75	27.06	26.08	66.91
1.5	1.25	22.18	21.38	88.29
2	1.75	10.82	10.43	98.72
2.5	2.25	1.26	1.21	99.93
3	2.75	0.04	0.04	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.045
16	-0.870
25	-0.325
50	0.425
75	0.940
84	1.150
95	1.570
99	1.865

Moment Measures	(phi)	(mm)
Mean	0.451	0.731
Standard Deviation	1.030	0.490
Skewness	-0.895	
Kurtosis	3.331	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.140	0.235
Standard Deviation	1.010	1.053
Skewness (1)	-0.282	-0.324
Skewness (2)	-0.656	
Kurtosis	0.790	1.171



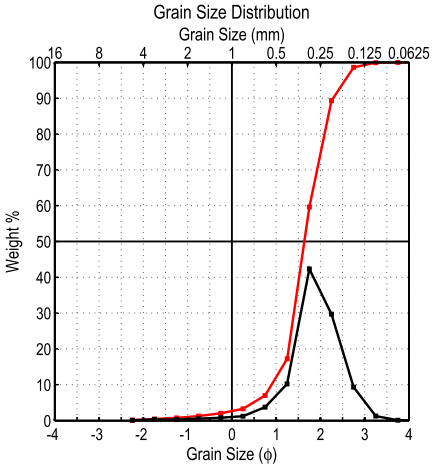
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**BC-E2j**
Interval	**Grab**
Mean	**0.567 mm**
STD	**0.571 mm**
Skewness	**-0.977**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	109.04
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	13.43

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.64	0.59	0.59
-1.5	-1.75	1.00	0.92	1.50
-1	-1.25	2.26	2.07	3.58
-0.5	-0.75	4.14	3.80	7.37
0	-0.25	6.60	6.05	13.43
0.5	0.25	13.99	12.83	26.26
1	0.75	30.66	28.12	54.37
1.5	1.25	30.00	27.51	81.89
2	1.75	16.92	15.52	97.40
2.5	2.25	2.61	2.39	99.80
3	2.75	0.19	0.17	99.97
3.5	3.25	0.01	0.01	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.025
5	-1.065
16	-0.150
25	0.200
50	0.670
75	1.125
84	1.320
95	1.675
99	2.085

Moment Measures	(phi)	(mm)
Mean	0.819	0.567
Standard Deviation	0.808	0.571
Skewness	-0.977	
Kurtosis	4.440	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.585	0.613
Standard Deviation	0.735	0.783
Skewness (1)	-0.116	-0.191
Skewness (2)	-0.497	
Kurtosis	0.864	1.214



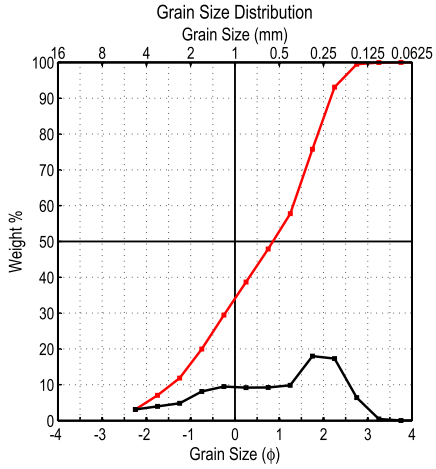
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NSS-01a**
Interval	**Swash**
Mean	**0.277 mm**
STD	**0.635 mm**
Skewness	**-1.707**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	114.04
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	2.05

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.14	0.12	0.12
-1.5	-1.75	0.36	0.32	0.44
-1	-1.25	0.34	0.30	0.74
-0.5	-0.75	0.60	0.53	1.26
0	-0.25	0.90	0.79	2.05
0.5	0.25	1.40	1.23	3.28
1	0.75	4.27	3.74	7.02
1.5	1.25	11.69	10.25	17.27
2	1.75	48.28	42.34	59.61
2.5	2.25	33.87	29.70	89.31
3	2.75	10.62	9.31	98.62
3.5	3.25	1.45	1.27	99.89
4	3.75	0.11	0.10	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.000
5	0.480
16	1.190
25	1.340
50	1.635
75	2.010
84	2.160
95	2.555
99	2.900

Moment Measures	(phi)	(mm)
Mean	1.852	0.277
Standard Deviation	0.656	0.635
Skewness	-1.707	
Kurtosis	9.892	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.675	1.662
Standard Deviation	0.485	0.557
Skewness (1)	0.082	-0.015
Skewness (2)	-0.242	
Kurtosis	1.139	1.269



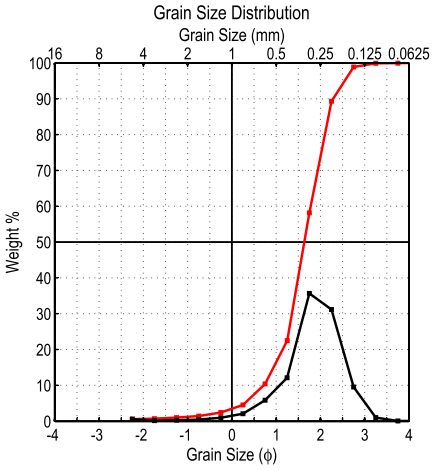
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NSS-01b**
Interval	**LTT**
Mean	**0.562 mm**
STD	**0.385 mm**
Skewness	**-0.493**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	106.18
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	29.46

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.28	3.09	3.09
-1.5	-1.75	4.21	3.96	7.05
-1	-1.25	5.11	4.81	11.87
-0.5	-0.75	8.61	8.11	19.98
0	-0.25	10.07	9.48	29.46
0.5	0.25	9.78	9.21	38.67
1	0.75	9.82	9.25	47.92
1.5	1.25	10.46	9.85	57.77
2	1.75	19.09	17.98	75.75
2.5	2.25	18.39	17.32	93.07
3	2.75	6.79	6.39	99.46
3.5	3.25	0.49	0.46	99.92
4	3.75	0.04	0.04	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-2.250
5	-2.010
16	-0.995
25	-0.485
50	0.855
75	1.730
84	1.990
95	2.400
99	2.715

Moment Measures	(phi)	(mm)
Mean	0.830	0.562
Standard Deviation	1.378	0.385
Skewness	-0.493	
Kurtosis	2.225	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.497	0.617
Standard Deviation	1.492	1.414
Skewness (1)	-0.240	-0.269
Skewness (2)	-0.442	
Kurtosis	0.477	0.816



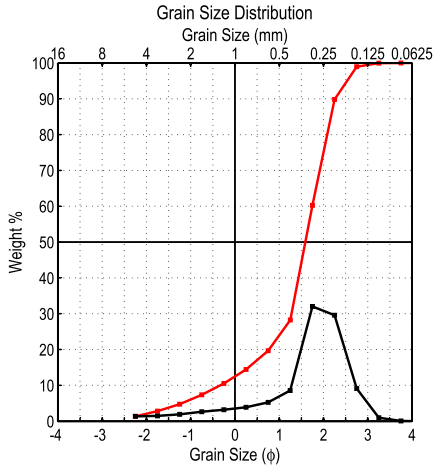
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NSS-02a**
Interval	**Swash**
Mean	**0.287 mm**
STD	**0.602 mm**
Skewness	**-1.769**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	101.90
% finer than 4.00 phi	0.05
% coarser than -1.00 phi	2.42

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.57	0.56	0.56
-1.5	-1.75	0.16	0.16	0.72
-1	-1.25	0.29	0.28	1.00
-0.5	-0.75	0.45	0.44	1.44
0	-0.25	1.00	0.98	2.42
0.5	0.25	2.13	2.09	4.51
1	0.75	5.98	5.87	10.38
1.5	1.25	12.33	12.10	22.48
2	1.75	36.34	35.66	58.15
2.5	2.25	31.76	31.17	89.31
3	2.75	9.74	9.56	98.87
3.5	3.25	1.03	1.01	99.88
4	3.75	0.07	0.07	99.95
>4.0	4.25	0.05	0.05	100.00

Percentiles	
1	-1.250
5	0.290
16	0.980
25	1.285
50	1.635
75	2.020
84	2.165
95	2.545
99	2.815

Moment Measures	(phi)	(mm)
Mean	1.802	0.287
Standard Deviation	0.733	0.602
Skewness	-1.769	
Kurtosis	9.486	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.573	1.593
Standard Deviation	0.593	0.638
Skewness (1)	-0.105	-0.149
Skewness (2)	-0.367	
Kurtosis	0.903	1.257



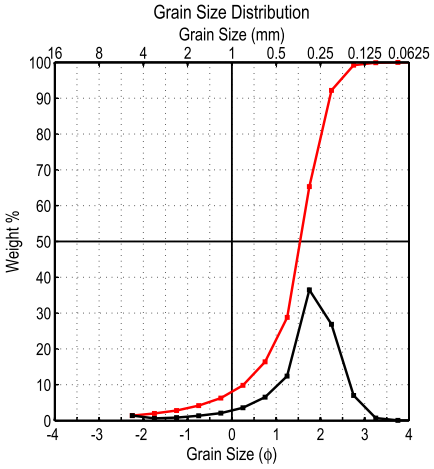
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NSS-02b**
Interval	**LTT**
Mean	**0.339 mm**
STD	**0.472 mm**
Skewness	**-1.588**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	112.95
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	10.53

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.53	1.35	1.35
-1.5	-1.75	1.65	1.46	2.82
-1	-1.25	2.16	1.91	4.73
-0.5	-0.75	2.96	2.62	7.35
0	-0.25	3.59	3.18	10.53
0.5	0.25	4.40	3.90	14.42
1	0.75	5.93	5.25	19.67
1.5	1.25	9.69	8.58	28.25
2	1.75	36.15	32.01	60.26
2.5	2.25	33.40	29.57	89.83
3	2.75	10.30	9.12	98.95
3.5	3.25	1.10	0.97	99.92
4	3.75	0.07	0.06	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.200
16	0.400
25	1.060
50	1.590
75	2.000
84	2.150
95	2.535
99	2.775

Moment Measures	(phi)	(mm)
Mean	1.560	0.339
Standard Deviation	1.084	0.472
Skewness	-1.588	
Kurtosis	5.345	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.275	1.380
Standard Deviation	0.875	1.003
Skewness (1)	-0.360	-0.427
Skewness (2)	-1.054	
Kurtosis	1.134	1.628



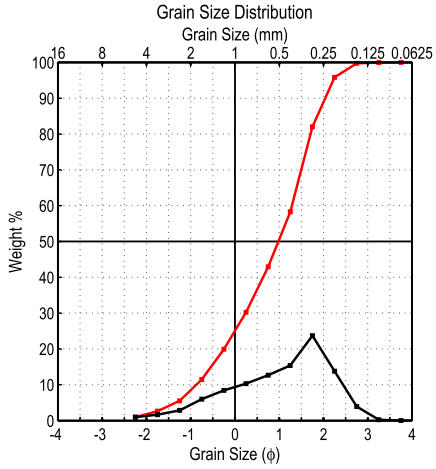
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NSS-03a**
Interval	**Swash**
Mean	**0.328 mm**
STD	**0.527 mm**
Skewness	**-1.841**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	101.40
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	6.27

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.43	1.41	1.41
-1.5	-1.75	0.61	0.60	2.01
-1	-1.25	0.83	0.82	2.83
-0.5	-0.75	1.39	1.37	4.20
0	-0.25	2.10	2.07	6.27
0.5	0.25	3.64	3.59	9.86
1	0.75	6.63	6.54	16.40
1.5	1.25	12.59	12.42	28.82
2	1.75	36.99	36.48	65.30
2.5	2.25	27.25	26.87	92.17
3	2.75	7.12	7.02	99.19
3.5	3.25	0.73	0.72	99.91
4	3.75	0.06	0.06	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-0.555
16	0.720
25	1.095
50	1.540
75	1.930
84	2.100
95	2.450
99	2.735

Moment Measures	(phi)	(mm)
Mean	1.608	0.328
Standard Deviation	0.925	0.527
Skewness	-1.841	
Kurtosis	7.514	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.410	1.453
Standard Deviation	0.690	0.800
Skewness (1)	-0.188	-0.291
Skewness (2)	-0.859	
Kurtosis	1.178	1.475



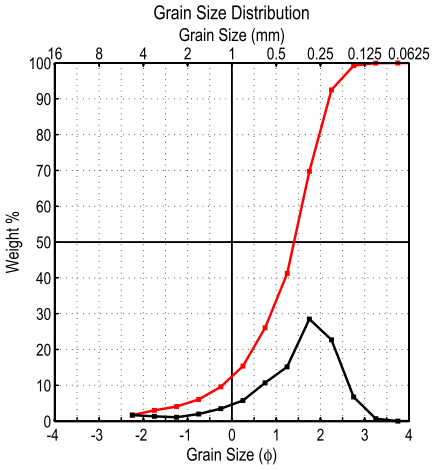
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NSS-03b**
Interval	**LTT**
Mean	**0.499 mm**
STD	**0.461 mm**
Skewness	**-0.663**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	110.31
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	19.93

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.08	0.98	0.98
-1.5	-1.75	1.84	1.67	2.65
-1	-1.25	3.15	2.86	5.50
-0.5	-0.75	6.61	5.99	11.49
0	-0.25	9.30	8.43	19.93
0.5	0.25	11.38	10.32	30.24
1	0.75	13.97	12.66	42.91
1.5	1.25	16.98	15.39	58.30
2	1.75	26.15	23.71	82.01
2.5	2.25	15.22	13.80	95.80
3	2.75	4.31	3.91	99.71
3.5	3.25	0.26	0.24	99.95
4	3.75	0.03	0.03	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.245
5	-1.340
16	-0.485
25	-0.005
50	0.980
75	1.600
84	1.820
95	2.220
99	2.660

Moment Measures	(phi)	(mm)
Mean	1.003	0.499
Standard Deviation	1.118	0.461
Skewness	-0.663	
Kurtosis	2.862	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.667	0.772
Standard Deviation	1.152	1.116
Skewness (1)	-0.271	-0.287
Skewness (2)	-0.469	
Kurtosis	0.544	0.909



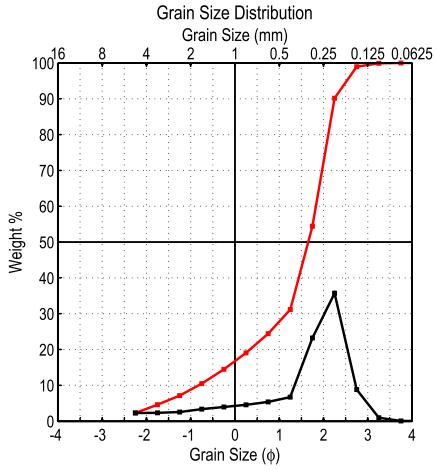
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NSS-04a**
Interval	**Swash**
Mean	**0.377 mm**
STD	**0.484 mm**
Skewness	**-1.362**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	111.75
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	9.60

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.88	1.68	1.68
-1.5	-1.75	1.50	1.34	3.02
-1	-1.25	1.20	1.07	4.10
-0.5	-0.75	2.22	1.99	6.09
0	-0.25	3.93	3.52	9.60
0.5	0.25	6.45	5.77	15.37
1	0.75	11.95	10.69	26.07
1.5	1.25	16.96	15.18	41.24
2	1.75	31.85	28.50	69.74
2.5	2.25	25.39	22.72	92.47
3	2.75	7.56	6.77	99.23
3.5	3.25	0.80	0.72	99.95
4	3.75	0.04	0.04	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.025
16	0.280
25	0.700
50	1.405
75	1.865
84	2.065
95	2.435
99	2.735

Moment Measures	(phi)	(mm)
Mean	1.407	0.377
Standard Deviation	1.047	0.484
Skewness	-1.362	
Kurtosis	5.118	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.172	1.250
Standard Deviation	0.893	0.970
Skewness (1)	-0.261	-0.333
Skewness (2)	-0.784	
Kurtosis	0.938	1.217



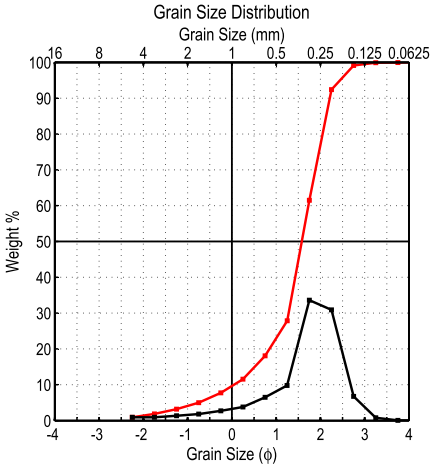
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NSS-04b**
Interval	**LTT**
Mean	**0.362 mm**
STD	**0.423 mm**
Skewness	**-1.400**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	113.34
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	14.50

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.59	2.29	2.29
-1.5	-1.75	2.63	2.32	4.61
-1	-1.25	2.89	2.55	7.16
-0.5	-0.75	3.80	3.35	10.51
0	-0.25	4.52	3.99	14.50
0.5	0.25	5.17	4.56	19.06
1	0.75	6.09	5.37	24.43
1.5	1.25	7.62	6.72	31.15
2	1.75	26.35	23.25	54.40
2.5	2.25	40.50	35.73	90.14
3	2.75	9.97	8.80	98.93
3.5	3.25	1.11	0.98	99.91
4	3.75	0.06	0.05	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-2.250
5	-1.675
16	-0.085
25	0.790
50	1.655
75	2.040
84	2.165
95	2.525
99	2.785

Moment Measures	(phi)	(mm)
Mean	1.465	0.362
Standard Deviation	1.243	0.423
Skewness	-1.400	
Kurtosis	4.192	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.040	1.245
Standard Deviation	1.125	1.199
Skewness (1)	-0.547	-0.566
Skewness (2)	-1.093	
Kurtosis	0.867	1.377



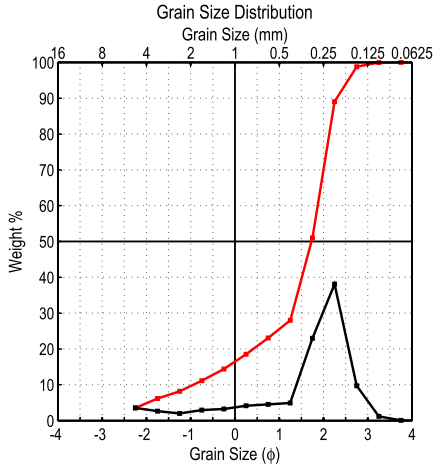
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NSS-05a**
Interval	**Swash**
Mean	**0.329 mm**
STD	**0.513 mm**
Skewness	**-1.692**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	110.41
% finer than 4.00 phi	0.05
% coarser than -1.00 phi	7.74

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.01	0.91	0.91
-1.5	-1.75	1.03	0.93	1.85
-1	-1.25	1.48	1.34	3.19
-0.5	-0.75	2.00	1.81	5.00
0	-0.25	3.03	2.74	7.74
0.5	0.25	4.21	3.81	11.56
1	0.75	7.19	6.51	18.07
1.5	1.25	10.80	9.78	27.85
2	1.75	37.13	33.63	61.48
2.5	2.25	34.12	30.90	92.38
3	2.75	7.44	6.74	99.12
3.5	3.25	0.87	0.79	99.91
4	3.75	0.05	0.05	99.95
>4.0	4.25	0.05	0.05	100.00

Percentiles	
1	-2.205
5	-0.750
16	0.590
25	1.105
50	1.580
75	1.970
84	2.115
95	2.445
99	2.740

Moment Measures	(phi)	(mm)
Mean	1.605	0.329
Standard Deviation	0.962	0.513
Skewness	-1.692	
Kurtosis	6.301	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.353	1.428
Standard Deviation	0.763	0.865
Skewness (1)	-0.298	-0.378
Skewness (2)	-0.961	
Kurtosis	1.095	1.514



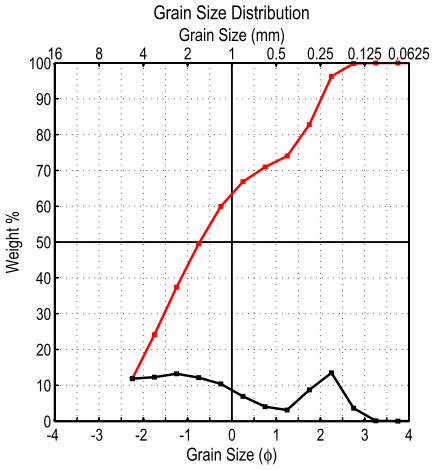
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NSS-05b**
Interval	**LTT**
Mean	**0.356 mm**
STD	**0.406 mm**
Skewness	**-1.516**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	104.20
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	14.38

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.68	3.53	3.53
-1.5	-1.75	2.74	2.63	6.16
-1	-1.25	2.10	2.02	8.18
-0.5	-0.75	3.07	2.95	11.12
0	-0.25	3.39	3.25	14.38
0.5	0.25	4.33	4.16	18.53
1	0.75	4.73	4.54	23.07
1.5	1.25	5.11	4.90	27.98
2	1.75	23.96	22.99	50.97
2.5	2.25	39.67	38.07	89.04
3	2.75	10.13	9.72	98.76
3.5	3.25	1.22	1.17	99.93
4	3.75	0.05	0.05	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.970
16	-0.055
25	0.945
50	1.730
75	2.065
84	2.185
95	2.555
99	2.850

Moment Measures	(phi)	(mm)
Mean	1.492	0.356
Standard Deviation	1.300	0.406
Skewness	-1.516	
Kurtosis	4.426	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.065	1.287
Standard Deviation	1.120	1.246
Skewness (1)	-0.594	-0.615
Skewness (2)	-1.283	
Kurtosis	1.020	1.656



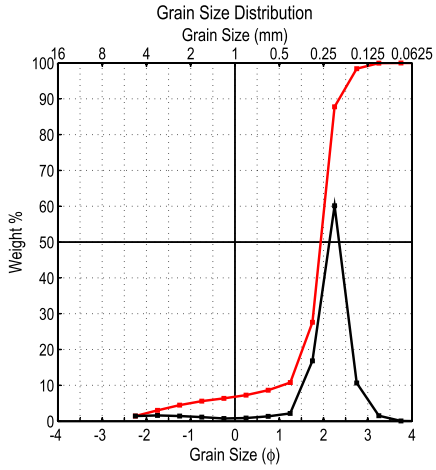
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-01a**
Interval	**Swash**
Mean	**1.085 mm**
STD	**0.330 mm**
Skewness	**0.361**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	107.63
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	59.95

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	12.77	11.86	11.86
-1.5	-1.75	13.22	12.28	24.15
-1	-1.25	14.23	13.22	37.37
-0.5	-0.75	13.10	12.17	49.54
0	-0.25	11.20	10.41	59.95
0.5	0.25	7.45	6.92	66.87
1	0.75	4.38	4.07	70.94
1.5	1.25	3.34	3.10	74.04
2	1.75	9.39	8.72	82.77
2.5	2.25	14.50	13.47	96.24
3	2.75	3.90	3.62	99.86
3.5	3.25	0.11	0.10	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.080
25	-1.720
50	-0.730
75	1.305
84	1.795
95	2.205
99	2.630

Moment Measures	(phi)	(mm)
Mean	-0.118	1.085
Standard Deviation	1.600	0.330
Skewness	0.361	
Kurtosis	1.782	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.143	-0.338
Standard Deviation	1.938	1.644
Skewness (1)	0.303	0.310
Skewness (2)	0.365	
Kurtosis	0.150	0.604



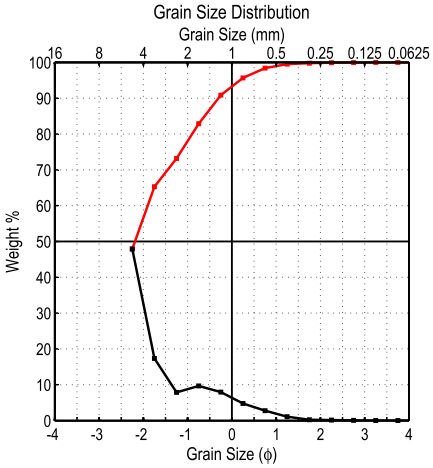
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-01b**
Interval	**LTT**
Mean	**0.260 mm**
STD	**0.508 mm**
Skewness	**-2.795**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	102.85
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	6.36

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.47	1.43	1.43
-1.5	-1.75	1.66	1.61	3.04
-1	-1.25	1.47	1.43	4.47
-0.5	-0.75	1.18	1.15	5.62
0	-0.25	0.76	0.74	6.36
0.5	0.25	0.92	0.89	7.25
1	0.75	1.41	1.37	8.62
1.5	1.25	2.21	2.15	10.77
2	1.75	17.32	16.84	27.61
2.5	2.25	61.85	60.14	87.75
3	2.75	10.96	10.66	98.41
3.5	3.25	1.56	1.52	99.92
4	3.75	0.06	0.06	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.020
16	1.405
25	1.670
50	1.935
75	2.145
84	2.220
95	2.590
99	2.945

Moment Measures	(phi)	(mm)
Mean	1.944	0.260
Standard Deviation	0.976	0.508
Skewness	-2.795	
Kurtosis	10.912	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.812	1.853
Standard Deviation	0.407	0.751
Skewness (1)	-0.301	-0.469
Skewness (2)	-2.822	
Kurtosis	3.429	3.115



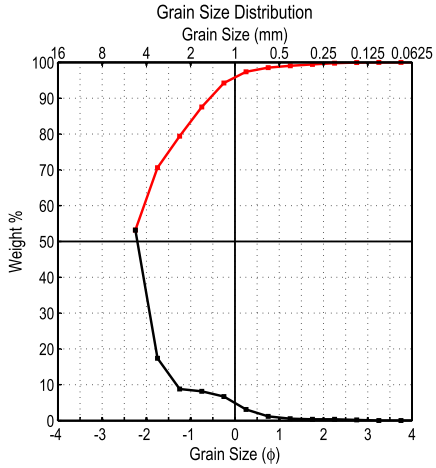
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-02a**
Interval	**Swash**
Mean	**2.860 mm**
STD	**0.517 mm**
Skewness	**1.291**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Sorted
Poorly Graded	Fine Skewed
	Leptokurtic
Total weight (gram)	103.47
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	90.83

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	49.58	47.92	47.92
-1.5	-1.75	17.97	17.37	65.28
-1	-1.25	8.16	7.89	73.17
-0.5	-0.75	10.03	9.69	82.86
0	-0.25	8.24	7.96	90.83
0.5	0.25	4.97	4.80	95.63
1	0.75	2.87	2.77	98.41
1.5	1.25	1.14	1.10	99.51
2	1.75	0.26	0.25	99.76
2.5	2.25	0.15	0.14	99.90
3	2.75	0.05	0.05	99.95
3.5	3.25	0.02	0.02	99.97
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-2.190
75	-1.155
84	-0.680
95	0.185
99	1.020

Moment Measures	(phi)	(mm)
Mean	-1.516	2.860
Standard Deviation	0.951	0.517
Skewness	1.291	
Kurtosis	4.095	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.465	-1.707
Standard Deviation	0.785	0.761
Skewness (1)	0.924	0.937
Skewness (2)	1.475	
Kurtosis	0.551	0.911



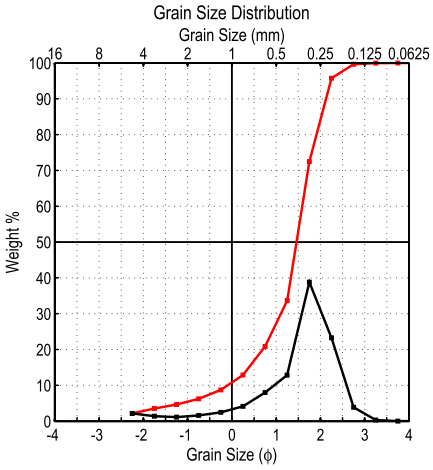
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-02b**
Interval	**LTT**
Mean	**3.127 mm**
STD	**0.544 mm**
Skewness	**1.772**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Sorted
Poorly Graded	Strongly Fine Skewed
	Leptokurtic
Total weight (gram)	108.86
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	94.25

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	57.88	53.17	53.17
-1.5	-1.75	18.96	17.42	70.59
-1	-1.25	9.58	8.80	79.39
-0.5	-0.75	8.88	8.16	87.54
0	-0.25	7.30	6.71	94.25
0.5	0.25	3.37	3.10	97.35
1	0.75	1.27	1.17	98.51
1.5	1.25	0.58	0.53	99.04
2	1.75	0.40	0.37	99.41
2.5	2.25	0.40	0.37	99.78
3	2.75	0.19	0.17	99.95
3.5	3.25	0.02	0.02	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-2.250
75	-1.500
84	-0.965
95	-0.130
99	1.210

Moment Measures	(phi)	(mm)
Mean	-1.645	3.127
Standard Deviation	0.880	0.544
Skewness	1.772	
Kurtosis	6.505	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.607	-1.822
Standard Deviation	0.643	0.642
Skewness (1)	1.000	1.000
Skewness (2)	1.650	
Kurtosis	0.650	1.158



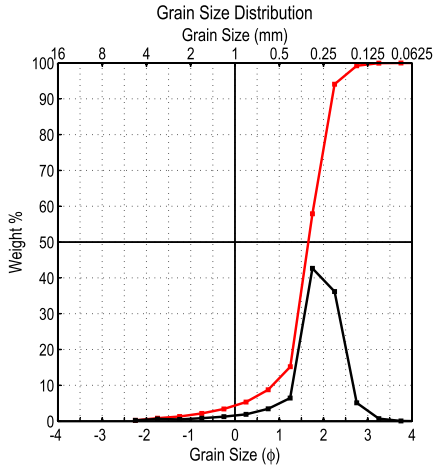
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-03a**
Interval	**Swash**
Mean	**0.367 mm**
STD	**0.494 mm**
Skewness	**-1.812**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	105.12
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	8.71

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.26	2.15	2.15
-1.5	-1.75	1.45	1.38	3.53
-1	-1.25	1.19	1.13	4.66
-0.5	-0.75	1.67	1.59	6.25
0	-0.25	2.59	2.46	8.71
0.5	0.25	4.37	4.16	12.87
1	0.75	8.39	7.98	20.85
1.5	1.25	13.50	12.84	33.69
2	1.75	40.78	38.79	72.49
2.5	2.25	24.45	23.26	95.75
3	2.75	4.09	3.89	99.64
3.5	3.25	0.32	0.30	99.94
4	3.75	0.03	0.03	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-1.145
16	0.445
25	0.910
50	1.460
75	1.805
84	1.995
95	2.235
99	2.670

Moment Measures	(phi)	(mm)
Mean	1.447	0.367
Standard Deviation	1.017	0.494
Skewness	-1.812	
Kurtosis	6.562	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.220	1.300
Standard Deviation	0.775	0.900
Skewness (1)	-0.310	-0.426
Skewness (2)	-1.181	
Kurtosis	1.181	1.548



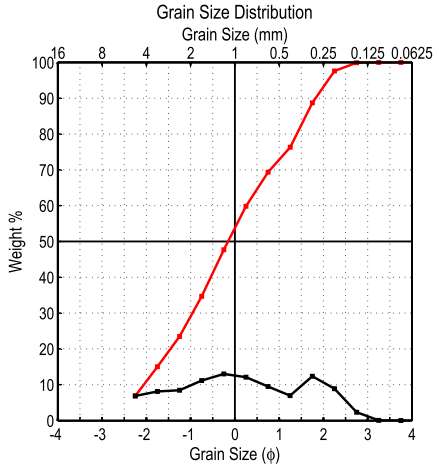
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-03b**
Interval	**LTT**
Mean	**0.286 mm**
STD	**0.610 mm**
Skewness	**-2.293**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	105.71
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	3.42

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.23	0.22	0.22
-1.5	-1.75	0.65	0.61	0.83
-1	-1.25	0.52	0.49	1.32
-0.5	-0.75	0.87	0.82	2.15
0	-0.25	1.35	1.28	3.42
0.5	0.25	2.02	1.91	5.34
1	0.75	3.64	3.44	8.78
1.5	1.25	6.81	6.44	15.22
2	1.75	45.12	42.68	57.90
2.5	2.25	38.23	36.16	94.07
3	2.75	5.41	5.12	99.19
3.5	3.25	0.77	0.73	99.91
4	3.75	0.06	0.06	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-1.580
5	0.160
16	1.260
25	1.365
50	1.655
75	1.985
84	2.110
95	2.340
99	2.730

Moment Measures	(phi)	(mm)
Mean	1.808	0.286
Standard Deviation	0.713	0.610
Skewness	-2.293	
Kurtosis	11.012	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.685	1.675
Standard Deviation	0.425	0.543
Skewness (1)	0.071	-0.150
Skewness (2)	-0.953	
Kurtosis	1.565	1.441



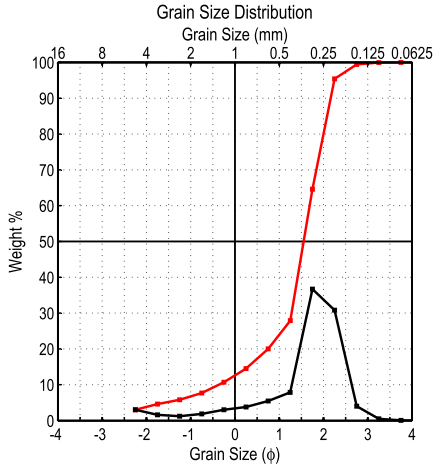
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-04a**
Interval	**Swash**
Mean	**0.899 mm**
STD	**0.378 mm**
Skewness	**0.015**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	105.73
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	47.70

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	7.30	6.90	6.90
-1.5	-1.75	8.61	8.14	15.05
-1	-1.25	8.94	8.46	23.50
-0.5	-0.75	11.81	11.17	34.67
0	-0.25	13.77	13.02	47.70
0.5	0.25	12.83	12.13	59.83
1	0.75	10.05	9.51	69.34
1.5	1.25	7.37	6.97	76.31
2	1.75	13.09	12.38	88.69
2.5	2.25	9.39	8.88	97.57
3	2.75	2.45	2.32	99.89
3.5	3.25	0.08	0.08	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.695
25	-1.185
50	-0.155
75	1.155
84	1.560
95	2.105
99	2.560

Moment Measures	(phi)	(mm)
Mean	0.153	0.899
Standard Deviation	1.402	0.378
Skewness	0.015	
Kurtosis	1.970	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.067	-0.097
Standard Deviation	1.627	1.474
Skewness (1)	0.054	0.046
Skewness (2)	0.051	
Kurtosis	0.338	0.763



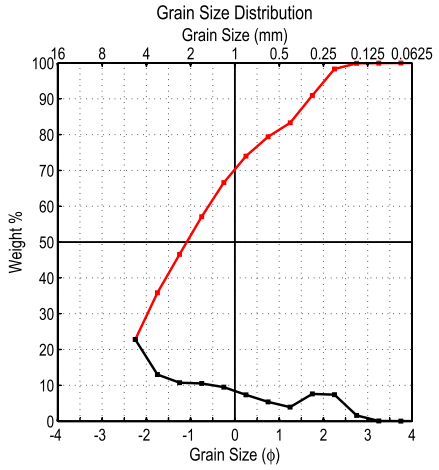
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-04b**
Interval	**LTT**
Mean	**0.358 mm**
STD	**0.461 mm**
Skewness	**-1.833**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	102.38
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	10.72

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.10	3.03	3.03
-1.5	-1.75	1.64	1.60	4.63
-1	-1.25	1.23	1.20	5.83
-0.5	-0.75	1.90	1.86	7.69
0	-0.25	3.11	3.04	10.72
0.5	0.25	3.89	3.80	14.52
1	0.75	5.62	5.49	20.01
1.5	1.25	8.07	7.88	27.90
2	1.75	37.57	36.70	64.59
2.5	2.25	31.55	30.82	95.41
3	2.75	4.11	4.01	99.42
3.5	3.25	0.52	0.51	99.93
4	3.75	0.05	0.05	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.595
16	0.385
25	1.065
50	1.550
75	1.920
84	2.065
95	2.245
99	2.695

Moment Measures	(phi)	(mm)
Mean	1.482	0.358
Standard Deviation	1.116	0.461
Skewness	-1.833	
Kurtosis	6.060	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.225	1.333
Standard Deviation	0.840	1.002
Skewness (1)	-0.387	-0.512
Skewness (2)	-1.458	
Kurtosis	1.286	1.841



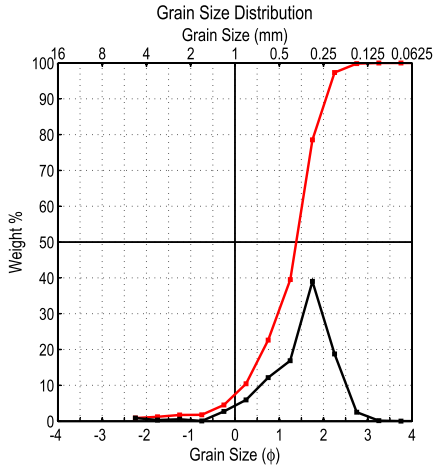
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-05a**
Interval	**Swash**
Mean	**1.437 mm**
STD	**0.346 mm**
Skewness	**0.558**
USCS	**Wentworth**
SW	Very Coarse Sand
Medium Sand	Poorly Sorted
Well Graded	Fine Skewed
	Platykurtic
Total weight (gram)	105.82
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	66.59

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	24.15	22.82	22.82
-1.5	-1.75	13.76	13.00	35.82
-1	-1.25	11.37	10.74	46.57
-0.5	-0.75	11.14	10.53	57.10
0	-0.25	10.05	9.50	66.59
0.5	0.25	7.80	7.37	73.97
1	0.75	5.72	5.41	79.37
1.5	1.25	4.15	3.92	83.29
2	1.75	8.08	7.64	90.93
2.5	2.25	7.81	7.38	98.31
3	2.75	1.69	1.60	99.91
3.5	3.25	0.05	0.05	99.95
4	3.75	0.02	0.02	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.165
50	-1.085
75	0.345
84	1.295
95	2.025
99	2.465

Moment Measures	(phi)	(mm)
Mean	-0.523	1.437
Standard Deviation	1.533	0.346
Skewness	0.558	
Kurtosis	2.073	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.478	-0.680
Standard Deviation	1.773	1.534
Skewness (1)	0.343	0.399
Skewness (2)	0.549	
Kurtosis	0.206	0.698



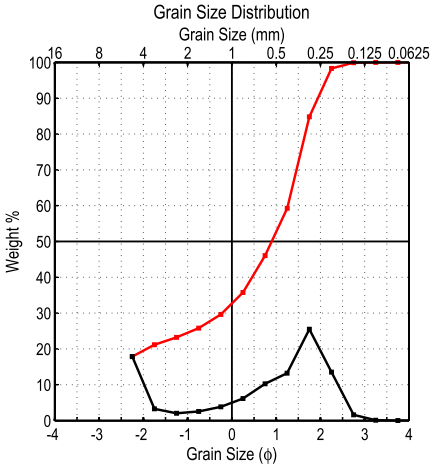
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-05b**
Interval	**LTT**
Mean	**0.364 mm**
STD	**0.576 mm**
Skewness	**-1.569**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	100.07
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	4.52

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.89	0.89	0.89
-1.5	-1.75	0.34	0.34	1.23
-1	-1.25	0.52	0.52	1.75
-0.5	-0.75	0.05	0.05	1.80
0	-0.25	2.72	2.72	4.52
0.5	0.25	5.94	5.94	10.45
1	0.75	12.19	12.18	22.63
1.5	1.25	16.89	16.88	39.51
2	1.75	39.04	39.01	78.53
2.5	2.25	18.80	18.79	97.31
3	2.75	2.49	2.49	99.80
3.5	3.25	0.17	0.17	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.085
5	-0.210
16	0.480
25	0.820
50	1.385
75	1.705
84	1.895
95	2.190
99	2.590

Moment Measures	(phi)	(mm)
Mean	1.458	0.364
Standard Deviation	0.795	0.576
Skewness	-1.569	
Kurtosis	7.252	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.188	1.253
Standard Deviation	0.708	0.717
Skewness (1)	-0.279	-0.304
Skewness (2)	-0.558	
Kurtosis	0.696	1.111



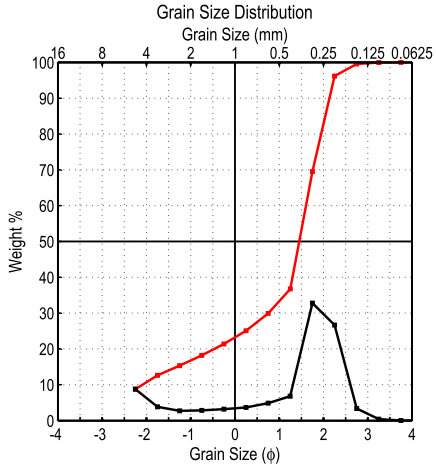
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-06a**
Interval	**Swash**
Mean	**0.687 mm**
STD	**0.325 mm**
Skewness	**-0.729**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	114.46
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	29.63

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	20.46	17.88	17.88
-1.5	-1.75	3.77	3.29	21.17
-1	-1.25	2.35	2.05	23.22
-0.5	-0.75	2.94	2.57	25.79
0	-0.25	4.40	3.84	29.63
0.5	0.25	7.03	6.14	35.78
1	0.75	11.75	10.27	46.04
1.5	1.25	15.15	13.24	59.28
2	1.75	29.18	25.49	84.77
2.5	2.25	15.48	13.52	98.30
3	2.75	1.83	1.60	99.90
3.5	3.25	0.10	0.09	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-0.905
50	0.900
75	1.560
84	1.735
95	2.130
99	2.470

Moment Measures	(phi)	(mm)
Mean	0.541	0.687
Standard Deviation	1.621	0.325
Skewness	-0.729	
Kurtosis	2.062	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.258	0.128
Standard Deviation	1.992	1.660
Skewness (1)	-0.581	-0.510
Skewness (2)	-0.482	
Kurtosis	0.099	0.728



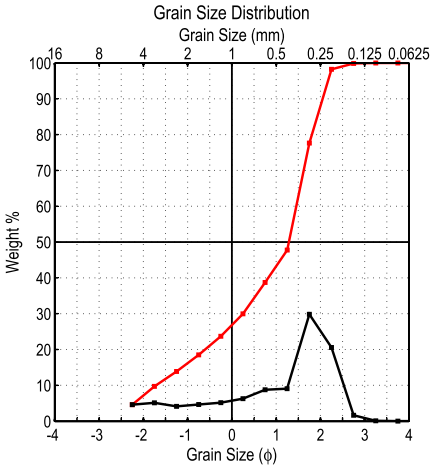
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-06b**
Interval	**LTT**
Mean	**0.472 mm**
STD	**0.354 mm**
Skewness	**-1.195**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	110.04
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	21.39

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	9.65	8.77	8.77
-1.5	-1.75	4.24	3.85	12.62
-1	-1.25	3.01	2.74	15.36
-0.5	-0.75	3.14	2.85	18.21
0	-0.25	3.50	3.18	21.39
0.5	0.25	4.03	3.66	25.05
1	0.75	5.35	4.86	29.92
1.5	1.25	7.50	6.82	36.73
2	1.75	36.09	32.80	69.53
2.5	2.25	29.32	26.64	96.17
3	2.75	3.70	3.36	99.54
3.5	3.25	0.44	0.40	99.94
4	3.75	0.03	0.03	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.140
25	0.245
50	1.450
75	1.855
84	2.020
95	2.230
99	2.670

Moment Measures	(phi)	(mm)
Mean	1.084	0.472
Standard Deviation	1.498	0.354
Skewness	-1.195	
Kurtosis	3.084	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.440	0.777
Standard Deviation	1.580	1.469
Skewness (1)	-0.639	-0.646
Skewness (2)	-0.924	
Kurtosis	0.418	1.140



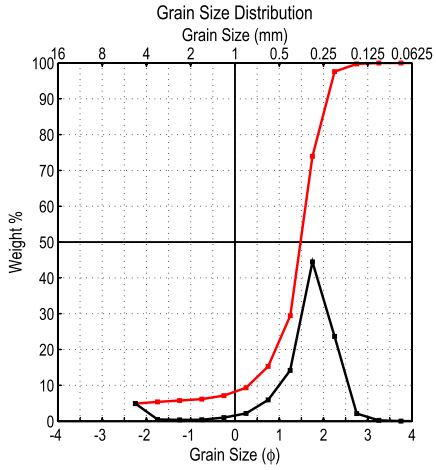
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-07a**
Interval	**Swash**
Mean	**0.522 mm**
STD	**0.385 mm**
Skewness	**-0.958**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	108.89
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	23.68

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.03	4.62	4.62
-1.5	-1.75	5.56	5.11	9.73
-1	-1.25	4.50	4.13	13.86
-0.5	-0.75	5.05	4.64	18.50
0	-0.25	5.65	5.19	23.68
0.5	0.25	6.83	6.27	29.96
1	0.75	9.53	8.75	38.71
1.5	1.25	9.88	9.07	47.78
2	1.75	32.49	29.84	77.62
2.5	2.25	22.41	20.58	98.20
3	2.75	1.80	1.65	99.85
3.5	3.25	0.14	0.13	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.215
16	-1.020
25	-0.145
50	1.285
75	1.705
84	1.905
95	2.170
99	2.490

Moment Measures	(phi)	(mm)
Mean	0.938	0.522
Standard Deviation	1.377	0.385
Skewness	-0.958	
Kurtosis	2.736	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.442	0.723
Standard Deviation	1.462	1.396
Skewness (1)	-0.576	-0.586
Skewness (2)	-0.894	
Kurtosis	0.499	0.971



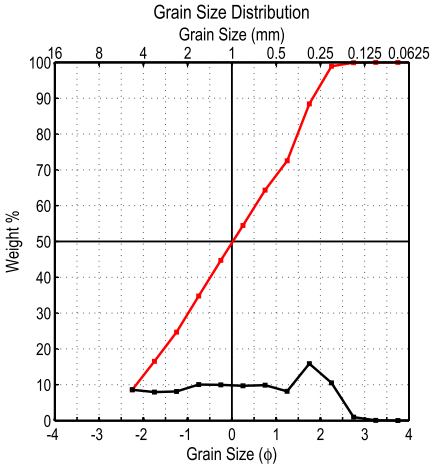
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-07b**
Interval	**LTT**
Mean	**0.359 mm**
STD	**0.483 mm**
Skewness	**-2.393**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	101.23
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	7.16

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	4.98	4.92	4.92
-1.5	-1.75	0.48	0.47	5.39
-1	-1.25	0.37	0.37	5.76
-0.5	-0.75	0.41	0.41	6.16
0	-0.25	1.01	1.00	7.16
0.5	0.25	2.21	2.18	9.35
1	0.75	6.01	5.94	15.28
1.5	1.25	14.35	14.18	29.46
2	1.75	45.03	44.48	73.94
2.5	2.25	23.93	23.64	97.58
3	2.75	2.17	2.14	99.72
3.5	3.25	0.26	0.26	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.165
16	0.775
25	1.095
50	1.480
75	1.770
84	1.965
95	2.195
99	2.580

Moment Measures	(phi)	(mm)
Mean	1.477	0.359
Standard Deviation	1.049	0.483
Skewness	-2.393	
Kurtosis	8.793	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.370	1.407
Standard Deviation	0.595	0.958
Skewness (1)	-0.185	-0.428
Skewness (2)	-2.462	
Kurtosis	2.664	2.647



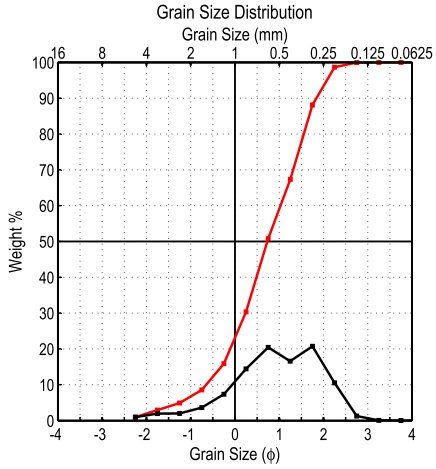
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-08a**
Interval	**Swash**
Mean	**0.864 mm**
STD	**0.364 mm**
Skewness	**-0.148**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	104.46
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	44.73

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	8.98	8.60	8.60
-1.5	-1.75	8.31	7.96	16.55
-1	-1.25	8.50	8.14	24.69
-0.5	-0.75	10.51	10.06	34.75
0	-0.25	10.42	9.98	44.73
0.5	0.25	10.16	9.73	54.45
1	0.75	10.34	9.90	64.35
1.5	1.25	8.52	8.16	72.51
2	1.75	16.59	15.88	88.39
2.5	2.25	10.98	10.51	98.90
3	2.75	1.03	0.99	99.89
3.5	3.25	0.08	0.08	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.785
25	-1.235
50	0.020
75	1.330
84	1.610
95	2.065
99	2.300

Moment Measures	**(phi)**	**(mm)**
Mean	0.211	0.864
Standard Deviation	1.456	0.364
Skewness	-0.148	
Kurtosis	1.812	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-0.088	-0.052
Standard Deviation	1.698	1.503
Skewness (1)	-0.063	-0.058
Skewness (2)	-0.066	
Kurtosis	0.271	0.689



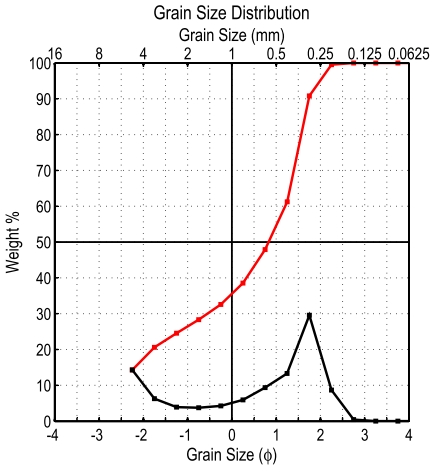
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-08b**
Interval	**LTT**
Mean	**0.533 mm**
STD	**0.500 mm**
Skewness	**-0.719**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	109.29
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	15.90

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.07	0.98	0.98
-1.5	-1.75	2.12	1.94	2.92
-1	-1.25	2.19	2.00	4.92
-0.5	-0.75	3.97	3.63	8.56
0	-0.25	8.03	7.35	15.90
0.5	0.25	15.77	14.43	30.33
1	0.75	22.34	20.44	50.77
1.5	1.25	18.12	16.58	67.35
2	1.75	22.69	20.76	88.11
2.5	2.25	11.52	10.54	98.65
3	2.75	1.38	1.26	99.92
3.5	3.25	0.07	0.06	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.245
5	-1.240
16	-0.245
25	0.065
50	0.730
75	1.435
84	1.650
95	2.075
99	2.385

Moment Measures	**(phi)**	**(mm)**
Mean	0.908	0.533
Standard Deviation	0.999	0.500
Skewness	-0.719	
Kurtosis	3.451	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.702	0.712
Standard Deviation	0.948	0.976
Skewness (1)	-0.029	-0.109
Skewness (2)	-0.330	
Kurtosis	0.749	0.992



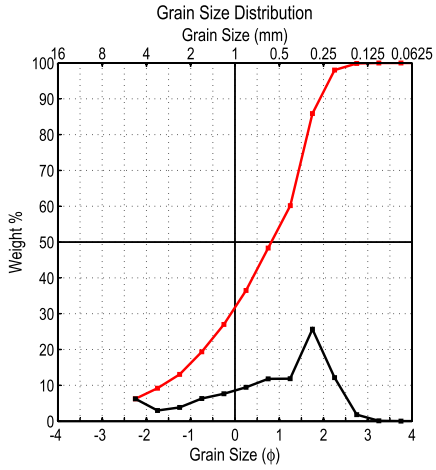
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-09a**
Interval	**Swash**
Mean	**0.728 mm**
STD	**0.338 mm**
Skewness	**-0.661**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	103.24
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	32.60

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	14.78	14.32	14.32
-1.5	-1.75	6.51	6.31	20.62
-1	-1.25	4.07	3.94	24.56
-0.5	-0.75	3.88	3.76	28.32
0	-0.25	4.42	4.28	32.60
0.5	0.25	6.14	5.95	38.55
1	0.75	9.66	9.36	47.91
1.5	1.25	13.77	13.34	61.25
2	1.75	30.53	29.57	90.82
2.5	2.25	8.96	8.68	99.50
3	2.75	0.48	0.46	99.96
3.5	3.25	0.02	0.02	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.115
25	-1.190
50	0.830
75	1.485
84	1.635
95	1.990
99	2.220

Moment Measures	**(phi)**	**(mm)**
Mean	0.458	0.728
Standard Deviation	1.563	0.338
Skewness	-0.661	
Kurtosis	1.938	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-0.240	0.117
Standard Deviation	1.875	1.580
Skewness (1)	-0.571	-0.512
Skewness (2)	-0.512	
Kurtosis	0.131	0.650



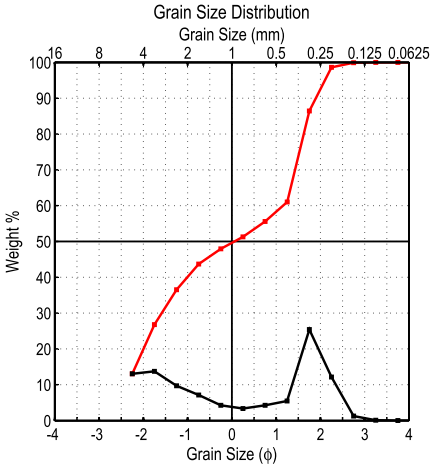
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-09b**
Interval	**LTT**
Mean	**0.602 mm**
STD	**0.396 mm**
Skewness	**-0.756**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	107.08
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	27.03

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.69	6.25	6.25
-1.5	-1.75	3.17	2.96	9.21
-1	-1.25	4.12	3.85	13.06
-0.5	-0.75	6.78	6.33	19.39
0	-0.25	8.18	7.64	27.03
0.5	0.25	10.15	9.48	36.51
1	0.75	12.64	11.80	48.31
1.5	1.25	12.70	11.86	60.17
2	1.75	27.51	25.69	85.86
2.5	2.25	13.02	12.16	98.02
3	2.75	1.97	1.84	99.86
3.5	3.25	0.12	0.11	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.015
25	-0.385
50	0.820
75	1.540
84	1.715
95	2.125
99	2.515

Moment Measures	**(phi)**	**(mm)**
Mean	0.732	0.602
Standard Deviation	1.337	0.396
Skewness	-0.756	
Kurtosis	2.614	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.350	0.507
Standard Deviation	1.365	1.345
Skewness (1)	-0.344	-0.374
Skewness (2)	-0.647	
Kurtosis	0.603	0.931



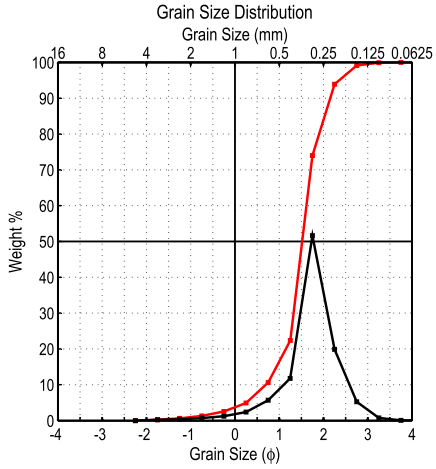
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-10a**
Interval	**Swash**
Mean	**0.904 mm**
STD	**0.309 mm**
Skewness	**-0.107**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	111.15
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	47.94

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	14.53	13.07	13.07
-1.5	-1.75	15.26	13.73	26.80
-1	-1.25	10.82	9.73	36.54
-0.5	-0.75	7.94	7.14	43.68
0	-0.25	4.73	4.26	47.94
0.5	0.25	3.74	3.36	51.30
1	0.75	4.74	4.26	55.56
1.5	1.25	6.06	5.45	61.02
2	1.75	28.23	25.40	86.41
2.5	2.25	13.54	12.18	98.60
3	2.75	1.42	1.28	99.87
3.5	3.25	0.11	0.10	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.145
25	-1.815
50	0.055
75	1.525
84	1.700
95	2.100
99	2.410

Moment Measures	**(phi)**	**(mm)**
Mean	0.146	0.904
Standard Deviation	1.695	0.309
Skewness	-0.107	
Kurtosis	1.380	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-0.223	-0.130
Standard Deviation	1.922	1.620
Skewness (1)	-0.144	-0.102
Skewness (2)	-0.068	
Kurtosis	0.131	0.534



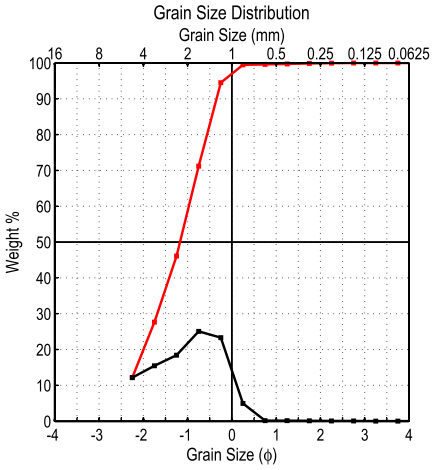
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**NHB-10b**
Interval	**LTT**
Mean	**0.307 mm**
STD	**0.639 mm**
Skewness	**-1.437**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	101.45
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	2.53

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.23	0.23	0.23
-1	-1.25	0.38	0.37	0.60
-0.5	-0.75	0.72	0.71	1.31
0	-0.25	1.24	1.22	2.53
0.5	0.25	2.41	2.38	4.91
1	0.75	5.78	5.70	10.61
1.5	1.25	11.94	11.77	22.38
2	1.75	52.36	51.61	73.99
2.5	2.25	20.18	19.89	93.88
3	2.75	5.33	5.25	99.13
3.5	3.25	0.78	0.77	99.90
4	3.75	0.07	0.07	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-0.970
5	0.260
16	0.980
25	1.275
50	1.520
75	1.775
84	2.000
95	2.355
99	2.735

Moment Measures	**(phi)**	**(mm)**
Mean	1.703	0.307
Standard Deviation	0.645	0.639
Skewness	-1.437	
Kurtosis	7.776	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.490	1.500
Standard Deviation	0.510	0.572
Skewness (1)	-0.059	-0.131
Skewness (2)	-0.417	
Kurtosis	1.054	1.717



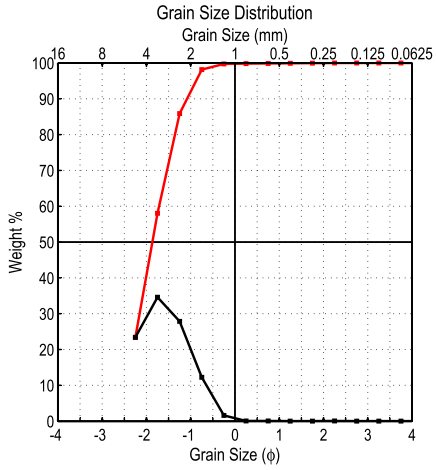
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**KH-01a**
Interval	**Swash**
Mean	**2.001 mm**
STD	**0.597 mm**
Skewness	**0.043**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	104.49
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	94.50

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	12.72	12.17	12.17
-1.5	-1.75	16.17	15.48	27.65
-1	-1.25	19.26	18.43	46.08
-0.5	-0.75	26.22	25.09	71.17
0	-0.25	24.37	23.32	94.50
0.5	0.25	5.17	4.95	99.44
1	0.75	0.16	0.15	99.60
1.5	1.25	0.14	0.13	99.73
2	1.75	0.12	0.11	99.85
2.5	2.25	0.08	0.08	99.92
3	2.75	0.05	0.05	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.125
25	-1.835
50	-1.170
75	-0.670
84	-0.475
95	-0.200
99	0.205

Moment Measures	**(phi)**	**(mm)**
Mean	-1.000	2.001
Standard Deviation	0.744	0.597
Skewness	0.043	
Kurtosis	3.094	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-1.300	-1.257
Standard Deviation	0.825	0.723
Skewness (1)	-0.158	-0.106
Skewness (2)	-0.067	
Kurtosis	0.242	0.721



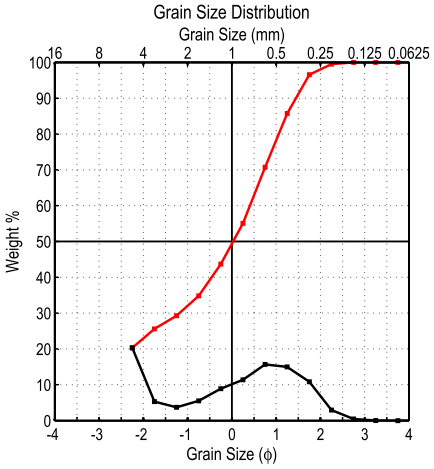
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**KH-01b**
Interval	**LTT**
Mean	**2.975 mm**
STD	**0.692 mm**
Skewness	**0.842**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Fine Skewed
	Leptokurtic
Total weight (gram)	112.10
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	99.73

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	26.23	23.40	23.40
-1.5	-1.75	38.80	34.61	58.01
-1	-1.25	31.23	27.86	85.87
-0.5	-0.75	13.75	12.27	98.14
0	-0.25	1.79	1.60	99.73
0.5	0.25	0.09	0.08	99.81
1	0.75	0.06	0.05	99.87
1.5	1.25	0.03	0.03	99.89
2	1.75	0.04	0.04	99.93
2.5	2.25	0.05	0.04	99.97
3	2.75	0.01	0.01	99.98
3.5	3.25	0.01	0.01	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.225
50	-1.865
75	-1.445
84	-1.285
95	-0.880
99	-0.480

Moment Measures	**(phi)**	**(mm)**
Mean	-1.573	2.975
Standard Deviation	0.532	0.692
Skewness	0.842	
Kurtosis	6.123	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-1.768	-1.800
Standard Deviation	0.482	0.449
Skewness (1)	0.202	0.320
Skewness (2)	0.622	
Kurtosis	0.420	0.720



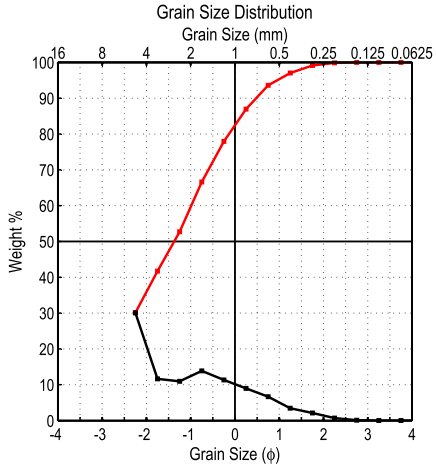
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**KH-02a**
Interval	**Swash**
Mean	**1.040 mm**
STD	**0.364 mm**
Skewness	**-0.306**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	100.51
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	43.69

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	20.40	20.30	20.30
-1.5	-1.75	5.33	5.30	25.60
-1	-1.25	3.72	3.70	29.30
-0.5	-0.75	5.53	5.50	34.80
0	-0.25	8.93	8.88	43.69
0.5	0.25	11.45	11.39	55.08
1	0.75	15.74	15.66	70.74
1.5	1.25	15.07	14.99	85.73
2	1.75	10.89	10.83	96.57
2.5	2.25	2.97	2.95	99.52
3	2.75	0.46	0.46	99.98
3.5	3.25	0.02	0.02	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.805
50	0.025
75	0.890
84	1.190
95	1.680
99	2.160

Moment Measures	**(phi)**	**(mm)**
Mean	-0.057	1.040
Standard Deviation	1.459	0.364
Skewness	-0.306	
Kurtosis	1.771	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-0.530	-0.345
Standard Deviation	1.720	1.455
Skewness (1)	-0.323	-0.240
Skewness (2)	-0.180	
Kurtosis	0.142	0.598



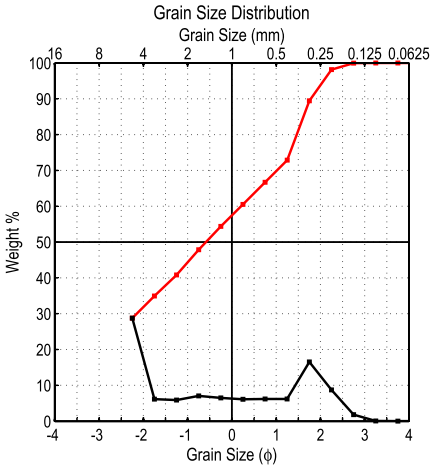
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**KH02b**
Interval	**LTT**
Mean	**1.970 mm**
STD	**0.442 mm**
Skewness	**0.619**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Platykurtic
Total weight (gram)	105.01
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	77.94

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	31.62	30.11	30.11
-1.5	-1.75	12.21	11.63	41.74
-1	-1.25	11.52	10.97	52.71
-0.5	-0.75	14.58	13.88	66.59
0	-0.25	11.92	11.35	77.94
0.5	0.25	9.43	8.98	86.93
1	0.75	7.00	6.67	93.59
1.5	1.25	3.61	3.44	97.03
2	1.75	2.21	2.10	99.13
2.5	2.25	0.76	0.72	99.86
3	2.75	0.12	0.11	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.375
75	-0.380
84	0.085
95	0.955
99	1.720

Moment Measures	**(phi)**	**(mm)**
Mean	-0.978	1.970
Standard Deviation	1.179	0.442
Skewness	0.619	
Kurtosis	2.476	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-1.083	-1.180
Standard Deviation	1.168	1.069
Skewness (1)	0.251	0.352
Skewness (2)	0.623	
Kurtosis	0.373	0.702



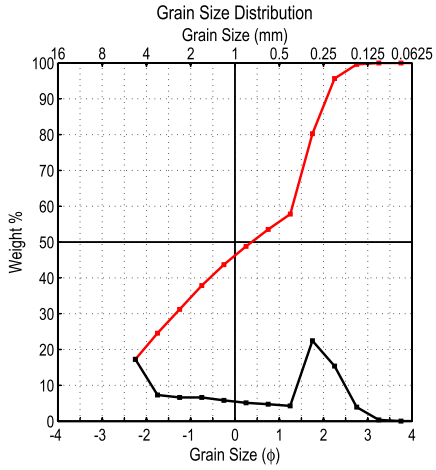
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**KH-03a**
Interval	**Swash**
Mean	**1.166 mm**
STD	**0.303 mm**
Skewness	**0.129**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	106.28
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	54.38

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	30.59	28.78	28.78
-1.5	-1.75	6.53	6.14	34.93
-1	-1.25	6.28	5.91	40.84
-0.5	-0.75	7.48	7.04	47.87
0	-0.25	6.92	6.51	54.38
0.5	0.25	6.49	6.11	60.49
1	0.75	6.58	6.19	66.68
1.5	1.25	6.58	6.19	72.87
2	1.75	17.57	16.53	89.41
2.5	2.25	9.26	8.71	98.12
3	2.75	1.92	1.81	99.92
3.5	3.25	0.06	0.06	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-0.585
75	1.315
84	1.585
95	2.070
99	2.495

Moment Measures	**(phi)**	**(mm)**
Mean	-0.221	1.166
Standard Deviation	1.721	0.303
Skewness	0.129	
Kurtosis	1.474	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-0.333	-0.417
Standard Deviation	1.918	1.613
Skewness (1)	0.132	0.180
Skewness (2)	0.258	
Kurtosis	0.126	0.497



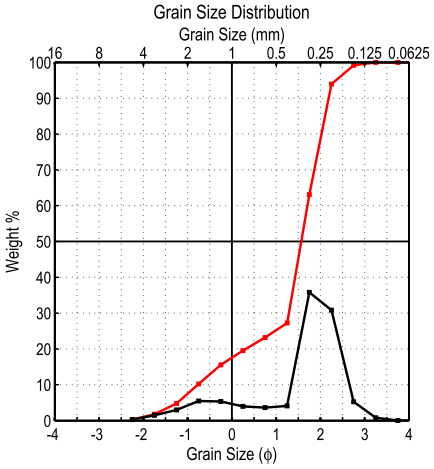
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**KH-03b**
Interval	**LTT**
Mean	**0.813 mm**
STD	**0.298 mm**
Skewness	**-0.235**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	101.69
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	43.68

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	17.54	17.25	17.25
-1.5	-1.75	7.43	7.31	24.56
-1	-1.25	6.76	6.65	31.20
-0.5	-0.75	6.76	6.65	37.85
0	-0.25	5.93	5.83	43.68
0.5	0.25	5.20	5.11	48.80
1	0.75	4.82	4.74	53.54
1.5	1.25	4.36	4.29	57.82
2	1.75	22.82	22.44	80.26
2.5	2.25	15.66	15.40	95.66
3	2.75	3.98	3.91	99.58
3.5	3.25	0.39	0.38	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.715
50	0.375
75	1.635
84	1.870
95	2.230
99	2.675

Moment Measures	**(phi)**	**(mm)**
Mean	0.299	0.813
Standard Deviation	1.749	0.298
Skewness	-0.235	
Kurtosis	1.505	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-0.190	-0.002
Standard Deviation	2.060	1.709
Skewness (1)	-0.274	-0.223
Skewness (2)	-0.187	
Kurtosis	0.087	0.548



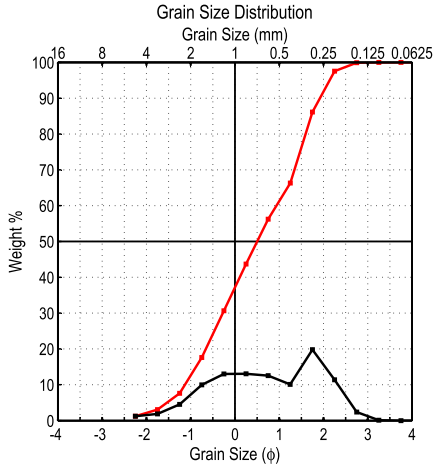
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**KH-04a**
Interval	**Swash**
Mean	**0.365 mm**
STD	**0.460 mm**
Skewness	**-1.313**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	103.99
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	15.57

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.31	0.30	0.30
-1.5	-1.75	1.56	1.50	1.80
-1	-1.25	3.10	2.98	4.78
-0.5	-0.75	5.68	5.46	10.24
0	-0.25	5.54	5.33	15.57
0.5	0.25	4.14	3.98	19.55
1	0.75	3.77	3.63	23.18
1.5	1.25	4.26	4.10	27.27
2	1.75	37.24	35.81	63.08
2.5	2.25	32.07	30.84	93.92
3	2.75	5.47	5.26	99.18
3.5	3.25	0.81	0.78	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.015
5	-1.230
16	-0.195
25	0.975
50	1.565
75	1.945
84	2.090
95	2.350
99	2.735

Moment Measures	(phi)	(mm)
Mean	1.456	0.365
Standard Deviation	1.119	0.460
Skewness	-1.313	
Kurtosis	3.792	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.948	1.153
Standard Deviation	1.142	1.114
Skewness (1)	-0.540	-0.551
Skewness (2)	-0.880	
Kurtosis	0.567	1.513



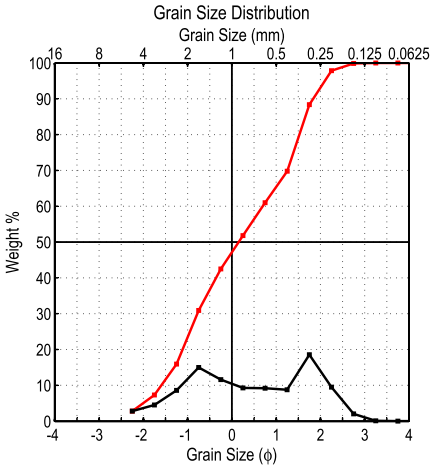
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**KH-04b**
Interval	**LTT**
Mean	**0.615 mm**
STD	**0.444 mm**
Skewness	**-0.285**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	101.48
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	30.64

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.22	1.20	1.20
-1.5	-1.75	1.91	1.88	3.08
-1	-1.25	4.61	4.54	7.63
-0.5	-0.75	10.13	9.98	17.61
0	-0.25	13.22	13.03	30.64
0.5	0.25	13.24	13.05	43.68
1	0.75	12.72	12.53	56.22
1.5	1.25	10.25	10.10	66.32
2	1.75	20.10	19.81	86.13
2.5	2.25	11.56	11.39	97.52
3	2.75	2.40	2.36	99.88
3.5	3.25	0.12	0.12	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.540
16	-0.830
25	-0.465
50	0.500
75	1.470
84	1.695
95	2.140
99	2.565

Moment Measures	(phi)	(mm)
Mean	0.700	0.615
Standard Deviation	1.172	0.444
Skewness	-0.285	
Kurtosis	2.210	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.432	0.455
Standard Deviation	1.263	1.189
Skewness (1)	-0.053	-0.081
Skewness (2)	-0.158	
Kurtosis	0.457	0.779



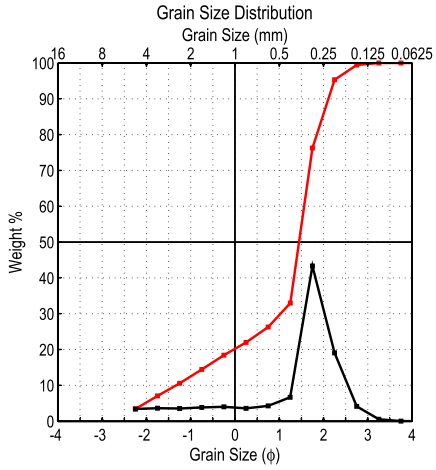
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**KH-05a**
Interval	**Swash**
Mean	**0.753 mm**
STD	**0.400 mm**
Skewness	**-0.108**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	102.85
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	42.50

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.87	2.79	2.79
-1.5	-1.75	4.67	4.54	7.33
-1	-1.25	8.83	8.59	15.92
-0.5	-0.75	15.41	14.98	30.90
0	-0.25	11.93	11.60	42.50
0.5	0.25	9.57	9.30	51.80
1	0.75	9.46	9.20	61.00
1.5	1.25	9.03	8.78	69.78
2	1.75	19.08	18.55	88.33
2.5	2.25	9.76	9.49	97.82
3	2.75	2.10	2.04	99.86
3.5	3.25	0.11	0.11	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.005
16	-1.245
25	-0.945
50	0.155
75	1.390
84	1.635
95	2.100
99	2.540

Moment Measures	(phi)	(mm)
Mean	0.410	0.753
Standard Deviation	1.323	0.400
Skewness	-0.108	
Kurtosis	1.887	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.195	0.182
Standard Deviation	1.440	1.342
Skewness (1)	0.028	-0.012
Skewness (2)	-0.075	
Kurtosis	0.425	0.721



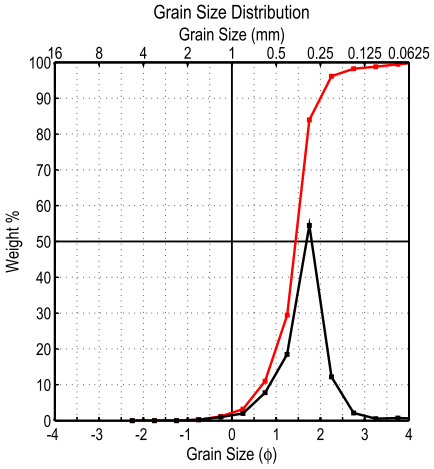
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2010**
Station	**KH-05b**
Interval	**LTT**
Mean	**0.429 mm**
STD	**0.408 mm**
Skewness	**-1.341**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	107.23
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	18.44

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.68	3.43	3.43
-1.5	-1.75	3.87	3.61	7.04
-1	-1.25	3.81	3.55	10.59
-0.5	-0.75	4.13	3.85	14.45
0	-0.25	4.28	3.99	18.44
0.5	0.25	3.82	3.56	22.00
1	0.75	4.60	4.29	26.29
1.5	1.25	7.14	6.66	32.95
2	1.75	46.42	43.29	76.24
2.5	2.25	20.44	19.06	95.30
3	2.75	4.42	4.12	99.42
3.5	3.25	0.58	0.54	99.96
4	3.75	0.04	0.04	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.035
16	-0.555
25	0.600
50	1.445
75	1.735
84	1.955
95	2.240
99	2.700

Moment Measures	(phi)	(mm)
Mean	1.219	0.429
Standard Deviation	1.293	0.408
Skewness	-1.341	
Kurtosis	3.749	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.700	0.948
Standard Deviation	1.255	1.275
Skewness (1)	-0.594	-0.611
Skewness (2)	-1.070	
Kurtosis	0.703	1.544



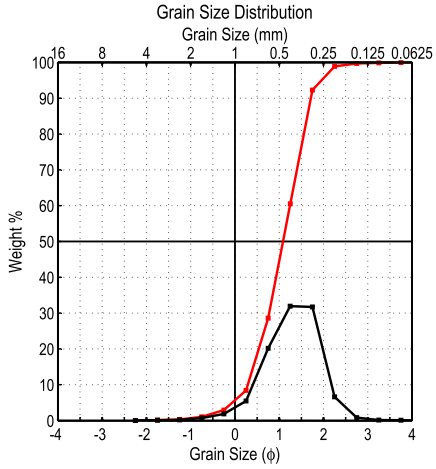
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**B2a**
Interval	**Grab**
Mean	**0.320 mm**
STD	**0.669 mm**
Skewness	**0.109**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	104.34
% finer than 4.00 phi	0.54
% coarser than -1.00 phi	1.20

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	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
-0.5	-0.75	0.25	0.24	0.24
0	-0.25	1.00	0.96	1.20
0.5	0.25	2.07	1.98	3.18
1	0.75	8.14	7.80	10.98
1.5	1.25	19.29	18.49	29.47
2	1.75	56.82	54.46	83.93
2.5	2.25	12.73	12.20	96.13
3	2.75	2.20	2.11	98.24
3.5	3.25	0.56	0.54	98.77
4	3.75	0.72	0.69	99.46
>4.0	4.25	0.56	0.54	100.00

Percentiles	
1	-0.355
5	0.365
16	0.885
25	1.130
50	1.440
75	1.670
84	1.755
95	2.205
99	3.415

Moment Measures	(phi)	(mm)
Mean	1.642	0.320
Standard Deviation	0.579	0.669
Skewness	0.109	
Kurtosis	7.101	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.320	1.360
Standard Deviation	0.435	0.496
Skewness (1)	-0.276	-0.222
Skewness (2)	-0.356	
Kurtosis	1.115	1.396



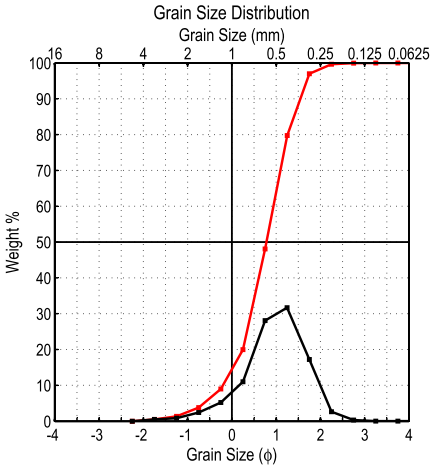
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**B2b**
Interval	**Grab**
Mean	**0.410 mm**
STD	**0.652 mm**
Skewness	**-0.587**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	123.63
% finer than 4.00 phi	0.06
% coarser than -1.00 phi	2.94

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.04	0.03	0.03
-1.5	-1.75	0.12	0.10	0.13
-1	-1.25	0.25	0.20	0.33
-0.5	-0.75	0.89	0.72	1.05
0	-0.25	2.33	1.88	2.94
0.5	0.25	6.77	5.48	8.41
1	0.75	24.95	20.18	28.59
1.5	1.25	39.47	31.93	60.52
2	1.75	39.24	31.74	92.26
2.5	2.25	8.18	6.62	98.88
3	2.75	1.01	0.82	99.69
3.5	3.25	0.18	0.15	99.84
4	3.75	0.13	0.11	99.94
>4.0	4.25	0.07	0.06	100.00

Percentiles	
1	-0.785
5	-0.060
16	0.440
25	0.660
50	1.085
75	1.480
84	1.620
95	1.955
99	2.325

Moment Measures	(phi)	(mm)
Mean	1.287	0.410
Standard Deviation	0.618	0.652
Skewness	-0.587	
Kurtosis	5.071	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.030	1.048
Standard Deviation	0.590	0.600
Skewness (1)	-0.093	-0.115
Skewness (2)	-0.233	
Kurtosis	0.708	1.007



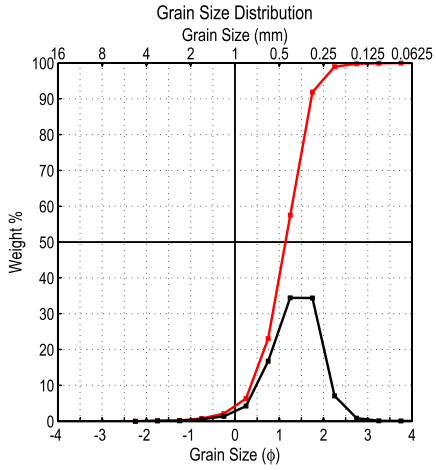
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**B2c**
Interval	**Grab**
Mean	**0.516 mm**
STD	**0.616 mm**
Skewness	**-0.770**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	105.86
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	9.00

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.54	0.51	0.51
-1	-1.25	0.90	0.85	1.36
-0.5	-0.75	2.58	2.44	3.80
0	-0.25	5.51	5.20	9.00
0.5	0.25	11.63	10.99	19.99
1	0.75	29.72	28.07	48.06
1.5	1.25	33.52	31.66	79.73
2	1.75	18.25	17.24	96.97
2.5	2.25	2.81	2.65	99.62
3	2.75	0.33	0.31	99.93
3.5	3.25	0.03	0.03	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.460
5	-0.635
16	0.070
25	0.340
50	0.780
75	1.175
84	1.375
95	1.695
99	2.135

Moment Measures	(phi)	(mm)
Mean	0.955	0.516
Standard Deviation	0.698	0.616
Skewness	-0.770	
Kurtosis	4.348	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.722	0.742
Standard Deviation	0.653	0.679
Skewness (1)	-0.088	-0.151
Skewness (2)	-0.383	
Kurtosis	0.785	1.144



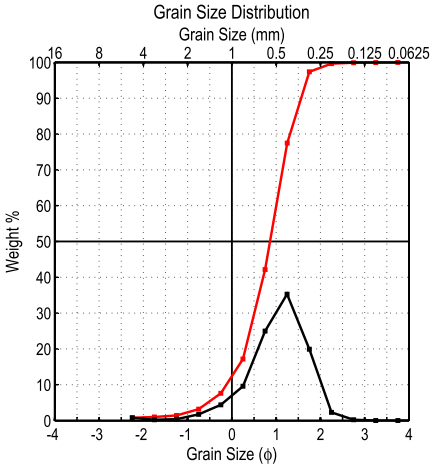
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**B2d**
Interval	**Grab**
Mean	**0.393 mm**
STD	**0.672 mm**
Skewness	**-0.650**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	101.79
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	2.10

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.11	0.11	0.11
-1	-1.25	0.10	0.10	0.21
-0.5	-0.75	0.55	0.54	0.75
0	-0.25	1.38	1.36	2.10
0.5	0.25	4.30	4.22	6.33
1	0.75	17.05	16.75	23.08
1.5	1.25	35.04	34.42	57.50
2	1.75	35.00	34.38	91.89
2.5	2.25	7.19	7.06	98.95
3	2.75	0.85	0.84	99.78
3.5	3.25	0.11	0.11	99.89
4	3.75	0.08	0.08	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-0.655
5	0.095
16	0.540
25	0.780
50	1.140
75	1.505
84	1.635
95	1.970
99	2.280

Moment Measures	(phi)	(mm)
Mean	1.347	0.393
Standard Deviation	0.574	0.672
Skewness	-0.650	
Kurtosis	5.228	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.087	1.105
Standard Deviation	0.547	0.558
Skewness (1)	-0.096	-0.105
Skewness (2)	-0.196	
Kurtosis	0.712	1.060



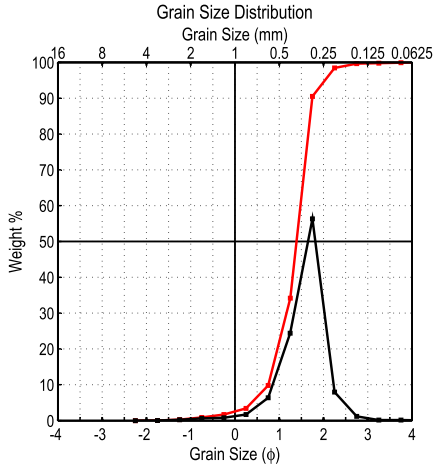
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**B2e**
Interval	**Grab**
Mean	**0.496 mm**
STD	**0.613 mm**
Skewness	**-1.250**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	101.13
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	7.59

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.80	0.79	0.79
-1.5	-1.75	0.23	0.23	1.02
-1	-1.25	0.43	0.43	1.44
-0.5	-0.75	1.77	1.75	3.19
0	-0.25	4.45	4.40	7.59
0.5	0.25	9.69	9.58	17.18
1	0.75	25.27	24.99	42.16
1.5	1.25	35.68	35.28	77.44
2	1.75	20.14	19.91	97.36
2.5	2.25	2.32	2.29	99.65
3	2.75	0.25	0.25	99.90
3.5	3.25	0.04	0.04	99.94
4	3.75	0.03	0.03	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-1.790
5	-0.545
16	0.190
25	0.405
50	0.860
75	1.215
84	1.415
95	1.690
99	2.105

Moment Measures	(phi)	(mm)
Mean	1.012	0.496
Standard Deviation	0.706	0.613
Skewness	-1.250	
Kurtosis	6.624	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.802	0.822
Standard Deviation	0.613	0.645
Skewness (1)	-0.094	-0.176
Skewness (2)	-0.469	
Kurtosis	0.824	1.131



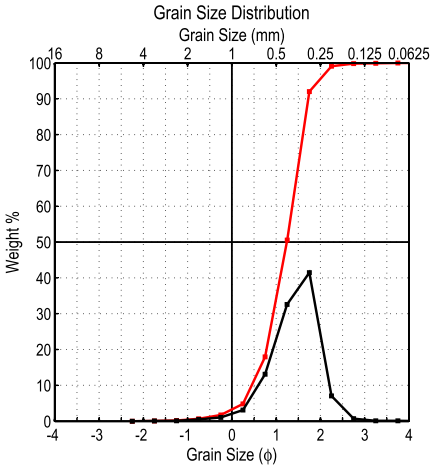
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**B3a**
Interval	**Grab**
Mean	**0.340 mm**
STD	**0.698 mm**
Skewness	**-1.273**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Very Leptokurtic
Total weight (gram)	114.57
% finer than 4.00 phi	0.09
% coarser than -1.00 phi	1.71

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.02	0.02	0.02
-1	-1.25	0.29	0.25	0.27
-0.5	-0.75	0.72	0.63	0.90
0	-0.25	0.93	0.81	1.71
0.5	0.25	1.95	1.70	3.41
1	0.75	7.30	6.37	9.78
1.5	1.25	27.93	24.38	34.16
2	1.75	64.52	56.31	90.48
2.5	2.25	9.12	7.96	98.44
3	2.75	1.36	1.19	99.62
3.5	3.25	0.18	0.16	99.78
4	3.75	0.15	0.13	99.91
>4.0	4.25	0.10	0.09	100.00

Percentiles	
1	-0.690
5	0.375
16	0.875
25	1.060
50	1.390
75	1.615
84	1.690
95	2.035
99	2.485

Moment Measures	(phi)	(mm)
Mean	1.558	0.340
Standard Deviation	0.518	0.698
Skewness	-1.273	
Kurtosis	9.068	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.283	1.318
Standard Deviation	0.407	0.455
Skewness (1)	-0.264	-0.243
Skewness (2)	-0.454	
Kurtosis	1.037	1.226



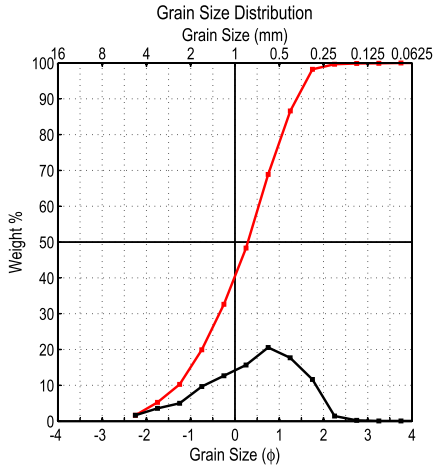
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**B3b**
Interval	**Grab**
Mean	**0.375 mm**
STD	**0.686 mm**
Skewness	**-0.848**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	107.30
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	1.72

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.09	0.08	0.08
-1	-1.25	0.11	0.10	0.19
-0.5	-0.75	0.51	0.48	0.66
0	-0.25	1.14	1.06	1.72
0.5	0.25	3.34	3.11	4.84
1	0.75	14.08	13.12	17.96
1.5	1.25	34.97	32.59	50.55
2	1.75	44.48	41.45	92.00
2.5	2.25	7.59	7.07	99.08
3	2.75	0.76	0.71	99.79
3.5	3.25	0.10	0.09	99.88
4	3.75	0.10	0.09	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-0.590
5	0.255
16	0.675
25	0.860
50	1.240
75	1.545
84	1.655
95	1.960
99	2.245

Moment Measures	(phi)	(mm)
Mean	1.416	0.375
Standard Deviation	0.544	0.686
Skewness	-0.848	
Kurtosis	6.006	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.165	1.190
Standard Deviation	0.490	0.503
Skewness (1)	-0.153	-0.154
Skewness (2)	-0.270	
Kurtosis	0.740	1.020



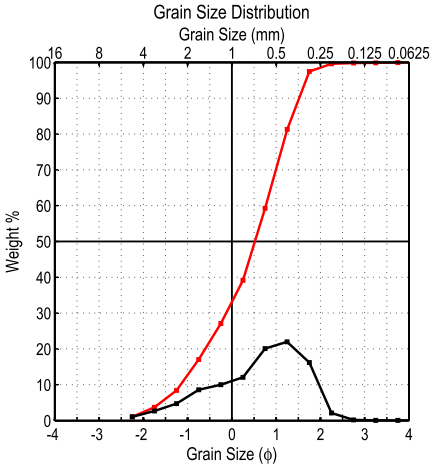
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**B3c**
Interval	**Grab**
Mean	**0.761 mm**
STD	**0.492 mm**
Skewness	**-0.452**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	102.45
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	32.63

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.71	1.67	1.67
-1.5	-1.75	3.69	3.60	5.27
-1	-1.25	5.11	4.99	10.26
-0.5	-0.75	9.92	9.68	19.94
0	-0.25	13.00	12.69	32.63
0.5	0.25	16.08	15.70	48.33
1	0.75	21.06	20.56	68.88
1.5	1.25	18.14	17.71	86.59
2	1.75	11.92	11.63	98.22
2.5	2.25	1.46	1.43	99.65
3	2.75	0.22	0.21	99.86
3.5	3.25	0.05	0.05	99.91
4	3.75	0.05	0.05	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-2.250
5	-1.790
16	-0.955
25	-0.550
50	0.290
75	0.925
84	1.175
95	1.610
99	2.020

Moment Measures	(phi)	(mm)
Mean	0.394	0.761
Standard Deviation	1.023	0.492
Skewness	-0.452	
Kurtosis	2.777	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.110	0.170
Standard Deviation	1.065	1.048
Skewness (1)	-0.169	-0.196
Skewness (2)	-0.357	
Kurtosis	0.596	0.945



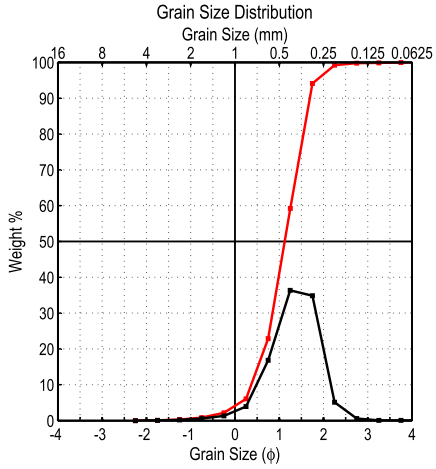
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**B3d**
Interval	**Grab**
Mean	**0.668 mm**
STD	**0.494 mm**
Skewness	**-0.587**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	103.94
% finer than 4.00 phi	0.06
% coarser than -1.00 phi	27.09

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.08	1.04	1.04
-1.5	-1.75	2.78	2.67	3.71
-1	-1.25	4.91	4.72	8.44
-0.5	-0.75	8.96	8.62	17.06
0	-0.25	10.43	10.03	27.09
0.5	0.25	12.55	12.07	39.17
1	0.75	20.88	20.09	59.26
1.5	1.25	22.87	22.00	81.26
2	1.75	16.84	16.20	97.46
2.5	2.25	2.21	2.13	99.59
3	2.75	0.22	0.21	99.80
3.5	3.25	0.07	0.07	99.87
4	3.75	0.08	0.08	99.94
>4.0	4.25	0.06	0.06	100.00

Percentiles	
1	-2.250
5	-1.615
16	-0.810
25	-0.355
50	0.520
75	1.110
84	1.335
95	1.675
99	2.110

Moment Measures	(phi)	(mm)
Mean	0.582	0.668
Standard Deviation	1.018	0.494
Skewness	-0.587	
Kurtosis	2.867	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.262	0.348
Standard Deviation	1.073	1.035
Skewness (1)	-0.240	-0.269
Skewness (2)	-0.457	
Kurtosis	0.534	0.920



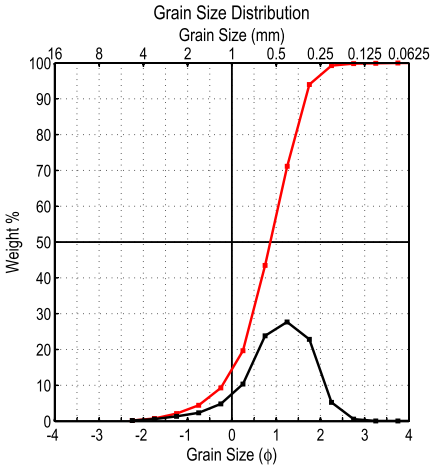
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**B3e**
Interval	**Grab**
Mean	**0.398 mm**
STD	**0.679 mm**
Skewness	**-0.711**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	101.99
% finer than 4.00 phi	0.08
% coarser than -1.00 phi	2.15

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.08	0.08	0.08
-1	-1.25	0.20	0.20	0.27
-0.5	-0.75	0.58	0.57	0.84
0	-0.25	1.33	1.30	2.15
0.5	0.25	3.99	3.91	6.06
1	0.75	17.18	16.84	22.90
1.5	1.25	37.06	36.34	59.24
2	1.75	35.55	34.86	94.10
2.5	2.25	5.23	5.13	99.23
3	2.75	0.57	0.56	99.78
3.5	3.25	0.07	0.07	99.85
4	3.75	0.07	0.07	99.92
>4.0	4.25	0.08	0.08	100.00

Percentiles	
1	-0.690
5	0.115
16	0.545
25	0.780
50	1.125
75	1.475
84	1.605
95	1.840
99	2.230

Moment Measures	(phi)	(mm)
Mean	1.328	0.398
Standard Deviation	0.558	0.679
Skewness	-0.711	
Kurtosis	5.936	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.075	1.092
Standard Deviation	0.530	0.526
Skewness (1)	-0.094	-0.133
Skewness (2)	-0.278	
Kurtosis	0.627	1.017



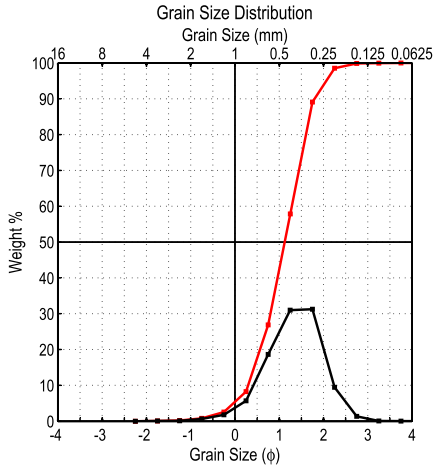
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**BC-E3a**
Interval	**Grab**
Mean	**0.490 mm**
STD	**0.582 mm**
Skewness	**-0.812**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.36
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	9.28

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.18	0.18	0.18
-1.5	-1.75	0.60	0.59	0.76
-1	-1.25	1.40	1.37	2.13
-0.5	-0.75	2.38	2.33	4.45
0	-0.25	4.94	4.83	9.28
0.5	0.25	10.62	10.38	19.66
1	0.75	24.38	23.82	43.47
1.5	1.25	28.33	27.68	71.15
2	1.75	23.37	22.83	93.98
2.5	2.25	5.37	5.25	99.23
3	2.75	0.59	0.58	99.80
3.5	3.25	0.08	0.08	99.88
4	3.75	0.08	0.08	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-1.665
5	-0.695
16	0.075
25	0.360
50	0.870
75	1.335
84	1.530
95	1.845
99	2.230

Moment Measures	(phi)	(mm)
Mean	1.030	0.490
Standard Deviation	0.781	0.582
Skewness	-0.812	
Kurtosis	4.452	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.802	0.825
Standard Deviation	0.728	0.749
Skewness (1)	-0.093	-0.163
Skewness (2)	-0.405	
Kurtosis	0.746	1.068



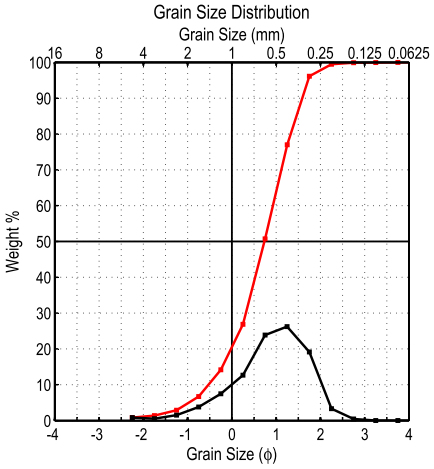
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**BC-E3b**
Interval	**Grab**
Mean	**0.398 mm**
STD	**0.651 mm**
Skewness	**-0.517**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	100.63
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	2.57

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.06	0.06	0.06
-1	-1.25	0.12	0.12	0.18
-0.5	-0.75	0.62	0.62	0.79
0	-0.25	1.79	1.78	2.57
0.5	0.25	5.70	5.66	8.24
1	0.75	18.74	18.62	26.86
1.5	1.25	31.18	30.98	57.85
2	1.75	31.44	31.24	89.09
2.5	2.25	9.51	9.45	98.54
3	2.75	1.34	1.33	99.87
3.5	3.25	0.08	0.08	99.95
4	3.75	0.04	0.04	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.690
5	-0.035
16	0.460
25	0.700
50	1.125
75	1.525
84	1.670
95	2.065
99	2.425

Moment Measures	(phi)	(mm)
Mean	1.330	0.398
Standard Deviation	0.619	0.651
Skewness	-0.517	
Kurtosis	4.041	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.065	1.085
Standard Deviation	0.605	0.621
Skewness (1)	-0.099	-0.102
Skewness (2)	-0.182	
Kurtosis	0.736	1.043



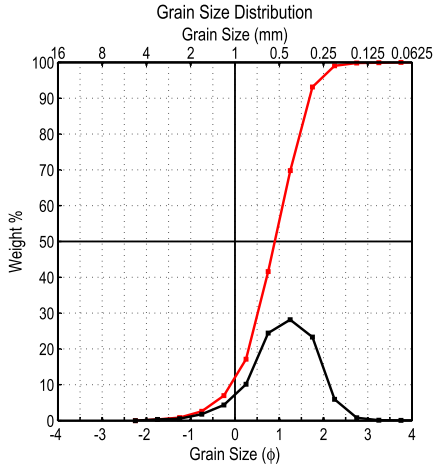
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**BC-E3c**
Interval	**Grab**
Mean	**0.547 mm**
STD	**0.559 mm**
Skewness	**-0.862**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.31
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	14.19

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.87	0.85	0.85
-1.5	-1.75	0.54	0.53	1.38
-1	-1.25	1.54	1.51	2.88
-0.5	-0.75	3.90	3.81	6.70
0	-0.25	7.67	7.50	14.19
0.5	0.25	12.97	12.68	26.87
1	0.75	24.41	23.86	50.73
1.5	1.25	26.85	26.24	76.97
2	1.75	19.60	19.16	96.13
2.5	2.25	3.42	3.34	99.47
3	2.75	0.44	0.43	99.90
3.5	3.25	0.04	0.04	99.94
4	3.75	0.04	0.04	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.110
5	-0.970
16	-0.180
25	0.175
50	0.735
75	1.210
84	1.435
95	1.720
99	2.180

Moment Measures	(phi)	(mm)
Mean	0.870	0.547
Standard Deviation	0.840	0.559
Skewness	-0.862	
Kurtosis	4.253	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.628	0.663
Standard Deviation	0.807	0.811
Skewness (1)	-0.133	-0.200
Skewness (2)	-0.446	
Kurtosis	0.666	1.065



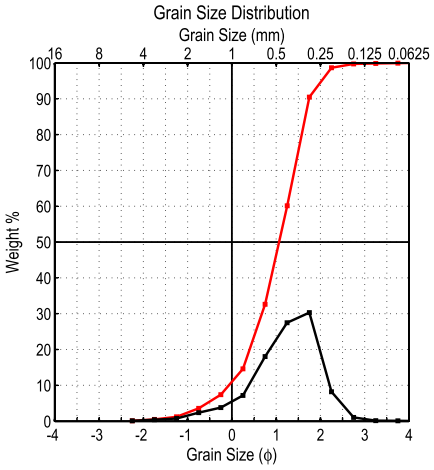
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**BC-E3d**
Interval	**Grab**
Mean	**0.468 mm**
STD	**0.608 mm**
Skewness	**-0.547**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.95
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	6.98

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.32	0.31	0.31
-1	-1.25	0.53	0.51	0.83
-0.5	-0.75	1.84	1.79	2.61
0	-0.25	4.50	4.37	6.98
0.5	0.25	10.46	10.16	17.14
1	0.75	25.17	24.45	41.59
1.5	1.25	29.00	28.17	69.76
2	1.75	24.02	23.33	93.09
2.5	2.25	6.11	5.93	99.03
3	2.75	0.80	0.78	99.81
3.5	3.25	0.09	0.09	99.89
4	3.75	0.08	0.08	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-1.200
5	-0.475
16	0.195
25	0.410
50	0.900
75	1.360
84	1.555
95	1.910
99	2.250

Moment Measures	(phi)	(mm)
Mean	1.095	0.468
Standard Deviation	0.717	0.608
Skewness	-0.547	
Kurtosis	3.992	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.875	0.883
Standard Deviation	0.680	0.701
Skewness (1)	-0.037	-0.095
Skewness (2)	-0.268	
Kurtosis	0.754	1.029



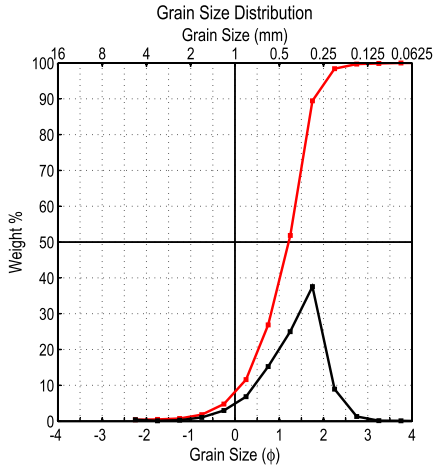
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**BC-E3e**
Interval	**Grab**
Mean	**0.433 mm**
STD	**0.588 mm**
Skewness	**-0.887**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	104.12
% finer than 4.00 phi	0.05
% coarser than -1.00 phi	7.40

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.09	0.09	0.09
-1.5	-1.75	0.42	0.40	0.49
-1	-1.25	0.76	0.73	1.22
-0.5	-0.75	2.48	2.38	3.60
0	-0.25	3.95	3.79	7.40
0.5	0.25	7.49	7.19	14.59
1	0.75	18.79	18.05	32.64
1.5	1.25	28.63	27.50	60.13
2	1.75	31.56	30.31	90.44
2.5	2.25	8.54	8.20	98.65
3	2.75	1.10	1.06	99.70
3.5	3.25	0.14	0.13	99.84
4	3.75	0.12	0.12	99.95
>4.0	4.25	0.05	0.05	100.00

Percentiles	
1	-1.400
5	-0.565
16	0.290
25	0.540
50	1.065
75	1.495
84	1.645
95	2.030
99	2.420

Moment Measures	(phi)	(mm)
Mean	1.206	0.433
Standard Deviation	0.766	0.588
Skewness	-0.887	
Kurtosis	4.593	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.968	1.000
Standard Deviation	0.677	0.732
Skewness (1)	-0.144	-0.200
Skewness (2)	-0.491	
Kurtosis	0.915	1.114



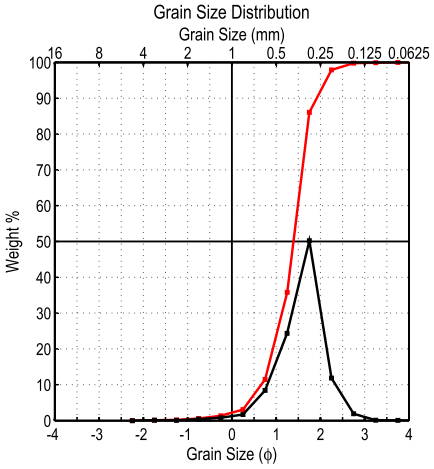
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**BC-E3f**
Interval	**Grab**
Mean	**0.400 mm**
STD	**0.608 mm**
Skewness	**-1.076**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.19
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	4.79

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.40	0.39	0.39
-1.5	-1.75	0.11	0.11	0.50
-1	-1.25	0.27	0.26	0.76
-0.5	-0.75	1.07	1.05	1.81
0	-0.25	3.05	2.98	4.79
0.5	0.25	6.98	6.83	11.63
1	0.75	15.59	15.26	26.88
1.5	1.25	25.53	24.98	51.86
2	1.75	38.38	37.56	89.42
2.5	2.25	9.16	8.96	98.39
3	2.75	1.33	1.30	99.69
3.5	3.25	0.16	0.16	99.84
4	3.75	0.12	0.12	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-1.135
5	-0.235
16	0.395
25	0.690
50	1.215
75	1.560
84	1.680
95	2.060
99	2.485

Moment Measures	(phi)	(mm)
Mean	1.320	0.400
Standard Deviation	0.717	0.608
Skewness	-1.076	
Kurtosis	5.861	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.038	1.097
Standard Deviation	0.643	0.669
Skewness (1)	-0.276	-0.270
Skewness (2)	-0.471	
Kurtosis	0.786	1.081



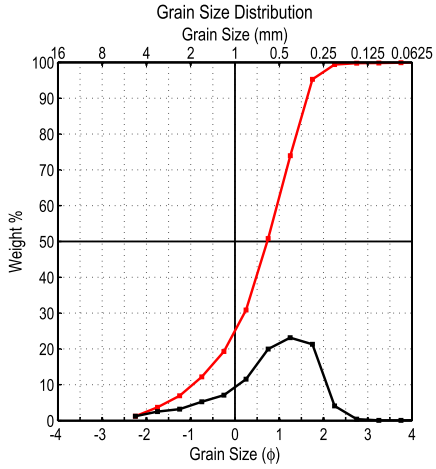
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**BC-E3g**
Interval	**Grab**
Mean	**0.337 mm**
STD	**0.692 mm**
Skewness	**-1.022**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	97.72
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	1.37

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.10	0.10	0.10
-1	-1.25	0.07	0.07	0.17
-0.5	-0.75	0.41	0.42	0.59
0	-0.25	0.76	0.78	1.37
0.5	0.25	1.66	1.70	3.07
1	0.75	8.23	8.42	11.49
1.5	1.25	23.77	24.32	35.82
2	1.75	49.07	50.21	86.03
2.5	2.25	11.59	11.86	97.89
3	2.75	1.85	1.89	99.79
3.5	3.25	0.10	0.10	99.89
4	3.75	0.07	0.07	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-0.490
5	0.365
16	0.845
25	1.030
50	1.390
75	1.640
84	1.730
95	2.130
99	2.545

Moment Measures	(phi)	(mm)
Mean	1.569	0.337
Standard Deviation	0.532	0.692
Skewness	-1.022	
Kurtosis	7.186	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.287	1.322
Standard Deviation	0.443	0.489
Skewness (1)	-0.232	-0.197
Skewness (2)	-0.322	
Kurtosis	0.994	1.186



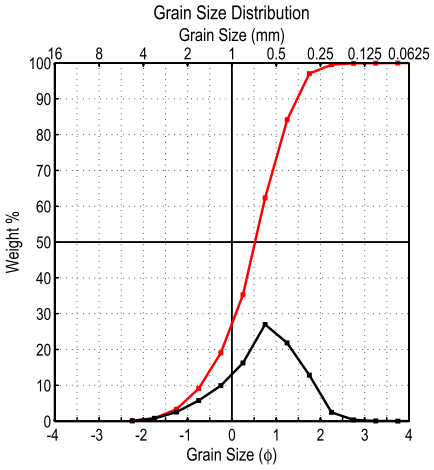
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**BC-E3h**
Interval	**Grab**
Mean	**0.580 mm**
STD	**0.497 mm**
Skewness	**-0.839**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	112.59
% finer than 4.00 phi	0.12
% coarser than -1.00 phi	19.28

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.38	1.23	1.23
-1.5	-1.75	2.82	2.50	3.73
-1	-1.25	3.59	3.19	6.92
-0.5	-0.75	5.94	5.28	12.19
0	-0.25	7.98	7.09	19.28
0.5	0.25	13.04	11.58	30.86
1	0.75	22.47	19.96	50.82
1.5	1.25	26.04	23.13	73.95
2	1.75	23.99	21.31	95.26
2.5	2.25	4.62	4.10	99.36
3	2.75	0.46	0.41	99.77
3.5	3.25	0.06	0.05	99.82
4	3.75	0.06	0.05	99.88
>4.0	4.25	0.14	0.12	100.00

Percentiles	
1	-2.250
5	-1.550
16	-0.480
25	-0.005
50	0.730
75	1.275
84	1.485
95	1.745
99	2.205

Moment Measures	(phi)	(mm)
Mean	0.785	0.580
Standard Deviation	1.007	0.497
Skewness	-0.839	
Kurtosis	3.583	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.502	0.578
Standard Deviation	0.982	0.990
Skewness (1)	-0.232	-0.308
Skewness (2)	-0.644	
Kurtosis	0.677	1.055



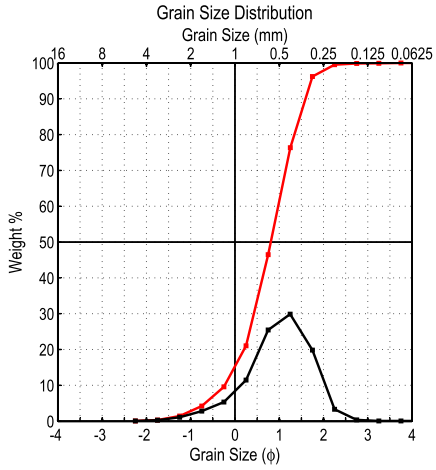
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**BC-E3i**
Interval	**Grab**
Mean	**0.617 mm**
STD	**0.563 mm**
Skewness	**-0.431**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	109.17
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	19.07

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.10	0.09	0.09
-1.5	-1.75	0.81	0.74	0.83
-1	-1.25	2.78	2.55	3.38
-0.5	-0.75	6.28	5.75	9.13
0	-0.25	10.85	9.94	19.07
0.5	0.25	17.72	16.23	35.30
1	0.75	29.49	27.01	62.32
1.5	1.25	23.85	21.85	84.16
2	1.75	14.05	12.87	97.03
2.5	2.25	2.69	2.46	99.50
3	2.75	0.42	0.38	99.88
3.5	3.25	0.05	0.05	99.93
4	3.75	0.04	0.04	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-1.715
5	-1.110
16	-0.405
25	-0.065
50	0.520
75	1.040
84	1.245
95	1.670
99	2.150

Moment Measures	(phi)	(mm)
Mean	0.697	0.617
Standard Deviation	0.829	0.563
Skewness	-0.431	
Kurtosis	3.254	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.420	0.453
Standard Deviation	0.825	0.834
Skewness (1)	-0.121	-0.147
Skewness (2)	-0.291	
Kurtosis	0.685	1.031



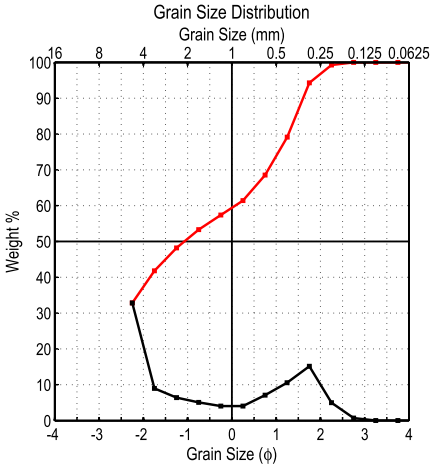
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**BC-E3j**
Interval	**Grab**
Mean	**0.509 mm**
STD	**0.603 mm**
Skewness	**-0.681**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.37
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	9.57

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.05	0.05	0.05
-1.5	-1.75	0.28	0.27	0.32
-1	-1.25	1.14	1.10	1.42
-0.5	-0.75	2.89	2.80	4.22
0	-0.25	5.53	5.35	9.57
0.5	0.25	11.85	11.46	21.03
1	0.75	26.30	25.44	46.47
1.5	1.25	30.87	29.86	76.34
2	1.75	20.53	19.86	96.20
2.5	2.25	3.43	3.32	99.52
3	2.75	0.36	0.35	99.86
3.5	3.25	0.05	0.05	99.91
4	3.75	0.05	0.05	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-1.440
5	-0.675
16	0.030
25	0.330
50	0.810
75	1.230
84	1.445
95	1.720
99	2.170

Moment Measures	(phi)	(mm)
Mean	0.976	0.509
Standard Deviation	0.730	0.603
Skewness	-0.681	
Kurtosis	4.057	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.737	0.762
Standard Deviation	0.708	0.717
Skewness (1)	-0.102	-0.171
Skewness (2)	-0.406	
Kurtosis	0.693	1.091



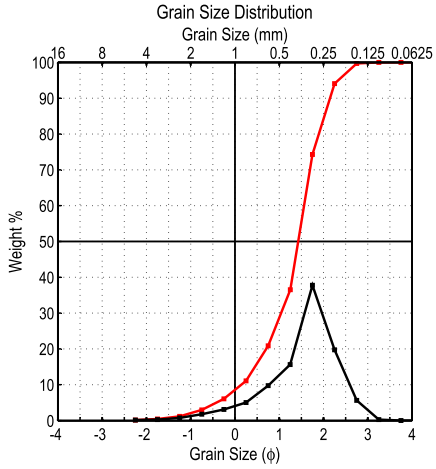
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NSS-01a**
Interval	**Swash**
Mean	**1.348 mm**
STD	**0.309 mm**
Skewness	**0.245**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	103.47
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	57.36

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	33.96	32.82	32.82
-1.5	-1.75	9.30	8.99	41.81
-1	-1.25	6.62	6.40	48.21
-0.5	-0.75	5.28	5.10	53.31
0	-0.25	4.19	4.05	57.36
0.5	0.25	4.21	4.07	61.43
1	0.75	7.35	7.10	68.53
1.5	1.25	10.96	10.59	79.12
2	1.75	15.67	15.14	94.27
2.5	2.25	5.16	4.99	99.26
3	2.75	0.74	0.72	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.075
75	1.055
84	1.410
95	1.825
99	2.225

Moment Measures	(phi)	(mm)
Mean	-0.430	1.348
Standard Deviation	1.692	0.309
Skewness	0.245	
Kurtosis	1.424	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.420	-0.638
Standard Deviation	1.830	1.532
Skewness (1)	0.358	0.391
Skewness (2)	0.471	
Kurtosis	0.113	0.505



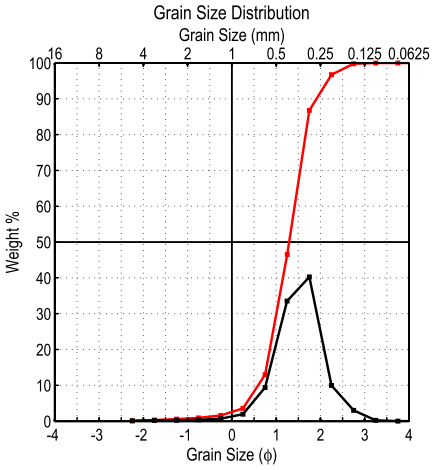
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NSS-01b**
Interval	**LTT**
Mean	**0.350 mm**
STD	**0.567 mm**
Skewness	**-1.196**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	100.30
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	6.07

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.15	0.15	0.15
-1.5	-1.75	0.30	0.30	0.45
-1	-1.25	0.75	0.75	1.20
-0.5	-0.75	1.77	1.76	2.96
0	-0.25	3.12	3.11	6.07
0.5	0.25	5.05	5.03	11.11
1	0.75	9.80	9.77	20.88
1.5	1.25	15.69	15.64	36.52
2	1.75	37.89	37.78	74.30
2.5	2.25	19.81	19.75	94.05
3	2.75	5.66	5.64	99.69
3.5	3.25	0.28	0.28	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.380
5	-0.420
16	0.500
25	0.880
50	1.430
75	1.770
84	1.995
95	2.335
99	2.690

Moment Measures	(phi)	(mm)
Mean	1.513	0.350
Standard Deviation	0.819	0.567
Skewness	-1.196	
Kurtosis	4.958	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.248	1.308
Standard Deviation	0.748	0.791
Skewness (1)	-0.244	-0.294
Skewness (2)	-0.632	
Kurtosis	0.843	1.269



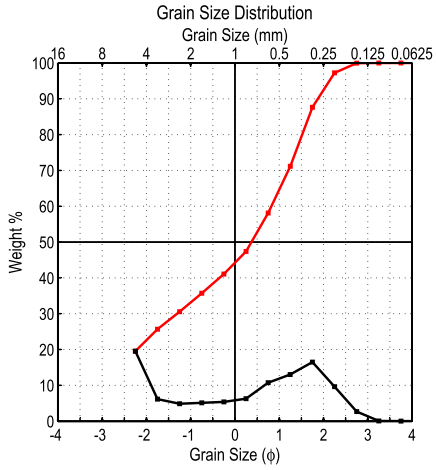
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NSS-02a**
Interval	**Swash**
Mean	**0.353 mm**
STD	**0.669 mm**
Skewness	**-1.142**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Very Leptokurtic
Total weight (gram)	103.54
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	1.62

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.12	0.12	0.12
-1.5	-1.75	0.22	0.21	0.33
-1	-1.25	0.24	0.23	0.56
-0.5	-0.75	0.37	0.36	0.92
0	-0.25	0.73	0.71	1.62
0.5	0.25	2.02	1.95	3.57
1	0.75	9.74	9.41	12.98
1.5	1.25	34.71	33.52	46.50
2	1.75	41.69	40.26	86.77
2.5	2.25	10.31	9.96	96.73
3	2.75	3.14	3.03	99.76
3.5	3.25	0.23	0.22	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.690
5	0.325
16	0.795
25	0.930
50	1.295
75	1.605
84	1.715
95	2.165
99	2.625

Moment Measures	(phi)	(mm)
Mean	1.501	0.353
Standard Deviation	0.580	0.669
Skewness	-1.142	
Kurtosis	8.549	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.255	1.268
Standard Deviation	0.460	0.509
Skewness (1)	-0.087	-0.071
Skewness (2)	-0.109	
Kurtosis	1.000	1.117



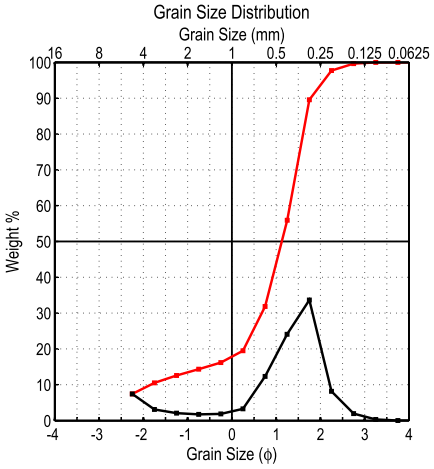
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NSS-02b**
Interval	**LTT**
Mean	**0.883 mm**
STD	**0.319 mm**
Skewness	**-0.286**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	102.16
% finer than 4.00 phi	-0.01
% coarser than -1.00 phi	41.10

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	19.95	19.53	19.53
-1.5	-1.75	6.30	6.17	25.69
-1	-1.25	4.99	4.88	30.58
-0.5	-0.75	5.25	5.14	35.72
0	-0.25	5.50	5.38	41.10
0.5	0.25	6.42	6.28	47.39
1	0.75	10.98	10.75	58.13
1.5	1.25	13.30	13.02	71.15
2	1.75	16.84	16.48	87.64
2.5	2.25	9.82	9.61	97.25
3	2.75	2.74	2.68	99.93
3.5	3.25	0.06	0.06	99.99
4	3.75	0.02	0.02	100.01
>4.0	4.25	-0.01	-0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.805
50	0.370
75	1.365
84	1.640
95	2.135
99	2.580

Moment Measures	(phi)	(mm)
Mean	0.179	0.883
Standard Deviation	1.650	0.319
Skewness	-0.286	
Kurtosis	1.629	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.305	-0.080
Standard Deviation	1.945	1.637
Skewness (1)	-0.347	-0.271
Skewness (2)	-0.220	
Kurtosis	0.127	0.567



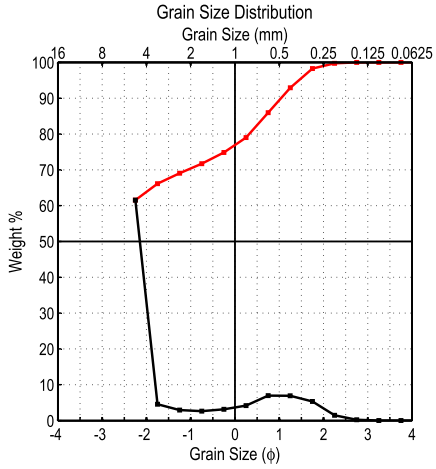
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NSS-03a**
Interval	**Swash**
Mean	**0.509 mm**
STD	**0.411 mm**
Skewness	**-1.424**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	104.11
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	16.21

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	7.74	7.43	7.43
-1.5	-1.75	3.23	3.10	10.54
-1	-1.25	2.16	2.07	12.61
-0.5	-0.75	1.79	1.72	14.33
0	-0.25	1.96	1.88	16.21
0.5	0.25	3.42	3.28	19.50
1	0.75	12.85	12.34	31.84
1.5	1.25	25.06	24.07	55.91
2	1.75	35.04	33.66	89.57
2.5	2.25	8.49	8.15	97.72
3	2.75	2.01	1.93	99.65
3.5	3.25	0.32	0.31	99.96
4	3.75	0.04	0.04	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-0.305
25	0.475
50	1.125
75	1.535
84	1.665
95	2.085
99	2.580

Moment Measures	(phi)	(mm)
Mean	0.974	0.509
Standard Deviation	1.281	0.411
Skewness	-1.424	
Kurtosis	4.111	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.680	0.828
Standard Deviation	0.985	1.149
Skewness (1)	-0.452	-0.504
Skewness (2)	-1.226	
Kurtosis	1.201	1.676



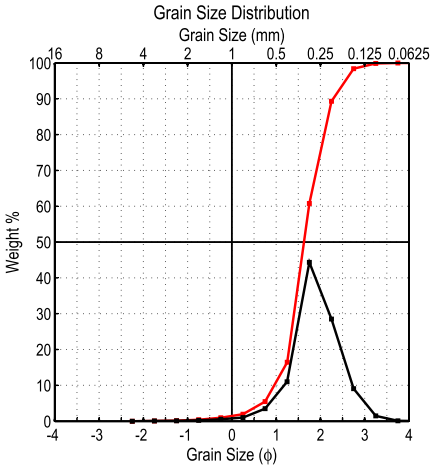
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NSS-03b**
Interval	**LTT**
Mean	**2.371 mm**
STD	**0.360 mm**
Skewness	**1.066**
USCS	**Wentworth**
SW	Granule
Coarse Sand	Poorly Sorted
Well Graded	Fine Skewed
	Platykurtic
Total weight (gram)	105.79
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	74.83

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	65.12	61.56	61.56
-1.5	-1.75	4.83	4.57	66.12
-1	-1.25	3.09	2.92	69.04
-0.5	-0.75	2.80	2.65	71.69
0	-0.25	3.32	3.14	74.83
0.5	0.25	4.41	4.17	79.00
1	0.75	7.37	6.97	85.96
1.5	1.25	7.35	6.95	92.91
2	1.75	5.66	5.35	98.26
2.5	2.25	1.55	1.47	99.73
3	2.75	0.26	0.25	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-2.250
75	-0.230
84	0.610
95	1.445
99	2.000

Moment Measures	(phi)	(mm)
Mean	-1.245	2.371
Standard Deviation	1.476	0.360
Skewness	1.066	
Kurtosis	2.513	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.820	-1.297
Standard Deviation	1.430	1.275
Skewness (1)	1.000	1.000
Skewness (2)	1.292	
Kurtosis	0.292	0.750



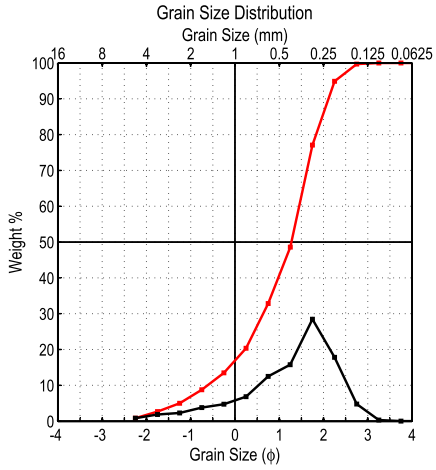
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NSS-04a**
Interval	**Swash**
Mean	**0.271 mm**
STD	**0.674 mm**
Skewness	**-0.886**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	113.23
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.95

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.09	0.08	0.08
-1	-1.25	0.10	0.09	0.17
-0.5	-0.75	0.29	0.26	0.42
0	-0.25	0.60	0.53	0.95
0.5	0.25	1.12	0.99	1.94
1	0.75	3.97	3.51	5.45
1.5	1.25	12.46	11.00	16.45
2	1.75	50.20	44.33	60.79
2.5	2.25	32.28	28.51	89.30
3	2.75	10.29	9.09	98.38
3.5	3.25	1.67	1.47	99.86
4	3.75	0.14	0.12	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.225
5	0.685
16	1.230
25	1.345
50	1.630
75	2.000
84	2.155
95	2.565
99	2.960

Moment Measures	(phi)	(mm)
Mean	1.881	0.271
Standard Deviation	0.569	0.674
Skewness	-0.886	
Kurtosis	6.954	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.693	1.672
Standard Deviation	0.463	0.516
Skewness (1)	0.135	0.065
Skewness (2)	-0.011	
Kurtosis	1.032	1.176



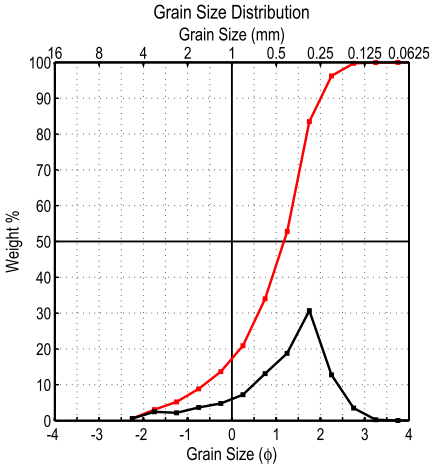
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NSS-04b**
Interval	**LTT**
Mean	**0.426 mm**
STD	**0.477 mm**
Skewness	**-1.057**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.07
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	13.51

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.87	0.84	0.84
-1.5	-1.75	1.91	1.85	2.70
-1	-1.25	2.36	2.29	4.99
-0.5	-0.75	3.91	3.79	8.78
0	-0.25	4.87	4.72	13.51
0.5	0.25	7.05	6.84	20.35
1	0.75	12.87	12.49	32.83
1.5	1.25	16.23	15.75	48.58
2	1.75	29.35	28.48	77.05
2.5	2.25	18.38	17.83	94.89
3	2.75	4.92	4.77	99.66
3.5	3.25	0.31	0.30	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.210
5	-1.250
16	-0.070
25	0.435
50	1.275
75	1.715
84	1.945
95	2.260
99	2.680

Moment Measures	(phi)	(mm)
Mean	1.229	0.426
Standard Deviation	1.069	0.477
Skewness	-1.057	
Kurtosis	3.818	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.937	1.050
Standard Deviation	1.008	1.036
Skewness (1)	-0.335	-0.387
Skewness (2)	-0.764	
Kurtosis	0.742	1.124



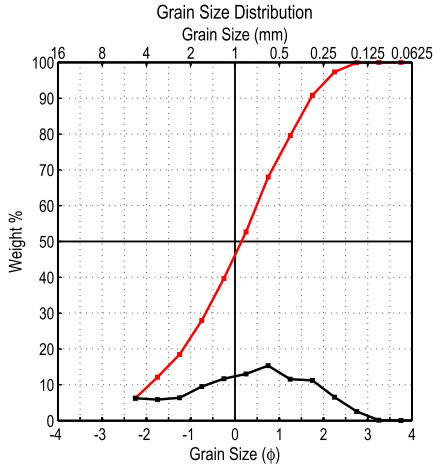
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NSS-05a**
Interval	**Swash**
Mean	**0.448 mm**
STD	**0.487 mm**
Skewness	**-1.065**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	112.20
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	13.67

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.65	0.58	0.58
-1.5	-1.75	2.77	2.47	3.05
-1	-1.25	2.42	2.16	5.20
-0.5	-0.75	4.12	3.67	8.88
0	-0.25	5.38	4.80	13.67
0.5	0.25	8.11	7.23	20.90
1	0.75	14.69	13.09	33.99
1.5	1.25	21.07	18.78	52.77
2	1.75	34.42	30.68	83.45
2.5	2.25	14.31	12.75	96.20
3	2.75	3.93	3.50	99.71
3.5	3.25	0.28	0.25	99.96
4	3.75	0.04	0.04	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.165
5	-1.300
16	-0.090
25	0.405
50	1.175
75	1.610
84	1.770
95	2.205
99	2.650

Moment Measures	(phi)	(mm)
Mean	1.158	0.448
Standard Deviation	1.037	0.487
Skewness	-1.065	
Kurtosis	3.906	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.840	0.952
Standard Deviation	0.930	0.996
Skewness (1)	-0.360	-0.386
Skewness (2)	-0.777	
Kurtosis	0.884	1.192



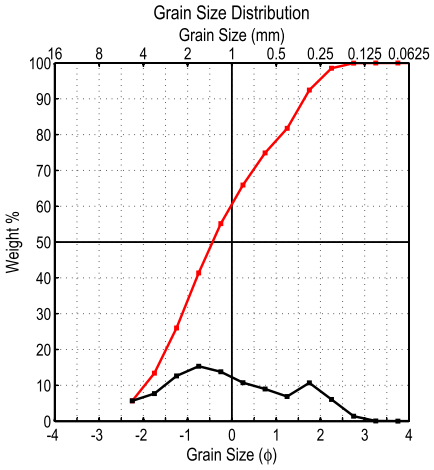
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NSS-05b**
Interval	**LTT**
Mean	**0.820 mm**
STD	**0.402 mm**
Skewness	**-0.214**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	102.51
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	39.64

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.40	6.24	6.24
-1.5	-1.75	6.01	5.86	12.11
-1	-1.25	6.52	6.36	18.47
-0.5	-0.75	9.72	9.48	27.95
0	-0.25	11.99	11.70	39.64
0.5	0.25	13.35	13.02	52.67
1	0.75	15.71	15.33	67.99
1.5	1.25	11.86	11.57	79.56
2	1.75	11.50	11.22	90.78
2.5	2.25	6.71	6.55	97.33
3	2.75	2.62	2.56	99.88
3.5	3.25	0.09	0.09	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.445
25	-0.905
50	0.150
75	1.055
84	1.450
95	2.070
99	2.575

Moment Measures	(phi)	(mm)
Mean	0.287	0.820
Standard Deviation	1.315	0.402
Skewness	-0.214	
Kurtosis	2.245	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.002	0.052
Standard Deviation	1.447	1.378
Skewness (1)	-0.102	-0.107
Skewness (2)	-0.166	
Kurtosis	0.492	0.903



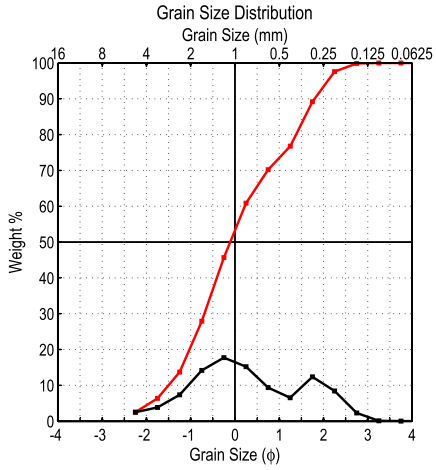
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-01a**
Interval	**Swash**
Mean	**1.018 mm**
STD	**0.402 mm**
Skewness	**0.226**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	104.94
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	55.16

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.96	5.68	5.68
-1.5	-1.75	8.10	7.72	13.40
-1	-1.25	13.24	12.62	26.01
-0.5	-0.75	16.10	15.34	41.36
0	-0.25	14.49	13.81	55.16
0.5	0.25	11.26	10.73	65.89
1	0.75	9.41	8.97	74.86
1.5	1.25	7.23	6.89	81.75
2	1.75	11.22	10.69	92.44
2.5	2.25	6.39	6.09	98.53
3	2.75	1.47	1.40	99.93
3.5	3.25	0.05	0.05	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.645
25	-1.290
50	-0.435
75	0.760
84	1.355
95	1.960
99	2.415

Moment Measures	(phi)	(mm)
Mean	-0.025	1.018
Standard Deviation	1.315	0.402
Skewness	0.226	
Kurtosis	2.084	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.145	-0.242
Standard Deviation	1.500	1.388
Skewness (1)	0.193	0.166
Skewness (2)	0.193	
Kurtosis	0.403	0.842



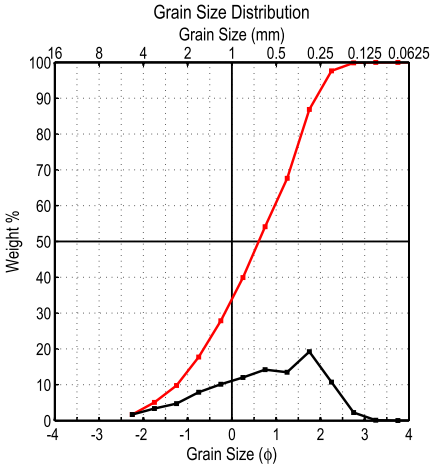
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-01b**
Interval	**LTT**
Mean	**0.814 mm**
STD	**0.425 mm**
Skewness	**0.129**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	105.59
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	45.67

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.67	2.53	2.53
-1.5	-1.75	4.04	3.83	6.35
-1	-1.25	7.78	7.37	13.72
-0.5	-0.75	14.98	14.19	27.91
0	-0.25	18.75	17.76	45.67
0.5	0.25	16.05	15.20	60.87
1	0.75	9.88	9.36	70.22
1.5	1.25	6.93	6.56	76.79
2	1.75	13.05	12.36	89.15
2.5	2.25	8.89	8.42	97.57
3	2.75	2.43	2.30	99.87
3.5	3.25	0.10	0.09	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.925
16	-1.170
25	-0.855
50	-0.105
75	1.115
84	1.540
95	2.100
99	2.560

Moment Measures	(phi)	(mm)
Mean	0.297	0.814
Standard Deviation	1.234	0.425
Skewness	0.129	
Kurtosis	2.221	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.185	0.088
Standard Deviation	1.355	1.287
Skewness (1)	0.214	0.155
Skewness (2)	0.142	
Kurtosis	0.485	0.837



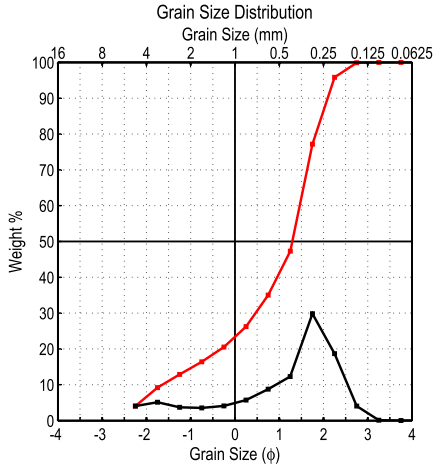
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-02a**
Interval	**Swash**
Mean	**0.612 mm**
STD	**0.437 mm**
Skewness	**-0.465**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	97.78
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	27.88

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.65	1.69	1.69
-1.5	-1.75	3.30	3.37	5.06
-1	-1.25	4.64	4.75	9.81
-0.5	-0.75	7.75	7.93	17.73
0	-0.25	9.92	10.15	27.88
0.5	0.25	11.76	12.03	39.91
1	0.75	13.89	14.21	54.11
1.5	1.25	13.21	13.51	67.62
2	1.75	18.82	19.25	86.87
2.5	2.25	10.50	10.74	97.61
3	2.75	2.21	2.26	99.87
3.5	3.25	0.10	0.10	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.760
16	-0.860
25	-0.390
50	0.605
75	1.440
84	1.675
95	2.130
99	2.560

Moment Measures	**(phi)**	**(mm)**
Mean	0.709	0.612
Standard Deviation	1.195	0.437
Skewness	-0.465	
Kurtosis	2.445	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.407	0.473
Standard Deviation	1.267	1.223
Skewness (1)	-0.156	-0.186
Skewness (2)	-0.331	
Kurtosis	0.535	0.871



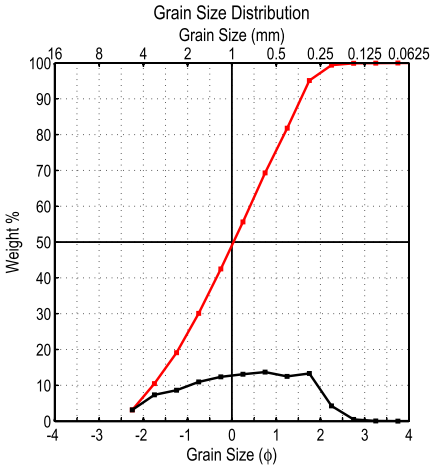
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-02b**
Interval	**LTT**
Mean	**0.490 mm**
STD	**0.393 mm**
Skewness	**-1.065**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	101.91
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	20.53

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	4.12	4.04	4.04
-1.5	-1.75	5.24	5.14	9.18
-1	-1.25	3.78	3.71	12.89
-0.5	-0.75	3.59	3.52	16.42
0	-0.25	4.19	4.11	20.53
0.5	0.25	5.83	5.72	26.25
1	0.75	8.94	8.77	35.02
1.5	1.25	12.52	12.29	47.31
2	1.75	30.40	29.83	77.14
2.5	2.25	19.02	18.66	95.80
3	2.75	4.15	4.07	99.87
3.5	3.25	0.10	0.10	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.155
16	-0.810
25	0.140
50	1.295
75	1.715
84	1.935
95	2.230
99	2.645

Moment Measures	**(phi)**	**(mm)**
Mean	1.028	0.490
Standard Deviation	1.346	0.393
Skewness	-1.065	
Kurtosis	3.080	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.563	0.807
Standard Deviation	1.373	1.351
Skewness (1)	-0.534	-0.554
Skewness (2)	-0.916	
Kurtosis	0.597	1.141



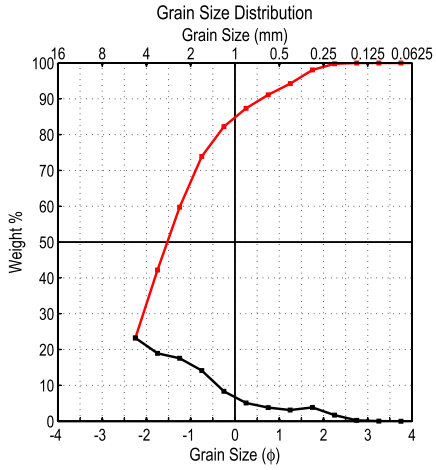
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-03a**
Interval	**Swash**
Mean	**0.860 mm**
STD	**0.428 mm**
Skewness	**-0.160**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	101.64
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	42.49

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.20	3.15	3.15
-1.5	-1.75	7.47	7.35	10.50
-1	-1.25	8.77	8.63	19.13
-0.5	-0.75	11.16	10.98	30.11
0	-0.25	12.59	12.39	42.49
0.5	0.25	13.33	13.11	55.61
1	0.75	13.91	13.69	69.29
1.5	1.25	12.70	12.50	81.79
2	1.75	13.53	13.31	95.10
2.5	2.25	4.34	4.27	99.37
3	2.75	0.52	0.51	99.88
3.5	3.25	0.06	0.06	99.94
4	3.75	0.03	0.03	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-2.125
16	-1.430
25	-0.985
50	0.035
75	0.980
84	1.335
95	1.745
99	2.205

Moment Measures	**(phi)**	**(mm)**
Mean	0.218	0.860
Standard Deviation	1.225	0.428
Skewness	-0.160	
Kurtosis	2.122	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-0.048	-0.020
Standard Deviation	1.383	1.278
Skewness (1)	-0.060	-0.088
Skewness (2)	-0.163	
Kurtosis	0.400	0.807



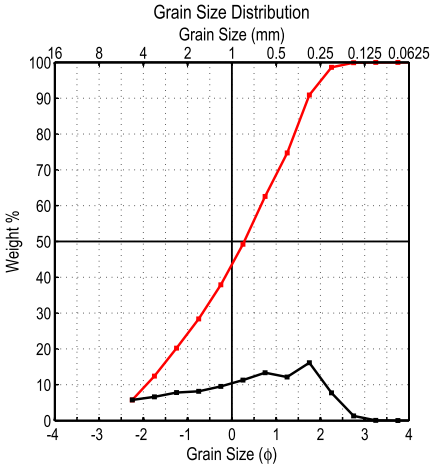
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-03b**
Interval	**LTT**
Mean	**2.013 mm**
STD	**0.441 mm**
Skewness	**1.036**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	103.92
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	82.23

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	24.16	23.25	23.25
-1.5	-1.75	19.68	18.94	42.19
-1	-1.25	18.25	17.56	59.75
-0.5	-0.75	14.71	14.16	73.90
0	-0.25	8.65	8.32	82.23
0.5	0.25	5.30	5.10	87.33
1	0.75	3.93	3.78	91.11
1.5	1.25	3.25	3.13	94.24
2	1.75	3.97	3.82	98.06
2.5	2.25	1.78	1.71	99.77
3	2.75	0.23	0.22	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.205
50	-1.530
75	-0.685
84	-0.075
95	1.350
99	2.025

Moment Measures	**(phi)**	**(mm)**
Mean	-1.009	2.013
Standard Deviation	1.180	0.441
Skewness	1.036	
Kurtosis	3.382	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-1.163	-1.285
Standard Deviation	1.087	1.089
Skewness (1)	0.338	0.469
Skewness (2)	0.993	
Kurtosis	0.655	0.971



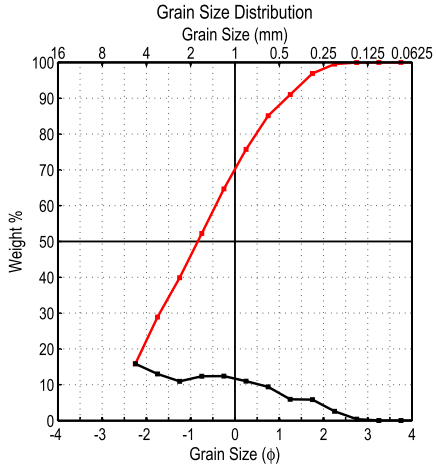
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-04a**
Interval	**Swash**
Mean	**0.786 mm**
STD	**0.393 mm**
Skewness	**-0.321**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	104.63
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	37.90

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.04	5.77	5.77
-1.5	-1.75	6.94	6.63	12.41
-1	-1.25	8.17	7.81	20.21
-0.5	-0.75	8.54	8.16	28.38
0	-0.25	9.97	9.53	37.90
0.5	0.25	11.83	11.31	49.21
1	0.75	13.96	13.34	62.55
1.5	1.25	12.73	12.17	74.72
2	1.75	16.91	16.16	90.88
2.5	2.25	8.09	7.73	98.61
3	2.75	1.36	1.30	99.91
3.5	3.25	0.06	0.06	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.520
25	-0.955
50	0.280
75	1.260
84	1.535
95	2.015
99	2.400

Moment Measures	(phi)	(mm)
Mean	0.347	0.786
Standard Deviation	1.348	0.393
Skewness	-0.321	
Kurtosis	2.060	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.008	0.098
Standard Deviation	1.528	1.410
Skewness (1)	-0.178	-0.182
Skewness (2)	-0.260	
Kurtosis	0.396	0.789



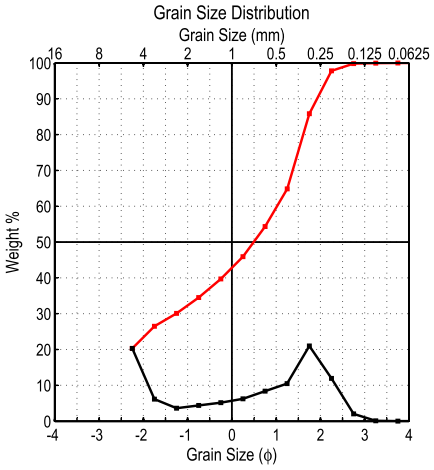
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-04b**
Interval	**LTT**
Mean	**1.413 mm**
STD	**0.404 mm**
Skewness	**0.351**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	105.17
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	64.69

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	16.69	15.87	15.87
-1.5	-1.75	13.69	13.02	28.89
-1	-1.25	11.54	10.97	39.86
-0.5	-0.75	13.03	12.39	52.25
0	-0.25	13.08	12.44	64.69
0.5	0.25	11.57	11.00	75.69
1	0.75	9.89	9.40	85.09
1.5	1.25	6.25	5.94	91.03
2	1.75	6.18	5.88	96.91
2.5	2.25	2.75	2.61	99.52
3	2.75	0.45	0.43	99.95
3.5	3.25	0.03	0.03	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.245
25	-1.900
50	-0.840
75	0.220
84	0.690
95	1.590
99	2.150

Moment Measures	(phi)	(mm)
Mean	-0.499	1.413
Standard Deviation	1.306	0.404
Skewness	0.351	
Kurtosis	2.156	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.778	-0.798
Standard Deviation	1.468	1.316
Skewness (1)	0.043	0.154
Skewness (2)	0.348	
Kurtosis	0.308	0.742



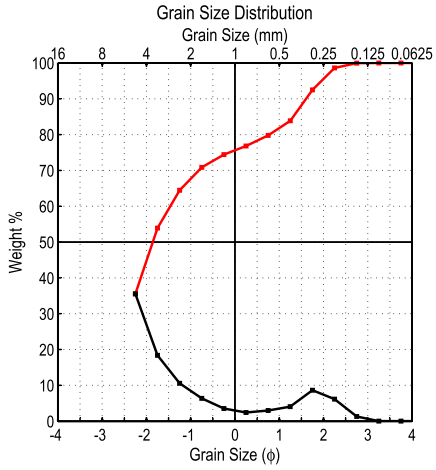
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-05a**
Interval	**Swash**
Mean	**0.840 mm**
STD	**0.309 mm**
Skewness	**-0.347**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	103.19
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	39.68

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	20.98	20.33	20.33
-1.5	-1.75	6.34	6.14	26.48
-1	-1.25	3.75	3.63	30.11
-0.5	-0.75	4.55	4.41	34.52
0	-0.25	5.33	5.17	39.68
0.5	0.25	6.46	6.26	45.94
1	0.75	8.66	8.39	54.34
1.5	1.25	10.84	10.50	64.84
2	1.75	21.67	21.00	85.84
2.5	2.25	12.33	11.95	97.79
3	2.75	2.10	2.04	99.83
3.5	3.25	0.11	0.11	99.93
4	3.75	0.04	0.04	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.870
50	0.490
75	1.490
84	1.705
95	2.135
99	2.545

Moment Measures	(phi)	(mm)
Mean	0.252	0.840
Standard Deviation	1.696	0.309
Skewness	-0.347	
Kurtosis	1.602	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.272	-0.018
Standard Deviation	1.978	1.653
Skewness (1)	-0.386	-0.318
Skewness (2)	-0.277	
Kurtosis	0.109	0.535



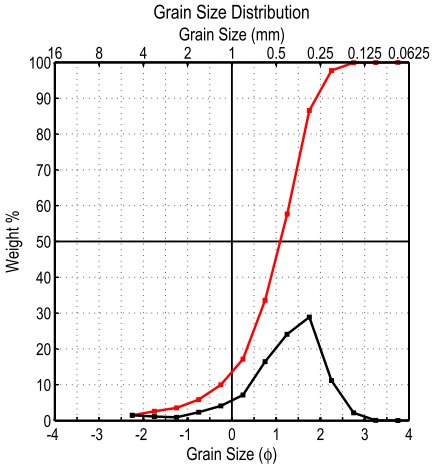
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-05b**
Interval	**LTT**
Mean	**1.870 mm**
STD	**0.333 mm**
Skewness	**0.963**
USCS	**Wentworth**
SW	Very Coarse Sand
Medium Sand	Poorly Sorted
Well Graded	Fine Skewed
	Platykurtic
Total weight (gram)	102.83
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	74.40

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	36.53	35.52	35.52
-1.5	-1.75	18.91	18.39	53.91
-1	-1.25	10.86	10.56	64.48
-0.5	-0.75	6.55	6.37	70.85
0	-0.25	3.66	3.56	74.40
0.5	0.25	2.48	2.41	76.82
1	0.75	3.05	2.97	79.78
1.5	1.25	4.18	4.06	83.85
2	1.75	8.88	8.64	92.48
2.5	2.25	6.31	6.14	98.62
3	2.75	1.35	1.31	99.93
3.5	3.25	0.04	0.04	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.855
75	-0.125
84	1.260
95	1.955
99	2.395

Moment Measures	(phi)	(mm)
Mean	-0.903	1.870
Standard Deviation	1.586	0.333
Skewness	0.963	
Kurtosis	2.431	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.495	-0.948
Standard Deviation	1.755	1.515
Skewness (1)	0.775	0.794
Skewness (2)	0.973	
Kurtosis	0.198	0.811



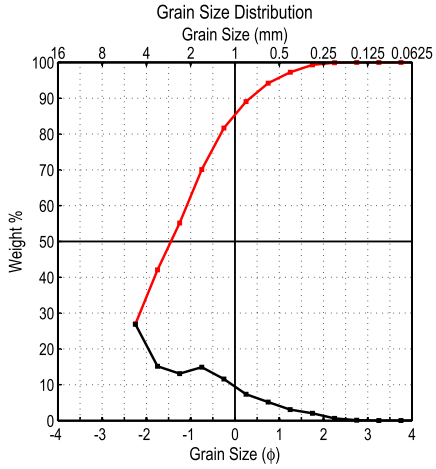
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-06a**
Interval	**Swash**
Mean	**0.444 mm**
STD	**0.523 mm**
Skewness	**-1.296**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	99.48
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	9.98

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.47	1.48	1.48
-1.5	-1.75	1.12	1.13	2.60
-1	-1.25	0.93	0.93	3.54
-0.5	-0.75	2.32	2.33	5.87
0	-0.25	4.09	4.11	9.98
0.5	0.25	7.11	7.15	17.13
1	0.75	16.35	16.44	33.56
1.5	1.25	23.96	24.09	57.65
2	1.75	28.73	28.88	86.53
2.5	2.25	11.11	11.17	97.70
3	2.75	2.17	2.18	99.88
3.5	3.25	0.07	0.07	99.95
4	3.75	0.03	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-0.935
16	0.170
25	0.490
50	1.090
75	1.550
84	1.705
95	2.130
99	2.550

Moment Measures	(phi)	(mm)
Mean	1.171	0.444
Standard Deviation	0.934	0.523
Skewness	-1.296	
Kurtosis	5.348	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.938	0.988
Standard Deviation	0.768	0.848
Skewness (1)	-0.199	-0.260
Skewness (2)	-0.642	
Kurtosis	0.997	1.185



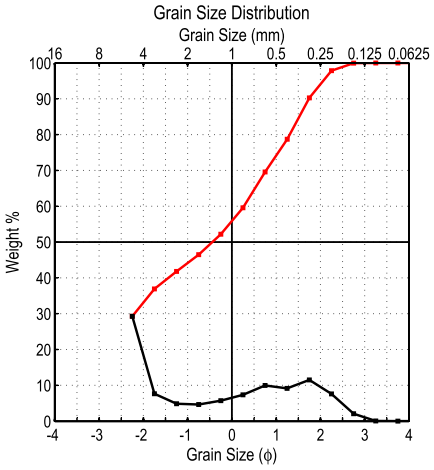
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-06b**
Interval	**LTT**
Mean	**2.038 mm**
STD	**0.461 mm**
Skewness	**0.737**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	102.99
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	81.67

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	27.72	26.92	26.92
-1.5	-1.75	15.60	15.15	42.06
-1	-1.25	13.49	13.10	55.16
-0.5	-0.75	15.36	14.91	70.07
0	-0.25	11.94	11.59	81.67
0.5	0.25	7.58	7.36	89.03
1	0.75	5.31	5.16	94.18
1.5	1.25	3.14	3.05	97.23
2	1.75	2.10	2.04	99.27
2.5	2.25	0.64	0.62	99.89
3	2.75	0.09	0.09	99.98
3.5	3.25	0.01	0.01	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.445
75	-0.540
84	-0.090
95	0.885
99	1.685

Moment Measures	(phi)	(mm)
Mean	-1.027	2.038
Standard Deviation	1.119	0.461
Skewness	0.737	
Kurtosis	2.816	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.170	-1.262
Standard Deviation	1.080	1.015
Skewness (1)	0.255	0.371
Skewness (2)	0.706	
Kurtosis	0.451	0.751



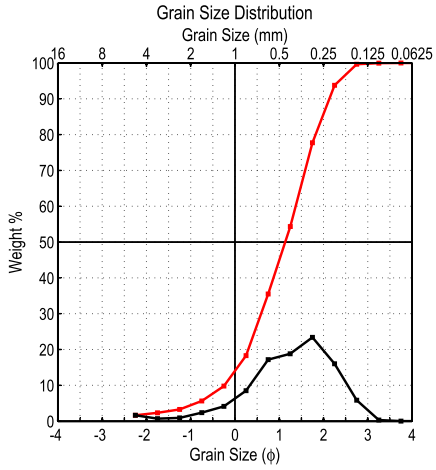
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-07a**
Interval	**Swash**
Mean	**1.199 mm**
STD	**0.309 mm**
Skewness	**0.120**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	107.59
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	52.18

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	31.50	29.28	29.28
-1.5	-1.75	8.22	7.64	36.92
-1	-1.25	5.26	4.89	41.81
-0.5	-0.75	5.02	4.67	46.47
0	-0.25	6.14	5.71	52.18
0.5	0.25	7.93	7.37	59.55
1	0.75	10.75	9.99	69.54
1.5	1.25	9.87	9.17	78.72
2	1.75	12.39	11.52	90.23
2.5	2.25	8.18	7.60	97.83
3	2.75	2.24	2.08	99.92
3.5	3.25	0.06	0.06	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-0.440
75	1.045
84	1.480
95	2.065
99	2.530

Moment Measures	(phi)	(mm)
Mean	-0.262	1.199
Standard Deviation	1.692	0.309
Skewness	0.120	
Kurtosis	1.511	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.385	-0.403
Standard Deviation	1.865	1.586
Skewness (1)	0.029	0.095
Skewness (2)	0.186	
Kurtosis	0.157	0.537



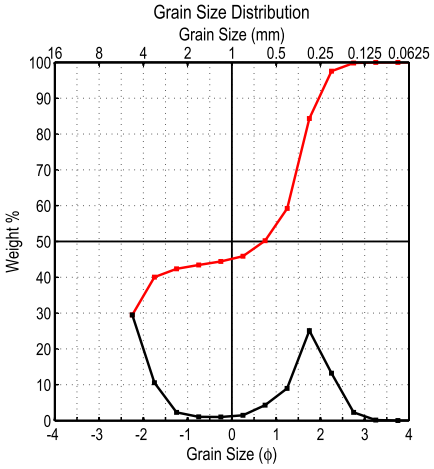
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-07b**
Interval	**LTT**
Mean	**0.423 mm**
STD	**0.499 mm**
Skewness	**-1.013**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	101.49
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	9.80

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.67	1.65	1.65
-1.5	-1.75	0.72	0.71	2.35
-1	-1.25	0.94	0.93	3.28
-0.5	-0.75	2.41	2.37	5.66
0	-0.25	4.21	4.15	9.80
0.5	0.25	8.64	8.51	18.32
1	0.75	17.44	17.18	35.50
1.5	1.25	19.10	18.82	54.32
2	1.75	23.76	23.41	77.73
2.5	2.25	16.26	16.02	93.75
3	2.75	5.96	5.87	99.63
3.5	3.25	0.32	0.32	99.94
4	3.75	0.03	0.03	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-0.890
16	0.115
25	0.445
50	1.135
75	1.690
84	1.945
95	2.355
99	2.695

Moment Measures	(phi)	(mm)
Mean	1.240	0.423
Standard Deviation	1.004	0.499
Skewness	-1.013	
Kurtosis	4.541	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.030	1.065
Standard Deviation	0.915	0.949
Skewness (1)	-0.115	-0.181
Skewness (2)	-0.440	
Kurtosis	0.773	1.068



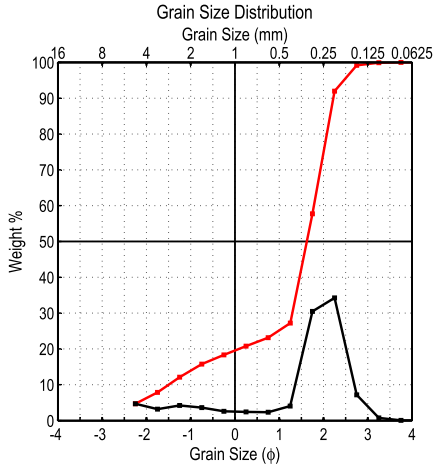
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-08a**
Interval	**Swash**
Mean	**0.955 mm**
STD	**0.266 mm**
Skewness	**-0.160**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	109.13
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	44.42

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	32.18	29.49	29.49
-1.5	-1.75	11.53	10.57	40.05
-1	-1.25	2.51	2.30	42.35
-0.5	-0.75	1.17	1.07	43.43
0	-0.25	1.09	1.00	44.42
0.5	0.25	1.60	1.47	45.89
1	0.75	4.72	4.33	50.22
1.5	1.25	9.81	8.99	59.20
2	1.75	27.41	25.12	84.32
2.5	2.25	14.42	13.21	97.54
3	2.75	2.50	2.29	99.83
3.5	3.25	0.15	0.14	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	0.725
75	1.565
84	1.745
95	2.155
99	2.570

Moment Measures	(phi)	(mm)
Mean	0.067	0.955
Standard Deviation	1.911	0.266
Skewness	-0.160	
Kurtosis	1.225	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.252	0.073
Standard Deviation	1.998	1.666
Skewness (1)	-0.489	-0.420
Skewness (2)	-0.387	
Kurtosis	0.103	0.473



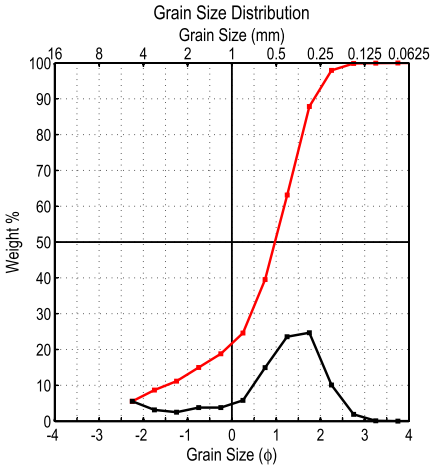
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-08b**
Interval	**LTT**
Mean	**0.390 mm**
STD	**0.378 mm**
Skewness	**-1.403**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	111.90
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	18.36

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.25	4.69	4.69
-1.5	-1.75	3.58	3.20	7.89
-1	-1.25	4.73	4.23	12.12
-0.5	-0.75	4.06	3.63	15.75
0	-0.25	2.92	2.61	18.36
0.5	0.25	2.73	2.44	20.80
1	0.75	2.61	2.33	23.13
1.5	1.25	4.56	4.08	27.20
2	1.75	34.13	30.50	57.70
2.5	2.25	38.33	34.25	91.96
3	2.75	8.06	7.20	99.16
3.5	3.25	0.82	0.73	99.89
4	3.75	0.08	0.07	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-2.250
5	-2.200
16	-0.700
25	0.980
50	1.625
75	2.000
84	2.135
95	2.460
99	2.740

Moment Measures	(phi)	(mm)
Mean	1.357	0.390
Standard Deviation	1.403	0.378
Skewness	-1.403	
Kurtosis	3.732	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.718	1.020
Standard Deviation	1.417	1.415
Skewness (1)	-0.640	-0.641
Skewness (2)	-1.055	
Kurtosis	0.644	1.872



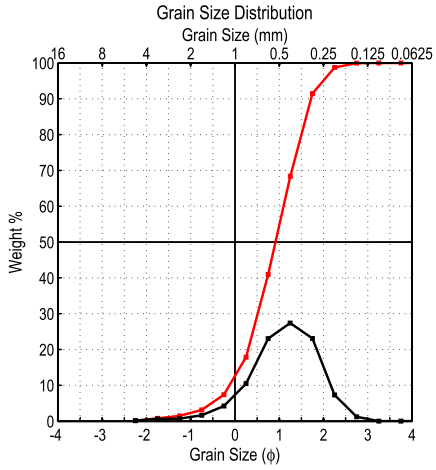
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-09a**
Interval	**Swash**
Mean	**0.540 mm**
STD	**0.423 mm**
Skewness	**-1.155**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	103.26
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	18.81

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.72	5.54	5.54
-1.5	-1.75	3.27	3.17	8.71
-1	-1.25	2.57	2.49	11.20
-0.5	-0.75	3.92	3.80	14.99
0	-0.25	3.94	3.82	18.81
0.5	0.25	5.99	5.80	24.61
1	0.75	15.42	14.93	39.54
1.5	1.25	24.36	23.59	63.13
2	1.75	25.50	24.69	87.83
2.5	2.25	10.42	10.09	97.92
3	2.75	1.99	1.93	99.85
3.5	3.25	0.09	0.09	99.93
4	3.75	0.03	0.03	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-2.250
5	-2.250
16	-0.620
25	0.265
50	0.970
75	1.490
84	1.675
95	2.105
99	2.530

Moment Measures	(phi)	(mm)
Mean	0.890	0.540
Standard Deviation	1.240	0.423
Skewness	-1.155	
Kurtosis	3.641	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.527	0.675
Standard Deviation	1.148	1.234
Skewness (1)	-0.386	-0.432
Skewness (2)	-0.908	
Kurtosis	0.898	1.457



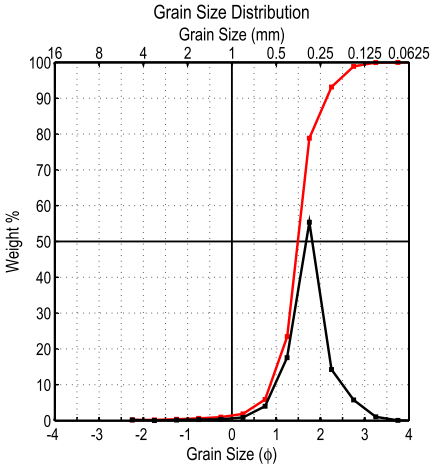
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-09b**
Interval	**LTT**
Mean	**0.467 mm**
STD	**0.590 mm**
Skewness	**-0.772**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	106.24
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.38

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.18	0.17	0.17
-1.5	-1.75	0.65	0.61	0.78
-1	-1.25	0.74	0.70	1.48
-0.5	-0.75	1.76	1.66	3.13
0	-0.25	4.51	4.25	7.38
0.5	0.25	11.14	10.49	17.87
1	0.75	24.52	23.08	40.95
1.5	1.25	29.11	27.40	68.35
2	1.75	24.54	23.10	91.44
2.5	2.25	7.75	7.29	98.74
3	2.75	1.29	1.21	99.95
3.5	3.25	0.04	0.04	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.595
5	-0.530
16	0.160
25	0.405
50	0.915
75	1.395
84	1.590
95	1.995
99	2.360

Moment Measures	(phi)	(mm)
Mean	1.099	0.467
Standard Deviation	0.762	0.590
Skewness	-0.772	
Kurtosis	4.423	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.875	0.888
Standard Deviation	0.715	0.740
Skewness (1)	-0.056	-0.100
Skewness (2)	-0.255	
Kurtosis	0.766	1.045



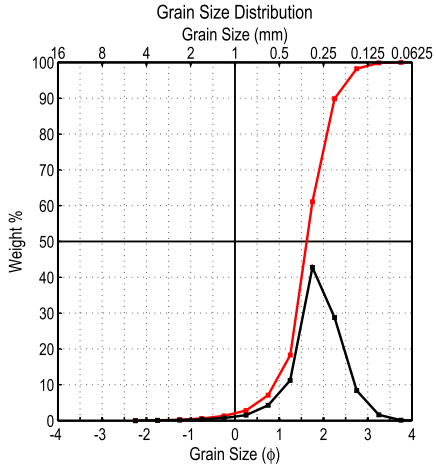
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-10a**
Interval	**Swash**
Mean	**0.302 mm**
STD	**0.684 mm**
Skewness	**-1.143**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Very Leptokurtic
Total weight (gram)	107.55
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.99

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.19	0.18	0.18
-1.5	-1.75	0.02	0.02	0.20
-1	-1.25	0.16	0.15	0.34
-0.5	-0.75	0.28	0.26	0.60
0	-0.25	0.41	0.38	0.99
0.5	0.25	0.96	0.89	1.88
1	0.75	4.33	4.03	5.90
1.5	1.25	18.88	17.55	23.46
2	1.75	59.55	55.37	78.83
2.5	2.25	15.35	14.27	93.10
3	2.75	6.22	5.78	98.88
3.5	3.25	1.12	1.04	99.93
4	3.75	0.06	0.06	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.240
5	0.640
16	1.040
25	1.265
50	1.490
75	1.715
84	1.930
95	2.415
99	2.805

Moment Measures	(phi)	(mm)
Mean	1.729	0.302
Standard Deviation	0.547	0.684
Skewness	-1.143	
Kurtosis	10.905	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.485	1.487
Standard Deviation	0.445	0.491
Skewness (1)	-0.011	0.016
Skewness (2)	0.084	
Kurtosis	0.994	1.617



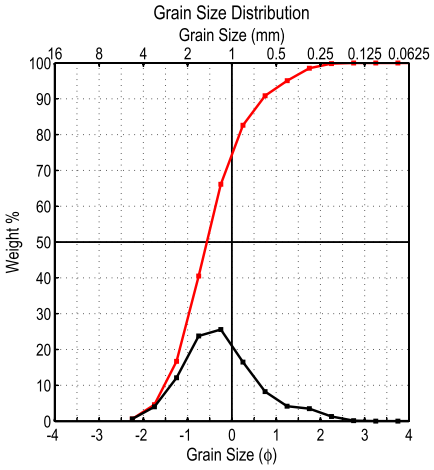
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**NHB-10b**
Interval	**LTT**
Mean	**0.277 mm**
STD	**0.657 mm**
Skewness	**-0.998**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	111.37
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	1.30

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.09	0.08	0.08
-1	-1.25	0.16	0.14	0.22
-0.5	-0.75	0.40	0.36	0.58
0	-0.25	0.80	0.72	1.30
0.5	0.25	1.68	1.51	2.81
1	0.75	4.76	4.27	7.08
1.5	1.25	12.50	11.22	18.31
2	1.75	47.63	42.77	61.08
2.5	2.25	32.03	28.76	89.84
3	2.75	9.36	8.40	98.24
3.5	3.25	1.81	1.63	99.87
4	3.75	0.12	0.11	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-0.460
5	0.505
16	1.145
25	1.330
50	1.620
75	1.990
84	2.150
95	2.555
99	2.985

Moment Measures	(phi)	(mm)
Mean	1.853	0.277
Standard Deviation	0.606	0.657
Skewness	-0.998	
Kurtosis	6.687	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.648	1.638
Standard Deviation	0.502	0.562
Skewness (1)	0.055	-0.017
Skewness (2)	-0.179	
Kurtosis	1.040	1.273



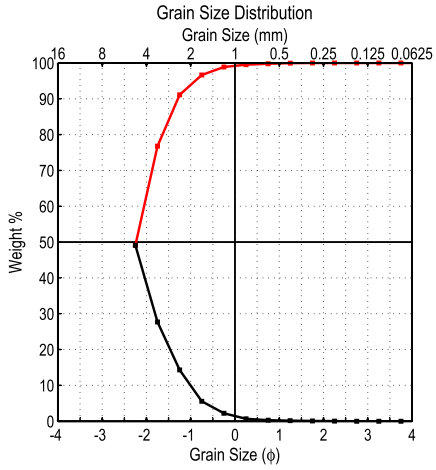
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**KH-01a**
Interval	**Swash**
Mean	**1.170 mm**
STD	**0.548 mm**
Skewness	**0.617**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	100.12
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	66.14

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.63	0.63	0.63
-1.5	-1.75	4.00	4.00	4.62
-1	-1.25	12.12	12.11	16.73
-0.5	-0.75	23.83	23.80	40.53
0	-0.25	25.64	25.61	66.14
0.5	0.25	16.50	16.48	82.62
1	0.75	8.25	8.24	90.86
1.5	1.25	4.18	4.17	95.04
2	1.75	3.48	3.48	98.51
2.5	2.25	1.29	1.29	99.80
3	2.75	0.16	0.16	99.96
3.5	3.25	0.02	0.02	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.205
5	-1.735
16	-1.280
25	-1.075
50	-0.565
75	0.020
84	0.335
95	1.245
99	1.940

Moment Measures	(phi)	(mm)
Mean	-0.227	1.170
Standard Deviation	0.868	0.548
Skewness	0.617	
Kurtosis	3.511	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.472	-0.503
Standard Deviation	0.807	0.855
Skewness (1)	0.115	0.165
Skewness (2)	0.396	
Kurtosis	0.845	1.115



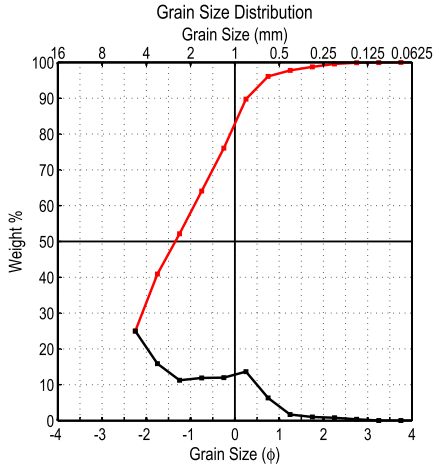
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**KH-01b**
Interval	**LTT**
Mean	**3.502 mm**
STD	**0.673 mm**
Skewness	**1.680**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Strongly Fine Skewed
	Leptokurtic
Total weight (gram)	108.17
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	98.84

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	53.10	49.09	49.09
-1.5	-1.75	29.95	27.69	76.78
-1	-1.25	15.47	14.30	91.08
-0.5	-0.75	5.99	5.54	96.62
0	-0.25	2.41	2.23	98.84
0.5	0.25	0.71	0.66	99.50
1	0.75	0.30	0.28	99.78
1.5	1.25	0.17	0.16	99.94
2	1.75	0.05	0.05	99.98
2.5	2.25	0.02	0.02	100.00
3	2.75	0.00	0.00	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-2.235
75	-1.780
84	-1.495
95	-0.895
99	-0.130

Moment Measures	(phi)	(mm)
Mean	-1.808	3.502
Standard Deviation	0.572	0.673
Skewness	1.680	
Kurtosis	6.841	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.873	-1.993
Standard Deviation	0.377	0.394
Skewness (1)	0.960	0.969
Skewness (2)	1.755	
Kurtosis	0.795	1.182



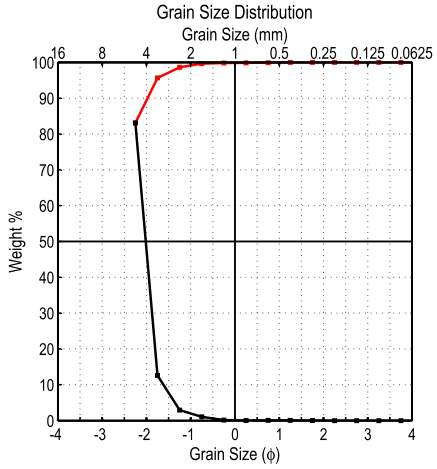
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**KH-02a**
Interval	**Swash**
Mean	**1.930 mm**
STD	**0.456 mm**
Skewness	**0.596**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	101.80
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	76.05

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	25.44	24.99	24.99
-1.5	-1.75	16.18	15.89	40.88
-1	-1.25	11.46	11.26	52.14
-0.5	-0.75	12.13	11.92	64.06
0	-0.25	12.21	11.99	76.05
0.5	0.25	13.91	13.66	89.72
1	0.75	6.46	6.35	96.06
1.5	1.25	1.71	1.68	97.74
2	1.75	1.01	0.99	98.73
2.5	2.25	0.81	0.80	99.53
3	2.75	0.39	0.38	99.91
3.5	3.25	0.04	0.04	99.95
4	3.75	0.03	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.345
75	-0.295
84	0.040
95	0.665
99	1.920

Moment Measures	(phi)	(mm)
Mean	-0.949	1.930
Standard Deviation	1.133	0.456
Skewness	0.596	
Kurtosis	2.729	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.105	-1.185
Standard Deviation	1.145	1.014
Skewness (1)	0.210	0.294
Skewness (2)	0.483	
Kurtosis	0.273	0.611



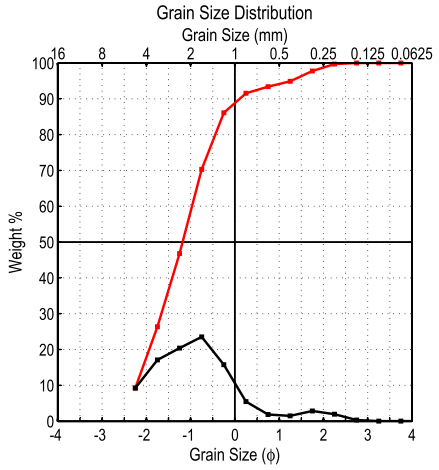
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**KH02b**
Interval	**LTT**
Mean	**4.385 mm**
STD	**0.806 mm**
Skewness	**4.103**
USCS	**Wentworth**
GP	Small Pebble
Fine Grained Soil	Very Well Sorted
Poorly Graded	Strongly Fine Skewed
	Very Leptokurtic
Total weight (gram)	110.59
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	99.82

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	91.85	83.05	83.05
-1.5	-1.75	13.92	12.59	95.64
-1	-1.25	3.26	2.95	98.59
-0.5	-0.75	1.18	1.07	99.66
0	-0.25	0.18	0.16	99.82
0.5	0.25	0.03	0.03	99.85
1	0.75	0.07	0.06	99.91
1.5	1.25	0.07	0.06	99.97
2	1.75	0.03	0.03	100.00
2.5	2.25	0.00	0.00	100.00
3	2.75	0.00	0.00	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-2.250
75	-2.250
84	-2.210
95	-1.775
99	-1.060

Moment Measures	(phi)	(mm)
Mean	-2.132	4.385
Standard Deviation	0.312	0.806
Skewness	4.103	
Kurtosis	29.366	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-2.230	-2.237
Standard Deviation	0.020	0.082
Skewness (1)	1.000	1.000
Skewness (2)	11.875	
Kurtosis	10.875	Inf



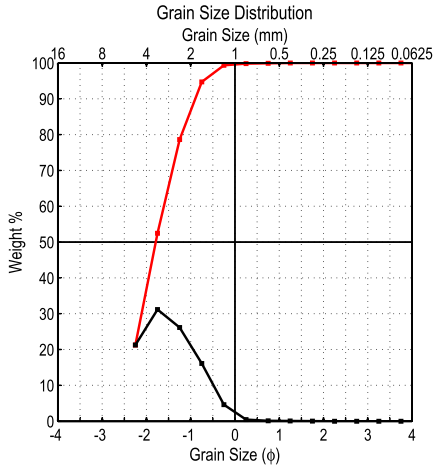
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**KH-03a**
Interval	**Swash**
Mean	**1.778 mm**
STD	**0.498 mm**
Skewness	**1.085**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Leptokurtic
Total weight (gram)	116.46
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	86.08

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	10.79	9.26	9.26
-1.5	-1.75	19.92	17.10	26.37
-1	-1.25	23.78	20.42	46.79
-0.5	-0.75	27.39	23.52	70.31
0	-0.25	18.37	15.77	86.08
0.5	0.25	6.35	5.45	91.53
1	0.75	2.16	1.85	93.39
1.5	1.25	1.74	1.49	94.88
2	1.75	3.32	2.85	97.73
2.5	2.25	2.26	1.94	99.67
3	2.75	0.35	0.30	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.055
25	-1.790
50	-1.180
75	-0.600
84	-0.315
95	1.270
99	2.075

Moment Measures	(phi)	(mm)
Mean	-0.830	1.778
Standard Deviation	1.007	0.498
Skewness	1.085	
Kurtosis	4.458	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.185	-1.183
Standard Deviation	0.870	0.968
Skewness (1)	-0.006	0.193
Skewness (2)	0.793	
Kurtosis	1.023	1.212



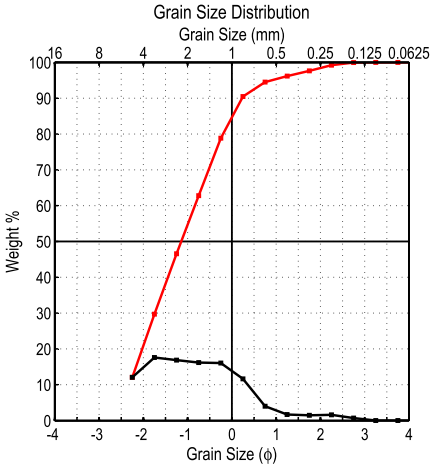
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**KH-03b**
Interval	**LTT**
Mean	**2.790 mm**
STD	**0.665 mm**
Skewness	**0.525**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	107.61
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	99.33

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	22.87	21.25	21.25
-1.5	-1.75	33.56	31.19	52.44
-1	-1.25	28.15	26.16	78.60
-0.5	-0.75	17.34	16.11	94.71
0	-0.25	4.97	4.62	99.33
0.5	0.25	0.50	0.46	99.80
1	0.75	0.12	0.11	99.91
1.5	1.25	0.08	0.07	99.98
2	1.75	0.02	0.02	100.00
2.5	2.25	0.00	0.00	100.00
3	2.75	0.00	0.00	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.190
50	-1.790
75	-1.320
84	-1.080
95	-0.720
99	-0.285

Moment Measures	(phi)	(mm)
Mean	-1.480	2.790
Standard Deviation	0.588	0.665
Skewness	0.525	
Kurtosis	3.014	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.665	-1.707
Standard Deviation	0.585	0.524
Skewness (1)	0.214	0.306
Skewness (2)	0.521	
Kurtosis	0.308	0.721



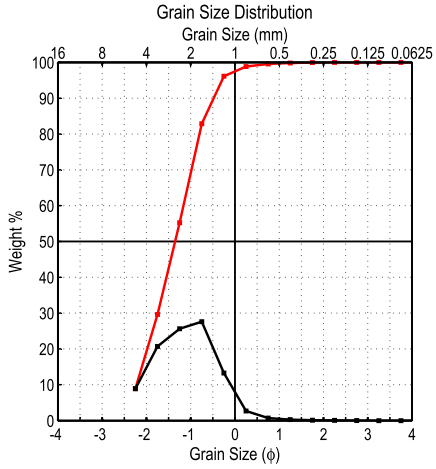
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**KH-04a**
Interval	**Swash**
Mean	**1.728 mm**
STD	**0.477 mm**
Skewness	**0.788**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	100.98
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	78.84

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	12.20	12.08	12.08
-1.5	-1.75	17.79	17.62	29.70
-1	-1.25	17.05	16.88	46.58
-0.5	-0.75	16.34	16.18	62.76
0	-0.25	16.23	16.07	78.84
0.5	0.25	11.75	11.64	90.47
1	0.75	4.04	4.00	94.47
1.5	1.25	1.69	1.67	96.15
2	1.75	1.50	1.49	97.63
2.5	2.25	1.61	1.59	99.23
3	2.75	0.71	0.70	99.93
3.5	3.25	0.03	0.03	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.140
25	-1.885
50	-1.145
75	-0.370
84	-0.030
95	0.905
99	2.180

Moment Measures	(phi)	(mm)
Mean	-0.789	1.728
Standard Deviation	1.067	0.477
Skewness	0.788	
Kurtosis	3.646	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.085	-1.105
Standard Deviation	1.055	1.006
Skewness (1)	0.057	0.178
Skewness (2)	0.448	
Kurtosis	0.495	0.853



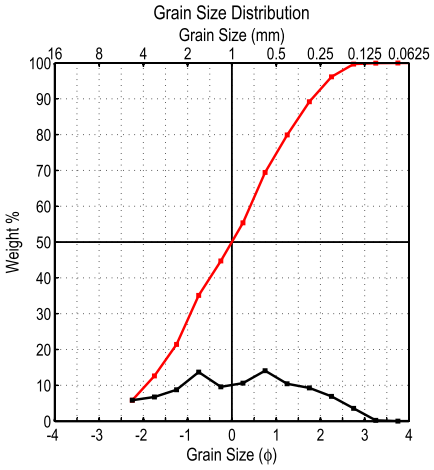
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**KH-04b**
Interval	**LTT**
Mean	**2.150 mm**
STD	**0.629 mm**
Skewness	**0.367**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	109.89
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	96.13

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	9.77	8.89	8.89
-1.5	-1.75	22.76	20.71	29.60
-1	-1.25	28.17	25.63	55.24
-0.5	-0.75	30.34	27.61	82.85
0	-0.25	14.60	13.29	96.13
0.5	0.25	2.97	2.70	98.84
1	0.75	0.78	0.71	99.54
1.5	1.25	0.29	0.26	99.81
2	1.75	0.13	0.12	99.93
2.5	2.25	0.06	0.05	99.98
3	2.75	0.02	0.02	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.080
25	-1.860
50	-1.350
75	-0.890
84	-0.705
95	-0.295
99	0.365

Moment Measures	(phi)	(mm)
Mean	-1.104	2.150
Standard Deviation	0.669	0.629
Skewness	0.367	
Kurtosis	3.540	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.393	-1.378
Standard Deviation	0.688	0.640
Skewness (1)	-0.062	0.009
Skewness (2)	0.113	
Kurtosis	0.422	0.826



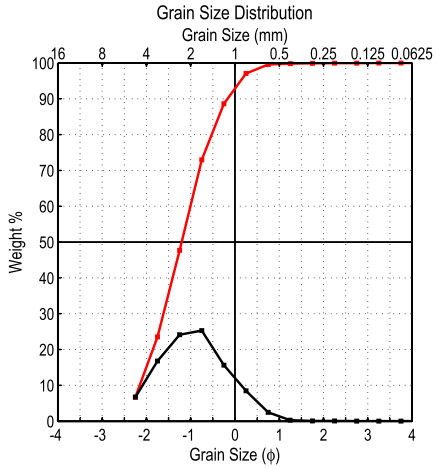
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**KH-05a**
Interval	**Swash**
Mean	**0.869 mm**
STD	**0.387 mm**
Skewness	**0.002**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	111.26
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	44.72

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.51	5.85	5.85
-1.5	-1.75	7.54	6.78	12.63
-1	-1.25	9.78	8.79	21.42
-0.5	-0.75	15.26	13.72	35.13
0	-0.25	10.66	9.58	44.72
0.5	0.25	11.83	10.63	55.35
1	0.75	15.69	14.10	69.45
1.5	1.25	11.62	10.44	79.89
2	1.75	10.33	9.28	89.18
2.5	2.25	7.73	6.95	96.13
3	2.75	3.97	3.57	99.69
3.5	3.25	0.28	0.25	99.95
4	3.75	0.04	0.04	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.560
25	-1.120
50	0.000
75	1.015
84	1.470
95	2.170
99	2.655

Moment Measures	(phi)	(mm)
Mean	0.203	0.869
Standard Deviation	1.369	0.387
Skewness	0.002	
Kurtosis	2.089	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.045	-0.030
Standard Deviation	1.515	1.427
Skewness (1)	-0.030	-0.024
Skewness (2)	-0.026	
Kurtosis	0.459	0.848



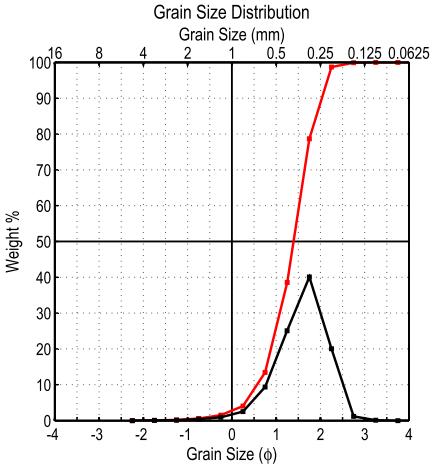
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2010**
Station	**KH-05b**
Interval	**LTT**
Mean	**1.903 mm**
STD	**0.596 mm**
Skewness	**0.386**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	113.05
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	88.59

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	7.60	6.72	6.72
-1.5	-1.75	19.00	16.81	23.53
-1	-1.25	27.29	24.14	47.67
-0.5	-0.75	28.57	25.27	72.94
0	-0.25	17.69	15.65	88.59
0.5	0.25	9.58	8.47	97.06
1	0.75	2.79	2.47	99.53
1.5	1.25	0.33	0.29	99.82
2	1.75	0.07	0.06	99.89
2.5	2.25	0.05	0.04	99.93
3	2.75	0.03	0.03	99.96
3.5	3.25	0.02	0.02	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.975
25	-1.720
50	-1.205
75	-0.685
84	-0.395
95	0.130
99	0.640

Moment Measures	(phi)	(mm)
Mean	-0.928	1.903
Standard Deviation	0.748	0.596
Skewness	0.386	
Kurtosis	3.428	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.185	-1.192
Standard Deviation	0.790	0.756
Skewness (1)	0.025	0.074
Skewness (2)	0.184	
Kurtosis	0.506	0.942



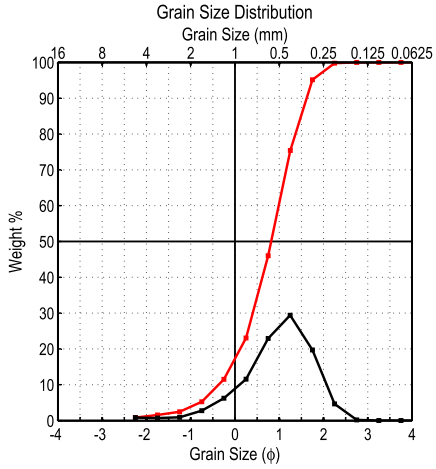
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**B2a**
Interval	**Grab**
Mean	**0.336 mm**
STD	**0.673 mm**
Skewness	**-0.984**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	101.85
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	1.53

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.05	0.05	0.05
-1	-1.25	0.13	0.13	0.18
-0.5	-0.75	0.42	0.41	0.59
0	-0.25	0.96	0.94	1.53
0.5	0.25	2.57	2.52	4.05
1	0.75	9.56	9.39	13.44
1.5	1.25	25.56	25.10	38.54
2	1.75	40.85	40.11	78.65
2.5	2.25	20.41	20.04	98.68
3	2.75	1.22	1.20	99.88
3.5	3.25	0.12	0.12	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.530
5	0.300
16	0.800
25	0.980
50	1.395
75	1.705
84	1.885
95	2.160
99	2.380

Moment Measures	(phi)	(mm)
Mean	1.572	0.336
Standard Deviation	0.572	0.673
Skewness	-0.984	
Kurtosis	5.245	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.342	1.360
Standard Deviation	0.542	0.553
Skewness (1)	-0.097	-0.137
Skewness (2)	-0.304	
Kurtosis	0.714	1.051



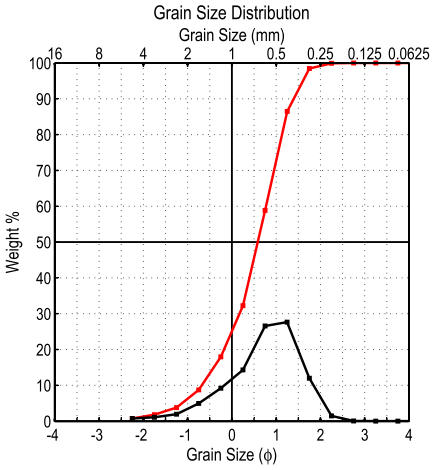
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**B2b**
Interval	**Grab**
Mean	**0.519 mm**
STD	**0.570 mm**
Skewness	**-1.055**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	99.86
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	11.51

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.84	0.84	0.84
-1.5	-1.75	0.71	0.71	1.55
-1	-1.25	0.92	0.92	2.47
-0.5	-0.75	2.78	2.78	5.26
0	-0.25	6.24	6.25	11.51
0.5	0.25	11.54	11.56	23.06
1	0.75	22.90	22.93	45.99
1.5	1.25	29.37	29.41	75.41
2	1.75	19.70	19.73	95.13
2.5	2.25	4.63	4.64	99.77
3	2.75	0.20	0.20	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.140
5	-0.795
16	-0.055
25	0.290
50	0.820
75	1.245
84	1.470
95	1.745
99	2.165

Moment Measures	(phi)	(mm)
Mean	0.945	0.519
Standard Deviation	0.811	0.570
Skewness	-1.055	
Kurtosis	4.855	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.708	0.745
Standard Deviation	0.762	0.766
Skewness (1)	-0.148	-0.210
Skewness (2)	-0.452	
Kurtosis	0.666	1.090



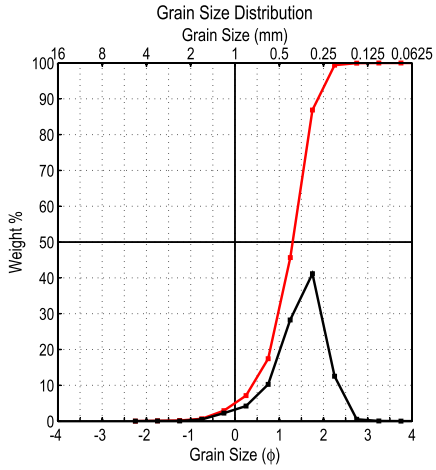
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**B2c**
Interval	**Grab**
Mean	**0.613 mm**
STD	**0.565 mm**
Skewness	**-0.899**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	114.17
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	17.94

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.85	0.74	0.74
-1.5	-1.75	1.24	1.09	1.83
-1	-1.25	2.24	1.96	3.79
-0.5	-0.75	5.65	4.95	8.74
0	-0.25	10.50	9.20	17.94
0.5	0.25	16.33	14.30	32.24
1	0.75	30.35	26.58	58.82
1.5	1.25	31.55	27.63	86.46
2	1.75	13.69	11.99	98.45
2.5	2.25	1.67	1.46	99.91
3	2.75	0.07	0.06	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.130
5	-1.130
16	-0.355
25	-0.005
50	0.585
75	1.045
84	1.205
95	1.605
99	1.940

Moment Measures	(phi)	(mm)
Mean	0.706	0.613
Standard Deviation	0.823	0.565
Skewness	-0.899	
Kurtosis	3.998	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.425	0.478
Standard Deviation	0.780	0.804
Skewness (1)	-0.205	-0.230
Skewness (2)	-0.446	
Kurtosis	0.753	1.068



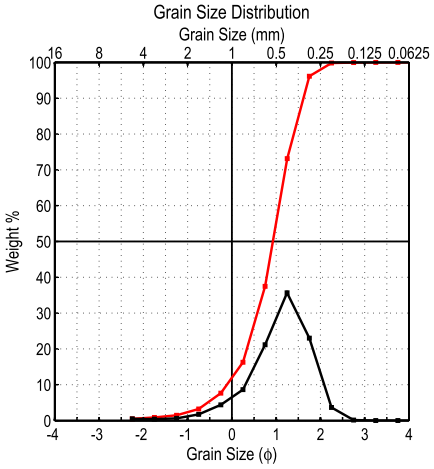
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**B2d**
Interval	**Grab**
Mean	**0.366 mm**
STD	**0.660 mm**
Skewness	**-1.096**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	99.01
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	2.92

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.04	0.04	0.04
-1.5	-1.75	0.07	0.07	0.11
-1	-1.25	0.07	0.07	0.18
-0.5	-0.75	0.48	0.48	0.67
0	-0.25	2.23	2.25	2.92
0.5	0.25	4.18	4.22	7.14
1	0.75	10.19	10.29	17.43
1.5	1.25	27.95	28.23	45.66
2	1.75	40.77	41.18	86.84
2.5	2.25	12.43	12.55	99.39
3	2.75	0.52	0.53	99.92
3.5	3.25	0.05	0.05	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.675
5	-0.005
16	0.680
25	0.885
50	1.305
75	1.605
84	1.715
95	2.075
99	2.235

Moment Measures	(phi)	(mm)
Mean	1.449	0.366
Standard Deviation	0.599	0.660
Skewness	-1.096	
Kurtosis	5.322	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.197	1.233
Standard Deviation	0.518	0.574
Skewness (1)	-0.208	-0.234
Skewness (2)	-0.522	
Kurtosis	1.010	1.184



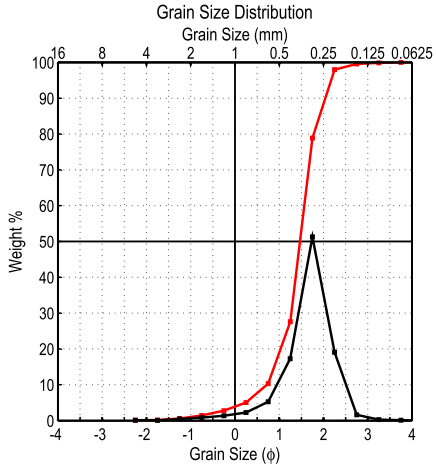
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**B2e**
Interval	**Grab**
Mean	**0.477 mm**
STD	**0.610 mm**
Skewness	**-1.240**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	101.22
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.64

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.49	0.48	0.48
-1.5	-1.75	0.40	0.40	0.88
-1	-1.25	0.61	0.60	1.48
-0.5	-0.75	1.77	1.75	3.23
0	-0.25	4.46	4.41	7.64
0.5	0.25	8.74	8.63	16.27
1	0.75	21.44	21.18	37.45
1.5	1.25	36.09	35.66	73.11
2	1.75	23.31	23.03	96.14
2.5	2.25	3.71	3.67	99.80
3	2.75	0.14	0.14	99.94
3.5	3.25	0.03	0.03	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.650
5	-0.550
16	0.235
25	0.455
50	0.925
75	1.290
84	1.485
95	1.725
99	2.140

Moment Measures	(phi)	(mm)
Mean	1.068	0.477
Standard Deviation	0.713	0.610
Skewness	-1.240	
Kurtosis	5.923	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.860	0.882
Standard Deviation	0.625	0.657
Skewness (1)	-0.104	-0.200
Skewness (2)	-0.540	
Kurtosis	0.820	1.117



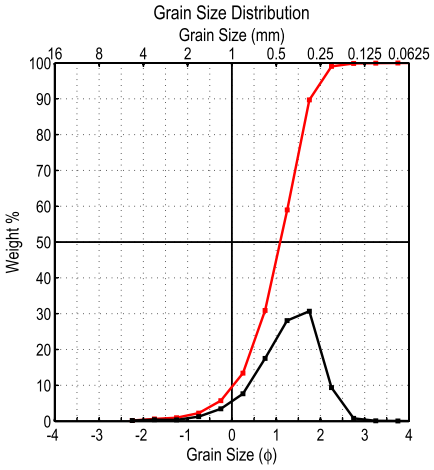
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**B3a**
Interval	**Grab**
Mean	**0.323 mm**
STD	**0.653 mm**
Skewness	**-1.696**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	103.81
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	2.78

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.10	0.10	0.10
-1.5	-1.75	0.06	0.06	0.15
-1	-1.25	0.46	0.44	0.60
-0.5	-0.75	0.85	0.82	1.42
0	-0.25	1.42	1.37	2.78
0.5	0.25	2.35	2.26	5.05
1	0.75	5.46	5.26	10.31
1.5	1.25	17.94	17.28	27.59
2	1.75	53.25	51.30	78.88
2.5	2.25	19.80	19.07	97.96
3	2.75	1.67	1.61	99.57
3.5	3.25	0.31	0.30	99.87
4	3.75	0.11	0.11	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-1.005
5	0.240
16	0.915
25	1.175
50	1.470
75	1.710
84	1.885
95	2.170
99	2.575

Moment Measures	(phi)	(mm)
Mean	1.629	0.323
Standard Deviation	0.614	0.653
Skewness	-1.696	
Kurtosis	8.850	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.400	1.423
Standard Deviation	0.485	0.535
Skewness (1)	-0.144	-0.209
Skewness (2)	-0.546	
Kurtosis	0.990	1.478



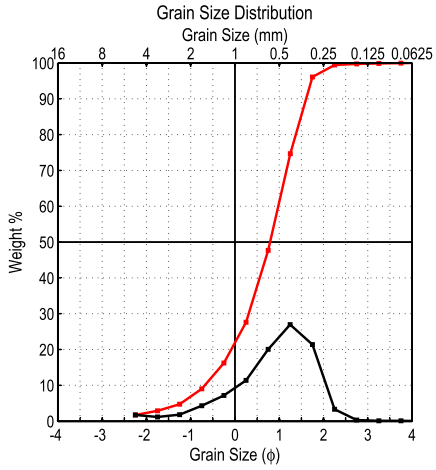
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**B3b**
Interval	**Grab**
Mean	**0.423 mm**
STD	**0.603 mm**
Skewness	**-0.999**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	106.04
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	5.73

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.22	0.21	0.21
-1.5	-1.75	0.45	0.42	0.63
-1	-1.25	0.37	0.35	0.98
-0.5	-0.75	1.36	1.28	2.26
0	-0.25	3.68	3.47	5.73
0.5	0.25	8.14	7.68	13.41
1	0.75	18.57	17.51	30.92
1.5	1.25	29.76	28.06	58.99
2	1.75	32.56	30.71	89.69
2.5	2.25	9.92	9.35	99.05
3	2.75	0.84	0.79	99.84
3.5	3.25	0.10	0.09	99.93
4	3.75	0.07	0.07	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.240
5	-0.355
16	0.325
25	0.580
50	1.090
75	1.510
84	1.655
95	2.035
99	2.245

Moment Measures	(phi)	(mm)
Mean	1.242	0.423
Standard Deviation	0.729	0.603
Skewness	-0.999	
Kurtosis	5.104	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.990	1.023
Standard Deviation	0.665	0.695
Skewness (1)	-0.150	-0.180
Skewness (2)	-0.376	
Kurtosis	0.797	1.053



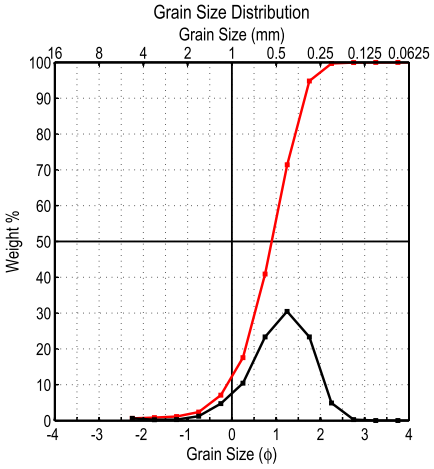
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**B3c**
Interval	**Grab**
Mean	**0.554 mm**
STD	**0.521 mm**
Skewness	**-1.014**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	105.00
% finer than 4.00 phi	0.08
% coarser than -1.00 phi	16.22

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.84	1.75	1.75
-1.5	-1.75	1.22	1.16	2.91
-1	-1.25	1.92	1.83	4.74
-0.5	-0.75	4.52	4.30	9.05
0	-0.25	7.53	7.17	16.22
0.5	0.25	11.96	11.39	27.61
1	0.75	21.08	20.08	47.69
1.5	1.25	28.33	26.98	74.67
2	1.75	22.47	21.40	96.07
2.5	2.25	3.50	3.33	99.40
3	2.75	0.33	0.31	99.71
3.5	3.25	0.12	0.11	99.83
4	3.75	0.10	0.10	99.92
>4.0	4.25	0.08	0.08	100.00

Percentiles	
1	-2.250
5	-1.220
16	-0.265
25	0.135
50	0.795
75	1.260
84	1.470
95	1.725
99	2.190

Moment Measures	(phi)	(mm)
Mean	0.852	0.554
Standard Deviation	0.940	0.521
Skewness	-1.014	
Kurtosis	4.397	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.602	0.667
Standard Deviation	0.867	0.880
Skewness (1)	-0.222	-0.295
Skewness (2)	-0.625	
Kurtosis	0.697	1.073



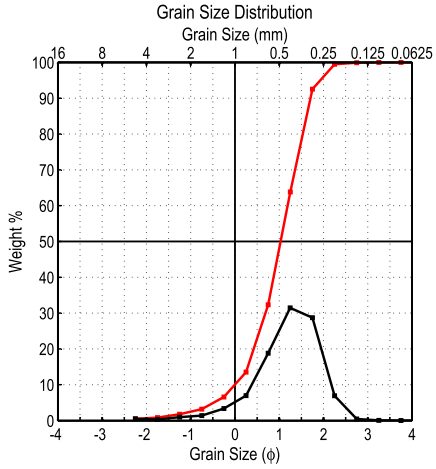
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**B3d**
Interval	**Grab**
Mean	**0.477 mm**
STD	**0.608 mm**
Skewness	**-1.041**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.50
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.11

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.65	0.63	0.63
-1.5	-1.75	0.22	0.21	0.85
-1	-1.25	0.29	0.28	1.13
-0.5	-0.75	1.27	1.24	2.37
0	-0.25	4.86	4.74	7.11
0.5	0.25	10.70	10.44	17.55
1	0.75	23.95	23.37	40.92
1.5	1.25	31.26	30.50	71.41
2	1.75	23.95	23.37	94.78
2.5	2.25	5.03	4.91	99.69
3	2.75	0.27	0.26	99.95
3.5	3.25	0.03	0.03	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.485
5	-0.475
16	0.175
25	0.410
50	0.900
75	1.325
84	1.520
95	1.770
99	2.180

Moment Measures	(phi)	(mm)
Mean	1.068	0.477
Standard Deviation	0.719	0.608
Skewness	-1.041	
Kurtosis	5.616	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.847	0.865
Standard Deviation	0.673	0.676
Skewness (1)	-0.078	-0.152
Skewness (2)	-0.375	
Kurtosis	0.669	1.006



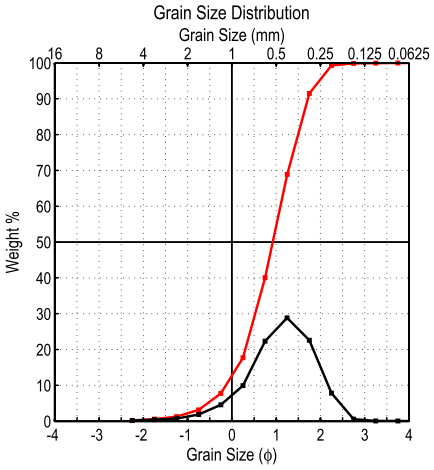
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**B3e**
Interval	**Grab**
Mean	**0.442 mm**
STD	**0.598 mm**
Skewness	**-1.278**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	106.62
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	6.57

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.52	0.49	0.49
-1.5	-1.75	0.35	0.33	0.82
-1	-1.25	1.04	0.98	1.79
-0.5	-0.75	1.49	1.40	3.19
0	-0.25	3.61	3.39	6.57
0.5	0.25	7.41	6.95	13.52
1	0.75	20.05	18.81	32.33
1.5	1.25	33.55	31.47	63.80
2	1.75	30.64	28.74	92.53
2.5	2.25	7.37	6.91	99.45
3	2.75	0.49	0.46	99.91
3.5	3.25	0.07	0.07	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.655
5	-0.485
16	0.315
25	0.555
50	1.030
75	1.445
84	1.600
95	1.930
99	2.220

Moment Measures	(phi)	(mm)
Mean	1.178	0.442
Standard Deviation	0.741	0.598
Skewness	-1.278	
Kurtosis	6.031	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.958	0.982
Standard Deviation	0.643	0.687
Skewness (1)	-0.113	-0.184
Skewness (2)	-0.479	
Kurtosis	0.879	1.112



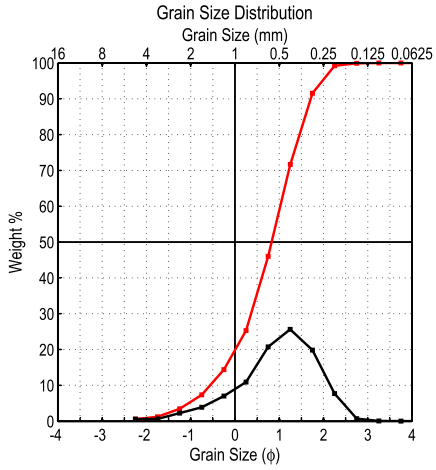
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**BC-E4a**
Interval	**Grab**
Mean	**0.467 mm**
STD	**0.593 mm**
Skewness	**-0.763**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	108.28
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	7.76

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.20	0.18	0.18
-1.5	-1.75	0.42	0.39	0.57
-1	-1.25	0.77	0.71	1.28
-0.5	-0.75	2.04	1.88	3.17
0	-0.25	4.97	4.59	7.76
0.5	0.25	10.77	9.95	17.70
1	0.75	24.17	22.32	40.03
1.5	1.25	31.22	28.83	68.86
2	1.75	24.48	22.61	91.47
2.5	2.25	8.47	7.82	99.29
3	2.75	0.63	0.58	99.87
3.5	3.25	0.08	0.07	99.94
4	3.75	0.05	0.05	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.450
5	-0.550
16	0.165
25	0.415
50	0.925
75	1.385
84	1.585
95	1.975
99	2.230

Moment Measures	(phi)	(mm)
Mean	1.099	0.467
Standard Deviation	0.753	0.593
Skewness	-0.763	
Kurtosis	4.347	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.875	0.892
Standard Deviation	0.710	0.738
Skewness (1)	-0.070	-0.119
Skewness (2)	-0.299	
Kurtosis	0.778	1.067



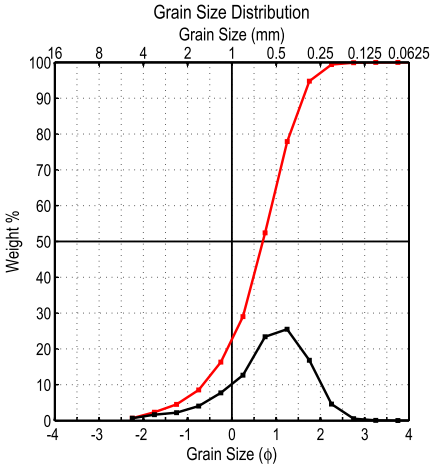
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**BC-E4b**
Interval	**Grab**
Mean	**0.519 mm**
STD	**0.538 mm**
Skewness	**-0.793**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	104.56
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	14.38

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.61	0.58	0.58
-1.5	-1.75	0.65	0.62	1.21
-1	-1.25	2.36	2.26	3.46
-0.5	-0.75	4.08	3.90	7.36
0	-0.25	7.34	7.02	14.38
0.5	0.25	11.41	10.91	25.30
1	0.75	21.68	20.73	46.03
1.5	1.25	26.80	25.63	71.66
2	1.75	20.76	19.85	91.52
2.5	2.25	8.03	7.68	99.20
3	2.75	0.74	0.71	99.90
3.5	3.25	0.07	0.07	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.915
5	-1.055
16	-0.175
25	0.235
50	0.825
75	1.335
84	1.560
95	1.975
99	2.235

Moment Measures	(phi)	(mm)
Mean	0.947	0.519
Standard Deviation	0.894	0.538
Skewness	-0.793	
Kurtosis	3.725	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.693	0.737
Standard Deviation	0.867	0.893
Skewness (1)	-0.153	-0.197
Skewness (2)	-0.421	
Kurtosis	0.746	1.129



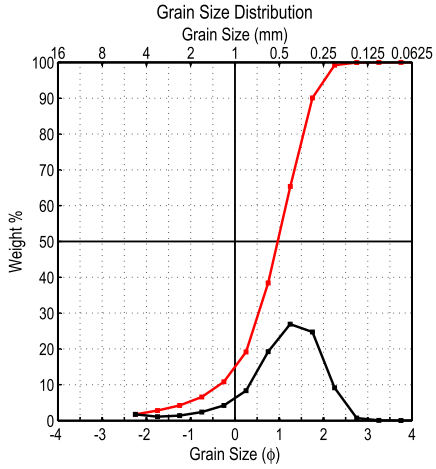
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**BC-E4c**
Interval	**Grab**
Mean	**0.566 mm**
STD	**0.536 mm**
Skewness	**-0.824**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	105.74
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	16.34

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.71	0.67	0.67
-1.5	-1.75	1.75	1.66	2.33
-1	-1.25	2.32	2.19	4.52
-0.5	-0.75	4.29	4.06	8.58
0	-0.25	8.21	7.76	16.34
0.5	0.25	13.40	12.67	29.01
1	0.75	24.73	23.39	52.40
1.5	1.25	26.96	25.50	77.90
2	1.75	17.81	16.84	94.74
2.5	2.25	4.89	4.62	99.37
3	2.75	0.57	0.54	99.91
3.5	3.25	0.07	0.07	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.150
5	-1.190
16	-0.270
25	0.090
50	0.700
75	1.195
84	1.430
95	1.780
99	2.210

Moment Measures	(phi)	(mm)
Mean	0.821	0.566
Standard Deviation	0.901	0.536
Skewness	-0.824	
Kurtosis	3.845	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.580	0.620
Standard Deviation	0.850	0.875
Skewness (1)	-0.141	-0.207
Skewness (2)	-0.476	
Kurtosis	0.747	1.102



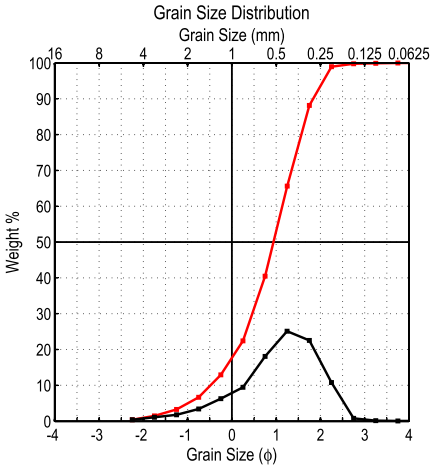
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**BC-E4d**
Interval	**Grab**
Mean	**0.480 mm**
STD	**0.527 mm**
Skewness	**-1.316**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	107.59
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	10.83

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.86	1.73	1.73
-1.5	-1.75	1.17	1.09	2.82
-1	-1.25	1.50	1.39	4.21
-0.5	-0.75	2.57	2.39	6.60
0	-0.25	4.55	4.23	10.83
0.5	0.25	8.98	8.35	19.17
1	0.75	20.72	19.26	38.43
1.5	1.25	28.95	26.91	65.34
2	1.75	26.60	24.72	90.06
2.5	2.25	9.84	9.15	99.21
3	2.75	0.76	0.71	99.92
3.5	3.25	0.07	0.07	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.085
16	0.060
25	0.400
50	0.965
75	1.445
84	1.625
95	2.020
99	2.240

Moment Measures	(phi)	(mm)
Mean	1.058	0.480
Standard Deviation	0.925	0.527
Skewness	-1.316	
Kurtosis	5.310	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.843	0.883
Standard Deviation	0.782	0.862
Skewness (1)	-0.157	-0.239
Skewness (2)	-0.636	
Kurtosis	0.984	1.218



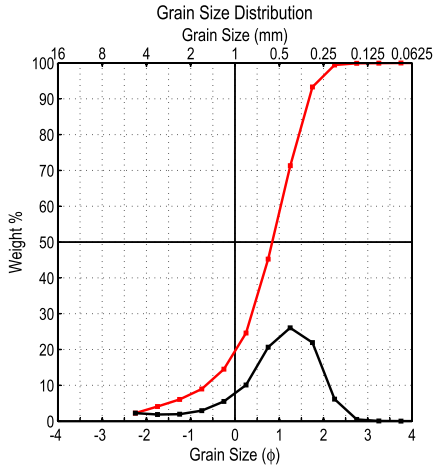
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**BC-E4e**
Interval	**Grab**
Mean	**0.483 mm**
STD	**0.531 mm**
Skewness	**-0.843**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	101.85
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	12.95

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.40	0.39	0.39
-1.5	-1.75	1.11	1.09	1.48
-1	-1.25	1.82	1.79	3.27
-0.5	-0.75	3.48	3.42	6.69
0	-0.25	6.38	6.26	12.95
0.5	0.25	9.64	9.46	22.42
1	0.75	18.40	18.07	40.48
1.5	1.25	25.58	25.12	65.60
2	1.75	22.95	22.53	88.13
2.5	2.25	11.00	10.80	98.93
3	2.75	0.83	0.81	99.74
3.5	3.25	0.14	0.14	99.88
4	3.75	0.08	0.08	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-1.970
5	-0.995
16	-0.090
25	0.320
50	0.940
75	1.460
84	1.660
95	2.070
99	2.295

Moment Measures	(phi)	(mm)
Mean	1.050	0.483
Standard Deviation	0.912	0.531
Skewness	-0.843	
Kurtosis	3.865	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.785	0.837
Standard Deviation	0.875	0.902
Skewness (1)	-0.177	-0.220
Skewness (2)	-0.460	
Kurtosis	0.751	1.102



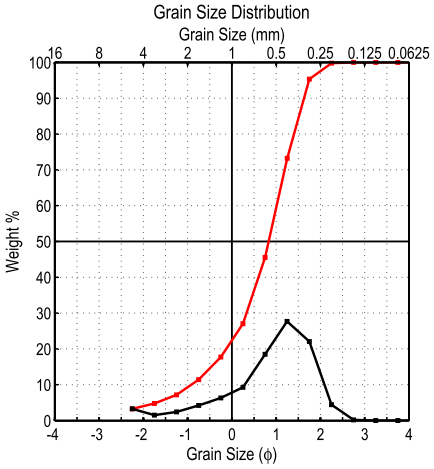
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**BC-E4f**
Interval	**Grab**
Mean	**0.535 mm**
STD	**0.505 mm**
Skewness	**-1.194**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.10
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	14.51

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.32	2.25	2.25
-1.5	-1.75	1.91	1.85	4.10
-1	-1.25	2.03	1.97	6.07
-0.5	-0.75	3.01	2.92	8.99
0	-0.25	5.69	5.52	14.51
0.5	0.25	10.42	10.11	24.62
1	0.75	21.28	20.64	45.26
1.5	1.25	26.87	26.06	71.32
2	1.75	22.63	21.95	93.27
2.5	2.25	6.33	6.14	99.41
3	2.75	0.49	0.48	99.88
3.5	3.25	0.07	0.07	99.95
4	3.75	0.03	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.520
16	-0.175
25	0.260
50	0.840
75	1.335
84	1.540
95	1.890
99	2.215

Moment Measures	(phi)	(mm)
Mean	0.902	0.535
Standard Deviation	0.985	0.505
Skewness	-1.194	
Kurtosis	4.593	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.683	0.735
Standard Deviation	0.857	0.945
Skewness (1)	-0.184	-0.284
Skewness (2)	-0.764	
Kurtosis	0.988	1.300



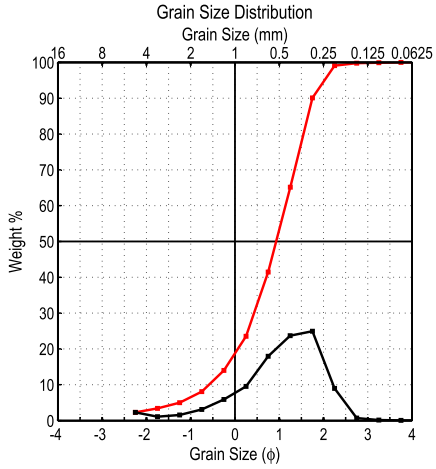
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**BC-E4g**
Interval	**Grab**
Mean	**0.565 mm**
STD	**0.489 mm**
Skewness	**-1.221**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.13
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	17.75

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.37	3.27	3.27
-1.5	-1.75	1.57	1.52	4.79
-1	-1.25	2.48	2.40	7.19
-0.5	-0.75	4.36	4.23	11.42
0	-0.25	6.53	6.33	17.75
0.5	0.25	9.58	9.29	27.04
1	0.75	19.09	18.51	45.55
1.5	1.25	28.54	27.67	73.23
2	1.75	22.77	22.08	95.31
2.5	2.25	4.60	4.46	99.77
3	2.75	0.21	0.20	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.705
16	-0.390
25	0.140
50	0.830
75	1.290
84	1.495
95	1.745
99	2.165

Moment Measures	(phi)	(mm)
Mean	0.824	0.565
Standard Deviation	1.031	0.489
Skewness	-1.221	
Kurtosis	4.236	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.552	0.645
Standard Deviation	0.943	0.994
Skewness (1)	-0.294	-0.382
Skewness (2)	-0.859	
Kurtosis	0.830	1.230



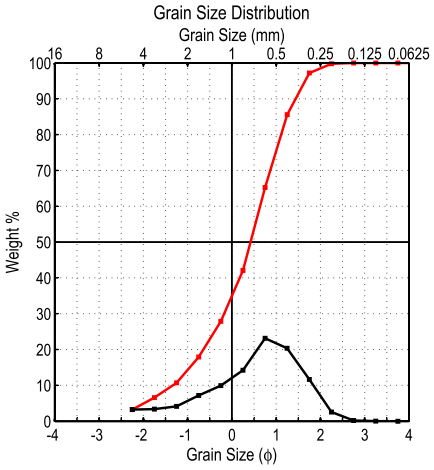
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**BC-E4h**
Interval	**Grab**
Mean	**0.503 mm**
STD	**0.502 mm**
Skewness	**-1.150**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	108.18
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	13.99

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.49	2.30	2.30
-1.5	-1.75	1.20	1.11	3.41
-1	-1.25	1.70	1.57	4.98
-0.5	-0.75	3.36	3.11	8.09
0	-0.25	6.38	5.90	13.99
0.5	0.25	10.32	9.54	23.53
1	0.75	19.41	17.94	41.47
1.5	1.25	25.62	23.68	65.15
2	1.75	26.97	24.93	90.08
2.5	2.25	9.72	8.99	99.07
3	2.75	0.75	0.69	99.76
3.5	3.25	0.14	0.13	99.89
4	3.75	0.08	0.07	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-2.250
5	-1.245
16	-0.145
25	0.290
50	0.930
75	1.450
84	1.630
95	2.025
99	2.245

Moment Measures	(phi)	(mm)
Mean	0.992	0.503
Standard Deviation	0.996	0.502
Skewness	-1.150	
Kurtosis	4.593	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.742	0.805
Standard Deviation	0.887	0.939
Skewness (1)	-0.211	-0.271
Skewness (2)	-0.608	
Kurtosis	0.842	1.155



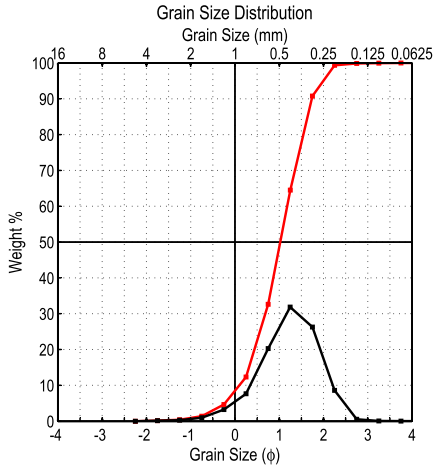
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**BC-E4i**
Interval	**Grab**
Mean	**0.722 mm**
STD	**0.480 mm**
Skewness	**-0.738**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	108.45
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	27.85

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.50	3.23	3.23
-1.5	-1.75	3.66	3.37	6.60
-1	-1.25	4.47	4.12	10.72
-0.5	-0.75	7.81	7.20	17.93
0	-0.25	10.76	9.92	27.85
0.5	0.25	15.41	14.21	42.06
1	0.75	25.11	23.15	65.21
1.5	1.25	22.07	20.35	85.56
2	1.75	12.61	11.63	97.19
2.5	2.25	2.79	2.57	99.76
3	2.75	0.22	0.20	99.96
3.5	3.25	0.04	0.04	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.985
16	-0.885
25	-0.395
50	0.420
75	0.990
84	1.210
95	1.655
99	2.100

Moment Measures	(phi)	(mm)
Mean	0.470	0.722
Standard Deviation	1.058	0.480
Skewness	-0.738	
Kurtosis	3.075	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.163	0.248
Standard Deviation	1.047	1.075
Skewness (1)	-0.246	-0.284
Skewness (2)	-0.558	
Kurtosis	0.737	1.077



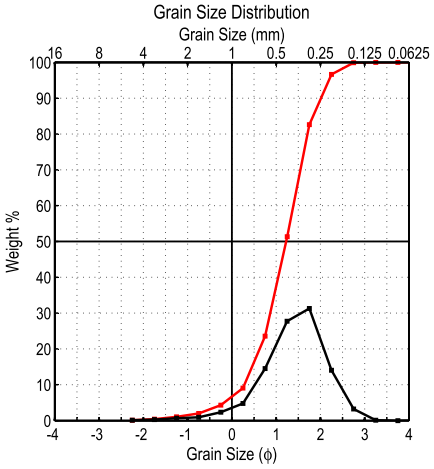
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**BC-E4j**
Interval	**Grab**
Mean	**0.429 mm**
STD	**0.631 mm**
Skewness	**-0.608**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.90
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	4.66

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.14	0.14	0.14
-1	-1.25	0.30	0.29	0.43
-0.5	-0.75	1.01	0.98	1.41
0	-0.25	3.35	3.26	4.66
0.5	0.25	7.89	7.67	12.33
1	0.75	20.88	20.29	32.62
1.5	1.25	32.79	31.87	64.49
2	1.75	27.02	26.26	90.75
2.5	2.25	8.85	8.60	99.35
3	2.75	0.53	0.52	99.86
3.5	3.25	0.07	0.07	99.93
4	3.75	0.04	0.04	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-0.960
5	-0.230
16	0.340
25	0.560
50	1.025
75	1.450
84	1.620
95	1.995
99	2.230

Moment Measures	(phi)	(mm)
Mean	1.220	0.429
Standard Deviation	0.664	0.631
Skewness	-0.608	
Kurtosis	4.071	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.980	0.995
Standard Deviation	0.640	0.657
Skewness (1)	-0.070	-0.099
Skewness (2)	-0.223	
Kurtosis	0.738	1.025



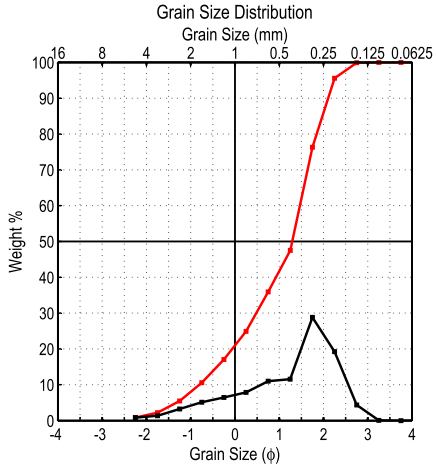
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NSS-01a**
Interval	**Swash**
Mean	**0.380 mm**
STD	**0.604 mm**
Skewness	**-0.987**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	105.64
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	4.31

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.13	0.12	0.12
-1.5	-1.75	0.30	0.28	0.41
-1	-1.25	0.69	0.65	1.06
-0.5	-0.75	0.97	0.92	1.98
0	-0.25	2.46	2.33	4.31
0.5	0.25	5.04	4.77	9.08
1	0.75	15.33	14.51	23.59
1.5	1.25	29.30	27.74	51.33
2	1.75	33.04	31.28	82.60
2.5	2.25	14.82	14.03	96.63
3	2.75	3.44	3.26	99.89
3.5	3.25	0.10	0.09	99.98
4	3.75	0.00	0.00	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.295
5	-0.175
16	0.490
25	0.775
50	1.225
75	1.630
84	1.800
95	2.190
99	2.615

Moment Measures	(phi)	(mm)
Mean	1.395	0.380
Standard Deviation	0.728	0.604
Skewness	-0.987	
Kurtosis	5.329	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.145	1.172
Standard Deviation	0.655	0.686
Skewness (1)	-0.122	-0.153
Skewness (2)	-0.332	
Kurtosis	0.805	1.134



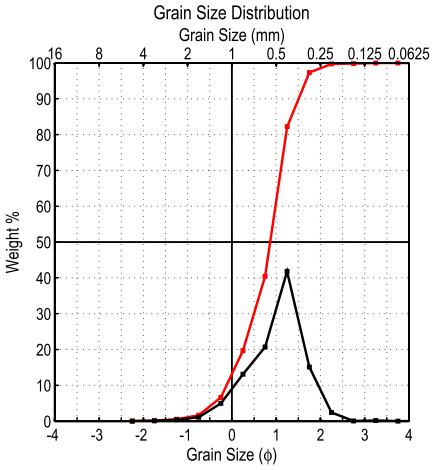
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NSS-01b**
Interval	**LTT**
Mean	**0.445 mm**
STD	**0.461 mm**
Skewness	**-0.913**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	113.13
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	17.03

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.94	0.83	0.83
-1.5	-1.75	1.55	1.37	2.20
-1	-1.25	3.68	3.25	5.45
-0.5	-0.75	5.79	5.12	10.57
0	-0.25	7.31	6.46	17.03
0.5	0.25	8.92	7.88	24.92
1	0.75	12.45	11.01	35.92
1.5	1.25	13.10	11.58	47.50
2	1.75	32.58	28.80	76.30
2.5	2.25	21.78	19.25	95.55
3	2.75	4.93	4.36	99.91
3.5	3.25	0.09	0.08	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.190
5	-1.320
16	-0.330
25	0.255
50	1.295
75	1.725
84	1.950
95	2.235
99	2.645

Moment Measures	(phi)	(mm)
Mean	1.169	0.445
Standard Deviation	1.116	0.461
Skewness	-0.913	
Kurtosis	3.130	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.810	0.972
Standard Deviation	1.140	1.109
Skewness (1)	-0.425	-0.448
Skewness (2)	-0.735	
Kurtosis	0.559	0.991



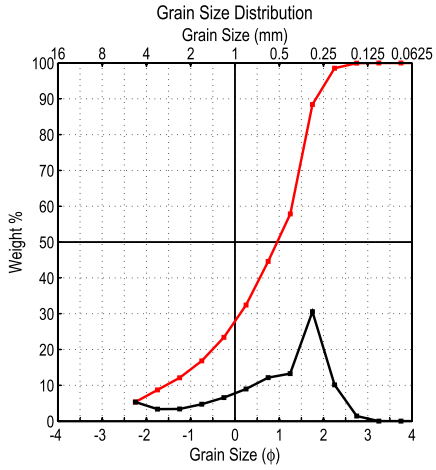
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NSS-02a**
Interval	**Swash**
Mean	**0.497 mm**
STD	**0.648 mm**
Skewness	**-0.650**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	104.79
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	6.61

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.03	0.03	0.03
-1.5	-1.75	0.12	0.11	0.14
-1	-1.25	0.43	0.41	0.55
-0.5	-0.75	1.16	1.11	1.66
0	-0.25	5.19	4.95	6.61
0.5	0.25	13.74	13.11	19.73
1	0.75	21.69	20.70	40.42
1.5	1.25	43.80	41.80	82.22
2	1.75	15.83	15.11	97.33
2.5	2.25	2.52	2.40	99.73
3	2.75	0.08	0.08	99.81
3.5	3.25	0.18	0.17	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.050
5	-0.415
16	0.110
25	0.375
50	0.865
75	1.165
84	1.310
95	1.675
99	2.100

Moment Measures	(phi)	(mm)
Mean	1.009	0.497
Standard Deviation	0.626	0.648
Skewness	-0.650	
Kurtosis	4.238	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.710	0.762
Standard Deviation	0.600	0.617
Skewness (1)	-0.258	-0.242
Skewness (2)	-0.392	
Kurtosis	0.742	1.084



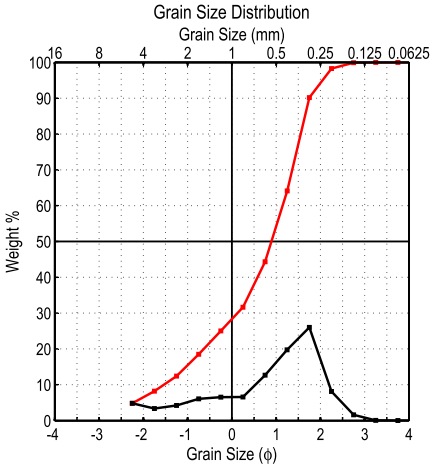
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NSS-02b**
Interval	**LTT**
Mean	**0.571 mm**
STD	**0.411 mm**
Skewness	**-0.938**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	112.98
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	23.41

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.04	5.35	5.35
-1.5	-1.75	3.80	3.36	8.71
-1	-1.25	3.83	3.39	12.10
-0.5	-0.75	5.35	4.74	16.83
0	-0.25	7.43	6.58	23.41
0.5	0.25	10.17	9.00	32.41
1	0.75	13.75	12.17	44.58
1.5	1.25	14.98	13.26	57.84
2	1.75	34.54	30.57	88.41
2.5	2.25	11.44	10.13	98.54
3	2.75	1.60	1.42	99.96
3.5	3.25	0.02	0.02	99.97
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-0.840
25	-0.160
50	0.955
75	1.530
84	1.680
95	2.075
99	2.415

Moment Measures	(phi)	(mm)
Mean	0.809	0.571
Standard Deviation	1.283	0.411
Skewness	-0.938	
Kurtosis	2.964	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.420	0.598
Standard Deviation	1.260	1.285
Skewness (1)	-0.425	-0.453
Skewness (2)	-0.827	
Kurtosis	0.716	1.049



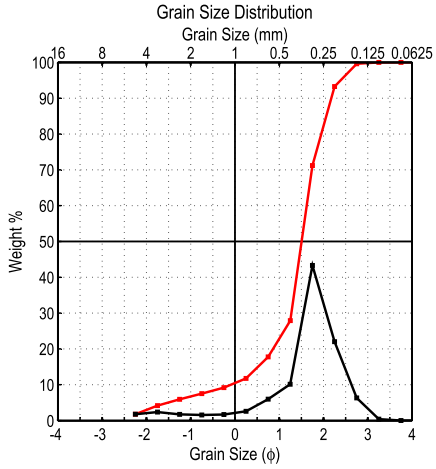
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NSS-03a**
Interval	**Swash**
Mean	**0.589 mm**
STD	**0.416 mm**
Skewness	**-0.890**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	123.17
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	25.05

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.95	4.83	4.83
-1.5	-1.75	4.16	3.38	8.21
-1	-1.25	5.20	4.22	12.43
-0.5	-0.75	7.49	6.08	18.51
0	-0.25	8.05	6.54	25.05
0.5	0.25	8.12	6.59	31.64
1	0.75	15.64	12.70	44.34
1.5	1.25	24.35	19.77	64.11
2	1.75	32.06	26.03	90.14
2.5	2.25	10.03	8.14	98.28
3	2.75	1.99	1.62	99.89
3.5	3.25	0.09	0.07	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.225
16	-0.955
25	-0.255
50	0.895
75	1.460
84	1.630
95	2.050
99	2.475

Moment Measures	(phi)	(mm)
Mean	0.763	0.589
Standard Deviation	1.264	0.416
Skewness	-0.890	
Kurtosis	2.890	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.337	0.523
Standard Deviation	1.293	1.294
Skewness (1)	-0.431	-0.445
Skewness (2)	-0.760	
Kurtosis	0.654	1.022



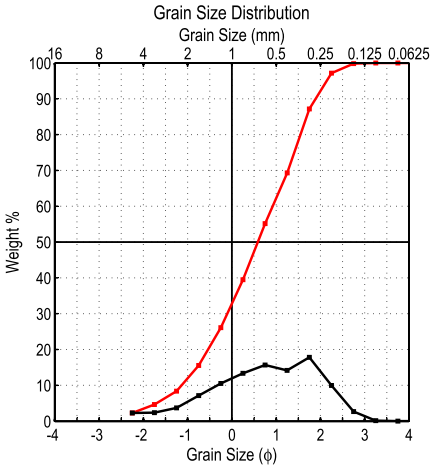
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NSS-03b**
Interval	**LTT**
Mean	**0.354 mm**
STD	**0.481 mm**
Skewness	**-1.897**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	101.09
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	9.20

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.81	1.79	1.79
-1.5	-1.75	2.42	2.39	4.18
-1	-1.25	1.77	1.75	5.94
-0.5	-0.75	1.60	1.58	7.52
0	-0.25	1.70	1.68	9.20
0.5	0.25	2.62	2.59	11.79
1	0.75	6.05	5.98	17.78
1.5	1.25	10.24	10.13	27.91
2	1.75	43.76	43.29	71.19
2.5	2.25	22.28	22.04	93.23
3	2.75	6.41	6.34	99.57
3.5	3.25	0.40	0.40	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.515
16	0.600
25	1.105
50	1.505
75	1.835
84	2.040
95	2.390
99	2.705

Moment Measures	(phi)	(mm)
Mean	1.500	0.354
Standard Deviation	1.055	0.481
Skewness	-1.897	
Kurtosis	6.561	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.320	1.382
Standard Deviation	0.720	0.952
Skewness (1)	-0.257	-0.402
Skewness (2)	-1.483	
Kurtosis	1.712	2.192



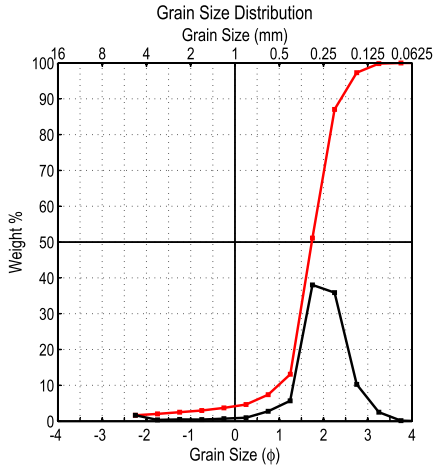
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NSS-04a**
Interval	**Swash**
Mean	**0.605 mm**
STD	**0.445 mm**
Skewness	**-0.483**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	108.88
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	26.10

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.50	2.30	2.30
-1.5	-1.75	2.58	2.37	4.67
-1	-1.25	4.05	3.72	8.39
-0.5	-0.75	7.80	7.16	15.55
0	-0.25	11.49	10.55	26.10
0.5	0.25	14.56	13.37	39.47
1	0.75	17.06	15.67	55.14
1.5	1.25	15.42	14.16	69.31
2	1.75	19.43	17.85	87.15
2.5	2.25	10.88	9.99	97.14
3	2.75	2.92	2.68	99.83
3.5	3.25	0.15	0.14	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.705
16	-0.730
25	-0.300
50	0.585
75	1.410
84	1.660
95	2.145
99	2.595

Moment Measures	(phi)	(mm)
Mean	0.725	0.605
Standard Deviation	1.167	0.445
Skewness	-0.483	
Kurtosis	2.694	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.465	0.505
Standard Deviation	1.195	1.181
Skewness (1)	-0.100	-0.145
Skewness (2)	-0.305	
Kurtosis	0.611	0.923



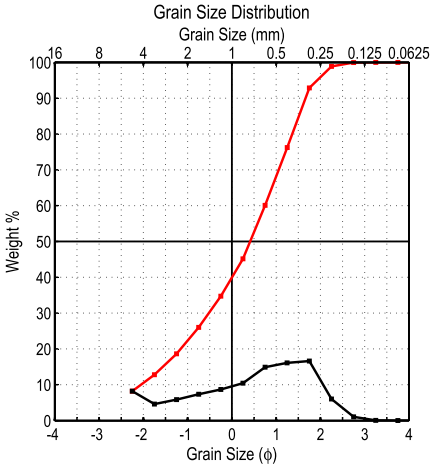
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NSS-04b**
Interval	**LTT**
Mean	**0.271 mm**
STD	**0.556 mm**
Skewness	**-2.634**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	104.71
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	3.70

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.75	1.67	1.67
-1.5	-1.75	0.38	0.36	2.03
-1	-1.25	0.52	0.50	2.53
-0.5	-0.75	0.46	0.44	2.97
0	-0.25	0.76	0.73	3.70
0.5	0.25	0.99	0.95	4.64
1	0.75	2.90	2.77	7.41
1.5	1.25	5.95	5.68	13.09
2	1.75	39.83	38.04	51.13
2.5	2.25	37.56	35.87	87.00
3	2.75	10.78	10.30	97.30
3.5	3.25	2.65	2.53	99.83
4	3.75	0.16	0.15	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	0.315
16	1.290
25	1.405
50	1.735
75	2.085
84	2.210
95	2.640
99	3.085

Moment Measures	(phi)	(mm)
Mean	1.884	0.271
Standard Deviation	0.846	0.556
Skewness	-2.634	
Kurtosis	13.002	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.750	1.745
Standard Deviation	0.460	0.582
Skewness (1)	0.033	-0.094
Skewness (2)	-0.560	
Kurtosis	1.527	1.401



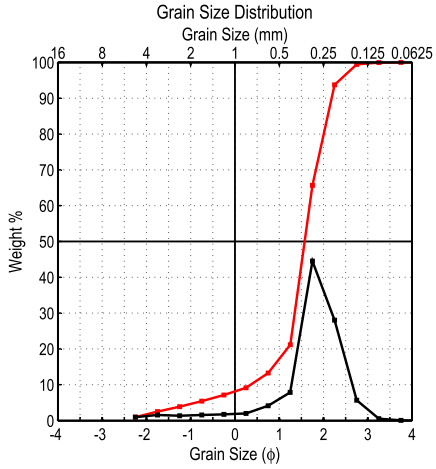
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NSS-05a**
Interval	**Swash**
Mean	**0.767 mm**
STD	**0.395 mm**
Skewness	**-0.515**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	110.73
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	34.74

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	9.09	8.21	8.21
-1.5	-1.75	5.09	4.60	12.81
-1	-1.25	6.48	5.85	18.66
-0.5	-0.75	8.17	7.38	26.04
0	-0.25	9.64	8.71	34.74
0.5	0.25	11.55	10.43	45.17
1	0.75	16.52	14.92	60.09
1.5	1.25	17.85	16.12	76.21
2	1.75	18.43	16.64	92.86
2.5	2.25	6.66	6.01	98.87
3	2.75	1.17	1.06	99.93
3.5	3.25	0.07	0.06	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.475
25	-0.820
50	0.410
75	1.210
84	1.485
95	1.930
99	2.310

Moment Measures	(phi)	(mm)
Mean	0.382	0.767
Standard Deviation	1.339	0.395
Skewness	-0.515	
Kurtosis	2.251	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.005	0.140
Standard Deviation	1.480	1.373
Skewness (1)	-0.274	-0.273
Skewness (2)	-0.385	
Kurtosis	0.412	0.844



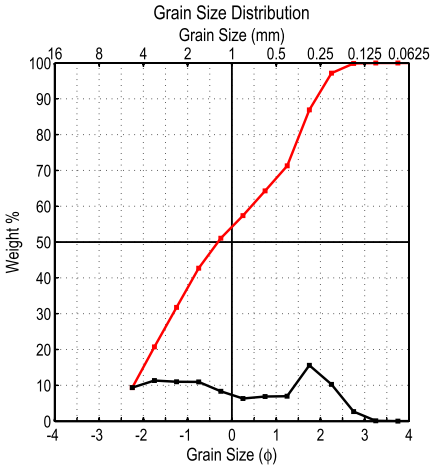
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NSS-05b**
Interval	**LTT**
Mean	**0.321 mm**
STD	**0.524 mm**
Skewness	**-2.153**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	114.31
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	7.16

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.08	0.94	0.94
-1.5	-1.75	1.81	1.58	2.53
-1	-1.25	1.54	1.35	3.88
-0.5	-0.75	1.77	1.55	5.42
0	-0.25	1.98	1.73	7.16
0.5	0.25	2.27	1.99	9.14
1	0.75	4.75	4.16	13.30
1.5	1.25	9.00	7.87	21.17
2	1.75	50.87	44.50	65.67
2.5	2.25	32.07	28.06	93.73
3	2.75	6.51	5.70	99.42
3.5	3.25	0.59	0.52	99.94
4	3.75	0.05	0.04	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.235
5	-0.885
16	0.920
25	1.295
50	1.575
75	1.915
84	2.075
95	2.360
99	2.715

Moment Measures	(phi)	(mm)
Mean	1.639	0.321
Standard Deviation	0.931	0.524
Skewness	-2.153	
Kurtosis	8.225	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.498	1.523
Standard Deviation	0.578	0.780
Skewness (1)	-0.134	-0.325
Skewness (2)	-1.450	
Kurtosis	1.810	2.145



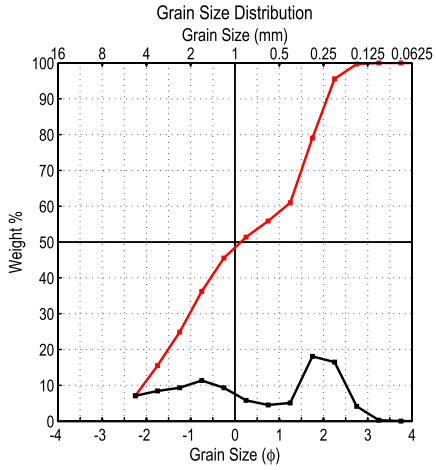
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-01a**
Interval	**Swash**
Mean	**0.941 mm**
STD	**0.340 mm**
Skewness	**0.056**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	101.99
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	51.05

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	9.58	9.39	9.39
-1.5	-1.75	11.58	11.35	20.75
-1	-1.25	11.24	11.02	31.77
-0.5	-0.75	11.17	10.95	42.72
0	-0.25	8.50	8.33	51.05
0.5	0.25	6.47	6.34	57.40
1	0.75	7.04	6.90	64.30
1.5	1.25	7.13	6.99	71.29
2	1.75	15.91	15.60	86.89
2.5	2.25	10.48	10.28	97.17
3	2.75	2.75	2.70	99.86
3.5	3.25	0.12	0.12	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.960
25	-1.555
50	-0.315
75	1.370
84	1.655
95	2.145
99	2.590

Moment Measures	(phi)	(mm)
Mean	0.087	0.941
Standard Deviation	1.557	0.340
Skewness	0.056	
Kurtosis	1.635	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.153	-0.207
Standard Deviation	1.807	1.570
Skewness (1)	0.090	0.105
Skewness (2)	0.145	
Kurtosis	0.216	0.616



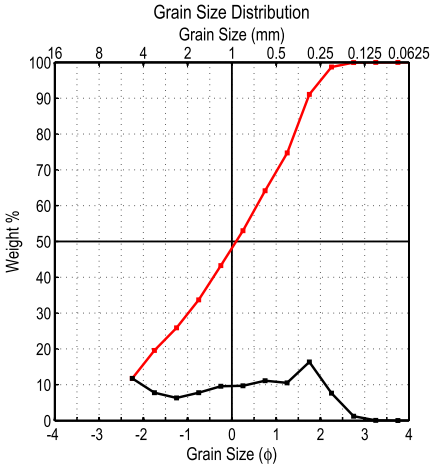
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-01b**
Interval	**LTT**
Mean	**0.762 mm**
STD	**0.332 mm**
Skewness	**-0.143**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	112.71
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	45.52

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	8.02	7.12	7.12
-1.5	-1.75	9.48	8.41	15.53
-1	-1.25	10.51	9.32	24.85
-0.5	-0.75	12.80	11.36	36.21
0	-0.25	10.50	9.32	45.52
0.5	0.25	6.57	5.83	51.35
1	0.75	5.12	4.54	55.90
1.5	1.25	5.72	5.07	60.97
2	1.75	20.38	18.08	79.05
2.5	2.25	18.59	16.49	95.55
3	2.75	4.68	4.15	99.70
3.5	3.25	0.31	0.28	99.97
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.725
25	-1.245
50	0.135
75	1.640
84	1.900
95	2.235
99	2.665

Moment Measures	(phi)	(mm)
Mean	0.392	0.762
Standard Deviation	1.589	0.332
Skewness	-0.143	
Kurtosis	1.608	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.087	0.103
Standard Deviation	1.813	1.586
Skewness (1)	-0.026	-0.045
Skewness (2)	-0.079	
Kurtosis	0.237	0.637



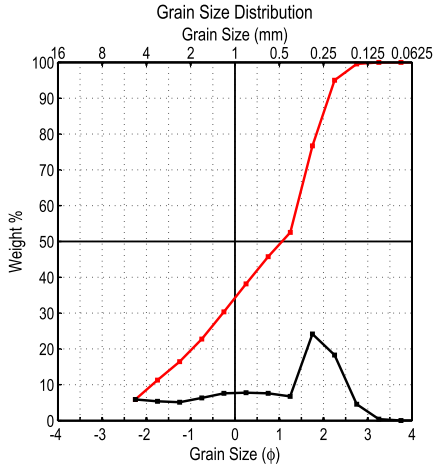
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-02a**
Interval	**Swash**
Mean	**0.888 mm**
STD	**0.359 mm**
Skewness	**-0.233**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	106.84
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	43.28

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	12.60	11.79	11.79
-1.5	-1.75	8.32	7.79	19.58
-1	-1.25	6.75	6.32	25.90
-0.5	-0.75	8.32	7.79	33.69
0	-0.25	10.25	9.59	43.28
0.5	0.25	10.40	9.73	53.01
1	0.75	11.90	11.14	64.15
1.5	1.25	11.26	10.54	74.69
2	1.75	17.48	16.36	91.05
2.5	2.25	8.16	7.64	98.69
3	2.75	1.32	1.24	99.93
3.5	3.25	0.05	0.05	99.97
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.980
25	-1.320
50	0.095
75	1.260
84	1.535
95	2.010
99	2.375

Moment Measures	**(phi)**	**(mm)**
Mean	0.171	0.888
Standard Deviation	1.476	0.359
Skewness	-0.233	
Kurtosis	1.829	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-0.222	-0.117
Standard Deviation	1.758	1.524
Skewness (1)	-0.181	-0.141
Skewness (2)	-0.122	
Kurtosis	0.212	0.677



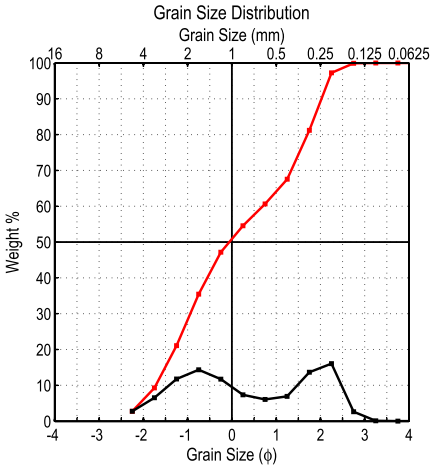
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-02b**
Interval	**LTT**
Mean	**0.583 mm**
STD	**0.358 mm**
Skewness	**-0.623**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	115.45
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	30.37

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.80	5.89	5.89
-1.5	-1.75	6.23	5.40	11.29
-1	-1.25	5.94	5.15	16.43
-0.5	-0.75	7.29	6.31	22.75
0	-0.25	8.80	7.62	30.37
0.5	0.25	8.98	7.78	38.15
1	0.75	8.80	7.62	45.77
1.5	1.25	7.79	6.75	52.52
2	1.75	27.92	24.18	76.70
2.5	2.25	21.13	18.30	95.00
3	2.75	5.26	4.56	99.56
3.5	3.25	0.47	0.41	99.97
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.290
25	-0.600
50	1.065
75	1.715
84	1.950
95	2.250
99	2.690

Moment Measures	**(phi)**	**(mm)**
Mean	0.778	0.583
Standard Deviation	1.480	0.358
Skewness	-0.623	
Kurtosis	2.168	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.330	0.575
Standard Deviation	1.620	1.492
Skewness (1)	-0.454	-0.464
Skewness (2)	-0.657	
Kurtosis	0.389	0.797



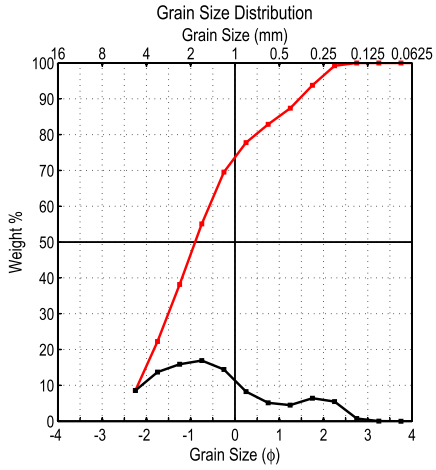
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-03a**
Interval	**Swash**
Mean	**0.776 mm**
STD	**0.369 mm**
Skewness	**0.012**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	104.02
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	47.18

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.87	2.76	2.76
-1.5	-1.75	6.81	6.55	9.31
-1	-1.25	12.26	11.79	21.09
-0.5	-0.75	14.94	14.36	35.45
0	-0.25	12.20	11.73	47.18
0.5	0.25	7.66	7.36	54.55
1	0.75	6.33	6.09	60.63
1.5	1.25	7.20	6.92	67.55
2	1.75	14.20	13.65	81.21
2.5	2.25	16.69	16.04	97.25
3	2.75	2.73	2.62	99.88
3.5	3.25	0.11	0.11	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.080
16	-1.465
25	-1.115
50	-0.060
75	1.525
84	1.835
95	2.180
99	2.585

Moment Measures	**(phi)**	**(mm)**
Mean	0.366	0.776
Standard Deviation	1.438	0.369
Skewness	0.012	
Kurtosis	1.674	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.185	0.103
Standard Deviation	1.650	1.470
Skewness (1)	0.148	0.100
Skewness (2)	0.067	
Kurtosis	0.291	0.661



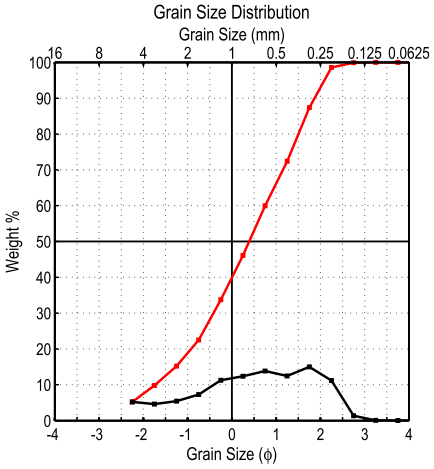
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-03b**
Interval	**LTT**
Mean	**1.341 mm**
STD	**0.409 mm**
Skewness	**0.621**
USCS	**Wentworth**
SW	Very Coarse Sand
Medium Sand	Poorly Sorted
Well Graded	Fine Skewed
	Platykurtic
Total weight (gram)	104.57
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	69.52

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	8.95	8.56	8.56
-1.5	-1.75	14.32	13.69	22.25
-1	-1.25	16.64	15.91	38.17
-0.5	-0.75	17.69	16.92	55.08
0	-0.25	15.10	14.44	69.52
0.5	0.25	8.62	8.24	77.77
1	0.75	5.35	5.12	82.88
1.5	1.25	4.70	4.49	87.38
2	1.75	6.69	6.40	93.77
2.5	2.25	5.70	5.45	99.23
3	2.75	0.77	0.74	99.96
3.5	3.25	0.04	0.04	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.980
25	-1.665
50	-0.900
75	0.080
84	0.875
95	1.860
99	2.230

Moment Measures	**(phi)**	**(mm)**
Mean	-0.423	1.341
Standard Deviation	1.289	0.409
Skewness	0.621	
Kurtosis	2.513	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-0.552	-0.668
Standard Deviation	1.428	1.336
Skewness (1)	0.243	0.293
Skewness (2)	0.494	
Kurtosis	0.440	0.965



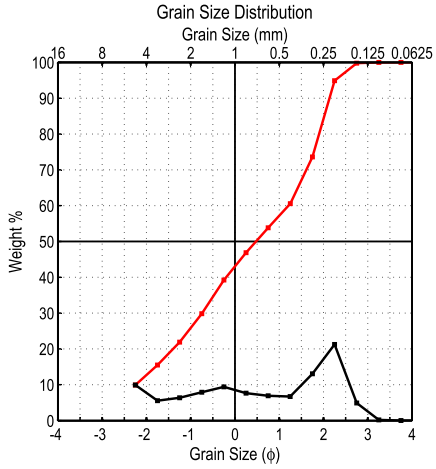
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-04a**
Interval	**Swash**
Mean	**0.709 mm**
STD	**0.404 mm**
Skewness	**-0.424**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	109.27
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	33.75

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.70	5.22	5.22
-1.5	-1.75	5.03	4.60	9.82
-1	-1.25	5.91	5.41	15.23
-0.5	-0.75	7.93	7.26	22.49
0	-0.25	12.31	11.27	33.75
0.5	0.25	13.51	12.36	46.12
1	0.75	15.10	13.82	59.93
1.5	1.25	13.62	12.46	72.40
2	1.75	16.37	14.98	87.38
2.5	2.25	12.21	11.17	98.55
3	2.75	1.47	1.35	99.90
3.5	3.25	0.09	0.08	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.195
25	-0.640
50	0.390
75	1.335
84	1.635
95	2.090
99	2.415

Moment Measures	(phi)	(mm)
Mean	0.496	0.709
Standard Deviation	1.307	0.404
Skewness	-0.424	
Kurtosis	2.306	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.220	0.277
Standard Deviation	1.415	1.365
Skewness (1)	-0.120	-0.168
Skewness (2)	-0.332	
Kurtosis	0.534	0.901



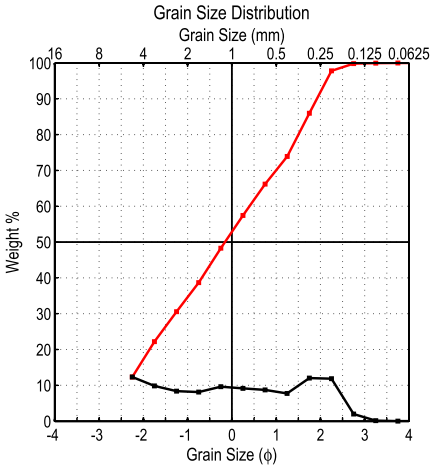
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-04b**
Interval	**LTT**
Mean	**0.697 mm**
STD	**0.329 mm**
Skewness	**-0.331**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	108.93
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	39.23

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	10.84	9.95	9.95
-1.5	-1.75	6.05	5.55	15.51
-1	-1.25	6.96	6.39	21.89
-0.5	-0.75	8.63	7.92	29.82
0	-0.25	10.25	9.41	39.23
0.5	0.25	8.33	7.65	46.87
1	0.75	7.57	6.95	53.82
1.5	1.25	7.32	6.72	60.54
2	1.75	14.24	13.07	73.62
2.5	2.25	23.16	21.26	94.88
3	2.75	5.33	4.89	99.77
3.5	3.25	0.22	0.20	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.710
25	-1.055
50	0.475
75	1.785
84	1.995
95	2.265
99	2.670

Moment Measures	(phi)	(mm)
Mean	0.521	0.697
Standard Deviation	1.604	0.329
Skewness	-0.331	
Kurtosis	1.779	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.143	0.253
Standard Deviation	1.853	1.610
Skewness (1)	-0.179	-0.193
Skewness (2)	-0.252	
Kurtosis	0.219	0.652



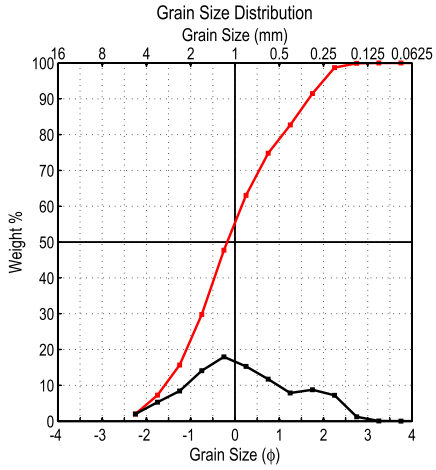
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-05a**
Interval	**Swash**
Mean	**0.943 mm**
STD	**0.340 mm**
Skewness	**-0.018**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	105.13
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	48.29

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	12.96	12.33	12.33
-1.5	-1.75	10.36	9.85	22.18
-1	-1.25	8.80	8.37	30.55
-0.5	-0.75	8.53	8.11	38.67
0	-0.25	10.12	9.63	48.29
0.5	0.25	9.61	9.14	57.43
1	0.75	9.17	8.72	66.16
1.5	1.25	8.14	7.74	73.90
2	1.75	12.65	12.03	85.93
2.5	2.25	12.48	11.87	97.80
3	2.75	2.10	2.00	99.80
3.5	3.25	0.16	0.15	99.95
4	3.75	0.03	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.065
25	-1.580
50	-0.155
75	1.295
84	1.670
95	2.130
99	2.550

Moment Measures	(phi)	(mm)
Mean	0.085	0.943
Standard Deviation	1.556	0.340
Skewness	-0.018	
Kurtosis	1.715	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.198	-0.183
Standard Deviation	1.867	1.597
Skewness (1)	-0.023	0.010
Skewness (2)	0.051	
Kurtosis	0.173	0.624



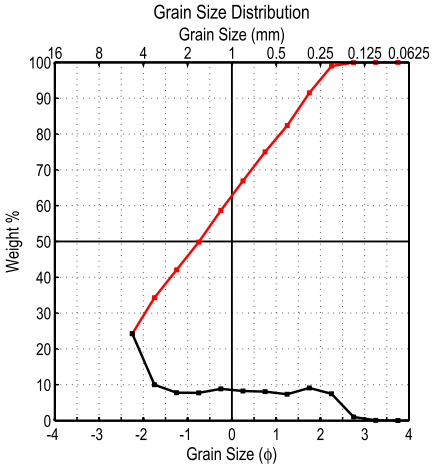
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-05b**
Interval	**LTT**
Mean	**0.880 mm**
STD	**0.442 mm**
Skewness	**0.170**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	108.45
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	47.75

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.17	2.00	2.00
-1.5	-1.75	5.73	5.28	7.28
-1	-1.25	9.12	8.41	15.69
-0.5	-0.75	15.28	14.09	29.78
0	-0.25	19.48	17.96	47.75
0.5	0.25	16.59	15.30	63.04
1	0.75	12.73	11.74	74.78
1.5	1.25	8.56	7.89	82.67
2	1.75	9.53	8.79	91.46
2.5	2.25	7.85	7.24	98.70
3	2.75	1.31	1.21	99.91
3.5	3.25	0.07	0.06	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.965
16	-1.240
25	-0.920
50	-0.175
75	0.765
84	1.325
95	1.995
99	2.375

Moment Measures	(phi)	(mm)
Mean	0.185	0.880
Standard Deviation	1.178	0.442
Skewness	0.170	
Kurtosis	2.340	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.042	-0.030
Standard Deviation	1.282	1.241
Skewness (1)	0.170	0.133
Skewness (2)	0.148	
Kurtosis	0.544	0.963



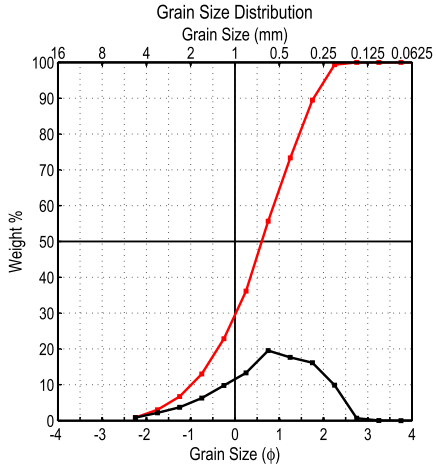
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-06a**
Interval	**Swash**
Mean	**1.291 mm**
STD	**0.336 mm**
Skewness	**0.270**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	107.49
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	58.66

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	26.08	24.26	24.26
-1.5	-1.75	10.79	10.04	34.30
-1	-1.25	8.36	7.78	42.08
-0.5	-0.75	8.32	7.74	49.82
0	-0.25	9.50	8.84	58.66
0.5	0.25	8.88	8.26	66.92
1	0.75	8.71	8.10	75.02
1.5	1.25	7.89	7.34	82.36
2	1.75	9.79	9.11	91.47
2.5	2.25	8.03	7.47	98.94
3	2.75	1.07	1.00	99.93
3.5	3.25	0.05	0.05	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.215
50	-0.740
75	0.750
84	1.340
95	1.985
99	2.280

Moment Measures	(phi)	(mm)
Mean	-0.369	1.291
Standard Deviation	1.573	0.336
Skewness	0.270	
Kurtosis	1.716	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.455	-0.550
Standard Deviation	1.795	1.539
Skewness (1)	0.159	0.223
Skewness (2)	0.338	
Kurtosis	0.180	0.585



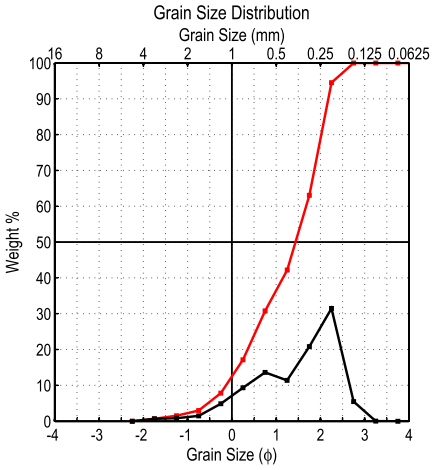
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-06b**
Interval	**LTT**
Mean	**0.595 mm**
STD	**0.485 mm**
Skewness	**-0.542**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	108.43
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	22.84

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.91	0.84	0.84
-1.5	-1.75	2.36	2.18	3.02
-1	-1.25	4.03	3.72	6.73
-0.5	-0.75	6.83	6.30	13.03
0	-0.25	10.64	9.81	22.84
0.5	0.25	14.43	13.31	36.15
1	0.75	21.17	19.52	55.68
1.5	1.25	19.13	17.64	73.32
2	1.75	17.51	16.15	89.47
2.5	2.25	10.71	9.88	99.35
3	2.75	0.70	0.65	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.215
5	-1.485
16	-0.600
25	-0.170
50	0.605
75	1.300
84	1.580
95	2.030
99	2.235

Moment Measures	(phi)	(mm)
Mean	0.748	0.595
Standard Deviation	1.043	0.485
Skewness	-0.542	
Kurtosis	2.810	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.490	0.528
Standard Deviation	1.090	1.078
Skewness (1)	-0.106	-0.147
Skewness (2)	-0.305	
Kurtosis	0.612	0.980



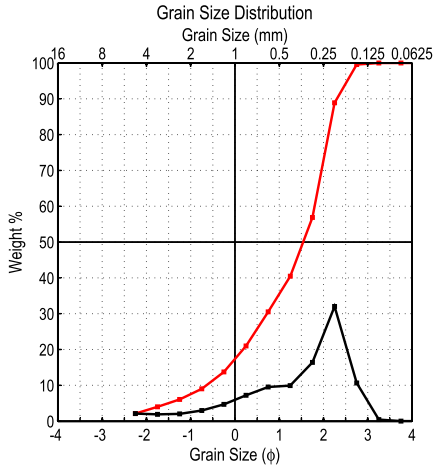
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-07a**
Interval	**Swash**
Mean	**0.367 mm**
STD	**0.526 mm**
Skewness	**-0.869**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	110.82
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.83

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.76	0.69	0.69
-1	-1.25	0.92	0.83	1.52
-0.5	-0.75	1.62	1.46	2.98
0	-0.25	5.38	4.85	7.83
0.5	0.25	10.33	9.32	17.15
1	0.75	15.11	13.63	30.79
1.5	1.25	12.64	11.41	42.19
2	1.75	23.08	20.83	63.02
2.5	2.25	34.87	31.47	94.49
3	2.75	6.08	5.49	99.97
3.5	3.25	0.03	0.03	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.560
5	-0.540
16	0.190
25	0.540
50	1.435
75	1.940
84	2.085
95	2.295
99	2.660

Moment Measures	(phi)	(mm)
Mean	1.447	0.367
Standard Deviation	0.928	0.526
Skewness	-0.869	
Kurtosis	3.258	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.138	1.237
Standard Deviation	0.948	0.903
Skewness (1)	-0.314	-0.354
Skewness (2)	-0.588	
Kurtosis	0.496	0.830



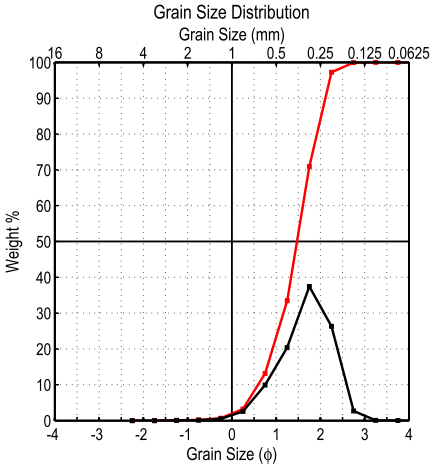
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-07b**
Interval	**LTT**
Mean	**0.382 mm**
STD	**0.430 mm**
Skewness	**-1.167**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.46
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	13.76

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.19	2.12	2.12
-1.5	-1.75	1.97	1.90	4.02
-1	-1.25	2.13	2.06	6.08
-0.5	-0.75	3.07	2.97	9.05
0	-0.25	4.88	4.72	13.76
0.5	0.25	7.47	7.22	20.98
1	0.75	9.87	9.54	30.52
1.5	1.25	10.29	9.95	40.47
2	1.75	16.97	16.40	56.87
2.5	2.25	33.12	32.01	88.88
3	2.75	11.02	10.65	99.54
3.5	3.25	0.45	0.43	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.510
16	-0.095
25	0.460
50	1.540
75	2.035
84	2.175
95	2.535
99	2.725

Moment Measures	(phi)	(mm)
Mean	1.389	0.382
Standard Deviation	1.217	0.430
Skewness	-1.167	
Kurtosis	3.766	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.040	1.207
Standard Deviation	1.135	1.180
Skewness (1)	-0.441	-0.474
Skewness (2)	-0.905	
Kurtosis	0.782	1.053



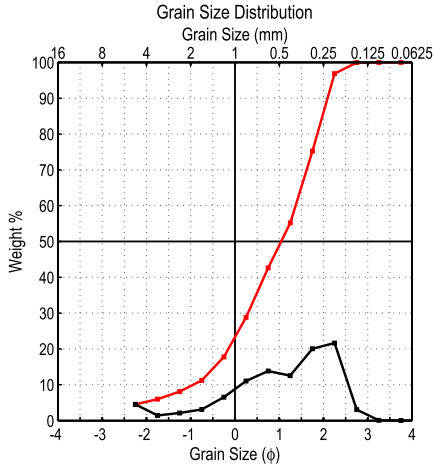
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-08a**
Interval	**Swash**
Mean	**0.317 mm**
STD	**0.673 mm**
Skewness	**-0.711**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	104.94
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	0.69

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.08	0.08	0.08
-0.5	-0.75	0.13	0.12	0.20
0	-0.25	0.51	0.49	0.69
0.5	0.25	2.67	2.54	3.23
1	0.75	10.42	9.93	13.16
1.5	1.25	21.35	20.34	33.50
2	1.75	39.27	37.42	70.93
2.5	2.25	27.61	26.31	97.24
3	2.75	2.82	2.69	99.92
3.5	3.25	0.07	0.07	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.190
5	0.340
16	0.820
25	1.040
50	1.470
75	1.825
84	2.000
95	2.205
99	2.580

Moment Measures	(phi)	(mm)
Mean	1.655	0.317
Standard Deviation	0.572	0.673
Skewness	-0.711	
Kurtosis	3.824	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.410	1.430
Standard Deviation	0.590	0.578
Skewness (1)	-0.102	-0.157
Skewness (2)	-0.335	
Kurtosis	0.581	0.974



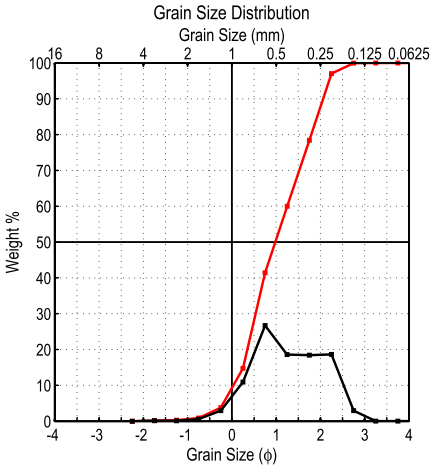
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-08b**
Interval	**LTT**
Mean	**0.494 mm**
STD	**0.425 mm**
Skewness	**-0.986**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	105.95
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	17.77

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	4.81	4.54	4.54
-1.5	-1.75	1.54	1.45	5.99
-1	-1.25	2.24	2.11	8.11
-0.5	-0.75	3.30	3.11	11.22
0	-0.25	6.94	6.55	17.77
0.5	0.25	11.69	11.03	28.81
1	0.75	14.64	13.82	42.62
1.5	1.25	13.30	12.55	55.18
2	1.75	21.26	20.07	75.24
2.5	2.25	22.91	21.62	96.87
3	2.75	3.25	3.07	99.93
3.5	3.25	0.06	0.06	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.090
16	-0.385
25	0.080
50	1.045
75	1.745
84	1.950
95	2.205
99	2.600

Moment Measures	(phi)	(mm)
Mean	1.019	0.494
Standard Deviation	1.233	0.425
Skewness	-0.986	
Kurtosis	3.442	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.783	0.870
Standard Deviation	1.168	1.235
Skewness (1)	-0.225	-0.342
Skewness (2)	-0.846	
Kurtosis	0.839	1.057



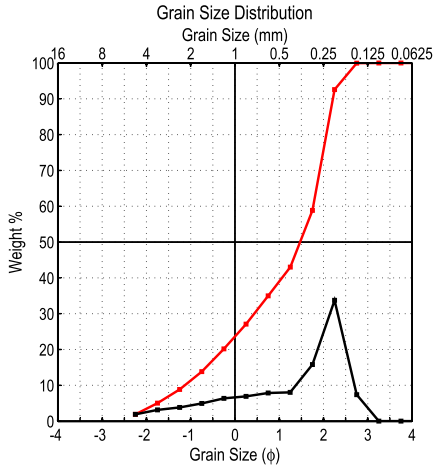
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-09a**
Interval	**Swash**
Mean	**0.416 mm**
STD	**0.588 mm**
Skewness	**-0.148**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	101.69
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	3.82

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.16	0.16	0.16
-1	-1.25	0.11	0.11	0.27
-0.5	-0.75	0.61	0.60	0.87
0	-0.25	3.00	2.95	3.82
0.5	0.25	11.10	10.92	14.73
1	0.75	27.14	26.69	41.42
1.5	1.25	18.89	18.58	60.00
2	1.75	18.72	18.41	78.40
2.5	2.25	18.94	18.63	97.03
3	2.75	2.97	2.92	99.95
3.5	3.25	0.04	0.04	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.725
5	-0.195
16	0.275
25	0.440
50	0.980
75	1.660
84	1.900
95	2.195
99	2.585

Moment Measures	(phi)	(mm)
Mean	1.267	0.416
Standard Deviation	0.766	0.588
Skewness	-0.148	
Kurtosis	2.612	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.087	1.052
Standard Deviation	0.813	0.768
Skewness (1)	0.132	0.075
Skewness (2)	0.025	
Kurtosis	0.471	0.803



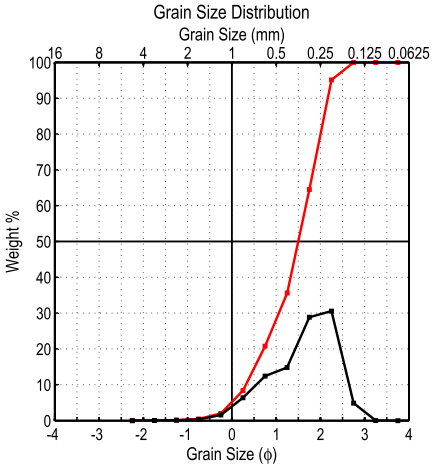
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-09b**
Interval	**LTT**
Mean	**0.430 mm**
STD	**0.402 mm**
Skewness	**-0.957**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	102.13
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	20.20

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.93	1.89	1.89
-1.5	-1.75	3.20	3.13	5.02
-1	-1.25	3.93	3.85	8.87
-0.5	-0.75	5.05	4.94	13.82
0	-0.25	6.52	6.38	20.20
0.5	0.25	7.06	6.91	27.11
1	0.75	8.03	7.86	34.98
1.5	1.25	8.20	8.03	43.00
2	1.75	16.16	15.82	58.83
2.5	2.25	34.44	33.72	92.55
3	2.75	7.56	7.40	99.95
3.5	3.25	0.04	0.04	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.755
16	-0.580
25	0.095
50	1.470
75	1.990
84	2.125
95	2.415
99	2.685

Moment Measures	(phi)	(mm)
Mean	1.219	0.430
Standard Deviation	1.315	0.402
Skewness	-0.957	
Kurtosis	2.850	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.772	1.005
Standard Deviation	1.353	1.308
Skewness (1)	-0.516	-0.531
Skewness (2)	-0.843	
Kurtosis	0.542	0.902



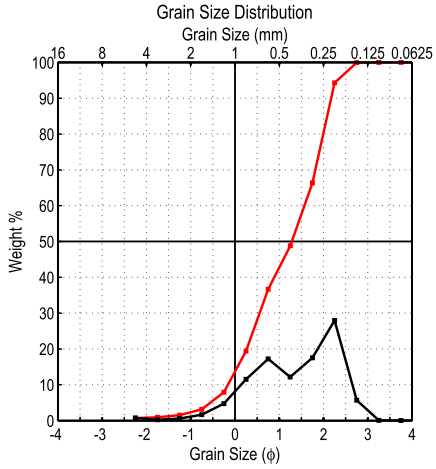
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-10a**
Interval	**Swash**
Mean	**0.326 mm**
STD	**0.611 mm**
Skewness	**-0.757**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	100.63
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	2.00

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.02	0.02	0.02
-1	-1.25	0.10	0.10	0.12
-0.5	-0.75	0.32	0.32	0.44
0	-0.25	1.57	1.56	2.00
0.5	0.25	6.42	6.38	8.38
1	0.75	12.50	12.42	20.80
1.5	1.25	14.93	14.84	35.64
2	1.75	29.05	28.87	64.50
2.5	2.25	30.78	30.59	95.09
3	2.75	4.91	4.88	99.97
3.5	3.25	0.03	0.03	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.570
5	-0.015
16	0.555
25	0.890
50	1.500
75	1.920
84	2.070
95	2.250
99	2.650

Moment Measures	(phi)	(mm)
Mean	1.615	0.326
Standard Deviation	0.712	0.611
Skewness	-0.757	
Kurtosis	3.150	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.313	1.375
Standard Deviation	0.758	0.722
Skewness (1)	-0.248	-0.293
Skewness (2)	-0.505	
Kurtosis	0.495	0.901



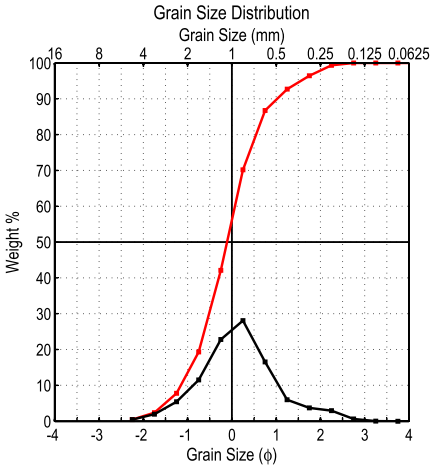
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**NHB-10b**
Interval	**LTT**
Mean	**0.392 mm**
STD	**0.515 mm**
Skewness	**-0.755**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	105.23
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.91

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.73	0.69	0.69
-1.5	-1.75	0.23	0.22	0.91
-1	-1.25	0.63	0.60	1.51
-0.5	-0.75	1.74	1.65	3.16
0	-0.25	4.99	4.74	7.91
0.5	0.25	12.12	11.52	19.42
1	0.75	18.12	17.22	36.64
1.5	1.25	12.81	12.17	48.82
2	1.75	18.43	17.51	66.33
2.5	2.25	29.39	27.93	94.26
3	2.75	5.98	5.68	99.94
3.5	3.25	0.05	0.05	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.675
5	-0.555
16	0.100
25	0.410
50	1.285
75	1.905
84	2.065
95	2.315
99	2.665

Moment Measures	(phi)	(mm)
Mean	1.352	0.392
Standard Deviation	0.957	0.515
Skewness	-0.755	
Kurtosis	3.437	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.083	1.150
Standard Deviation	0.982	0.926
Skewness (1)	-0.206	-0.244
Skewness (2)	-0.412	
Kurtosis	0.461	0.787



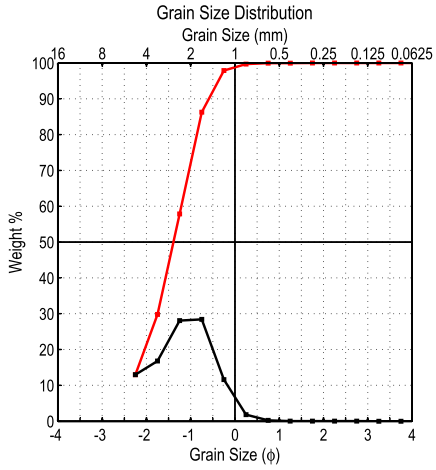
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**KH-01a**
Interval	**Swash**
Mean	**0.893 mm**
STD	**0.552 mm**
Skewness	**0.293**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	108.60
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	42.10

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.48	0.44	0.44
-1.5	-1.75	2.10	1.93	2.38
-1	-1.25	5.89	5.42	7.80
-0.5	-0.75	12.50	11.51	19.31
0	-0.25	24.75	22.79	42.10
0.5	0.25	30.49	28.08	70.17
1	0.75	17.98	16.56	86.73
1.5	1.25	6.48	5.97	92.70
2	1.75	4.05	3.73	96.43
2.5	2.25	3.18	2.93	99.36
3	2.75	0.69	0.64	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.105
5	-1.510
16	-0.895
25	-0.625
50	-0.110
75	0.395
84	0.670
95	1.560
99	2.190

Moment Measures	(phi)	(mm)
Mean	0.163	0.893
Standard Deviation	0.857	0.552
Skewness	0.293	
Kurtosis	3.525	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.113	-0.112
Standard Deviation	0.782	0.856
Skewness (1)	-0.003	0.042
Skewness (2)	0.173	
Kurtosis	0.962	1.234



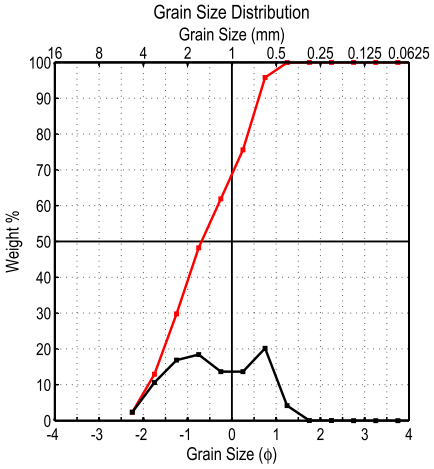
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**KH-01b**
Interval	**LTT**
Mean	**2.252 mm**
STD	**0.641 mm**
Skewness	**0.041**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	104.95
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	97.87

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	13.62	12.98	12.98
-1.5	-1.75	17.64	16.81	29.79
-1	-1.25	29.45	28.06	57.85
-0.5	-0.75	29.83	28.42	86.27
0	-0.25	12.17	11.60	97.87
0.5	0.25	1.91	1.82	99.69
1	0.75	0.24	0.23	99.91
1.5	1.25	0.03	0.03	99.94
2	1.75	0.02	0.02	99.96
2.5	2.25	0.03	0.03	99.99
3	2.75	0.01	0.01	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.160
25	-1.890
50	-1.390
75	-0.950
84	-0.790
95	-0.375
99	0.060

Moment Measures	(phi)	(mm)
Mean	-1.171	2.252
Standard Deviation	0.641	0.641
Skewness	0.041	
Kurtosis	2.826	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.475	-1.447
Standard Deviation	0.685	0.627
Skewness (1)	-0.124	-0.021
Skewness (2)	0.113	
Kurtosis	0.369	0.817



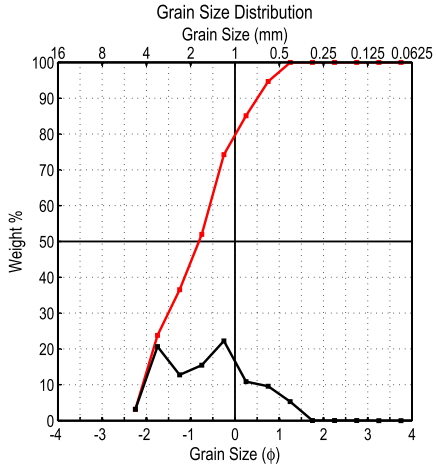
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**KH-02a**
Interval	**Swash**
Mean	**1.303 mm**
STD	**0.525 mm**
Skewness	**-0.032**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	102.36
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	61.90

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.38	2.33	2.33
-1.5	-1.75	10.87	10.62	12.94
-1	-1.25	17.26	16.86	29.81
-0.5	-0.75	18.87	18.43	48.24
0	-0.25	13.98	13.66	61.90
0.5	0.25	13.99	13.67	75.57
1	0.75	20.68	20.20	95.77
1.5	1.25	4.27	4.17	99.94
2	1.75	0.04	0.04	99.98
2.5	2.25	0.02	0.02	100.00
3	2.75	0.00	0.00	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.125
16	-1.660
25	-1.395
50	-0.685
75	0.230
84	0.460
95	0.730
99	1.135

Moment Measures	(phi)	(mm)
Mean	-0.382	1.303
Standard Deviation	0.928	0.525
Skewness	-0.032	
Kurtosis	1.913	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.600	-0.628
Standard Deviation	1.060	0.963
Skewness (1)	0.080	0.036
Skewness (2)	-0.012	
Kurtosis	0.347	0.720



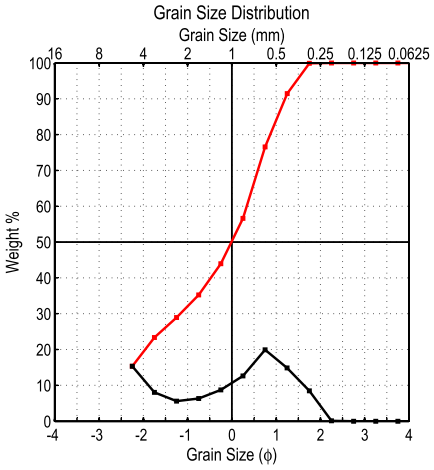
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**KH02b**
Interval	**LTT**
Mean	**1.513 mm**
STD	**0.522 mm**
Skewness	**0.189**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	106.11
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	74.23

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.35	3.16	3.16
-1.5	-1.75	21.91	20.65	23.81
-1	-1.25	13.52	12.74	36.55
-0.5	-0.75	16.39	15.45	51.99
0	-0.25	23.60	22.24	74.23
0.5	0.25	11.52	10.86	85.09
1	0.75	10.16	9.57	94.67
1.5	1.25	5.63	5.31	99.97
2	1.75	0.01	0.01	99.98
2.5	2.25	0.01	0.01	99.99
3	2.75	0.01	0.01	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.205
16	-1.940
25	-1.705
50	-0.815
75	-0.215
84	0.200
95	0.780
99	1.160

Moment Measures	(phi)	(mm)
Mean	-0.597	1.513
Standard Deviation	0.938	0.522
Skewness	0.189	
Kurtosis	2.111	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.870	-0.852
Standard Deviation	1.070	0.987
Skewness (1)	-0.051	0.009
Skewness (2)	0.096	
Kurtosis	0.395	0.821



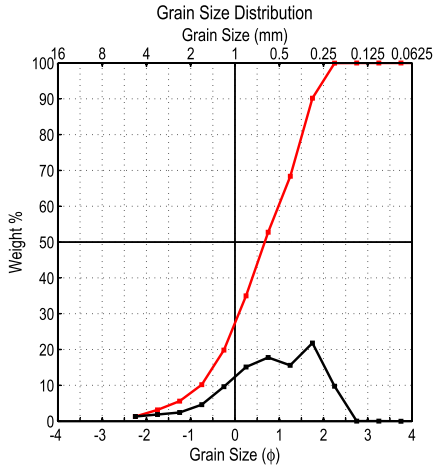
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**KH-03a**
Interval	**Swash**
Mean	**1.077 mm**
STD	**0.399 mm**
Skewness	**-0.390**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	102.18
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	43.97

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	15.66	15.33	15.33
-1.5	-1.75	8.21	8.03	23.36
-1	-1.25	5.70	5.58	28.94
-0.5	-0.75	6.46	6.32	35.26
0	-0.25	8.90	8.71	43.97
0.5	0.25	12.93	12.65	56.63
1	0.75	20.37	19.94	76.56
1.5	1.25	15.19	14.87	91.43
2	1.75	8.66	8.48	99.90
2.5	2.25	0.10	0.10	100.00
3	2.75	0.00	0.00	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.210
25	-1.605
50	-0.010
75	0.710
84	1.000
95	1.460
99	1.695

Moment Measures	(phi)	(mm)
Mean	-0.107	1.077
Standard Deviation	1.325	0.399
Skewness	-0.390	
Kurtosis	1.809	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.605	-0.407
Standard Deviation	1.605	1.365
Skewness (1)	-0.371	-0.289
Skewness (2)	-0.240	
Kurtosis	0.156	0.657



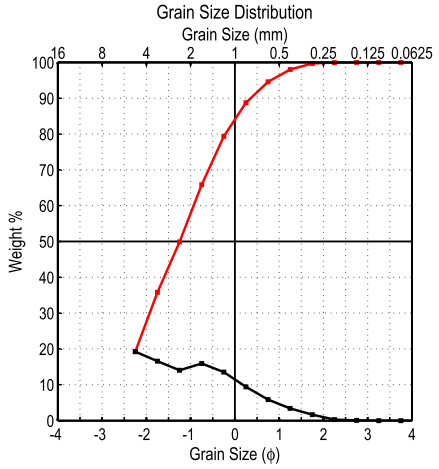
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**KH-03b**
Interval	**LTT**
Mean	**0.567 mm**
STD	**0.493 mm**
Skewness	**-0.704**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	102.97
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	19.85

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.34	1.30	1.30
-1.5	-1.75	1.92	1.86	3.17
-1	-1.25	2.51	2.44	5.60
-0.5	-0.75	4.74	4.60	10.21
0	-0.25	9.93	9.64	19.85
0.5	0.25	15.58	15.13	34.98
1	0.75	18.30	17.77	52.75
1.5	1.25	16.06	15.60	68.35
2	1.75	22.47	21.82	90.17
2.5	2.25	10.07	9.78	99.95
3	2.75	0.04	0.04	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.375
16	-0.450
25	-0.080
50	0.675
75	1.400
84	1.610
95	1.995
99	2.200

Moment Measures	(phi)	(mm)
Mean	0.818	0.567
Standard Deviation	1.022	0.493
Skewness	-0.704	
Kurtosis	3.140	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.580	0.612
Standard Deviation	1.030	1.026
Skewness (1)	-0.092	-0.154
Skewness (2)	-0.354	
Kurtosis	0.636	0.933



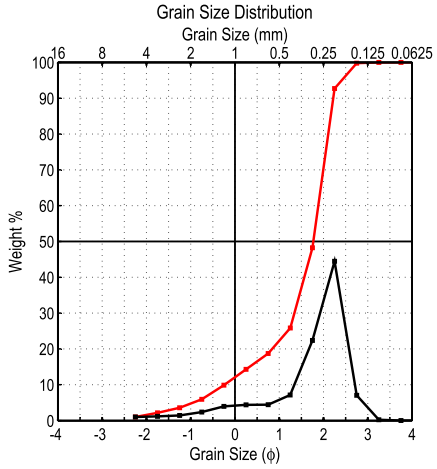
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**KH-04a**
Interval	**Swash**
Mean	**1.872 mm**
STD	**0.477 mm**
Skewness	**0.527**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Platykurtic
Total weight (gram)	104.91
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	79.33

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	20.17	19.23	19.23
-1.5	-1.75	17.39	16.58	35.80
-1	-1.25	14.75	14.06	49.86
-0.5	-0.75	16.73	15.95	65.81
0	-0.25	14.18	13.52	79.33
0.5	0.25	9.87	9.41	88.73
1	0.75	6.13	5.84	94.58
1.5	1.25	3.60	3.43	98.01
2	1.75	1.73	1.65	99.66
2.5	2.25	0.30	0.29	99.94
3	2.75	0.06	0.06	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.075
50	-1.245
75	-0.410
84	0.000
95	0.810
99	1.550

Moment Measures	(phi)	(mm)
Mean	-0.905	1.872
Standard Deviation	1.069	0.477
Skewness	0.527	
Kurtosis	2.523	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.125	-1.165
Standard Deviation	1.125	1.026
Skewness (1)	0.107	0.225
Skewness (2)	0.467	
Kurtosis	0.360	0.753



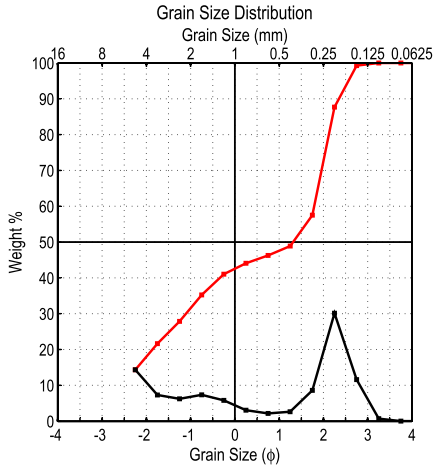
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**KH-04b**
Interval	**LTT**
Mean	**0.321 mm**
STD	**0.488 mm**
Skewness	**-1.726**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	101.51
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	9.90

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.02	1.00	1.00
-1.5	-1.75	1.18	1.16	2.17
-1	-1.25	1.44	1.42	3.59
-0.5	-0.75	2.40	2.36	5.95
0	-0.25	4.01	3.95	9.90
0.5	0.25	4.47	4.40	14.30
1	0.75	4.49	4.42	18.73
1.5	1.25	7.23	7.12	25.85
2	1.75	22.73	22.39	48.24
2.5	2.25	45.12	44.45	92.69
3	2.75	7.17	7.06	99.75
3.5	3.25	0.24	0.24	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-0.950
16	0.440
25	1.190
50	1.770
75	2.050
84	2.150
95	2.415
99	2.695

Moment Measures	(phi)	(mm)
Mean	1.639	0.321
Standard Deviation	1.036	0.488
Skewness	-1.726	
Kurtosis	5.625	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.295	1.453
Standard Deviation	0.855	0.937
Skewness (1)	-0.556	-0.586
Skewness (2)	-1.213	
Kurtosis	0.968	1.604



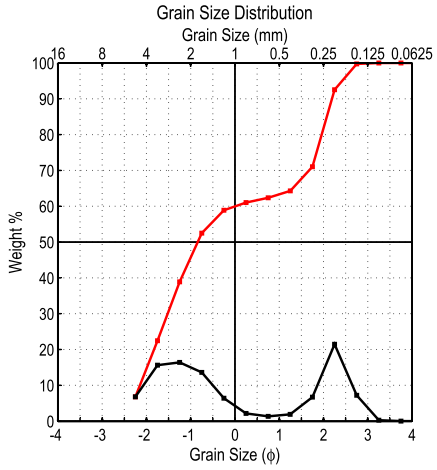
Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**KH-05a**
Interval	**Swash**
Mean	**0.646 mm**
STD	**0.274 mm**
Skewness	**-0.370**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	105.08
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	41.04

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	15.07	14.34	14.34
-1.5	-1.75	7.67	7.30	21.64
-1	-1.25	6.56	6.24	27.88
-0.5	-0.75	7.72	7.35	35.23
0	-0.25	6.10	5.81	41.04
0.5	0.25	3.22	3.06	44.10
1	0.75	2.26	2.15	46.25
1.5	1.25	2.79	2.66	48.91
2	1.75	9.05	8.61	57.52
2.5	2.25	31.69	30.16	87.68
3	2.75	12.18	11.59	99.27
3.5	3.25	0.73	0.69	99.96
4	3.75	0.04	0.04	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.135
25	-1.480
50	1.315
75	2.040
84	2.190
95	2.565
99	2.740

Moment Measures	(phi)	(mm)
Mean	0.631	0.646
Standard Deviation	1.870	0.274
Skewness	-0.370	
Kurtosis	1.491	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.028	0.457
Standard Deviation	2.162	1.811
Skewness (1)	-0.595	-0.538
Skewness (2)	-0.535	
Kurtosis	0.113	0.561



Project	**2203**
Location	**Nags Head, NC**
Date	**Apr 2011**
Station	**KH-05b**
Interval	**LTT**
Mean	**0.934 mm**
STD	**0.297 mm**
Skewness	**0.291**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	108.59
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	58.88

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	7.38	6.80	6.80
-1.5	-1.75	16.99	15.65	22.44
-1	-1.25	17.84	16.43	38.87
-0.5	-0.75	14.77	13.60	52.47
0	-0.25	6.96	6.41	58.88
0.5	0.25	2.33	2.15	61.03
1	0.75	1.46	1.34	62.37
1.5	1.25	2.08	1.92	64.29
2	1.75	7.31	6.73	71.02
2.5	2.25	23.33	21.48	92.50
3	2.75	7.83	7.21	99.71
3.5	3.25	0.28	0.26	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

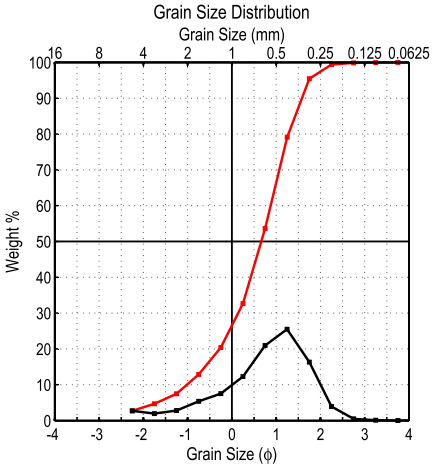
Percentiles	
1	-2.250
5	-2.250
16	-1.955
25	-1.670
50	-0.840
75	1.845
84	2.050
95	2.425
99	2.700

Moment Measures	(phi)	(mm)
Mean	0.098	0.934
Standard Deviation	1.749	0.297
Skewness	0.291	
Kurtosis	1.444	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.047	-0.248
Standard Deviation	2.002	1.710
Skewness (1)	0.443	0.420
Skewness (2)	0.463	
Kurtosis	0.167	0.545

Appendix B – Part 3

Post-Y1 Sediment Analyses Results



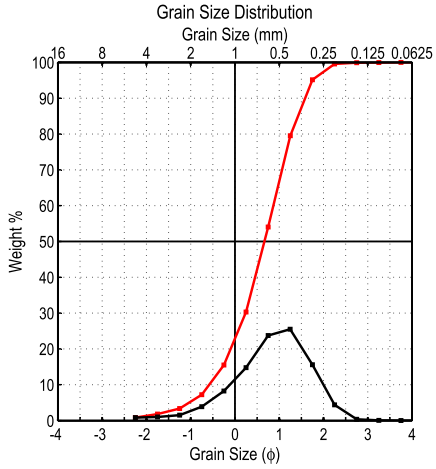
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**B2a**
Interval	**Grab**
Mean	**0.612 mm**
STD	**0.491 mm**
Skewness	**-0.933**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.41
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	20.39
% $CaCO_3$	1.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.78	2.71	2.71
-1.5	-1.75	2.01	1.96	4.68
-1	-1.25	2.89	2.82	7.50
-0.5	-0.75	5.51	5.38	12.88
0	-0.25	7.69	7.51	20.39
0.5	0.25	12.57	12.27	32.66
1	0.75	21.45	20.95	53.61
1.5	1.25	26.14	25.52	79.13
2	1.75	16.70	16.31	95.44
2.5	2.25	4.02	3.93	99.37
3	2.75	0.49	0.48	99.84
3.5	3.25	0.09	0.09	99.93
4	3.75	0.04	0.04	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-1.695
16	-0.540
25	-0.060
50	0.665
75	1.170
84	1.400
95	1.735
99	2.205

Moment Measures	(phi)	(mm)
Mean	0.709	0.612
Standard Deviation	1.026	0.491
Skewness	-0.933	
Kurtosis	3.761	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.430	0.508
Standard Deviation	0.970	1.005
Skewness (1)	-0.242	-0.309
Skewness (2)	-0.665	
Kurtosis	0.768	1.143



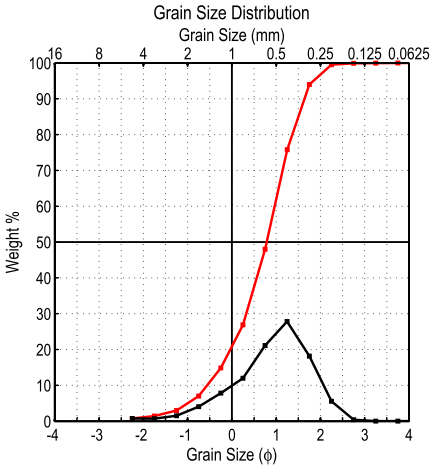
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**B2b**
Interval	**Grab**
Mean	**0.569 mm**
STD	**0.550 mm**
Skewness	**-0.757**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.32
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	15.51
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.85	0.83	0.83
-1.5	-1.75	1.01	0.99	1.82
-1	-1.25	1.58	1.54	3.36
-0.5	-0.75	3.96	3.87	7.23
0	-0.25	8.47	8.28	15.51
0.5	0.25	15.14	14.80	30.31
1	0.75	24.29	23.74	54.05
1.5	1.25	26.08	25.49	79.53
2	1.75	15.97	15.61	95.14
2.5	2.25	4.50	4.40	99.54
3	2.75	0.36	0.35	99.89
3.5	3.25	0.05	0.05	99.94
4	3.75	0.03	0.03	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.165
5	-1.040
16	-0.235
25	0.070
50	0.665
75	1.160
84	1.395
95	1.745
99	2.190

Moment Measures	(phi)	(mm)
Mean	0.814	0.569
Standard Deviation	0.862	0.550
Skewness	-0.757	
Kurtosis	4.053	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.580	0.608
Standard Deviation	0.815	0.829
Skewness (1)	-0.104	-0.164
Skewness (2)	-0.383	
Kurtosis	0.709	1.047



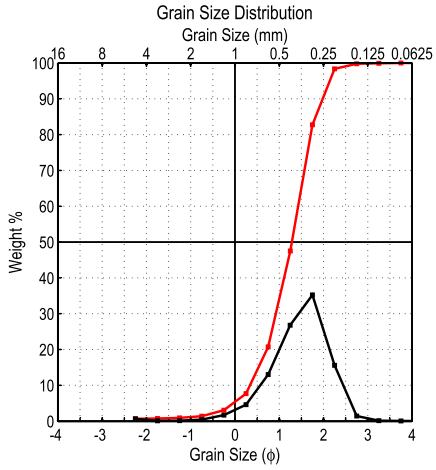
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**B2c**
Interval	**Grab**
Mean	**0.538 mm**
STD	**0.549 mm**
Skewness	**-0.821**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.27
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	14.85
% $CaCO_3$	0.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.76	0.74	0.74
-1.5	-1.75	0.72	0.70	1.45
-1	-1.25	1.55	1.52	2.96
-0.5	-0.75	4.14	4.05	7.01
0	-0.25	8.02	7.84	14.85
0.5	0.25	12.28	12.01	26.86
1	0.75	21.60	21.12	47.98
1.5	1.25	28.44	27.81	75.79
2	1.75	18.58	18.17	93.96
2.5	2.25	5.67	5.54	99.50
3	2.75	0.42	0.41	99.91
3.5	3.25	0.04	0.04	99.95
4	3.75	0.03	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.070
5	-1.000
16	-0.200
25	0.175
50	0.785
75	1.235
84	1.475
95	1.845
99	2.205

Moment Measures	(phi)	(mm)
Mean	0.895	0.538
Standard Deviation	0.866	0.549
Skewness	-0.821	
Kurtosis	3.982	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.638	0.687
Standard Deviation	0.837	0.850
Skewness (1)	-0.176	-0.215
Skewness (2)	-0.433	
Kurtosis	0.699	1.100



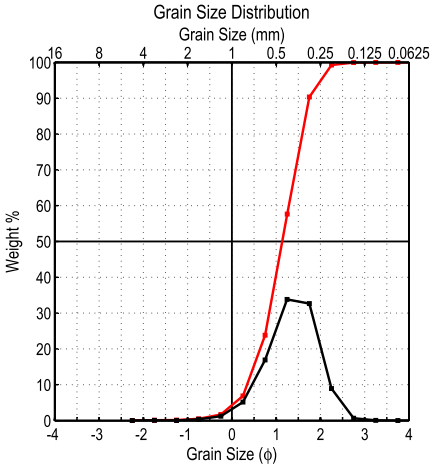
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**B2d**
Interval	**Grab**
Mean	**0.370 mm**
STD	**0.615 mm**
Skewness	**-1.421**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	105.06
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	3.06
% $CaCO_3$	3.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.70	0.67	0.67
-1.5	-1.75	0.10	0.10	0.76
-1	-1.25	0.17	0.16	0.92
-0.5	-0.75	0.48	0.46	1.38
0	-0.25	1.77	1.68	3.06
0.5	0.25	4.85	4.62	7.68
1	0.75	13.70	13.04	20.72
1.5	1.25	28.13	26.78	47.50
2	1.75	37.02	35.24	82.73
2.5	2.25	16.39	15.60	98.33
3	2.75	1.50	1.43	99.76
3.5	3.25	0.14	0.13	99.90
4	3.75	0.07	0.07	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-1.165
5	-0.040
16	0.570
25	0.830
50	1.285
75	1.640
84	1.790
95	2.145
99	2.485

Moment Measures	(phi)	(mm)
Mean	1.433	0.370
Standard Deviation	0.701	0.615
Skewness	-1.421	
Kurtosis	8.049	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.180	1.215
Standard Deviation	0.610	0.636
Skewness (1)	-0.172	-0.192
Skewness (2)	-0.381	
Kurtosis	0.791	1.106



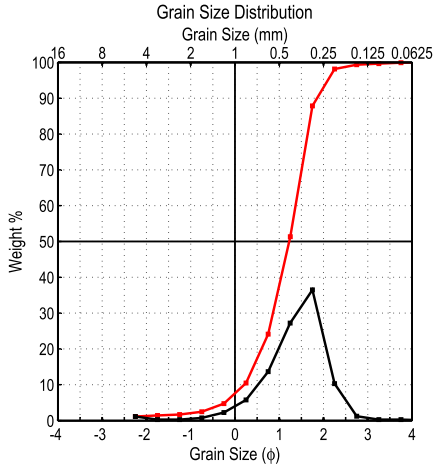
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**B2e**
Interval	**Grab**
Mean	**0.393 mm**
STD	**0.672 mm**
Skewness	**-0.629**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.45
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	1.70
% $CaCO_3$	1.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.04	0.04	0.04
-1.5	-1.75	0.07	0.07	0.11
-1	-1.25	0.04	0.04	0.14
-0.5	-0.75	0.36	0.35	0.49
0	-0.25	1.25	1.21	1.70
0.5	0.25	5.35	5.17	6.87
1	0.75	17.53	16.95	23.82
1.5	1.25	35.00	33.83	57.65
2	1.75	33.80	32.67	90.32
2.5	2.25	9.25	8.94	99.27
3	2.75	0.68	0.66	99.92
3.5	3.25	0.05	0.05	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.540
5	0.070
16	0.520
25	0.765
50	1.135
75	1.515
84	1.655
95	2.010
99	2.235

Moment Measures	(phi)	(mm)
Mean	1.349	0.393
Standard Deviation	0.573	0.672
Skewness	-0.629	
Kurtosis	4.637	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.087	1.103
Standard Deviation	0.567	0.578
Skewness (1)	-0.084	-0.091
Skewness (2)	-0.167	
Kurtosis	0.709	1.060



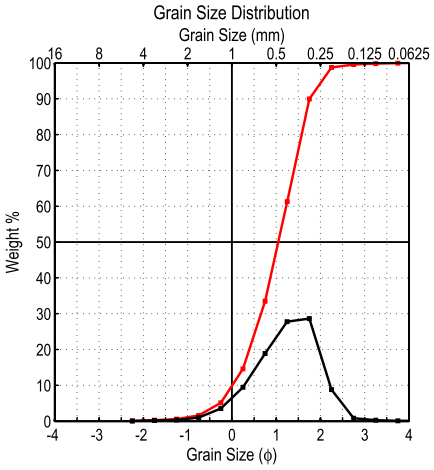
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**B3a**
Interval	**Grab**
Mean	**0.396 mm**
STD	**0.583 mm**
Skewness	**-1.494**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	104.52
% finer than 4.00 phi	0.10
% coarser than -1.00 phi	4.75
% $CaCO_3$	1.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.21	1.16	1.16
-1.5	-1.75	0.28	0.27	1.43
-1	-1.25	0.30	0.29	1.71
-0.5	-0.75	0.80	0.77	2.48
0	-0.25	2.37	2.27	4.75
0.5	0.25	6.01	5.75	10.50
1	0.75	14.26	13.64	24.14
1.5	1.25	28.43	27.20	51.34
2	1.75	38.14	36.49	87.83
2.5	2.25	10.77	10.30	98.13
3	2.75	1.27	1.22	99.35
3.5	3.25	0.31	0.30	99.65
4	3.75	0.27	0.26	99.90
>4.0	4.25	0.10	0.10	100.00

Percentiles	
1	-2.250
5	-0.230
16	0.450
25	0.765
50	1.225
75	1.575
84	1.700
95	2.100
99	2.605

Moment Measures	(phi)	(mm)
Mean	1.338	0.396
Standard Deviation	0.779	0.583
Skewness	-1.494	
Kurtosis	8.139	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.075	1.125
Standard Deviation	0.625	0.666
Skewness (1)	-0.240	-0.244
Skewness (2)	-0.464	
Kurtosis	0.864	1.179



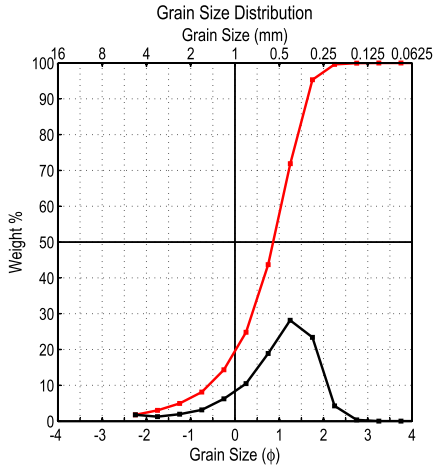
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**B3b**
Interval	**Grab**
Mean	**0.428 mm**
STD	**0.610 mm**
Skewness	**-0.581**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	107.28
% finer than 4.00 phi	0.06
% coarser than -1.00 phi	5.13
% $CaCO_3$	1.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.09	0.08	0.08
-1.5	-1.75	0.22	0.21	0.29
-1	-1.25	0.33	0.31	0.60
-0.5	-0.75	1.08	1.01	1.60
0	-0.25	3.78	3.52	5.13
0.5	0.25	10.17	9.48	14.61
1	0.75	20.27	18.89	33.50
1.5	1.25	29.82	27.80	61.30
2	1.75	30.73	28.64	89.94
2.5	2.25	9.44	8.80	98.74
3	2.75	0.88	0.82	99.56
3.5	3.25	0.28	0.26	99.82
4	3.75	0.13	0.12	99.94
>4.0	4.25	0.06	0.06	100.00

Percentiles	
1	-1.050
5	-0.270
16	0.285
25	0.525
50	1.045
75	1.490
84	1.645
95	2.035
99	2.405

Moment Measures	(phi)	(mm)
Mean	1.224	0.428
Standard Deviation	0.714	0.610
Skewness	-0.581	
Kurtosis	4.292	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.965	0.992
Standard Deviation	0.680	0.689
Skewness (1)	-0.118	-0.129
Skewness (2)	-0.239	
Kurtosis	0.695	0.979



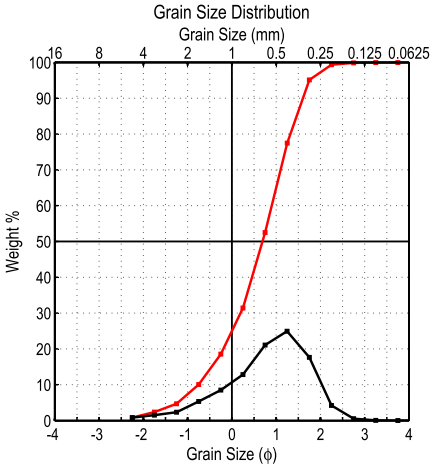
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**B3c**
Interval	**Grab**
Mean	**0.531 mm**
STD	**0.524 mm**
Skewness	**-1.214**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	107.36
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	14.33
% $CaCO_3$	2.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.90	1.77	1.77
-1.5	-1.75	1.35	1.26	3.03
-1	-1.25	2.08	1.94	4.96
-0.5	-0.75	3.38	3.15	8.11
0	-0.25	6.68	6.22	14.33
0.5	0.25	11.26	10.49	24.82
1	0.75	20.28	18.89	43.71
1.5	1.25	30.25	28.18	71.89
2	1.75	25.14	23.42	95.31
2.5	2.25	4.60	4.28	99.59
3	2.75	0.37	0.34	99.93
3.5	3.25	0.03	0.03	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.245
16	-0.170
25	0.255
50	0.860
75	1.315
84	1.510
95	1.745
99	2.180

Moment Measures	(phi)	(mm)
Mean	0.913	0.531
Standard Deviation	0.932	0.524
Skewness	-1.214	
Kurtosis	4.689	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.670	0.733
Standard Deviation	0.840	0.873
Skewness (1)	-0.226	-0.317
Skewness (2)	-0.726	
Kurtosis	0.780	1.156



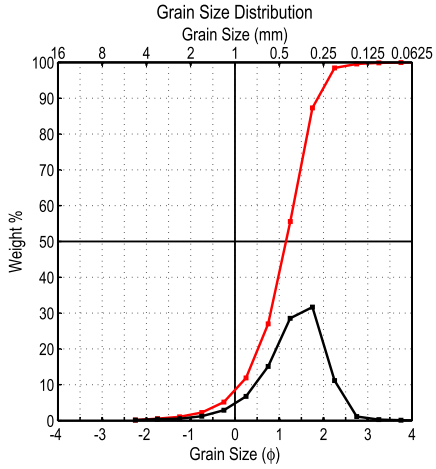
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**B3d**
Interval	**Grab**
Mean	**0.579 mm**
STD	**0.524 mm**
Skewness	**-0.752**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	109.57
% finer than 4.00 phi	0.05
% coarser than -1.00 phi	18.55
% $CaCO_3$	1.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.94	0.86	0.86
-1.5	-1.75	1.68	1.53	2.39
-1	-1.25	2.54	2.32	4.71
-0.5	-0.75	5.86	5.35	10.06
0	-0.25	9.31	8.50	18.55
0.5	0.25	14.08	12.85	31.40
1	0.75	23.12	21.10	52.51
1.5	1.25	27.34	24.95	77.46
2	1.75	19.33	17.64	95.10
2.5	2.25	4.63	4.23	99.32
3	2.75	0.58	0.53	99.85
3.5	3.25	0.07	0.06	99.92
4	3.75	0.04	0.04	99.95
>4.0	4.25	0.05	0.05	100.00

Percentiles	
1	-2.205
5	-1.225
16	-0.400
25	0.000
50	0.690
75	1.200
84	1.435
95	1.745
99	2.210

Moment Measures	(phi)	(mm)
Mean	0.790	0.579
Standard Deviation	0.932	0.524
Skewness	-0.752	
Kurtosis	3.611	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.518	0.575
Standard Deviation	0.917	0.909
Skewness (1)	-0.188	-0.239
Skewness (2)	-0.469	
Kurtosis	0.619	1.014



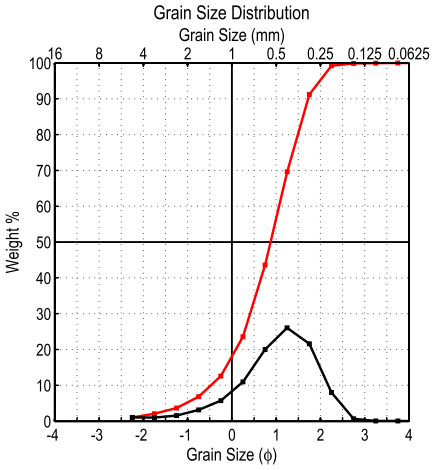
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**B3e**
Interval	**Grab**
Mean	**0.404 mm**
STD	**0.601 mm**
Skewness	**-0.945**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	106.13
% finer than 4.00 phi	0.06
% coarser than -1.00 phi	5.18
% $CaCO_3$	1.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.14	0.13	0.13
-1.5	-1.75	0.42	0.40	0.53
-1	-1.25	0.55	0.52	1.05
-0.5	-0.75	1.30	1.22	2.27
0	-0.25	3.09	2.91	5.18
0.5	0.25	7.15	6.74	11.92
1	0.75	16.03	15.10	27.02
1.5	1.25	30.30	28.55	55.57
2	1.75	33.63	31.69	87.26
2.5	2.25	11.85	11.17	98.43
3	2.75	1.21	1.14	99.57
3.5	3.25	0.28	0.26	99.83
4	3.75	0.12	0.11	99.94
>4.0	4.25	0.06	0.06	100.00

Percentiles	
1	-1.295
5	-0.280
16	0.385
25	0.685
50	1.150
75	1.555
84	1.700
95	2.095
99	2.500

Moment Measures	(phi)	(mm)
Mean	1.306	0.404
Standard Deviation	0.735	0.601
Skewness	-0.945	
Kurtosis	5.273	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.042	1.078
Standard Deviation	0.657	0.689
Skewness (1)	-0.163	-0.184
Skewness (2)	-0.369	
Kurtosis	0.806	1.119



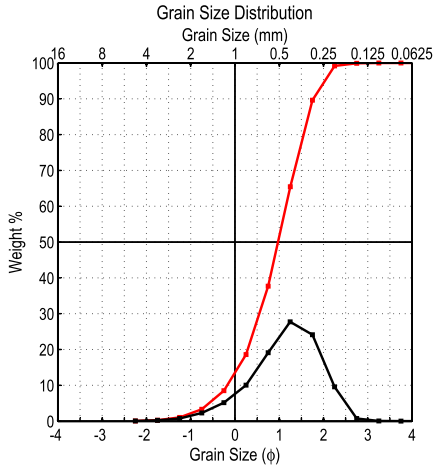
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**BC-E5a**
Interval	**Grab**
Mean	**0.505 mm**
STD	**0.533 mm**
Skewness	**-0.980**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	116.59
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	12.58
% $CaCO_3$	2.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.23	1.05	1.05
-1.5	-1.75	1.20	1.03	2.08
-1	-1.25	1.85	1.59	3.67
-0.5	-0.75	3.69	3.16	6.84
0	-0.25	6.70	5.75	12.58
0.5	0.25	12.79	10.97	23.55
1	0.75	23.31	19.99	43.55
1.5	1.25	30.37	26.05	69.59
2	1.75	25.16	21.58	91.17
2.5	2.25	9.34	8.01	99.19
3	2.75	0.77	0.66	99.85
3.5	3.25	0.08	0.07	99.91
4	3.75	0.06	0.05	99.97
>4.0	4.25	0.04	0.03	100.00

Percentiles	
1	-2.250
5	-1.040
16	-0.095
25	0.285
50	0.875
75	1.375
84	1.585
95	1.990
99	2.240

Moment Measures	(phi)	(mm)
Mean	0.985	0.505
Standard Deviation	0.908	0.533
Skewness	-0.980	
Kurtosis	4.432	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.745	0.788
Standard Deviation	0.840	0.879
Skewness (1)	-0.155	-0.209
Skewness (2)	-0.476	
Kurtosis	0.804	1.139



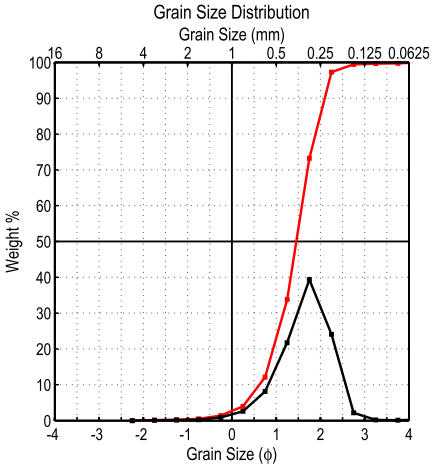
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**BC-E5b**
Interval	**Grab**
Mean	**0.456 mm**
STD	**0.586 mm**
Skewness	**-0.677**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	126.56
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	8.51
% $CaCO_3$	1.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.08	0.06	0.06
-1.5	-1.75	0.28	0.22	0.28
-1	-1.25	0.95	0.75	1.04
-0.5	-0.75	2.90	2.29	3.33
0	-0.25	6.56	5.18	8.51
0.5	0.25	12.74	10.07	18.58
1	0.75	24.19	19.11	37.69
1.5	1.25	35.11	27.74	65.43
2	1.75	30.56	24.15	89.58
2.5	2.25	12.11	9.57	99.15
3	2.75	0.95	0.75	99.90
3.5	3.25	0.08	0.06	99.96
4	3.75	0.03	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.275
5	-0.590
16	0.120
25	0.420
50	0.970
75	1.450
84	1.635
95	2.035
99	2.240

Moment Measures	(phi)	(mm)
Mean	1.133	0.456
Standard Deviation	0.772	0.586
Skewness	-0.677	
Kurtosis	3.645	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.877	0.908
Standard Deviation	0.757	0.776
Skewness (1)	-0.122	-0.155
Skewness (2)	-0.327	
Kurtosis	0.733	1.044



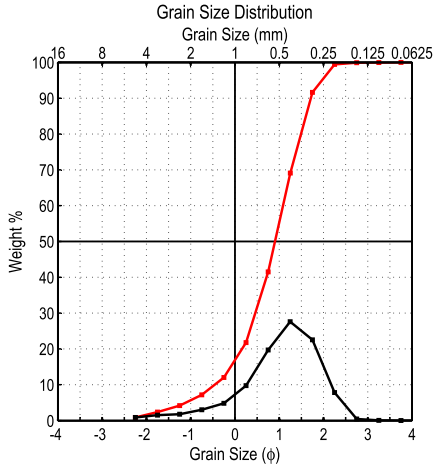
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**BC-E5c**
Interval	**Grab**
Mean	**0.320 mm**
STD	**0.657 mm**
Skewness	**-0.726**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	106.27
% finer than 4.00 phi	0.27
% coarser than -1.00 phi	1.37
% $CaCO_3$	1.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.12	0.11	0.11
-1	-1.25	0.14	0.13	0.24
-0.5	-0.75	0.26	0.24	0.49
0	-0.25	0.94	0.88	1.37
0.5	0.25	2.77	2.61	3.98
1	0.75	8.64	8.13	12.11
1.5	1.25	23.08	21.72	33.83
2	1.75	41.83	39.36	73.19
2.5	2.25	25.60	24.09	97.28
3	2.75	2.29	2.15	99.44
3.5	3.25	0.19	0.18	99.61
4	3.75	0.12	0.11	99.73
>4.0	4.25	0.29	0.27	100.00

Percentiles	
1	-0.460
5	0.315
16	0.840
25	1.045
50	1.455
75	1.790
84	1.975
95	2.205
99	2.650

Moment Measures	(phi)	(mm)
Mean	1.643	0.320
Standard Deviation	0.605	0.657
Skewness	-0.726	
Kurtosis	6.075	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.408	1.423
Standard Deviation	0.568	0.570
Skewness (1)	-0.084	-0.145
Skewness (2)	-0.344	
Kurtosis	0.665	1.040



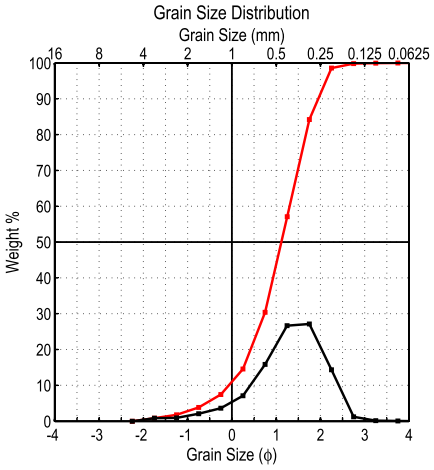
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**BC-E5d**
Interval	**Grab**
Mean	**0.500 mm**
STD	**0.534 mm**
Skewness	**-1.107**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	109.21
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	12.02
% $CaCO_3$	1.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.94	0.86	0.86
-1.5	-1.75	1.66	1.52	2.38
-1	-1.25	1.96	1.79	4.18
-0.5	-0.75	3.28	3.00	7.18
0	-0.25	5.29	4.84	12.02
0.5	0.25	10.65	9.75	21.77
1	0.75	21.53	19.71	41.49
1.5	1.25	30.14	27.60	69.09
2	1.75	24.61	22.53	91.62
2.5	2.25	8.54	7.82	99.44
3	2.75	0.50	0.46	99.90
3.5	3.25	0.05	0.05	99.95
4	3.75	0.03	0.03	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.205
5	-1.115
16	-0.045
25	0.330
50	0.905
75	1.380
84	1.580
95	1.965
99	2.220

Moment Measures	(phi)	(mm)
Mean	1.001	0.500
Standard Deviation	0.905	0.534
Skewness	-1.107	
Kurtosis	4.603	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.768	0.813
Standard Deviation	0.813	0.873
Skewness (1)	-0.169	-0.240
Skewness (2)	-0.591	
Kurtosis	0.895	1.202



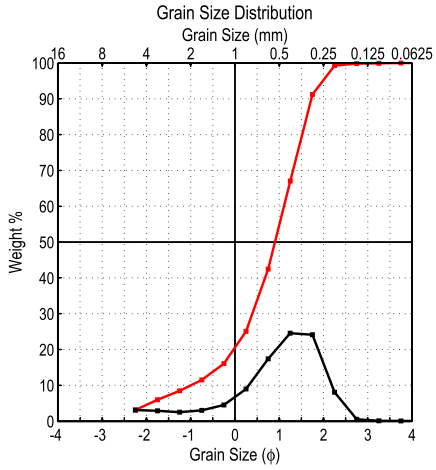
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**BC-E5e**
Interval	**Grab**
Mean	**0.418 mm**
STD	**0.570 mm**
Skewness	**-0.978**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	115.02
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	7.46
% $CaCO_3$	1.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.95	0.83	0.83
-1	-1.25	1.08	0.94	1.76
-0.5	-0.75	2.40	2.09	3.85
0	-0.25	4.15	3.61	7.46
0.5	0.25	8.17	7.10	14.56
1	0.75	18.21	15.83	30.39
1.5	1.25	30.68	26.67	57.07
2	1.75	31.20	27.13	84.19
2.5	2.25	16.51	14.35	98.55
3	2.75	1.43	1.24	99.79
3.5	3.25	0.16	0.14	99.93
4	3.75	0.06	0.05	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.655
5	-0.590
16	0.295
25	0.580
50	1.120
75	1.580
84	1.745
95	2.125
99	2.430

Moment Measures	(phi)	(mm)
Mean	1.258	0.418
Standard Deviation	0.811	0.570
Skewness	-0.978	
Kurtosis	4.459	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.020	1.053
Standard Deviation	0.725	0.774
Skewness (1)	-0.138	-0.199
Skewness (2)	-0.486	
Kurtosis	0.872	1.113



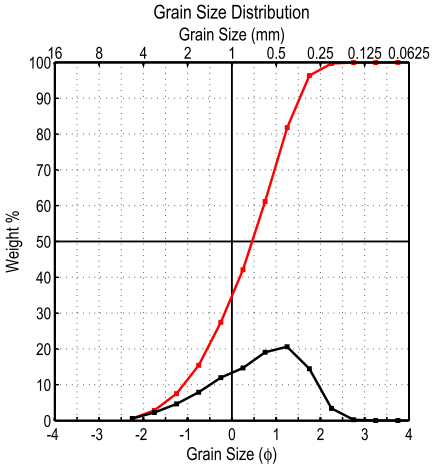
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**BC-E5f**
Interval	**Grab**
Mean	**0.536 mm**
STD	**0.469 mm**
Skewness	**-1.190**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	104.58
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	16.06
% $CaCO_3$	1.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.25	3.11	3.11
-1.5	-1.75	3.01	2.88	5.99
-1	-1.25	2.62	2.51	8.49
-0.5	-0.75	3.17	3.03	11.52
0	-0.25	4.75	4.54	16.06
0.5	0.25	9.41	9.00	25.06
1	0.75	18.20	17.40	42.47
1.5	1.25	25.70	24.57	67.04
2	1.75	25.25	24.14	91.18
2.5	2.25	8.45	8.08	99.26
3	2.75	0.57	0.55	99.81
3.5	3.25	0.09	0.09	99.89
4	3.75	0.07	0.07	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-2.250
5	-1.920
16	-0.255
25	0.245
50	0.905
75	1.415
84	1.600
95	1.985
99	2.235

Moment Measures	(phi)	(mm)
Mean	0.901	0.536
Standard Deviation	1.094	0.469
Skewness	-1.190	
Kurtosis	4.140	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.673	0.750
Standard Deviation	0.927	1.055
Skewness (1)	-0.251	-0.349
Skewness (2)	-0.941	
Kurtosis	1.105	1.368



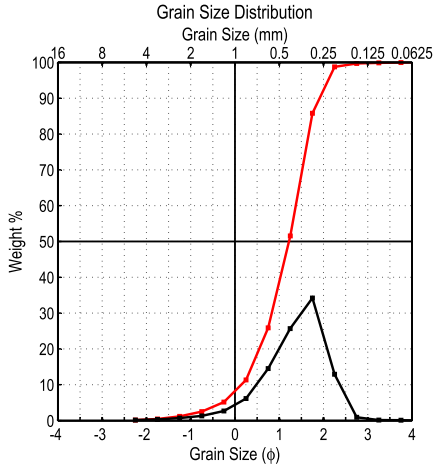
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**BC-E5g**
Interval	**Grab**
Mean	**0.671 mm**
STD	**0.504 mm**
Skewness	**-0.471**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	106.99
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	27.43
% $CaCO_3$	3.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.63	0.59	0.59
-1.5	-1.75	2.42	2.26	2.85
-1	-1.25	4.99	4.66	7.51
-0.5	-0.75	8.46	7.91	15.42
0	-0.25	12.85	12.01	27.43
0.5	0.25	15.71	14.68	42.12
1	0.75	20.38	19.05	61.16
1.5	1.25	22.06	20.62	81.78
2	1.75	15.51	14.50	96.28
2.5	2.25	3.65	3.41	99.69
3	2.75	0.25	0.23	99.93
3.5	3.25	0.03	0.03	99.95
4	3.75	0.03	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.160
5	-1.520
16	-0.725
25	-0.350
50	0.455
75	1.085
84	1.325
95	1.705
99	2.150

Moment Measures	(phi)	(mm)
Mean	0.576	0.671
Standard Deviation	0.987	0.504
Skewness	-0.471	
Kurtosis	2.709	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.300	0.352
Standard Deviation	1.025	1.001
Skewness (1)	-0.151	-0.188
Skewness (2)	-0.354	
Kurtosis	0.573	0.921



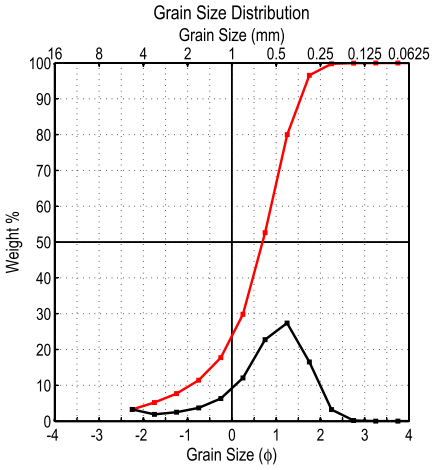
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**BC-E5h**
Interval	**Grab**
Mean	**0.395 mm**
STD	**0.599 mm**
Skewness	**-1.067**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	112.58
% finer than 4.00 phi	0.05
% coarser than -1.00 phi	5.19
% $CaCO_3$	1.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.15	0.13	0.13
-1.5	-1.75	0.37	0.33	0.46
-1	-1.25	0.82	0.73	1.19
-0.5	-0.75	1.47	1.31	2.50
0	-0.25	3.03	2.69	5.19
0.5	0.25	6.95	6.17	11.36
1	0.75	16.35	14.52	25.88
1.5	1.25	28.91	25.68	51.56
2	1.75	38.54	34.23	85.80
2.5	2.25	14.57	12.94	98.74
3	2.75	1.06	0.94	99.68
3.5	3.25	0.18	0.16	99.84
4	3.75	0.12	0.11	99.95
>4.0	4.25	0.06	0.05	100.00

Percentiles	
1	-1.380
5	-0.285
16	0.410
25	0.720
50	1.220
75	1.590
84	1.725
95	2.105
99	2.390

Moment Measures	(phi)	(mm)
Mean	1.339	0.395
Standard Deviation	0.741	0.599
Skewness	-1.067	
Kurtosis	5.330	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.068	1.118
Standard Deviation	0.657	0.691
Skewness (1)	-0.232	-0.246
Skewness (2)	-0.471	
Kurtosis	0.817	1.126



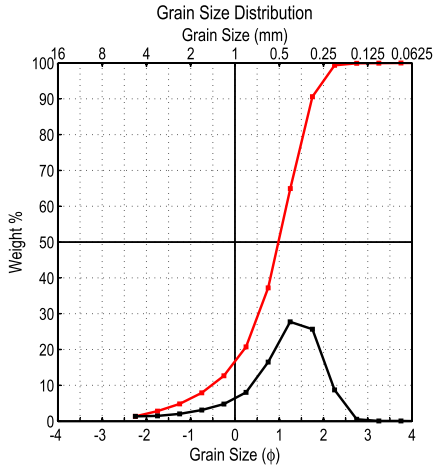
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**BC-E5i**
Interval	**Grab**
Mean	**0.603 mm**
STD	**0.498 mm**
Skewness	**-1.175**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.96
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	17.75
% $CaCO_3$	1.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.42	3.29	3.29
-1.5	-1.75	1.98	1.90	5.19
-1	-1.25	2.61	2.51	7.70
-0.5	-0.75	3.88	3.73	11.44
0	-0.25	6.56	6.31	17.75
0.5	0.25	12.57	12.09	29.84
1	0.75	23.68	22.78	52.62
1.5	1.25	28.46	27.38	79.99
2	1.75	17.19	16.54	96.53
2.5	2.25	3.37	3.24	99.77
3	2.75	0.19	0.18	99.95
3.5	3.25	0.02	0.02	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.800
16	-0.390
25	0.050
50	0.695
75	1.160
84	1.370
95	1.705
99	2.130

Moment Measures	(phi)	(mm)
Mean	0.730	0.603
Standard Deviation	1.005	0.498
Skewness	-1.175	
Kurtosis	4.293	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.490	0.558
Standard Deviation	0.880	0.971
Skewness (1)	-0.233	-0.328
Skewness (2)	-0.844	
Kurtosis	0.991	1.294



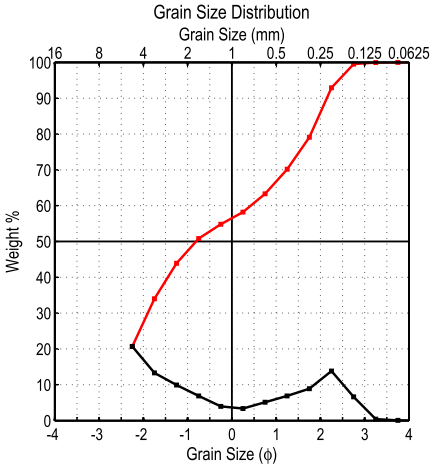
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**BC-E5j**
Interval	**Grab**
Mean	**0.487 mm**
STD	**0.518 mm**
Skewness	**-1.236**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	112.32
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	12.70
% $CaCO_3$	1.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.50	1.34	1.34
-1.5	-1.75	1.64	1.46	2.80
-1	-1.25	2.27	2.02	4.82
-0.5	-0.75	3.47	3.09	7.91
0	-0.25	5.38	4.79	12.70
0.5	0.25	9.03	8.04	20.74
1	0.75	18.52	16.49	37.22
1.5	1.25	31.13	27.72	64.94
2	1.75	28.82	25.66	90.60
2.5	2.25	9.80	8.73	99.32
3	2.75	0.62	0.55	99.88
3.5	3.25	0.06	0.05	99.93
4	3.75	0.05	0.04	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-1.220
16	-0.045
25	0.380
50	0.980
75	1.445
84	1.620
95	2.000
99	2.230

Moment Measures	(phi)	(mm)
Mean	1.039	0.487
Standard Deviation	0.949	0.518
Skewness	-1.236	
Kurtosis	4.742	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.788	0.852
Standard Deviation	0.833	0.904
Skewness (1)	-0.231	-0.299
Skewness (2)	-0.709	
Kurtosis	0.934	1.239



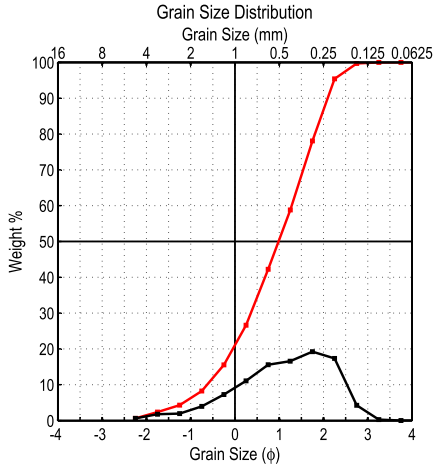
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NSS-01a**
Interval	**Swash**
Mean	**1.061 mm**
STD	**0.283 mm**
Skewness	**0.221**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	105.71
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	54.79
% $CaCO_3$	5.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	21.86	20.68	20.68
-1.5	-1.75	14.08	13.32	34.00
-1	-1.25	10.49	9.92	43.92
-0.5	-0.75	7.28	6.89	50.81
0	-0.25	4.21	3.98	54.79
0.5	0.25	3.58	3.39	58.18
1	0.75	5.40	5.11	63.29
1.5	1.25	7.26	6.87	70.15
2	1.75	9.42	8.91	79.07
2.5	2.25	14.63	13.84	92.91
3	2.75	7.00	6.62	99.53
3.5	3.25	0.42	0.40	99.92
4	3.75	0.05	0.05	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.090
50	-0.810
75	1.520
84	1.930
95	2.410
99	2.710

Moment Measures	**(phi)**	**(mm)**
Mean	-0.086	1.061
Standard Deviation	1.819	0.283
Skewness	0.221	
Kurtosis	1.470	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-0.160	-0.377
Standard Deviation	2.090	1.751
Skewness (1)	0.311	0.346
Skewness (2)	0.426	
Kurtosis	0.115	0.529



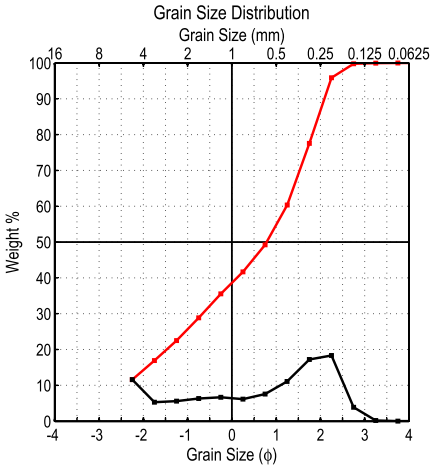
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NSS-01b**
Interval	**LTT**
Mean	**0.470 mm**
STD	**0.478 mm**
Skewness	**-0.678**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	118.37
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	15.55
% $CaCO_3$	3.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.74	0.63	0.63
-1.5	-1.75	2.09	1.77	2.39
-1	-1.25	2.29	1.93	4.33
-0.5	-0.75	4.68	3.95	8.28
0	-0.25	8.61	7.27	15.55
0.5	0.25	13.12	11.08	26.64
1	0.75	18.45	15.59	42.22
1.5	1.25	19.62	16.58	58.80
2	1.75	22.78	19.24	78.04
2.5	2.25	20.55	17.36	95.40
3	2.75	5.05	4.27	99.67
3.5	3.25	0.34	0.29	99.96
4	3.75	0.04	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.145
5	-1.165
16	-0.230
25	0.175
50	0.985
75	1.670
84	1.920
95	2.240
99	2.670

Moment Measures	**(phi)**	**(mm)**
Mean	1.091	0.470
Standard Deviation	1.065	0.478
Skewness	-0.678	
Kurtosis	3.119	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.845	0.892
Standard Deviation	1.075	1.053
Skewness (1)	-0.130	-0.197
Skewness (2)	-0.416	
Kurtosis	0.584	0.933



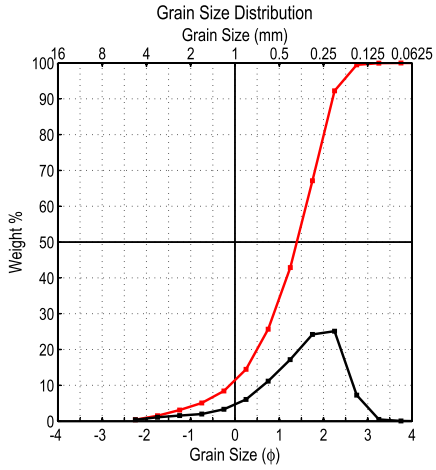
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NSS-02a**
Interval	**Swash**
Mean	**0.682 mm**
STD	**0.329 mm**
Skewness	**-0.485**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	112.78
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	35.53
% $CaCO_3$	3.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	13.11	11.62	11.62
-1.5	-1.75	5.99	5.31	16.94
-1	-1.25	6.30	5.59	22.52
-0.5	-0.75	7.14	6.33	28.85
0	-0.25	7.53	6.68	35.53
0.5	0.25	6.92	6.14	41.67
1	0.75	8.54	7.57	49.24
1.5	1.25	12.50	11.08	60.32
2	1.75	19.42	17.22	77.54
2.5	2.25	20.66	18.32	95.86
3	2.75	4.39	3.89	99.75
3.5	3.25	0.23	0.20	99.96
4	3.75	0.03	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.840
25	-1.055
50	0.785
75	1.675
84	1.925
95	2.225
99	2.655

Moment Measures	**(phi)**	**(mm)**
Mean	0.551	0.682
Standard Deviation	1.604	0.329
Skewness	-0.485	
Kurtosis	1.880	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.042	0.290
Standard Deviation	1.882	1.619
Skewness (1)	-0.394	-0.375
Skewness (2)	-0.424	
Kurtosis	0.189	0.672



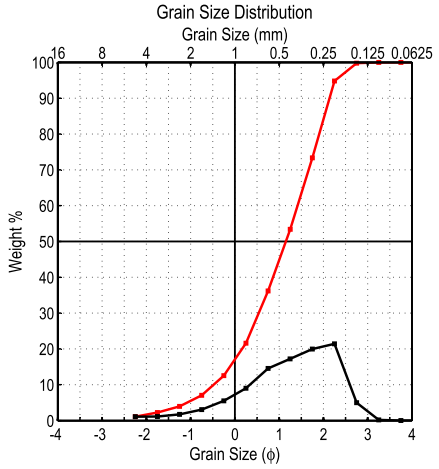
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NSS-02b**
Interval	**LTT**
Mean	**0.366 mm**
STD	**0.509 mm**
Skewness	**-1.153**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	107.14
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	8.43
% $CaCO_3$	1.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.44	0.41	0.41
-1.5	-1.75	1.18	1.10	1.51
-1	-1.25	1.70	1.59	3.10
-0.5	-0.75	2.13	1.99	5.09
0	-0.25	3.58	3.34	8.43
0.5	0.25	6.50	6.07	14.50
1	0.75	11.99	11.19	25.69
1.5	1.25	18.43	17.20	42.89
2	1.75	25.94	24.21	67.10
2.5	2.25	26.89	25.10	92.20
3	2.75	7.78	7.26	99.46
3.5	3.25	0.53	0.49	99.95
4	3.75	0.05	0.05	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.980
5	-0.770
16	0.315
25	0.720
50	1.395
75	1.905
84	2.085
95	2.445
99	2.720

Moment Measures	**(phi)**	**(mm)**
Mean	1.448	0.366
Standard Deviation	0.975	0.509
Skewness	-1.153	
Kurtosis	4.470	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.200	1.265
Standard Deviation	0.885	0.930
Skewness (1)	-0.220	-0.284
Skewness (2)	-0.630	
Kurtosis	0.816	1.112



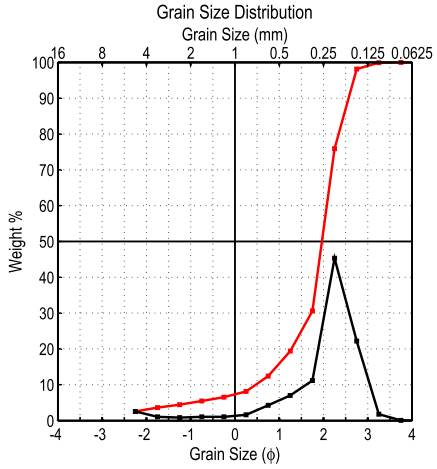
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NSS-03a**
Interval	**Swash**
Mean	**0.429 mm**
STD	**0.482 mm**
Skewness	**-0.914**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	104.38
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	12.56
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.16	1.11	1.11
-1.5	-1.75	1.18	1.13	2.24
-1	-1.25	1.80	1.72	3.97
-0.5	-0.75	3.21	3.08	7.04
0	-0.25	5.76	5.52	12.56
0.5	0.25	9.44	9.04	21.60
1	0.75	15.21	14.57	36.18
1.5	1.25	17.96	17.21	53.38
2	1.75	20.84	19.97	73.35
2.5	2.25	22.37	21.43	94.78
3	2.75	5.20	4.98	99.76
3.5	3.25	0.21	0.20	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.080
16	-0.060
25	0.365
50	1.150
75	1.790
84	2.000
95	2.270
99	2.675

Moment Measures	**(phi)**	**(mm)**
Mean	1.220	0.429
Standard Deviation	1.052	0.482
Skewness	-0.914	
Kurtosis	3.701	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.970	1.030
Standard Deviation	1.030	1.023
Skewness (1)	-0.175	-0.253
Skewness (2)	-0.539	
Kurtosis	0.626	0.963



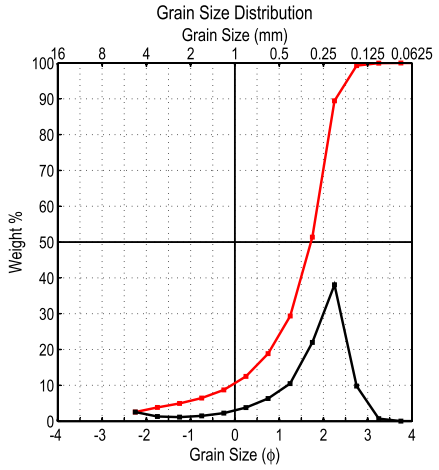
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NSS-03b**
Interval	**LTT**
Mean	**0.265 mm**
STD	**0.473 mm**
Skewness	**-2.294**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	104.81
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	6.53
% $CaCO_3$	2.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.69	2.57	2.57
-1.5	-1.75	1.10	1.05	3.62
-1	-1.25	0.87	0.83	4.45
-0.5	-0.75	1.09	1.04	5.49
0	-0.25	1.09	1.04	6.53
0.5	0.25	1.69	1.61	8.14
1	0.75	4.47	4.26	12.40
1.5	1.25	7.34	7.00	19.41
2	1.75	11.73	11.19	30.60
2.5	2.25	47.49	45.31	75.91
3	2.75	23.29	22.22	98.13
3.5	3.25	1.87	1.78	99.91
4	3.75	0.06	0.06	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-0.985
16	1.005
25	1.500
50	1.965
75	2.240
84	2.430
95	2.680
99	2.995

Moment Measures	**(phi)**	**(mm)**
Mean	1.914	0.265
Standard Deviation	1.081	0.473
Skewness	-2.294	
Kurtosis	8.478	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.717	1.800
Standard Deviation	0.712	0.912
Skewness (1)	-0.347	-0.479
Skewness (2)	-1.568	
Kurtosis	1.572	2.030



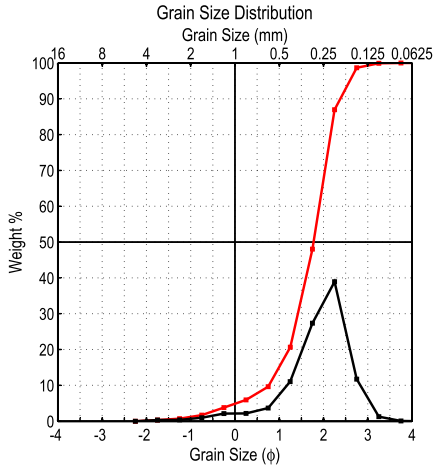
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NSS-04a**
Interval	**Swash**
Mean	**0.327 mm**
STD	**0.465 mm**
Skewness	**-1.806**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	118.81
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	8.72
% $CaCO_3$	2.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.02	2.54	2.54
-1.5	-1.75	1.54	1.30	3.84
-1	-1.25	1.34	1.13	4.97
-0.5	-0.75	1.78	1.50	6.46
0	-0.25	2.68	2.26	8.72
0.5	0.25	4.52	3.80	12.52
1	0.75	7.53	6.34	18.86
1.5	1.25	12.48	10.50	29.37
2	1.75	26.14	22.00	51.37
2.5	2.25	45.24	38.08	89.45
3	2.75	11.65	9.81	99.25
3.5	3.25	0.82	0.69	99.94
4	3.75	0.05	0.04	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.240
16	0.525
25	1.040
50	1.720
75	2.060
84	2.180
95	2.535
99	2.735

Moment Measures	**(phi)**	**(mm)**
Mean	1.614	0.327
Standard Deviation	1.104	0.465
Skewness	-1.806	
Kurtosis	6.247	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.352	1.475
Standard Deviation	0.827	0.986
Skewness (1)	-0.444	-0.506
Skewness (2)	-1.296	
Kurtosis	1.281	1.517



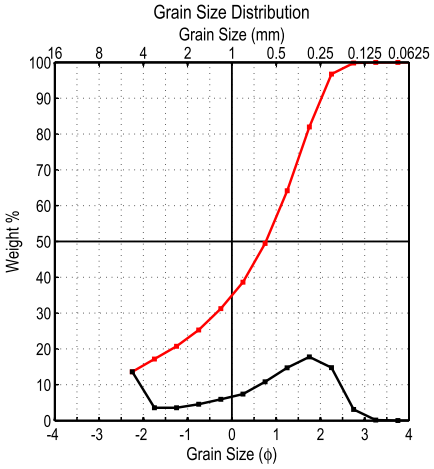
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NSS-04b**
Interval	**LTT**
Mean	**0.274 mm**
STD	**0.594 mm**
Skewness	**-1.589**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	104.46
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	3.78
% $CaCO_3$	1.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.35	0.34	0.34
-1	-1.25	0.38	0.36	0.70
-0.5	-0.75	1.02	0.98	1.68
0	-0.25	2.20	2.11	3.78
0.5	0.25	2.25	2.15	5.94
1	0.75	3.85	3.69	9.62
1.5	1.25	11.55	11.06	20.68
2	1.75	28.55	27.33	48.01
2.5	2.25	40.66	38.92	86.93
3	2.75	12.26	11.74	98.67
3.5	3.25	1.30	1.24	99.91
4	3.75	0.08	0.08	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.095
5	0.035
16	1.040
25	1.330
50	1.775
75	2.095
84	2.210
95	2.595
99	2.885

Moment Measures	**(phi)**	**(mm)**
Mean	1.869	0.274
Standard Deviation	0.751	0.594
Skewness	-1.589	
Kurtosis	6.789	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.625	1.675
Standard Deviation	0.585	0.680
Skewness (1)	-0.256	-0.308
Skewness (2)	-0.786	
Kurtosis	1.188	1.371



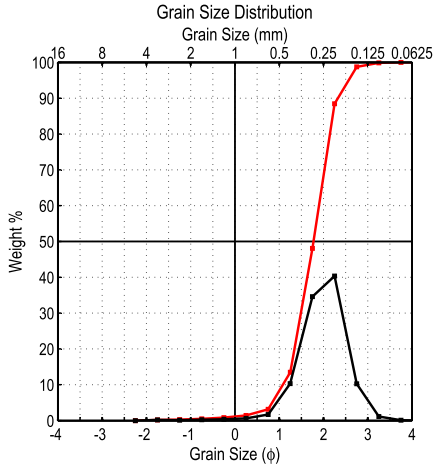
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NSS-05a**
Interval	**Swash**
Mean	**0.680 mm**
STD	**0.340 mm**
Skewness	**-0.626**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	104.15
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	31.25
% $CaCO_3$	3.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	14.17	13.61	13.61
-1.5	-1.75	3.73	3.58	17.19
-1	-1.25	3.71	3.56	20.75
-0.5	-0.75	4.75	4.56	25.31
0	-0.25	6.19	5.94	31.25
0.5	0.25	7.69	7.38	38.64
1	0.75	11.26	10.81	49.45
1.5	1.25	15.34	14.73	64.18
2	1.75	18.52	17.78	81.96
2.5	2.25	15.39	14.78	96.74
3	2.75	3.22	3.09	99.83
3.5	3.25	0.14	0.13	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.915
25	-0.785
50	0.770
75	1.555
84	1.820
95	2.190
99	2.615

Moment Measures	(phi)	(mm)
Mean	0.556	0.680
Standard Deviation	1.555	0.340
Skewness	-0.626	
Kurtosis	2.129	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.048	0.225
Standard Deviation	1.867	1.606
Skewness (1)	-0.438	-0.399
Skewness (2)	-0.428	
Kurtosis	0.189	0.778



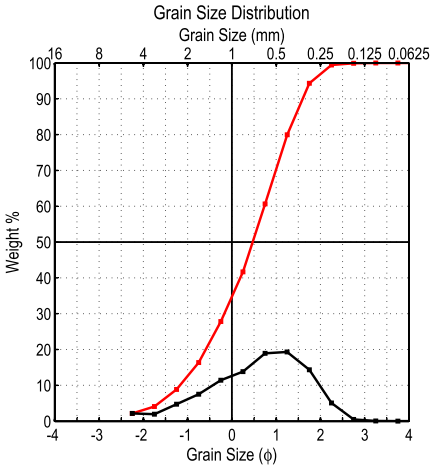
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NSS-05b**
Interval	**LTT**
Mean	**0.254 mm**
STD	**0.684 mm**
Skewness	**-1.347**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	104.41
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	0.85
% $CaCO_3$	1.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.18	0.17	0.17
-1	-1.25	0.09	0.09	0.26
-0.5	-0.75	0.25	0.24	0.50
0	-0.25	0.37	0.35	0.85
0.5	0.25	0.63	0.60	1.46
1	0.75	1.79	1.71	3.17
1.5	1.25	10.76	10.31	13.48
2	1.75	36.12	34.59	48.07
2.5	2.25	42.14	40.36	88.43
3	2.75	10.75	10.30	98.73
3.5	3.25	1.17	1.12	99.85
4	3.75	0.12	0.11	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-0.130
5	0.840
16	1.285
25	1.415
50	1.775
75	2.085
84	2.195
95	2.570
99	2.870

Moment Measures	(phi)	(mm)
Mean	1.975	0.254
Standard Deviation	0.547	0.684
Skewness	-1.347	
Kurtosis	9.533	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.740	1.752
Standard Deviation	0.455	0.490
Skewness (1)	-0.077	-0.079
Skewness (2)	-0.154	
Kurtosis	0.901	1.058



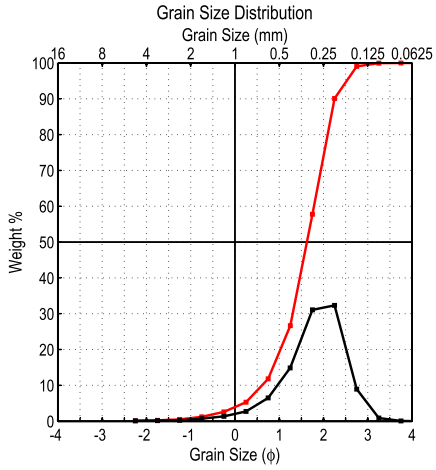
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-01a**
Interval	**Swash**
Mean	**0.672 mm**
STD	**0.479 mm**
Skewness	**-0.544**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	108.13
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	27.83
% $CaCO_3$	2.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.34	2.16	2.16
-1.5	-1.75	2.10	1.94	4.11
-1	-1.25	5.13	4.74	8.85
-0.5	-0.75	8.15	7.54	16.39
0	-0.25	12.37	11.44	27.83
0.5	0.25	14.97	13.84	41.67
1	0.75	20.49	18.95	60.62
1.5	1.25	20.91	19.34	79.96
2	1.75	15.51	14.34	94.30
2.5	2.25	5.52	5.10	99.41
3	2.75	0.54	0.50	99.91
3.5	3.25	0.06	0.06	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.655
16	-0.775
25	-0.375
50	0.470
75	1.120
84	1.390
95	1.820
99	2.210

Moment Measures	(phi)	(mm)
Mean	0.574	0.672
Standard Deviation	1.062	0.479
Skewness	-0.544	
Kurtosis	2.882	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.308	0.362
Standard Deviation	1.083	1.068
Skewness (1)	-0.150	-0.187
Skewness (2)	-0.358	
Kurtosis	0.605	0.953



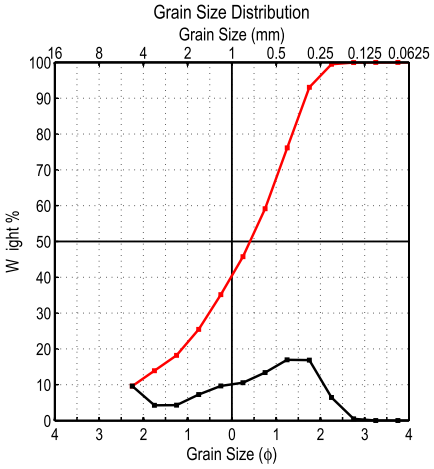
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-01b**
Interval	**LTT**
Mean	**0.292 mm**
STD	**0.608 mm**
Skewness	**-1.266**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	105.05
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	2.59
% $CaCO_3$	1.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.11	0.10	0.10
-1.5	-1.75	0.16	0.15	0.26
-1	-1.25	0.27	0.26	0.51
-0.5	-0.75	0.75	0.71	1.23
0	-0.25	1.43	1.36	2.59
0.5	0.25	2.86	2.72	5.31
1	0.75	6.83	6.50	11.81
1.5	1.25	15.60	14.85	26.66
2	1.75	32.66	31.09	57.75
2.5	2.25	33.96	32.33	90.08
3	2.75	9.41	8.96	99.04
3.5	3.25	0.93	0.89	99.92
4	3.75	0.06	0.06	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.910
5	0.195
16	0.890
25	1.195
50	1.625
75	2.015
84	2.155
95	2.525
99	2.750

Moment Measures	(phi)	(mm)
Mean	1.774	0.292
Standard Deviation	0.717	0.608
Skewness	-1.266	
Kurtosis	6.154	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.523	1.557
Standard Deviation	0.633	0.669
Skewness (1)	-0.162	-0.195
Skewness (2)	-0.419	
Kurtosis	0.842	1.165



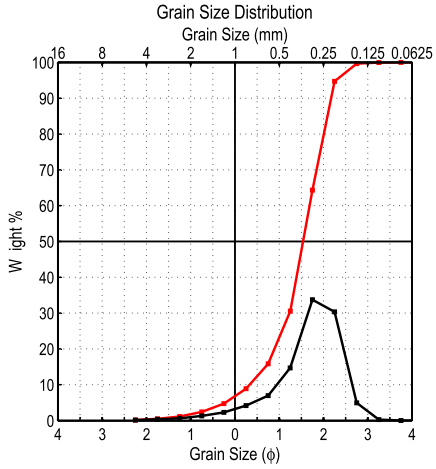
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-02a**
Interval	**Swash**
Mean	**0.773 mm**
STD	**0.392 mm**
Skewness	**-0.556**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	115.39
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	35.17
% $CaCO_3$	2.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	11.12	9.64	9.64
-1.5	-1.75	4.94	4.28	13.92
-1	-1.25	4.96	4.30	18.22
-0.5	-0.75	8.38	7.26	25.48
0	-0.25	11.18	9.69	35.17
0.5	0.25	12.19	10.56	45.73
1	0.75	15.49	13.42	59.16
1.5	1.25	19.58	16.97	76.12
2	1.75	19.50	16.90	93.02
2.5	2.25	7.44	6.45	99.47
3	2.75	0.55	0.48	99.95
3.5	3.25	0.03	0.03	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.510
25	-0.785
50	0.410
75	1.215
84	1.485
95	1.905
99	2.215

Moment Measures	**(phi)**	**(mm)**
Mean	0.371	0.773
Standard Deviation	1.353	0.392
Skewness	-0.556	
Kurtosis	2.262	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-0.012	0.128
Standard Deviation	1.497	1.378
Skewness (1)	-0.282	-0.281
Skewness (2)	-0.389	
Kurtosis	0.387	0.851



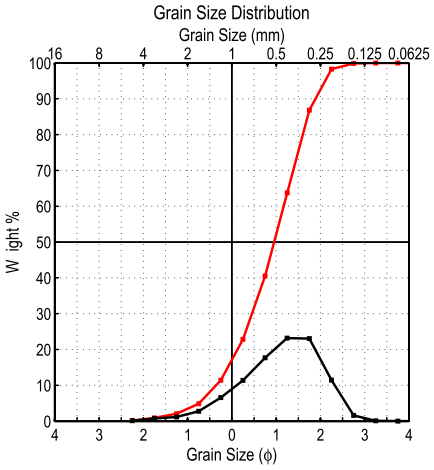
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-02b**
Interval	**LTT**
Mean	**0.322 mm**
STD	**0.580 mm**
Skewness	**-1.457**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	104.71
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	4.73
% $CaCO_3$	1.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.14	0.13	0.13
-1.5	-1.75	0.37	0.35	0.49
-1	-1.25	0.67	0.64	1.13
-0.5	-0.75	1.37	1.31	2.44
0	-0.25	2.40	2.29	4.73
0.5	0.25	4.37	4.17	8.90
1	0.75	7.30	6.97	15.87
1.5	1.25	15.39	14.70	30.57
2	1.75	35.34	33.75	64.32
2.5	2.25	31.79	30.36	94.68
3	2.75	5.20	4.97	99.65
3.5	3.25	0.30	0.29	99.93
4	3.75	0.04	0.04	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-1.350
5	-0.215
16	0.755
25	1.060
50	1.540
75	1.925
84	2.075
95	2.280
99	2.685

Moment Measures	**(phi)**	**(mm)**
Mean	1.636	0.322
Standard Deviation	0.786	0.580
Skewness	-1.457	
Kurtosis	5.982	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.415	1.457
Standard Deviation	0.660	0.708
Skewness (1)	-0.189	-0.298
Skewness (2)	-0.769	
Kurtosis	0.890	1.182



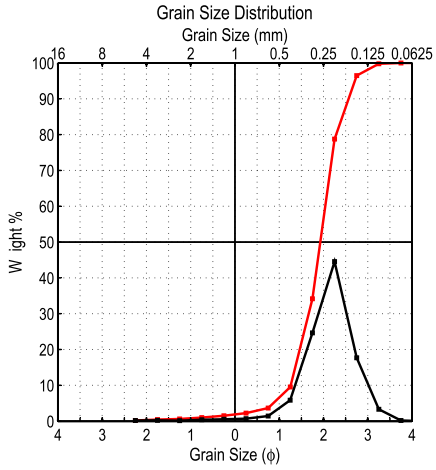
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-03a**
Interval	**Swash**
Mean	**0.469 mm**
STD	**0.545 mm**
Skewness	**-0.678**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	104.63
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	11.42
% $CaCO_3$	1.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.16	0.15	0.15
-1.5	-1.75	0.79	0.76	0.91
-1	-1.25	1.23	1.18	2.08
-0.5	-0.75	2.90	2.77	4.86
0	-0.25	6.87	6.57	11.42
0.5	0.25	11.93	11.40	22.82
1	0.75	18.52	17.70	40.52
1.5	1.25	24.28	23.21	63.73
2	1.75	24.14	23.07	86.80
2.5	2.25	12.00	11.47	98.27
3	2.75	1.67	1.60	99.87
3.5	3.25	0.10	0.10	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.710
5	-0.740
16	-0.050
25	0.310
50	0.955
75	1.495
84	1.690
95	2.105
99	2.480

Moment Measures	**(phi)**	**(mm)**
Mean	1.093	0.469
Standard Deviation	0.876	0.545
Skewness	-0.678	
Kurtosis	3.476	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.820	0.865
Standard Deviation	0.870	0.866
Skewness (1)	-0.155	-0.173
Skewness (2)	-0.313	
Kurtosis	0.635	0.984



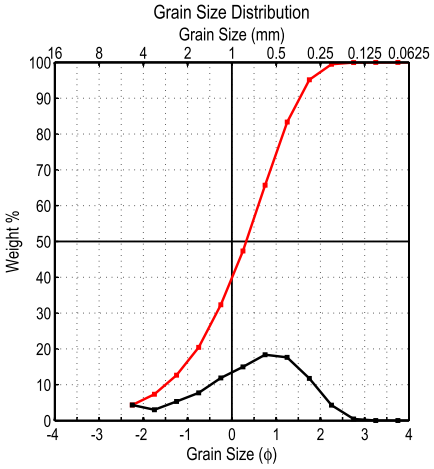
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-03b**
Interval	**LTT**
Mean	**0.232 mm**
STD	**0.641 mm**
Skewness	**-2.090**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	103.77
% finer than 4.00 phi	0.03
% coarser than 1.00 phi	1.52
% $CaCO_3$	1.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.22	0.21	0.21
-1.5	-1.75	0.25	0.24	0.45
-1	-1.25	0.16	0.15	0.61
-0.5	-0.75	0.41	0.40	1.00
0	-0.25	0.54	0.52	1.52
0.5	0.25	0.74	0.71	2.24
1	0.75	1.48	1.43	3.66
1.5	1.25	6.09	5.87	9.53
2	1.75	25.59	24.66	34.19
2.5	2.25	46.25	44.57	78.76
3	2.75	18.36	17.69	96.45
3.5	3.25	3.44	3.32	99.77
4	3.75	0.21	0.20	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-0.755
5	0.865
16	1.380
25	1.565
50	1.925
75	2.210
84	2.400
95	2.710
99	3.135

Moment Measures	**(phi)**	**(mm)**
Mean	2.108	0.232
Standard Deviation	0.642	0.641
Skewness	-2.090	
Kurtosis	12.914	
Dispersion		
Standard Deviation		
D viation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.890	1.902
Standard Deviation	0.510	0.535
Skewness (1)	-0.069	-0.109
Skewness (2)	-0.270	
Kurtosis	0.809	1.172



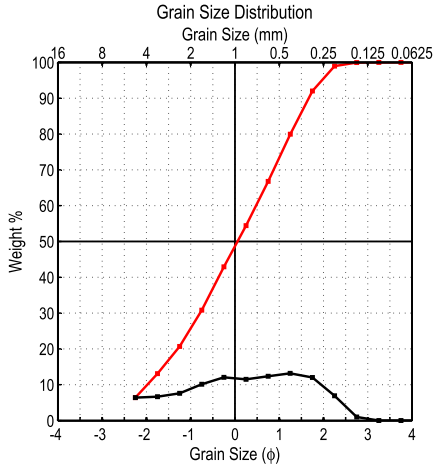
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-04a**
Interval	**Swash**
Mean	**0.753 mm**
STD	**0.455 mm**
Skewness	**-0.527**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	104.87
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	32.34
% $CaCO_3$	2.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	4.57	4.36	4.36
-1.5	-1.75	3.15	3.00	7.36
-1	-1.25	5.59	5.33	12.69
-0.5	-0.75	8.12	7.74	20.43
0	-0.25	12.48	11.90	32.34
0.5	0.25	15.73	15.00	47.33
1	0.75	19.27	18.38	65.71
1.5	1.25	18.50	17.64	83.35
2	1.75	12.37	11.80	95.15
2.5	2.25	4.54	4.33	99.48
3	2.75	0.47	0.45	99.92
3.5	3.25	0.04	0.04	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.145
16	-1.035
25	-0.560
50	0.325
75	1.015
84	1.280
95	1.745
99	2.195

Moment Measures	(phi)	(mm)
Mean	0.410	0.753
Standard Deviation	1.136	0.455
Skewness	-0.527	
Kurtosis	2.748	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.122	0.190
Standard Deviation	1.158	1.168
Skewness (1)	-0.175	-0.222
Skewness (2)	-0.454	
Kurtosis	0.680	1.012



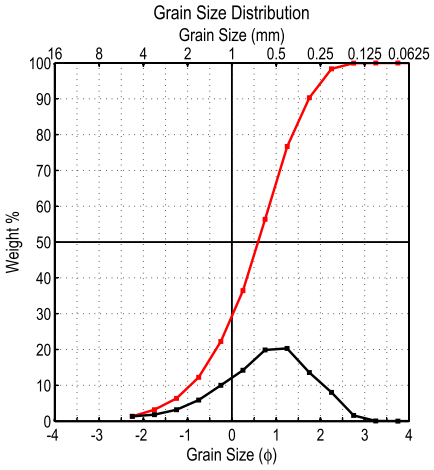
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-04b**
Interval	**LTT**
Mean	**0.859 mm**
STD	**0.400 mm**
Skewness	**-0.202**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	110.16
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	42.92
% $CaCO_3$	4.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	7.08	6.43	6.43
-1.5	-1.75	7.35	6.67	13.10
-1	-1.25	8.38	7.61	20.71
-0.5	-0.75	11.16	10.13	30.84
0	-0.25	13.31	12.08	42.92
0.5	0.25	12.68	11.51	54.43
1	0.75	13.62	12.36	66.79
1.5	1.25	14.51	13.17	79.97
2	1.75	13.26	12.04	92.00
2.5	2.25	7.65	6.94	98.95
3	2.75	1.10	1.00	99.95
3.5	3.25	0.03	0.03	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.560
25	-1.040
50	0.060
75	1.060
84	1.420
95	1.965
99	2.275

Moment Measures	(phi)	(mm)
Mean	0.220	0.859
Standard Deviation	1.323	0.400
Skewness	-0.202	
Kurtosis	2.066	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.070	-0.027
Standard Deviation	1.490	1.384
Skewness (1)	-0.087	-0.092
Skewness (2)	-0.136	
Kurtosis	0.414	0.823



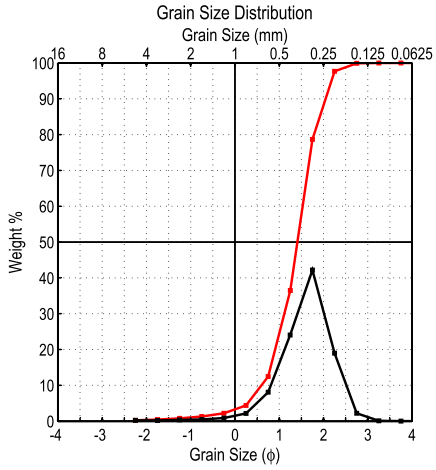
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-05a**
Interval	**Swash**
Mean	**0.602 mm**
STD	**0.489 mm**
Skewness	**-0.539**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	102.30
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	22.25
% $CaCO_3$	1.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.37	1.34	1.34
-1.5	-1.75	1.88	1.84	3.18
-1	-1.25	3.26	3.19	6.36
-0.5	-0.75	6.02	5.88	12.25
0	-0.25	10.23	10.00	22.25
0.5	0.25	14.53	14.20	36.45
1	0.75	20.36	19.90	56.35
1.5	1.25	20.80	20.33	76.69
2	1.75	13.91	13.60	90.28
2.5	2.25	8.25	8.06	98.35
3	2.75	1.63	1.59	99.94
3.5	3.25	0.05	0.05	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.465
16	-0.560
25	-0.155
50	0.590
75	1.210
84	1.520
95	2.040
99	2.455

Moment Measures	(phi)	(mm)
Mean	0.733	0.602
Standard Deviation	1.033	0.489
Skewness	-0.539	
Kurtosis	3.091	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.480	0.517
Standard Deviation	1.040	1.051
Skewness (1)	-0.106	-0.139
Skewness (2)	-0.291	
Kurtosis	0.685	1.052



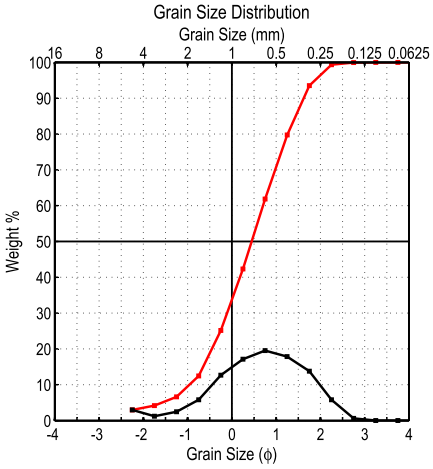
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-05b**
Interval	**LTT**
Mean	**0.335 mm**
STD	**0.646 mm**
Skewness	**-1.662**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	114.39
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	2.22
% $CaCO_3$	1.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.28	0.24	0.24
-1.5	-1.75	0.23	0.20	0.45
-1	-1.25	0.42	0.37	0.81
-0.5	-0.75	0.58	0.51	1.32
0	-0.25	1.03	0.90	2.22
0.5	0.25	2.49	2.18	4.40
1	0.75	9.23	8.07	12.47
1.5	1.25	27.49	24.03	36.50
2	1.75	48.25	42.18	78.68
2.5	2.25	21.71	18.98	97.66
3	2.75	2.55	2.23	99.89
3.5	3.25	0.11	0.10	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.065
5	0.285
16	0.825
25	1.010
50	1.410
75	1.705
84	1.890
95	2.180
99	2.550

Moment Measures	(phi)	(mm)
Mean	1.577	0.335
Standard Deviation	0.630	0.646
Skewness	-1.662	
Kurtosis	9.239	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.357	1.375
Standard Deviation	0.533	0.553
Skewness (1)	-0.099	-0.143
Skewness (2)	-0.333	
Kurtosis	0.779	1.117



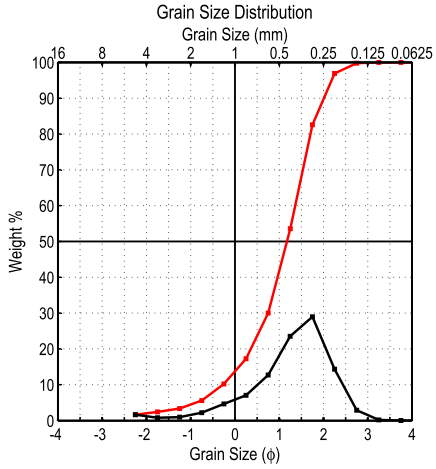
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-06a**
Interval	**Swash**
Mean	**0.655 mm**
STD	**0.489 mm**
Skewness	**-0.604**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	105.62
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	25.16
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.14	2.97	2.97
-1.5	-1.75	1.28	1.21	4.18
-1	-1.25	2.59	2.45	6.64
-0.5	-0.75	6.16	5.83	12.47
0	-0.25	13.40	12.69	25.16
0.5	0.25	18.12	17.16	42.31
1	0.75	20.63	19.53	61.84
1.5	1.25	18.89	17.88	79.73
2	1.75	14.55	13.78	93.51
2.5	2.25	6.16	5.83	99.34
3	2.75	0.65	0.62	99.95
3.5	3.25	0.02	0.02	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.585
16	-0.610
25	-0.255
50	0.445
75	1.120
84	1.405
95	1.880
99	2.220

Moment Measures	(phi)	(mm)
Mean	0.610	0.655
Standard Deviation	1.032	0.489
Skewness	-0.604	
Kurtosis	3.339	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.397	0.413
Standard Deviation	1.007	1.029
Skewness (1)	-0.047	-0.109
Skewness (2)	-0.295	
Kurtosis	0.720	1.033



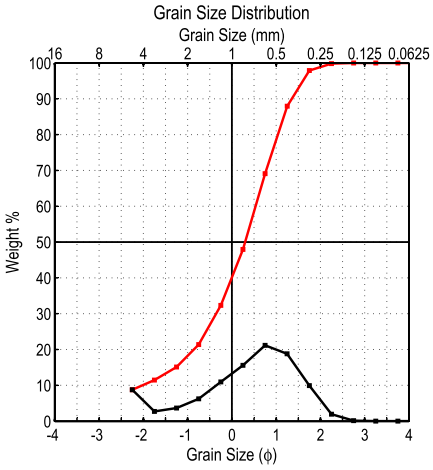
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-06b**
Interval	**LTT**
Mean	**0.425 mm**
STD	**0.515 mm**
Skewness	**-1.298**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.43
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	10.24
% $CaCO_3$	2.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.95	1.63	1.63
-1.5	-1.75	0.93	0.78	2.41
-1	-1.25	1.15	0.96	3.37
-0.5	-0.75	2.64	2.21	5.58
0	-0.25	5.56	4.66	10.24
0.5	0.25	8.41	7.04	17.28
1	0.75	15.19	12.72	30.00
1.5	1.25	28.12	23.55	53.55
2	1.75	34.63	29.00	82.54
2.5	2.25	17.15	14.36	96.90
3	2.75	3.44	2.88	99.78
3.5	3.25	0.22	0.18	99.97
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-0.880
16	0.160
25	0.555
50	1.175
75	1.620
84	1.800
95	2.185
99	2.615

Moment Measures	(phi)	(mm)
Mean	1.234	0.425
Standard Deviation	0.957	0.515
Skewness	-1.298	
Kurtosis	5.247	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.980	1.045
Standard Deviation	0.820	0.874
Skewness (1)	-0.238	-0.289
Skewness (2)	-0.637	
Kurtosis	0.869	1.179



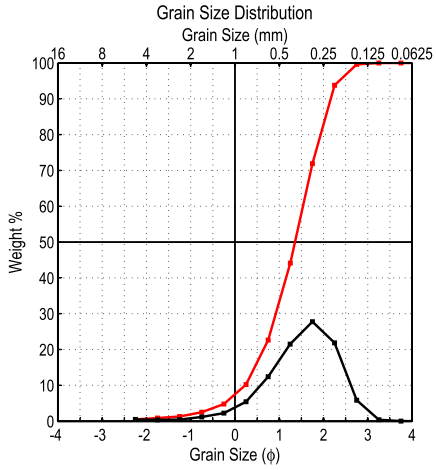
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-07a**
Interval	**Swash**
Mean	**0.817 mm**
STD	**0.443 mm**
Skewness	**-0.750**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	106.80
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	32.34
% $CaCO_3$	3.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	9.35	8.75	8.75
-1.5	-1.75	2.91	2.72	11.48
-1	-1.25	3.91	3.66	15.14
-0.5	-0.75	6.67	6.25	21.39
0	-0.25	11.70	10.96	32.34
0.5	0.25	16.64	15.58	47.92
1	0.75	22.63	21.19	69.11
1.5	1.25	20.10	18.82	87.93
2	1.75	10.61	9.93	97.87
2.5	2.25	2.08	1.95	99.81
3	2.75	0.17	0.16	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.180
25	-0.585
50	0.300
75	0.905
84	1.145
95	1.605
99	2.040

Moment Measures	(phi)	(mm)
Mean	0.291	0.817
Standard Deviation	1.176	0.443
Skewness	-0.750	
Kurtosis	2.830	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.018	0.088
Standard Deviation	1.163	1.165
Skewness (1)	-0.273	-0.298
Skewness (2)	-0.535	
Kurtosis	0.658	1.060



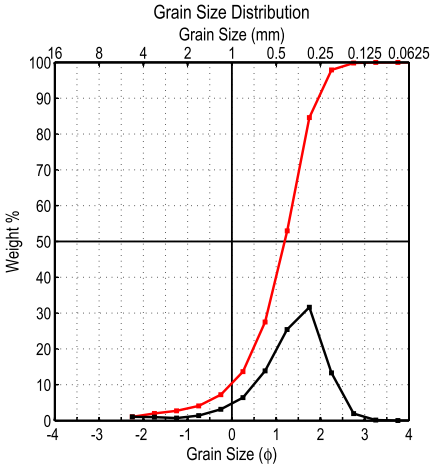
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-07b**
Interval	**LTT**
Mean	**0.356 mm**
STD	**0.563 mm**
Skewness	**-1.133**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	106.85
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	4.78
% $CaCO_3$	1.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.51	0.48	0.48
-1.5	-1.75	0.41	0.38	0.86
-1	-1.25	0.50	0.47	1.33
-0.5	-0.75	1.28	1.20	2.53
0	-0.25	2.41	2.26	4.78
0.5	0.25	5.80	5.43	10.21
1	0.75	13.26	12.41	22.62
1.5	1.25	22.97	21.50	44.12
2	1.75	29.67	27.77	71.89
2.5	2.25	23.35	21.85	93.74
3	2.75	6.24	5.84	99.58
3.5	3.25	0.42	0.39	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.600
5	-0.230
16	0.485
25	0.805
50	1.355
75	1.820
84	2.025
95	2.360
99	2.700

Moment Measures	(phi)	(mm)
Mean	1.489	0.356
Standard Deviation	0.828	0.563
Skewness	-1.133	
Kurtosis	5.445	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.255	1.288
Standard Deviation	0.770	0.777
Skewness (1)	-0.130	-0.177
Skewness (2)	-0.377	
Kurtosis	0.682	1.046



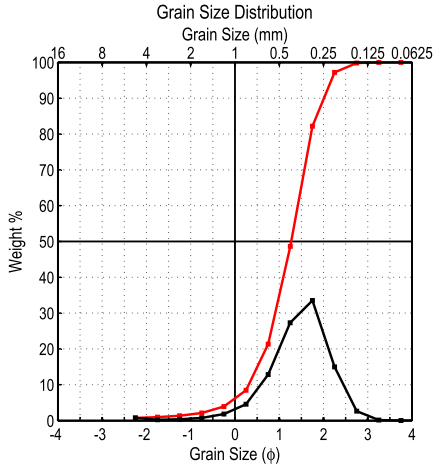
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-08a**
Interval	**Swash**
Mean	**0.411 mm**
STD	**0.549 mm**
Skewness	**-1.447**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	104.87
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	7.25
% $CaCO_3$	1.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.10	1.05	1.05
-1.5	-1.75	1.00	0.95	2.00
-1	-1.25	0.76	0.72	2.73
-0.5	-0.75	1.45	1.38	4.11
0	-0.25	3.29	3.14	7.25
0.5	0.25	6.71	6.40	13.65
1	0.75	14.56	13.88	27.53
1.5	1.25	26.66	25.42	52.95
2	1.75	33.16	31.62	84.57
2.5	2.25	13.95	13.30	97.87
3	2.75	2.04	1.95	99.82
3.5	3.25	0.15	0.14	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-0.610
16	0.335
25	0.660
50	1.190
75	1.600
84	1.740
95	2.140
99	2.540

Moment Measures	(phi)	(mm)
Mean	1.283	0.411
Standard Deviation	0.864	0.549
Skewness	-1.447	
Kurtosis	6.253	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.037	1.088
Standard Deviation	0.702	0.768
Skewness (1)	-0.217	-0.263
Skewness (2)	-0.605	
Kurtosis	0.957	1.199



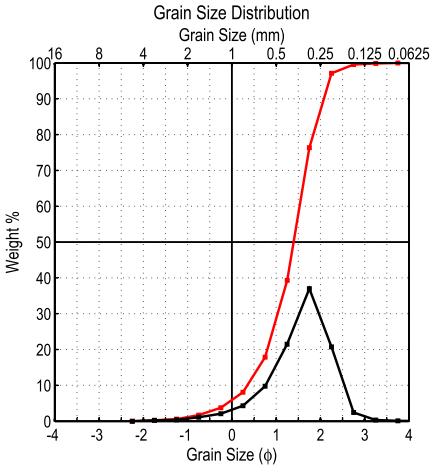
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-08b**
Interval	**LTT**
Mean	**0.375 mm**
STD	**0.597 mm**
Skewness	**-1.458**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	104.09
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	3.92
% $CaCO_3$	1.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.76	0.73	0.73
-1.5	-1.75	0.23	0.22	0.95
-1	-1.25	0.40	0.38	1.34
-0.5	-0.75	0.80	0.77	2.10
0	-0.25	1.89	1.82	3.92
0.5	0.25	4.76	4.57	8.49
1	0.75	13.37	12.84	21.34
1.5	1.25	28.42	27.30	48.64
2	1.75	34.91	33.54	82.18
2.5	2.25	15.62	15.01	97.19
3	2.75	2.75	2.64	99.83
3.5	3.25	0.17	0.16	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.685
5	-0.130
16	0.540
25	0.815
50	1.270
75	1.645
84	1.810
95	2.175
99	2.595

Moment Measures	(phi)	(mm)
Mean	1.417	0.375
Standard Deviation	0.745	0.597
Skewness	-1.458	
Kurtosis	7.573	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.175	1.207
Standard Deviation	0.635	0.667
Skewness (1)	-0.150	-0.182
Skewness (2)	-0.390	
Kurtosis	0.815	1.138



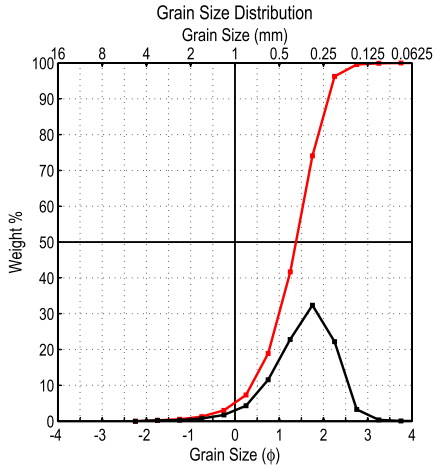
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-09a**
Interval	**Swash**
Mean	**0.347 mm**
STD	**0.612 mm**
Skewness	**-1.094**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	108.27
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	3.75
% $CaCO_3$	1.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.26	0.24	0.24
-1	-1.25	0.39	0.36	0.60
-0.5	-0.75	1.17	1.08	1.68
0	-0.25	2.24	2.07	3.75
0.5	0.25	4.69	4.33	8.08
1	0.75	10.58	9.77	17.85
1.5	1.25	23.25	21.47	39.33
2	1.75	40.08	37.02	76.35
2.5	2.25	22.48	20.76	97.11
3	2.75	2.64	2.44	99.55
3.5	3.25	0.35	0.32	99.87
4	3.75	0.12	0.11	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.065
5	-0.105
16	0.655
25	0.915
50	1.395
75	1.730
84	1.935
95	2.200
99	2.640

Moment Measures	(phi)	(mm)
Mean	1.528	0.347
Standard Deviation	0.708	0.612
Skewness	-1.094	
Kurtosis	5.259	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.295	1.328
Standard Deviation	0.640	0.669
Skewness (1)	-0.156	-0.229
Skewness (2)	-0.543	
Kurtosis	0.801	1.159



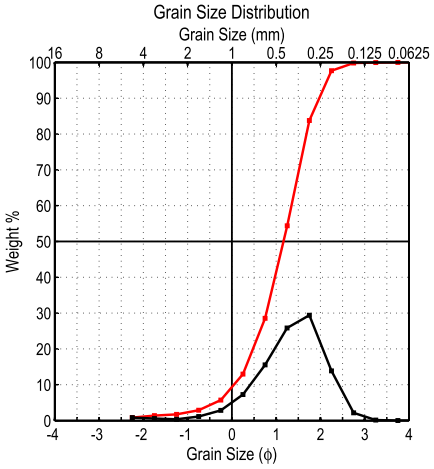
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-09b**
Interval	**LTT**
Mean	**0.345 mm**
STD	**0.613 mm**
Skewness	**-0.906**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	106.12
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	3.02
% $CaCO_3$	1.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.26	0.25	0.25
-1	-1.25	0.31	0.29	0.54
-0.5	-0.75	0.78	0.74	1.27
0	-0.25	1.85	1.74	3.02
0.5	0.25	4.58	4.32	7.33
1	0.75	12.28	11.57	18.90
1.5	1.25	24.19	22.79	41.70
2	1.75	34.33	32.35	74.05
2.5	2.25	23.56	22.20	96.25
3	2.75	3.50	3.30	99.55
3.5	3.25	0.37	0.35	99.90
4	3.75	0.09	0.08	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.935
5	-0.020
16	0.625
25	0.885
50	1.380
75	1.770
84	1.975
95	2.220
99	2.665

Moment Measures	(phi)	(mm)
Mean	1.536	0.345
Standard Deviation	0.705	0.613
Skewness	-0.906	
Kurtosis	4.836	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.300	1.327
Standard Deviation	0.675	0.677
Skewness (1)	-0.119	-0.184
Skewness (2)	-0.415	
Kurtosis	0.659	1.037



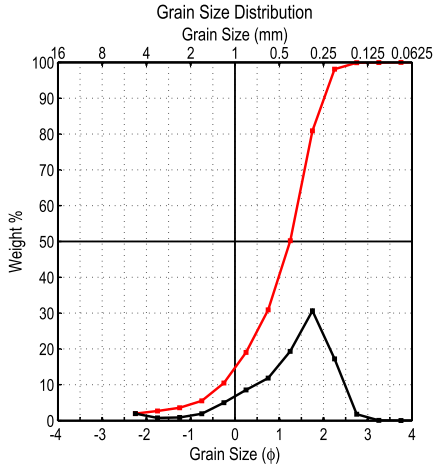
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-10a**
Interval	**Swash**
Mean	**0.406 mm**
STD	**0.569 mm**
Skewness	**-1.252**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	105.50
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	5.73
% $CaCO_3$	2.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.86	0.82	0.82
-1.5	-1.75	0.60	0.57	1.38
-1	-1.25	0.39	0.37	1.75
-0.5	-0.75	1.21	1.15	2.90
0	-0.25	2.99	2.83	5.73
0.5	0.25	7.65	7.25	12.99
1	0.75	16.41	15.55	28.54
1.5	1.25	27.26	25.84	54.38
2	1.75	31.01	29.39	83.77
2.5	2.25	14.65	13.89	97.66
3	2.75	2.27	2.15	99.81
3.5	3.25	0.15	0.14	99.95
4	3.75	0.04	0.04	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.090
5	-0.380
16	0.345
25	0.635
50	1.165
75	1.600
84	1.760
95	2.155
99	2.560

Moment Measures	(phi)	(mm)
Mean	1.302	0.406
Standard Deviation	0.814	0.569
Skewness	-1.252	
Kurtosis	6.106	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.052	1.090
Standard Deviation	0.708	0.738
Skewness (1)	-0.159	-0.189
Skewness (2)	-0.392	
Kurtosis	0.792	1.077



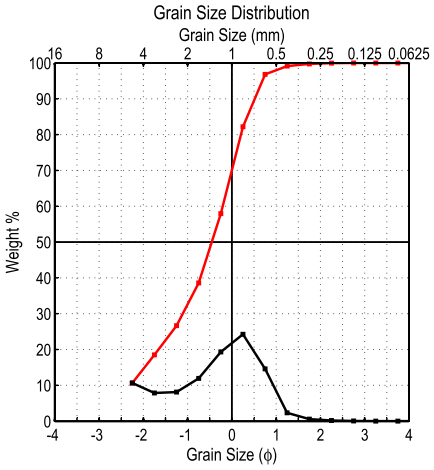
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**NHB-10b**
Interval	**LTT**
Mean	**0.425 mm**
STD	**0.507 mm**
Skewness	**-1.344**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	105.34
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	10.48
% $CaCO_3$	2.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.07	1.97	1.97
-1.5	-1.75	0.77	0.73	2.70
-1	-1.25	0.93	0.88	3.58
-0.5	-0.75	2.02	1.92	5.50
0	-0.25	5.25	4.98	10.48
0.5	0.25	9.01	8.55	19.03
1	0.75	12.51	11.88	30.91
1.5	1.25	20.35	19.32	50.23
2	1.75	32.29	30.65	80.88
2.5	2.25	18.14	17.22	98.10
3	2.75	1.87	1.78	99.88
3.5	3.25	0.07	0.07	99.94
4	3.75	0.03	0.03	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-0.880
16	0.075
25	0.500
50	1.245
75	1.655
84	1.840
95	2.160
99	2.505

Moment Measures	(phi)	(mm)
Mean	1.234	0.425
Standard Deviation	0.980	0.507
Skewness	-1.344	
Kurtosis	5.175	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.957	1.053
Standard Deviation	0.883	0.902
Skewness (1)	-0.326	-0.362
Skewness (2)	-0.686	
Kurtosis	0.722	1.079



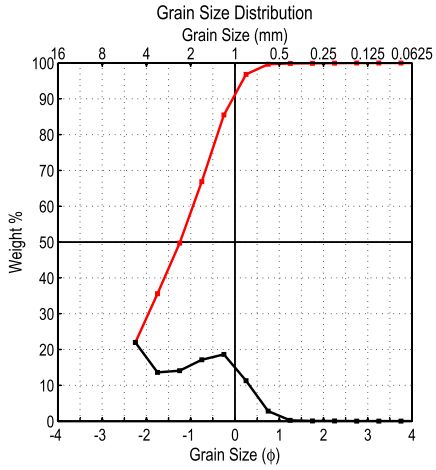
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**KH-01a**
Interval	**Swash**
Mean	**1.320 mm**
STD	**0.501 mm**
Skewness	**-0.396**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	108.83
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	57.93
% $CaCO_3$	2.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	11.58	10.64	10.64
-1.5	-1.75	8.58	7.88	18.52
-1	-1.25	8.85	8.13	26.66
-0.5	-0.75	13.00	11.95	38.60
0	-0.25	21.04	19.33	57.93
0.5	0.25	26.40	24.26	82.19
1	0.75	15.90	14.61	96.80
1.5	1.25	2.54	2.33	99.14
2	1.75	0.62	0.57	99.71
2.5	2.25	0.23	0.21	99.92
3	2.75	0.06	0.06	99.97
3.5	3.25	0.01	0.01	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.910
25	-1.350
50	-0.455
75	0.100
84	0.310
95	0.690
99	1.220

Moment Measures	(phi)	(mm)
Mean	-0.400	1.320
Standard Deviation	0.998	0.501
Skewness	-0.396	
Kurtosis	2.409	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.800	-0.685
Standard Deviation	1.110	1.000
Skewness (1)	-0.311	-0.266
Skewness (2)	-0.293	
Kurtosis	0.324	0.831



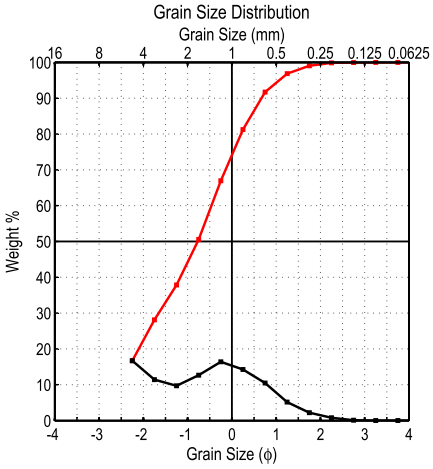
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**KH-01b**
Interval	**LTT**
Mean	**2.040 mm**
STD	**0.531 mm**
Skewness	**0.165**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	110.21
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	85.49
% $CaCO_3$	3.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	24.23	21.99	21.99
-1.5	-1.75	15.01	13.62	35.60
-1	-1.25	15.54	14.10	49.71
-0.5	-0.75	18.91	17.16	66.86
0	-0.25	20.53	18.63	85.49
0.5	0.25	12.46	11.31	96.80
1	0.75	3.12	2.83	99.63
1.5	1.25	0.24	0.22	99.85
2	1.75	0.07	0.06	99.91
2.5	2.25	0.05	0.05	99.95
3	2.75	0.02	0.02	99.97
3.5	3.25	0.01	0.01	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.140
50	-1.240
75	-0.530
84	-0.290
95	0.170
99	0.640

Moment Measures	(phi)	(mm)
Mean	-1.029	2.040
Standard Deviation	0.914	0.531
Skewness	0.165	
Kurtosis	2.136	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.270	-1.260
Standard Deviation	0.980	0.857
Skewness (1)	-0.031	0.067
Skewness (2)	0.204	
Kurtosis	0.235	0.616



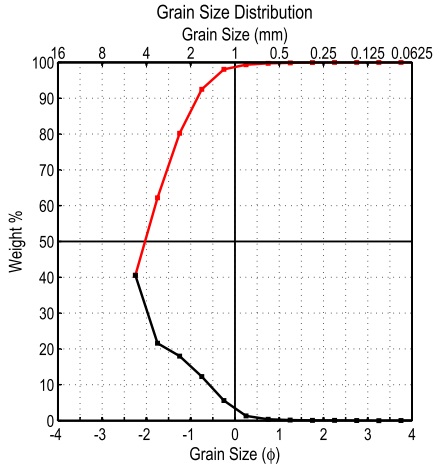
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**KH-02a**
Interval	**Swash**
Mean	**1.509 mm**
STD	**0.447 mm**
Skewness	**0.159**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	116.45
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	66.95
% $CaCO_3$	2.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	19.46	16.71	16.71
-1.5	-1.75	13.31	11.43	28.14
-1	-1.25	11.33	9.73	37.87
-0.5	-0.75	14.77	12.68	50.55
0	-0.25	19.09	16.39	66.95
0.5	0.25	16.61	14.26	81.21
1	0.75	12.20	10.48	91.69
1.5	1.25	6.00	5.15	96.84
2	1.75	2.58	2.22	99.06
2.5	2.25	0.91	0.78	99.84
3	2.75	0.13	0.11	99.95
3.5	3.25	0.03	0.03	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.885
50	-0.770
75	0.030
84	0.385
95	1.070
99	1.735

Moment Measures	(phi)	(mm)
Mean	-0.594	1.509
Standard Deviation	1.161	0.447
Skewness	0.159	
Kurtosis	2.180	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.933	-0.878
Standard Deviation	1.317	1.162
Skewness (1)	-0.123	-0.007
Skewness (2)	0.137	
Kurtosis	0.260	0.711



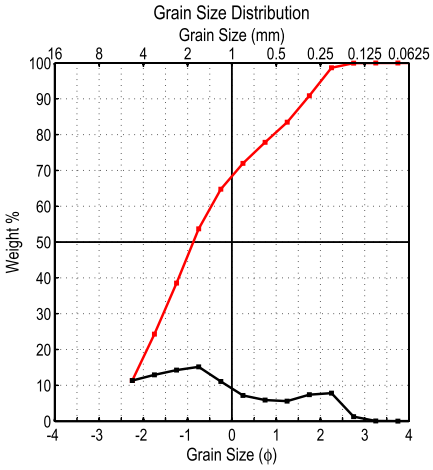
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**KH02b**
Interval	**LTT**
Mean	**3.055 mm**
STD	**0.617 mm**
Skewness	**1.093**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Fine Skewed
	Leptokurtic
Total weight (gram)	106.76
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	98.05
% $CaCO_3$	3.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	43.32	40.58	40.58
-1.5	-1.75	23.08	21.62	62.20
-1	-1.25	19.21	17.99	80.19
-0.5	-0.75	13.10	12.27	92.46
0	-0.25	5.97	5.59	98.05
0.5	0.25	1.39	1.30	99.35
1	0.75	0.39	0.37	99.72
1.5	1.25	0.14	0.13	99.85
2	1.75	0.08	0.07	99.93
2.5	2.25	0.05	0.05	99.97
3	2.75	0.02	0.02	99.99
3.5	3.25	0.00	0.00	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-2.030
75	-1.395
84	-1.095
95	-0.525
99	0.115

Moment Measures	(phi)	(mm)
Mean	-1.611	3.055
Standard Deviation	0.697	0.617
Skewness	1.093	
Kurtosis	4.378	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.672	-1.792
Standard Deviation	0.578	0.550
Skewness (1)	0.619	0.682
Skewness (2)	1.113	
Kurtosis	0.494	0.827



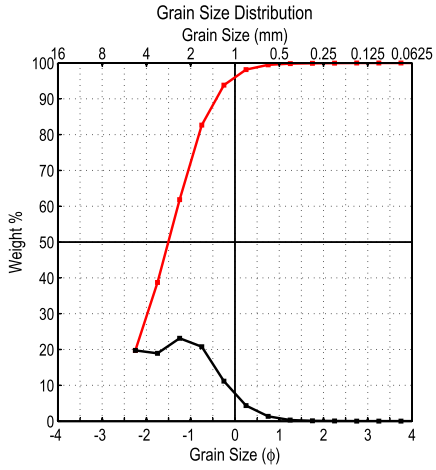
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**KH-03a**
Interval	**Swash**
Mean	**1.254 mm**
STD	**0.372 mm**
Skewness	**0.487**
USCS	**Wentworth**
SW	Very Coarse Sand
Medium Sand	Poorly Sorted
Well Graded	Fine Skewed
	Platykurtic
Total weight (gram)	106.65
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	64.75
% $CaCO_3$	4.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	12.09	11.34	11.34
-1.5	-1.75	13.81	12.95	24.29
-1	-1.25	15.19	14.24	38.53
-0.5	-0.75	16.16	15.15	53.68
0	-0.25	11.81	11.07	64.75
0.5	0.25	7.68	7.20	71.95
1	0.75	6.30	5.91	77.86
1.5	1.25	5.97	5.60	83.46
2	1.75	7.87	7.38	90.84
2.5	2.25	8.33	7.81	98.65
3	2.75	1.36	1.28	99.92
3.5	3.25	0.06	0.06	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.070
25	-1.725
50	-0.870
75	0.510
84	1.285
95	2.015
99	2.385

Moment Measures	(phi)	(mm)
Mean	-0.326	1.254
Standard Deviation	1.425	0.372
Skewness	0.487	
Kurtosis	2.116	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.392	-0.552
Standard Deviation	1.678	1.485
Skewness (1)	0.285	0.319
Skewness (2)	0.449	
Kurtosis	0.271	0.782



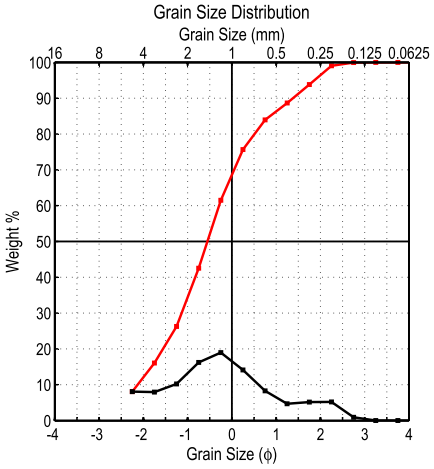
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**KH-03b**
Interval	**LTT**
Mean	**2.329 mm**
STD	**0.584 mm**
Skewness	**0.552**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	106.33
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	93.80
% $CaCO_3$	3.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	21.00	19.75	19.75
-1.5	-1.75	20.16	18.96	38.71
-1	-1.25	24.61	23.14	61.85
-0.5	-0.75	22.10	20.78	82.64
0	-0.25	11.87	11.16	93.80
0.5	0.25	4.61	4.34	98.14
1	0.75	1.43	1.34	99.48
1.5	1.25	0.33	0.31	99.79
2	1.75	0.12	0.11	99.91
2.5	2.25	0.05	0.05	99.95
3	2.75	0.02	0.02	99.97
3.5	3.25	0.01	0.01	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.110
50	-1.505
75	-0.935
84	-0.690
95	-0.110
99	0.570

Moment Measures	(phi)	(mm)
Mean	-1.220	2.329
Standard Deviation	0.777	0.584
Skewness	0.552	
Kurtosis	3.350	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.470	-1.482
Standard Deviation	0.780	0.714
Skewness (1)	0.045	0.174
Skewness (2)	0.417	
Kurtosis	0.372	0.746



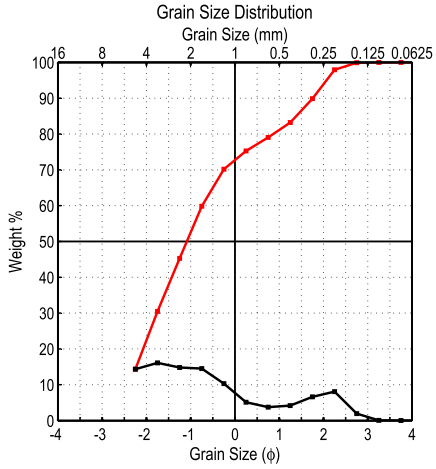
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**KH-04a**
Interval	**Swash**
Mean	**1.170 mm**
STD	**0.429 mm**
Skewness	**0.344**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	107.56
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	61.50
% $CaCO_3$	3.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	8.69	8.08	8.08
-1.5	-1.75	8.58	7.98	16.06
-1	-1.25	11.00	10.23	26.28
-0.5	-0.75	17.46	16.23	42.52
0	-0.25	20.42	18.98	61.50
0.5	0.25	15.22	14.15	75.65
1	0.75	8.91	8.28	83.93
1.5	1.25	5.06	4.70	88.64
2	1.75	5.56	5.17	93.81
2.5	2.25	5.61	5.22	99.02
3	2.75	0.99	0.92	99.94
3.5	3.25	0.03	0.03	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.755
25	-1.315
50	-0.555
75	0.225
84	0.755
95	1.865
99	2.250

Moment Measures	(phi)	(mm)
Mean	-0.227	1.170
Standard Deviation	1.222	0.429
Skewness	0.344	
Kurtosis	2.609	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.500	-0.518
Standard Deviation	1.255	1.251
Skewness (1)	0.044	0.110
Skewness (2)	0.289	
Kurtosis	0.639	1.095



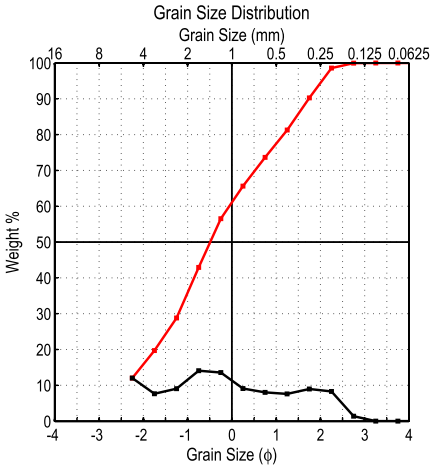
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**KH-04b**
Interval	**LTT**
Mean	**1.391 mm**
STD	**0.360 mm**
Skewness	**0.682**
USCS	**Wentworth**
SW	Very Coarse Sand
Medium Sand	Poorly Sorted
Well Graded	Fine Skewed
	Platykurtic
Total weight (gram)	103.60
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	70.14
% $CaCO_3$	4.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	14.86	14.34	14.34
-1.5	-1.75	16.71	16.13	30.47
-1	-1.25	15.35	14.82	45.29
-0.5	-0.75	15.05	14.53	59.82
0	-0.25	10.70	10.33	70.14
0.5	0.25	5.32	5.14	75.28
1	0.75	3.91	3.77	79.05
1.5	1.25	4.32	4.17	83.22
2	1.75	6.86	6.62	89.85
2.5	2.25	8.38	8.09	97.93
3	2.75	2.04	1.97	99.90
3.5	3.25	0.07	0.07	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.200
25	-1.920
50	-1.090
75	0.225
84	1.310
95	2.070
99	2.520

Moment Measures	(phi)	(mm)
Mean	-0.476	1.391
Standard Deviation	1.475	0.360
Skewness	0.682	
Kurtosis	2.288	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.445	-0.660
Standard Deviation	1.755	1.532
Skewness (1)	0.368	0.415
Skewness (2)	0.570	
Kurtosis	0.231	0.825



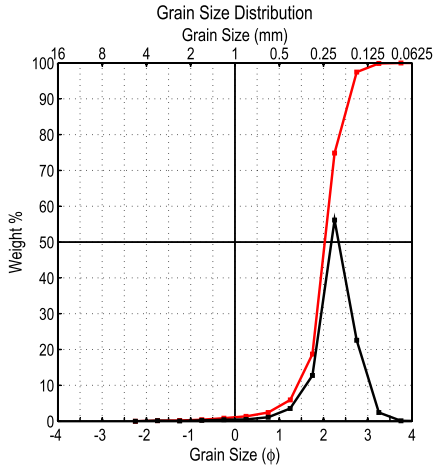
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**KH-05a**
Interval	**Swash**
Mean	**1.069 mm**
STD	**0.371 mm**
Skewness	**0.169**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	107.68
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	56.52
% $CaCO_3$	3.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	12.98	12.05	12.05
-1.5	-1.75	8.26	7.67	19.73
-1	-1.25	9.79	9.09	28.82
-0.5	-0.75	15.19	14.11	42.92
0	-0.25	14.64	13.60	56.52
0.5	0.25	9.80	9.10	65.62
1	0.75	8.65	8.03	73.65
1.5	1.25	8.19	7.61	81.26
2	1.75	9.68	8.99	90.25
2.5	2.25	8.96	8.32	98.57
3	2.75	1.49	1.38	99.95
3.5	3.25	0.03	0.03	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.995
25	-1.460
50	-0.490
75	0.840
84	1.400
95	2.035
99	2.405

Moment Measures	(phi)	(mm)
Mean	-0.097	1.069
Standard Deviation	1.429	0.371
Skewness	0.169	
Kurtosis	1.968	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.298	-0.362
Standard Deviation	1.698	1.498
Skewness (1)	0.113	0.146
Skewness (2)	0.225	
Kurtosis	0.262	0.764



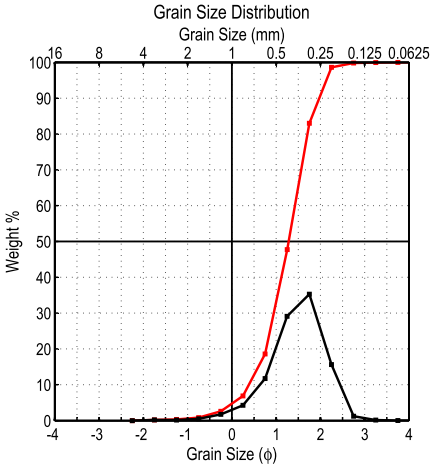
Project	**2203**
Location	**Nags Head NC**
Date	**Nov 2011**
Station	**KH-05b**
Interval	**LTT**
Mean	**0.212 mm**
STD	**0.697 mm**
Skewness	**-2.102**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	107.26
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	0.82
% $CaCO_3$	1.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.14	0.13	0.13
-1	-1.25	0.06	0.06	0.19
-0.5	-0.75	0.26	0.24	0.43
0	-0.25	0.42	0.39	0.82
0.5	0.25	0.55	0.51	1.33
1	0.75	1.16	1.08	2.41
1.5	1.25	3.80	3.54	5.96
2	1.75	13.70	12.77	18.73
2.5	2.25	60.20	56.13	74.86
3	2.75	24.24	22.60	97.45
3.5	3.25	2.58	2.41	99.86
4	3.75	0.11	0.10	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-0.075
5	1.115
16	1.645
25	1.805
50	2.030
75	2.255
84	2.450
95	2.695
99	3.070

Moment Measures	(phi)	(mm)
Mean	2.239	0.212
Standard Deviation	0.520	0.697
Skewness	-2.102	
Kurtosis	13.453	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	2.048	2.042
Standard Deviation	0.403	0.441
Skewness (1)	0.043	-0.057
Skewness (2)	-0.311	
Kurtosis	0.963	1.439



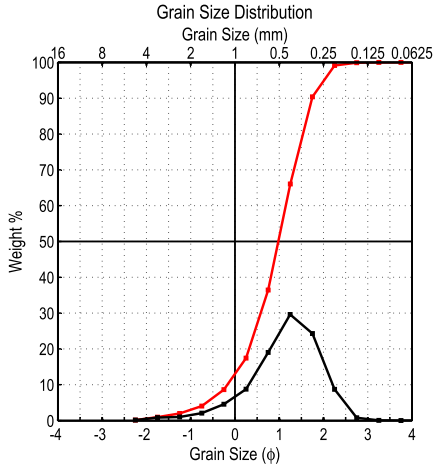
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**B2a**
Interval	**Grab**
Mean	**0.364 mm**
STD	**0.647 mm**
Skewness	**-0.910**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	115.05
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	2.60

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.21	0.18	0.18
-1	-1.25	0.18	0.16	0.34
-0.5	-0.75	0.58	0.50	0.84
0	-0.25	2.02	1.76	2.60
0.5	0.25	4.93	4.29	6.88
1	0.75	13.49	11.73	18.61
1.5	1.25	33.48	29.10	47.71
2	1.75	40.60	35.29	83.00
2.5	2.25	17.97	15.62	98.62
3	2.75	1.39	1.21	99.83
3.5	3.25	0.15	0.13	99.96
4	3.75	0.04	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.705
5	0.030
16	0.640
25	0.860
50	1.280
75	1.635
84	1.780
95	2.135
99	2.410

Moment Measures	(phi)	(mm)
Mean	1.457	0.364
Standard Deviation	0.628	0.647
Skewness	-0.910	
Kurtosis	5.087	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.210	1.233
Standard Deviation	0.570	0.604
Skewness (1)	-0.123	-0.155
Skewness (2)	-0.346	
Kurtosis	0.846	1.113



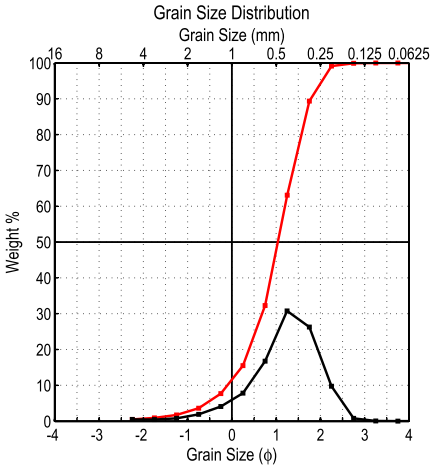
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**B2b**
Interval	**Grab**
Mean	**0.459 mm**
STD	**0.576 mm**
Skewness	**-0.967**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	116.45
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	8.65

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.18	0.15	0.15
-1.5	-1.75	0.96	0.82	0.98
-1	-1.25	1.17	1.00	1.98
-0.5	-0.75	2.42	2.08	4.06
0	-0.25	5.34	4.59	8.65
0.5	0.25	10.24	8.79	17.44
1	0.75	22.14	19.01	36.45
1.5	1.25	34.48	29.61	66.06
2	1.75	28.29	24.29	90.36
2.5	2.25	10.19	8.75	99.11
3	2.75	0.94	0.81	99.91
3.5	3.25	0.09	0.08	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.740
5	-0.650
16	0.170
25	0.450
50	0.980
75	1.435
84	1.620
95	2.015
99	2.245

Moment Measures	(phi)	(mm)
Mean	1.124	0.459
Standard Deviation	0.795	0.576
Skewness	-0.967	
Kurtosis	4.537	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.895	0.923
Standard Deviation	0.725	0.766
Skewness (1)	-0.117	-0.170
Skewness (2)	-0.410	
Kurtosis	0.838	1.109



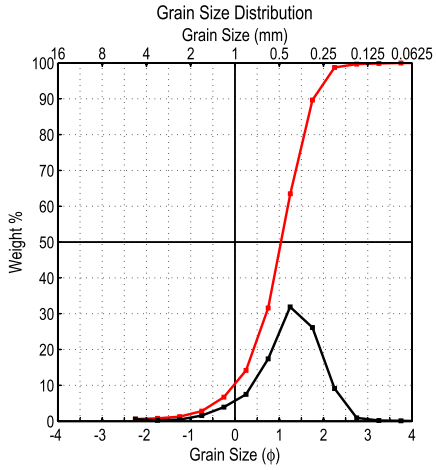
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**B2c**
Interval	**Grab**
Mean	**0.441 mm**
STD	**0.580 mm**
Skewness	**-1.125**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	114.41
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.69

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.54	0.47	0.47
-1.5	-1.75	0.53	0.46	0.94
-1	-1.25	0.90	0.79	1.72
-0.5	-0.75	2.16	1.89	3.61
0	-0.25	4.67	4.08	7.69
0.5	0.25	8.95	7.82	15.51
1	0.75	19.17	16.76	32.27
1.5	1.25	35.24	30.80	63.07
2	1.75	30.05	26.27	89.34
2.5	2.25	11.17	9.76	99.10
3	2.75	0.92	0.80	99.90
3.5	3.25	0.09	0.08	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.710
5	-0.580
16	0.265
25	0.535
50	1.040
75	1.475
84	1.650
95	2.040
99	2.245

Moment Measures	(phi)	(mm)
Mean	1.182	0.441
Standard Deviation	0.786	0.580
Skewness	-1.125	
Kurtosis	5.243	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.958	0.985
Standard Deviation	0.692	0.743
Skewness (1)	-0.119	-0.178
Skewness (2)	-0.448	
Kurtosis	0.892	1.142



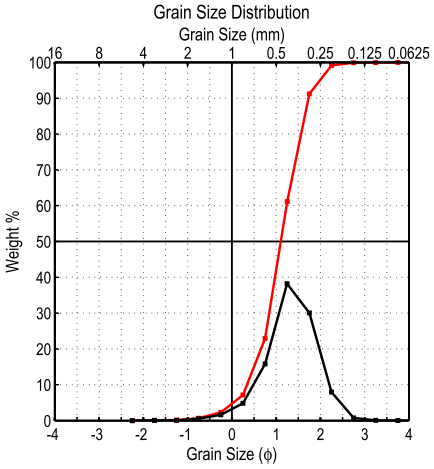
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**B2d**
Interval	**Grab**
Mean	**0.434 mm**
STD	**0.590 mm**
Skewness	**-1.020**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	113.92
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	6.72

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.64	0.56	0.56
-1.5	-1.75	0.28	0.25	0.81
-1	-1.25	0.51	0.45	1.26
-0.5	-0.75	1.77	1.55	2.81
0	-0.25	4.46	3.92	6.72
0.5	0.25	8.51	7.47	14.19
1	0.75	19.80	17.38	31.57
1.5	1.25	36.33	31.89	63.47
2	1.75	29.80	26.16	89.62
2.5	2.25	10.38	9.11	98.74
3	2.75	1.05	0.92	99.66
3.5	3.25	0.21	0.18	99.84
4	3.75	0.14	0.12	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-1.535
5	-0.470
16	0.300
25	0.560
50	1.040
75	1.470
84	1.640
95	2.045
99	2.395

Moment Measures	(phi)	(mm)
Mean	1.204	0.434
Standard Deviation	0.762	0.590
Skewness	-1.020	
Kurtosis	5.691	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.970	0.993
Standard Deviation	0.670	0.716
Skewness (1)	-0.104	-0.153
Skewness (2)	-0.377	
Kurtosis	0.877	1.133



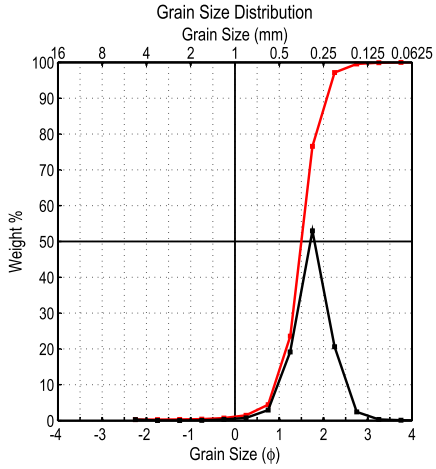
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**B2e**
Interval	**Grab**
Mean	**0.398 mm**
STD	**0.672 mm**
Skewness	**-0.616**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	113.45
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	2.30

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.09	0.08	0.08
-1	-1.25	0.07	0.06	0.14
-0.5	-0.75	0.61	0.54	0.68
0	-0.25	1.84	1.62	2.30
0.5	0.25	5.47	4.82	7.12
1	0.75	17.92	15.80	22.92
1.5	1.25	43.34	38.20	61.12
2	1.75	34.10	30.06	91.18
2.5	2.25	9.01	7.94	99.12
3	2.75	0.86	0.76	99.88
3.5	3.25	0.09	0.08	99.96
4	3.75	0.03	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.650
5	0.030
16	0.530
25	0.775
50	1.105
75	1.480
84	1.630
95	1.990
99	2.245

Moment Measures	(phi)	(mm)
Mean	1.328	0.398
Standard Deviation	0.573	0.672
Skewness	-0.616	
Kurtosis	4.744	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.080	1.088
Standard Deviation	0.550	0.572
Skewness (1)	-0.045	-0.071
Skewness (2)	-0.173	
Kurtosis	0.782	1.139



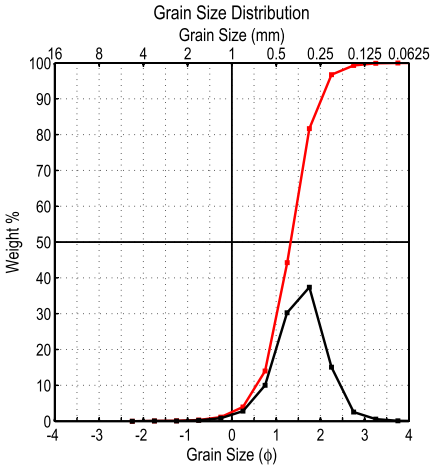
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**B3a**
Interval	**Grab**
Mean	**0.302 mm**
STD	**0.707 mm**
Skewness	**-1.811**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	110.08
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	0.72

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.32	0.29	0.29
-1.5	-1.75	0.01	0.01	0.30
-1	-1.25	0.03	0.03	0.33
-0.5	-0.75	0.08	0.07	0.40
0	-0.25	0.35	0.32	0.72
0.5	0.25	0.85	0.77	1.49
1	0.75	3.25	2.95	4.44
1.5	1.25	21.08	19.15	23.59
2	1.75	58.28	52.94	76.54
2.5	2.25	22.68	20.60	97.14
3	2.75	2.66	2.42	99.55
3.5	3.25	0.37	0.34	99.89
4	3.75	0.11	0.10	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.065
5	0.765
16	1.050
25	1.265
50	1.500
75	1.735
84	1.930
95	2.200
99	2.635

Moment Measures	(phi)	(mm)
Mean	1.727	0.302
Standard Deviation	0.499	0.707
Skewness	-1.811	
Kurtosis	15.944	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.490	1.493
Standard Deviation	0.440	0.437
Skewness (1)	-0.023	-0.024
Skewness (2)	-0.040	
Kurtosis	0.631	1.251



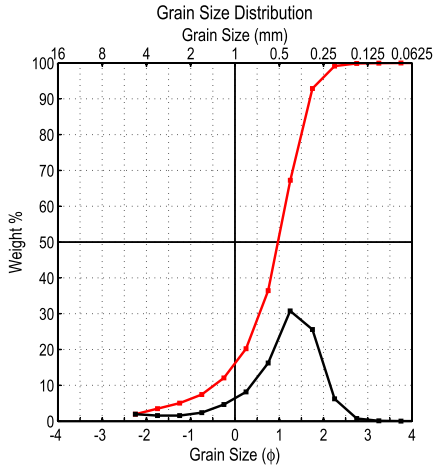
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**B3b**
Interval	**Grab**
Mean	**0.343 mm**
STD	**0.669 mm**
Skewness	**-0.402**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	118.88
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	1.15

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.06	0.05	0.05
-1	-1.25	0.07	0.06	0.11
-0.5	-0.75	0.26	0.22	0.33
0	-0.25	0.98	0.82	1.15
0.5	0.25	3.34	2.81	3.96
1	0.75	11.93	10.04	14.00
1.5	1.25	35.96	30.25	44.25
2	1.75	44.46	37.40	81.65
2.5	2.25	17.94	15.09	96.74
3	2.75	3.05	2.57	99.30
3.5	3.25	0.69	0.58	99.88
4	3.75	0.12	0.10	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.340
5	0.300
16	0.785
25	0.930
50	1.325
75	1.660
84	1.830
95	2.190
99	2.690

Moment Measures	(phi)	(mm)
Mean	1.543	0.343
Standard Deviation	0.580	0.669
Skewness	-0.402	
Kurtosis	4.751	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.308	1.313
Standard Deviation	0.522	0.548
Skewness (1)	-0.033	-0.059
Skewness (2)	-0.153	
Kurtosis	0.809	1.061



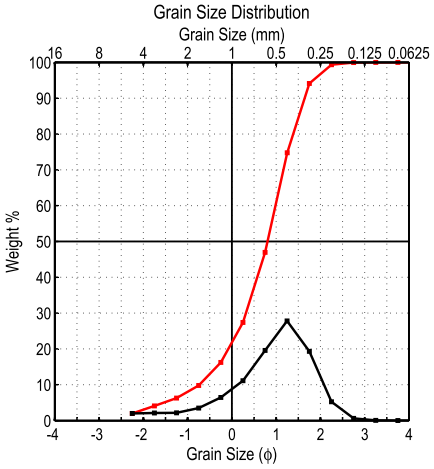
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**B3c**
Interval	**Grab**
Mean	**0.493 mm**
STD	**0.519 mm**
Skewness	**-1.398**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	113.29
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	12.07

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.19	1.93	1.93
-1.5	-1.75	1.77	1.56	3.50
-1	-1.25	1.77	1.56	5.06
-0.5	-0.75	2.69	2.37	7.43
0	-0.25	5.25	4.63	12.07
0.5	0.25	9.24	8.16	20.22
1	0.75	18.38	16.22	36.45
1.5	1.25	34.89	30.80	67.24
2	1.75	29.00	25.60	92.84
2.5	2.25	7.09	6.26	99.10
3	2.75	0.87	0.77	99.87
3.5	3.25	0.10	0.09	99.96
4	3.75	0.04	0.04	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.270
16	-0.010
25	0.395
50	0.970
75	1.400
84	1.575
95	1.920
99	2.240

Moment Measures	(phi)	(mm)
Mean	1.022	0.493
Standard Deviation	0.946	0.519
Skewness	-1.398	
Kurtosis	5.338	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.782	0.845
Standard Deviation	0.792	0.880
Skewness (1)	-0.237	-0.320
Skewness (2)	-0.814	
Kurtosis	1.013	1.301



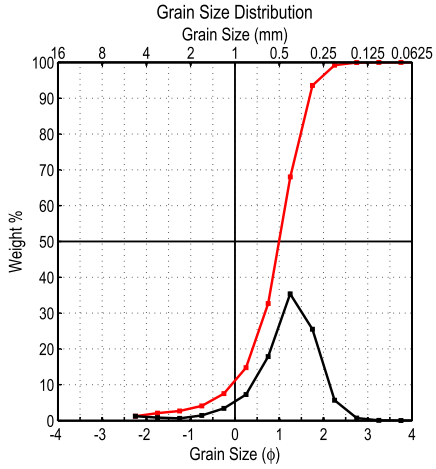
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**B3d**
Interval	**Grab**
Mean	**0.556 mm**
STD	**0.505 mm**
Skewness	**-1.103**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	110.82
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	16.24

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.23	2.01	2.01
-1.5	-1.75	2.33	2.10	4.11
-1	-1.25	2.40	2.17	6.28
-0.5	-0.75	3.89	3.51	9.79
0	-0.25	7.15	6.45	16.24
0.5	0.25	12.34	11.14	27.38
1	0.75	21.68	19.56	46.94
1.5	1.25	30.81	27.80	74.74
2	1.75	21.43	19.34	94.08
2.5	2.25	5.81	5.24	99.32
3	2.75	0.67	0.60	99.93
3.5	3.25	0.06	0.05	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.545
16	-0.270
25	0.145
50	0.805
75	1.255
84	1.490
95	1.840
99	2.220

Moment Measures	(phi)	(mm)
Mean	0.846	0.556
Standard Deviation	0.986	0.505
Skewness	-1.103	
Kurtosis	4.247	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.610	0.675
Standard Deviation	0.880	0.953
Skewness (1)	-0.222	-0.305
Skewness (2)	-0.747	
Kurtosis	0.923	1.250



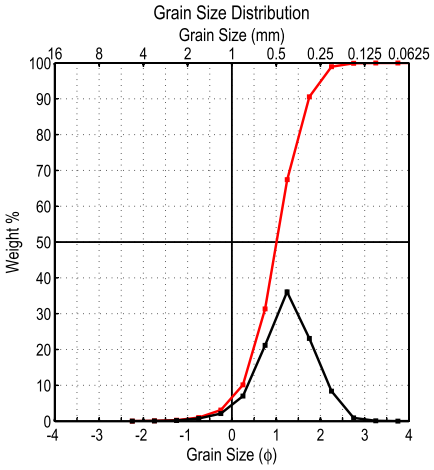
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**B3e**
Interval	**Grab**
Mean	**0.460 mm**
STD	**0.574 mm**
Skewness	**-1.582**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	106.98
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.52

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.33	1.24	1.24
-1.5	-1.75	0.90	0.84	2.08
-1	-1.25	0.65	0.61	2.69
-0.5	-0.75	1.52	1.42	4.11
0	-0.25	3.65	3.41	7.52
0.5	0.25	7.78	7.27	14.80
1	0.75	19.12	17.87	32.67
1.5	1.25	37.83	35.36	68.03
2	1.75	27.30	25.52	93.55
2.5	2.25	6.06	5.66	99.21
3	2.75	0.76	0.71	99.93
3.5	3.25	0.07	0.07	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-0.620
16	0.285
25	0.535
50	0.995
75	1.385
84	1.565
95	1.880
99	2.230

Moment Measures	(phi)	(mm)
Mean	1.121	0.460
Standard Deviation	0.800	0.574
Skewness	-1.582	
Kurtosis	7.102	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.925	0.948
Standard Deviation	0.640	0.699
Skewness (1)	-0.109	-0.201
Skewness (2)	-0.570	
Kurtosis	0.953	1.205



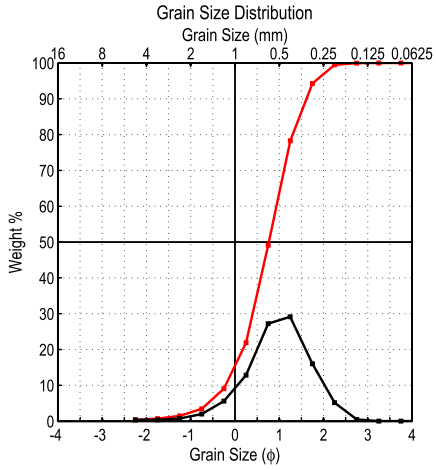
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**BC-E6a**
Interval	**Grab**
Mean	**0.424 mm**
STD	**0.649 mm**
Skewness	**-0.458**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	124.54
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	3.13

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.04	0.03	0.03
-1.5	-1.75	0.07	0.06	0.09
-1	-1.25	0.22	0.18	0.26
-0.5	-0.75	0.91	0.73	1.00
0	-0.25	2.66	2.14	3.13
0.5	0.25	8.74	7.02	10.15
1	0.75	26.39	21.19	31.34
1.5	1.25	44.94	36.08	67.42
2	1.75	28.79	23.12	90.54
2.5	2.25	10.45	8.39	98.93
3	2.75	1.17	0.94	99.87
3.5	3.25	0.13	0.10	99.98
4	3.75	0.03	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.750
5	-0.115
16	0.390
25	0.600
50	1.010
75	1.415
84	1.610
95	2.015
99	2.285

Moment Measures	(phi)	(mm)
Mean	1.236	0.424
Standard Deviation	0.624	0.649
Skewness	-0.458	
Kurtosis	4.212	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.000	1.003
Standard Deviation	0.610	0.628
Skewness (1)	-0.016	-0.036
Skewness (2)	-0.098	
Kurtosis	0.746	1.071



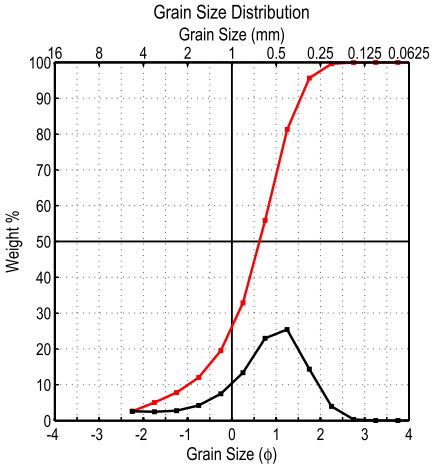
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**BC-E6b**
Interval	**Grab**
Mean	**0.514 mm**
STD	**0.599 mm**
Skewness	**-0.704**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.59
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	9.06

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.44	0.36	0.36
-1.5	-1.75	0.42	0.35	0.71
-1	-1.25	0.91	0.75	1.47
-0.5	-0.75	2.42	2.01	3.47
0	-0.25	6.74	5.59	9.06
0.5	0.25	15.48	12.84	21.90
1	0.75	32.80	27.20	49.10
1.5	1.25	35.16	29.16	78.26
2	1.75	19.31	16.01	94.27
2.5	2.25	6.24	5.17	99.44
3	2.75	0.60	0.50	99.94
3.5	3.25	0.05	0.04	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.560
5	-0.615
16	0.020
25	0.305
50	0.765
75	1.195
84	1.430
95	1.820
99	2.205

Moment Measures	(phi)	(mm)
Mean	0.960	0.514
Standard Deviation	0.740	0.599
Skewness	-0.704	
Kurtosis	4.542	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.725	0.738
Standard Deviation	0.705	0.721
Skewness (1)	-0.057	-0.095
Skewness (2)	-0.230	
Kurtosis	0.727	1.121



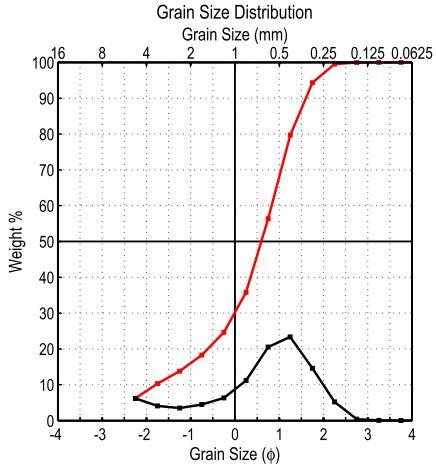
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**BC-E6c**
Interval	**Grab**
Mean	**0.620 mm**
STD	**0.498 mm**
Skewness	**-0.985**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.64
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	19.52

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.12	2.59	2.59
-1.5	-1.75	2.98	2.47	5.06
-1	-1.25	3.33	2.76	7.82
-0.5	-0.75	5.10	4.23	12.04
0	-0.25	9.02	7.48	19.52
0.5	0.25	16.10	13.35	32.87
1	0.75	27.74	22.99	55.86
1.5	1.25	30.64	25.40	81.26
2	1.75	17.32	14.36	95.62
2.5	2.25	4.80	3.98	99.59
3	2.75	0.41	0.34	99.93
3.5	3.25	0.05	0.04	99.98
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.760
16	-0.485
25	-0.045
50	0.625
75	1.125
84	1.345
95	1.730
99	2.175

Moment Measures	(phi)	(mm)
Mean	0.689	0.620
Standard Deviation	1.006	0.498
Skewness	-0.985	
Kurtosis	3.893	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.430	0.495
Standard Deviation	0.915	0.986
Skewness (1)	-0.213	-0.290
Skewness (2)	-0.699	
Kurtosis	0.907	1.223



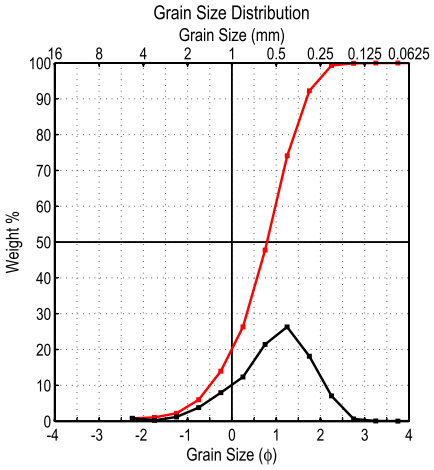
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**BC-E6d**
Interval	**Grab**
Mean	**0.680 mm**
STD	**0.434 mm**
Skewness	**-0.899**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	112.94
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	24.63

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	7.00	6.20	6.20
-1.5	-1.75	4.63	4.10	10.30
-1	-1.25	3.94	3.49	13.79
-0.5	-0.75	5.08	4.50	18.28
0	-0.25	7.17	6.35	24.63
0.5	0.25	12.62	11.17	35.81
1	0.75	23.18	20.52	56.33
1.5	1.25	26.39	23.37	79.70
2	1.75	16.49	14.60	94.30
2.5	2.25	5.89	5.22	99.51
3	2.75	0.47	0.42	99.93
3.5	3.25	0.06	0.05	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.005
25	-0.235
50	0.595
75	1.150
84	1.395
95	1.815
99	2.200

Moment Measures	(phi)	(mm)
Mean	0.556	0.680
Standard Deviation	1.205	0.434
Skewness	-0.899	
Kurtosis	3.062	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.195	0.328
Standard Deviation	1.200	1.216
Skewness (1)	-0.333	-0.367
Skewness (2)	-0.677	
Kurtosis	0.694	1.203



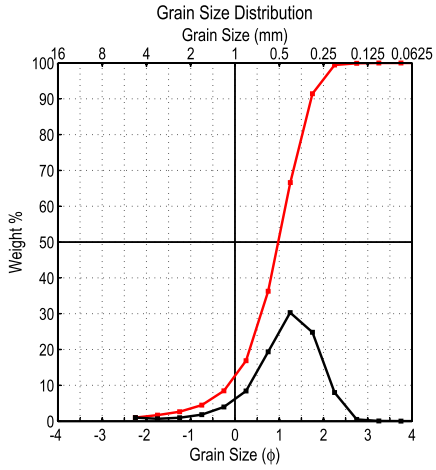
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**BC-E6e**
Interval	**Grab**
Mean	**0.524 mm**
STD	**0.552 mm**
Skewness	**-0.729**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	112.62
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	13.98

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.91	0.81	0.81
-1.5	-1.75	0.27	0.24	1.05
-1	-1.25	1.32	1.17	2.22
-0.5	-0.75	4.26	3.78	6.00
0	-0.25	8.98	7.97	13.98
0.5	0.25	13.90	12.34	26.32
1	0.75	24.15	21.44	47.76
1.5	1.25	29.62	26.30	74.06
2	1.75	20.42	18.13	92.19
2.5	2.25	7.97	7.08	99.27
3	2.75	0.71	0.63	99.90
3.5	3.25	0.09	0.08	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.850
5	-0.885
16	-0.170
25	0.195
50	0.795
75	1.275
84	1.525
95	1.950
99	2.230

Moment Measures	(phi)	(mm)
Mean	0.932	0.524
Standard Deviation	0.857	0.552
Skewness	-0.729	
Kurtosis	3.894	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.677	0.717
Standard Deviation	0.847	0.853
Skewness (1)	-0.139	-0.162
Skewness (2)	-0.310	
Kurtosis	0.673	1.076



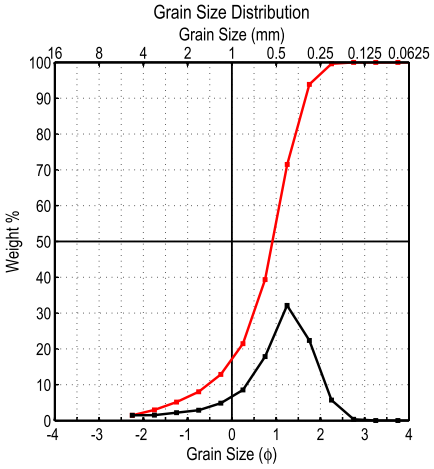
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**BC-E6f**
Interval	**Grab**
Mean	**0.464 mm**
STD	**0.565 mm**
Skewness	**-1.295**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	110.38
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	8.47

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.13	1.02	1.02
-1.5	-1.75	0.72	0.65	1.68
-1	-1.25	1.08	0.98	2.65
-0.5	-0.75	2.02	1.83	4.48
0	-0.25	4.40	3.99	8.47
0.5	0.25	9.30	8.43	16.90
1	0.75	21.38	19.37	36.27
1.5	1.25	33.47	30.32	66.59
2	1.75	27.38	24.81	91.39
2.5	2.25	8.84	8.01	99.40
3	2.75	0.56	0.51	99.91
3.5	3.25	0.07	0.06	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-0.685
16	0.195
25	0.460
50	0.975
75	1.420
84	1.600
95	1.975
99	2.225

Moment Measures	(phi)	(mm)
Mean	1.106	0.464
Standard Deviation	0.824	0.565
Skewness	-1.295	
Kurtosis	5.834	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.897	0.923
Standard Deviation	0.703	0.754
Skewness (1)	-0.110	-0.179
Skewness (2)	-0.470	
Kurtosis	0.893	1.136



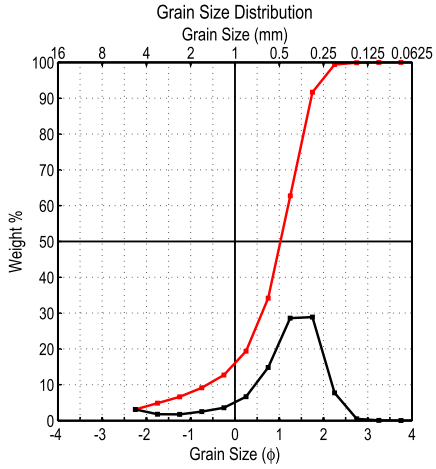
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**BC-E6g**
Interval	**Grab**
Mean	**0.511 mm**
STD	**0.528 mm**
Skewness	**-1.320**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	115.17
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	12.91

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.68	1.46	1.46
-1.5	-1.75	1.73	1.50	2.96
-1	-1.25	2.53	2.20	5.16
-0.5	-0.75	3.32	2.88	8.04
0	-0.25	5.61	4.87	12.91
0.5	0.25	9.85	8.55	21.46
1	0.75	20.59	17.88	39.34
1.5	1.25	37.02	32.14	71.49
2	1.75	25.75	22.36	93.84
2.5	2.25	6.61	5.74	99.58
3	2.75	0.44	0.38	99.97
3.5	3.25	0.03	0.03	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.285
16	-0.070
25	0.350
50	0.915
75	1.330
84	1.530
95	1.850
99	2.200

Moment Measures	**(phi)**	**(mm)**
Mean	0.969	0.511
Standard Deviation	0.922	0.528
Skewness	-1.320	
Kurtosis	4.963	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.730	0.792
Standard Deviation	0.800	0.875
Skewness (1)	-0.231	-0.317
Skewness (2)	-0.791	
Kurtosis	0.959	1.311



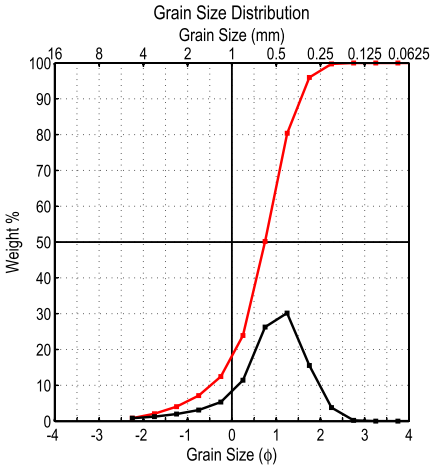
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**BC-E6h**
Interval	**Grab**
Mean	**0.489 mm**
STD	**0.491 mm**
Skewness	**-1.533**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	109.50
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	12.70

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.41	3.11	3.11
-1.5	-1.75	1.94	1.77	4.89
-1	-1.25	1.90	1.74	6.62
-0.5	-0.75	2.76	2.52	9.14
0	-0.25	3.90	3.56	12.70
0.5	0.25	7.29	6.66	19.36
1	0.75	16.22	14.81	34.17
1.5	1.25	31.30	28.58	62.76
2	1.75	31.64	28.89	91.65
2.5	2.25	8.48	7.74	99.40
3	2.75	0.56	0.51	99.91
3.5	3.25	0.08	0.07	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.715
16	0.000
25	0.440
50	1.025
75	1.460
84	1.620
95	1.965
99	2.225

Moment Measures	**(phi)**	**(mm)**
Mean	1.032	0.489
Standard Deviation	1.025	0.491
Skewness	-1.533	
Kurtosis	5.281	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.810	0.882
Standard Deviation	0.810	0.963
Skewness (1)	-0.265	-0.377
Skewness (2)	-1.111	
Kurtosis	1.272	1.479



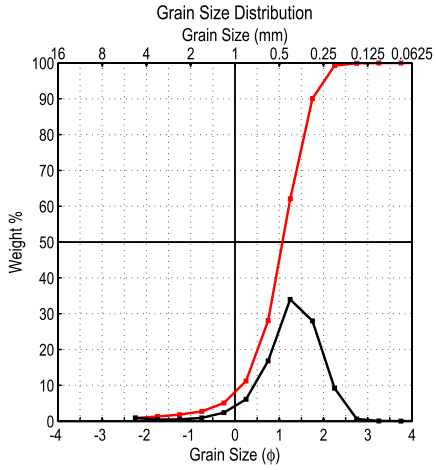
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**BC-E6i**
Interval	**Grab**
Mean	**0.548 mm**
STD	**0.561 mm**
Skewness	**-1.111**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	114.52
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	12.48

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.94	0.82	0.82
-1.5	-1.75	1.43	1.25	2.07
-1	-1.25	2.26	1.97	4.04
-0.5	-0.75	3.56	3.11	7.15
0	-0.25	6.10	5.33	12.48
0.5	0.25	13.08	11.42	23.90
1	0.75	30.10	26.28	50.18
1.5	1.25	34.58	30.20	80.38
2	1.75	17.83	15.57	95.95
2.5	2.25	4.34	3.79	99.74
3	2.75	0.26	0.23	99.97
3.5	3.25	0.03	0.03	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.180
5	-1.095
16	-0.095
25	0.270
50	0.745
75	1.160
84	1.365
95	1.720
99	2.155

Moment Measures	**(phi)**	**(mm)**
Mean	0.867	0.548
Standard Deviation	0.835	0.561
Skewness	-1.111	
Kurtosis	4.840	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.635	0.672
Standard Deviation	0.730	0.792
Skewness (1)	-0.151	-0.229
Skewness (2)	-0.592	
Kurtosis	0.928	1.296



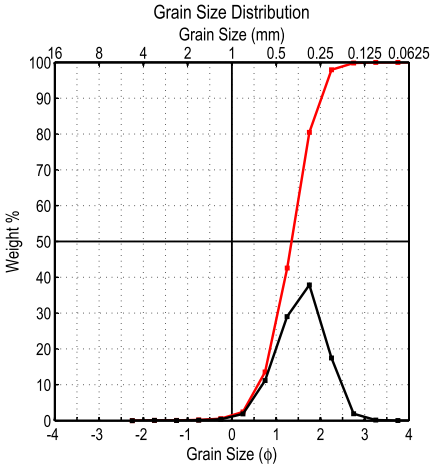
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**BC-E6j**
Interval	**Grab**
Mean	**0.424 mm**
STD	**0.597 mm**
Skewness	**-1.527**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	106.82
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	5.10

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.95	0.89	0.89
-1.5	-1.75	0.47	0.44	1.33
-1	-1.25	0.51	0.48	1.81
-0.5	-0.75	0.98	0.92	2.72
0	-0.25	2.54	2.38	5.10
0.5	0.25	6.55	6.13	11.23
1	0.75	17.98	16.83	28.07
1.5	1.25	36.34	34.02	62.08
2	1.75	29.88	27.97	90.06
2.5	2.25	9.82	9.19	99.25
3	2.75	0.67	0.63	99.88
3.5	3.25	0.09	0.08	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.125
5	-0.270
16	0.390
25	0.660
50	1.070
75	1.480
84	1.640
95	2.020
99	2.235

Moment Measures	**(phi)**	**(mm)**
Mean	1.238	0.424
Standard Deviation	0.744	0.597
Skewness	-1.527	
Kurtosis	7.692	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.015	1.033
Standard Deviation	0.625	0.659
Skewness (1)	-0.088	-0.129
Skewness (2)	-0.312	
Kurtosis	0.832	1.145



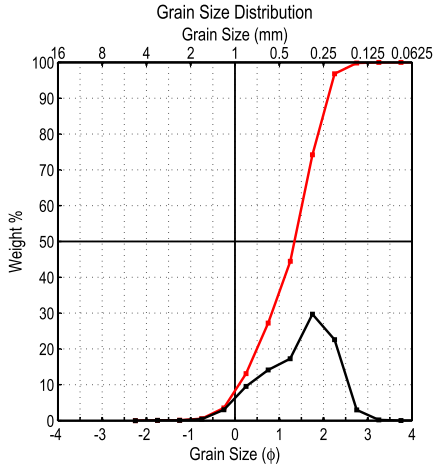
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NSS-01a**
Interval	**Swash**
Mean	**0.339 mm**
STD	**0.689 mm**
Skewness	**-0.448**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	106.43
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	0.54

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.07	0.07	0.07
-1	-1.25	0.02	0.02	0.08
-0.5	-0.75	0.11	0.10	0.19
0	-0.25	0.37	0.35	0.54
0.5	0.25	2.00	1.88	2.41
1	0.75	11.88	11.16	13.58
1.5	1.25	30.87	29.00	42.58
2	1.75	40.31	37.87	80.46
2.5	2.25	18.59	17.47	97.92
3	2.75	2.01	1.89	99.81
3.5	3.25	0.16	0.15	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.125
5	0.365
16	0.790
25	0.945
50	1.350
75	1.680
84	1.850
95	2.165
99	2.535

Moment Measures	(phi)	(mm)
Mean	1.562	0.339
Standard Deviation	0.537	0.689
Skewness	-0.448	
Kurtosis	4.383	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.320	1.330
Standard Deviation	0.530	0.538
Skewness (1)	-0.057	-0.076
Skewness (2)	-0.160	
Kurtosis	0.698	1.004



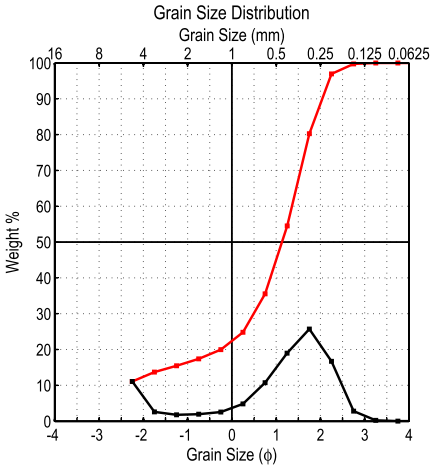
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NSS-01b**
Interval	**LTT**
Mean	**0.366 mm**
STD	**0.595 mm**
Skewness	**-0.565**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	111.95
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	3.55

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.06	0.05	0.05
-1	-1.25	0.07	0.06	0.12
-0.5	-0.75	0.47	0.42	0.54
0	-0.25	3.37	3.01	3.55
0.5	0.25	10.68	9.54	13.09
1	0.75	15.81	14.12	27.21
1.5	1.25	19.33	17.27	44.47
2	1.75	33.27	29.72	74.19
2.5	2.25	25.31	22.61	96.80
3	2.75	3.36	3.00	99.80
3.5	3.25	0.20	0.18	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.675
5	-0.175
16	0.355
25	0.670
50	1.345
75	1.770
84	1.965
95	2.210
99	2.615

Moment Measures	(phi)	(mm)
Mean	1.451	0.366
Standard Deviation	0.748	0.595
Skewness	-0.565	
Kurtosis	2.798	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.160	1.222
Standard Deviation	0.805	0.764
Skewness (1)	-0.230	-0.252
Skewness (2)	-0.407	
Kurtosis	0.481	0.889



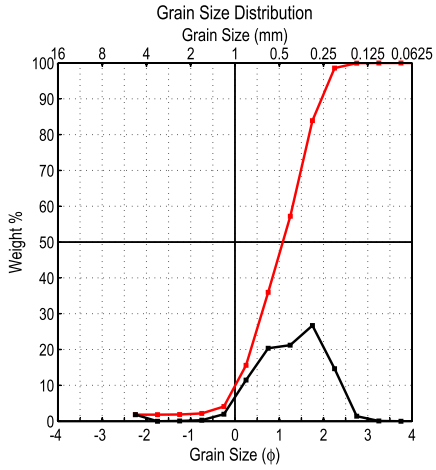
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NSS-02a**
Interval	**Swash**
Mean	**0.535 mm**
STD	**0.366 mm**
Skewness	**-1.150**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	108.03
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	19.96

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	12.00	11.11	11.11
-1.5	-1.75	2.80	2.59	13.70
-1	-1.25	1.92	1.78	15.48
-0.5	-0.75	2.09	1.93	17.41
0	-0.25	2.75	2.55	19.96
0.5	0.25	5.23	4.84	24.80
1	0.75	11.60	10.74	35.54
1.5	1.25	20.51	18.99	54.52
2	1.75	27.78	25.72	80.24
2.5	2.25	18.03	16.69	96.93
3	2.75	3.04	2.81	99.74
3.5	3.25	0.26	0.24	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.115
25	0.260
50	1.130
75	1.650
84	1.865
95	2.190
99	2.620

Moment Measures	(phi)	(mm)
Mean	0.903	0.535
Standard Deviation	1.449	0.366
Skewness	-1.150	
Kurtosis	3.161	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.375	0.627
Standard Deviation	1.490	1.418
Skewness (1)	-0.507	-0.515
Skewness (2)	-0.779	
Kurtosis	0.490	1.309



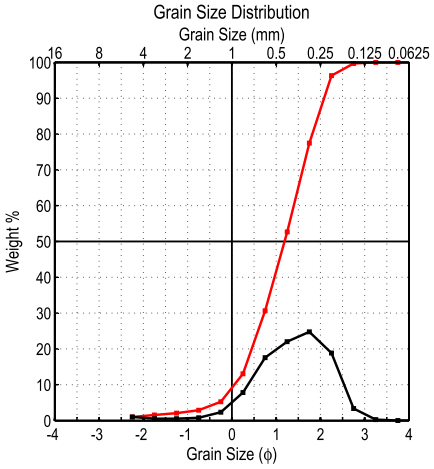
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NSS-02b**
Interval	**LTT**
Mean	**0.425 mm**
STD	**0.561 mm**
Skewness	**-1.310**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	111.09
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	4.10

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.04	1.84	1.84
-1.5	-1.75	0.00	0.00	1.84
-1	-1.25	0.05	0.05	1.88
-0.5	-0.75	0.31	0.28	2.16
0	-0.25	2.15	1.94	4.10
0.5	0.25	12.77	11.50	15.59
1	0.75	22.63	20.37	35.96
1.5	1.25	23.59	21.24	57.20
2	1.75	29.67	26.71	83.90
2.5	2.25	16.26	14.64	98.54
3	2.75	1.54	1.39	99.93
3.5	3.25	0.08	0.07	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-0.210
16	0.260
25	0.480
50	1.080
75	1.585
84	1.755
95	2.130
99	2.415

Moment Measures	(phi)	(mm)
Mean	1.235	0.425
Standard Deviation	0.834	0.561
Skewness	-1.310	
Kurtosis	6.707	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.007	1.032
Standard Deviation	0.748	0.728
Skewness (1)	-0.097	-0.100
Skewness (2)	-0.161	
Kurtosis	0.565	0.868



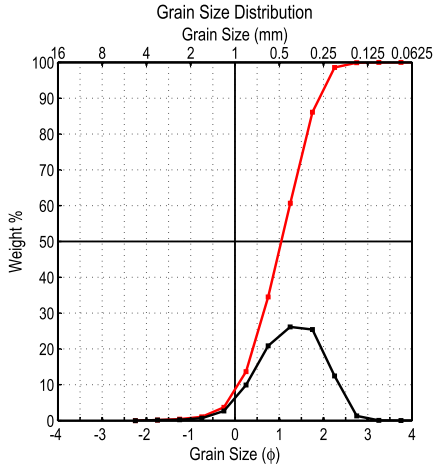
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NSS-03a**
Interval	**Swash**
Mean	**0.396 mm**
STD	**0.550 mm**
Skewness	**-1.159**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	109.20
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	5.25

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.12	1.03	1.03
-1.5	-1.75	0.58	0.53	1.56
-1	-1.25	0.58	0.53	2.09
-0.5	-0.75	0.88	0.81	2.89
0	-0.25	2.57	2.35	5.25
0.5	0.25	8.54	7.82	13.07
1	0.75	19.20	17.58	30.65
1.5	1.25	24.04	22.01	52.66
2	1.75	27.05	24.77	77.44
2.5	2.25	20.61	18.87	96.31
3	2.75	3.70	3.39	99.70
3.5	3.25	0.32	0.29	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-0.305
16	0.335
25	0.590
50	1.190
75	1.700
84	1.925
95	2.215
99	2.645

Moment Measures	**(phi)**	**(mm)**
Mean	1.337	0.396
Standard Deviation	0.864	0.550
Skewness	-1.159	
Kurtosis	5.694	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.130	1.150
Standard Deviation	0.795	0.779
Skewness (1)	-0.075	-0.131
Skewness (2)	-0.296	
Kurtosis	0.585	0.930



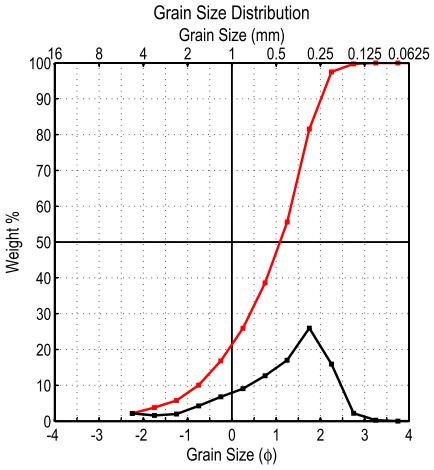
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NSS-03b**
Interval	**LTT**
Mean	**0.419 mm**
STD	**0.615 mm**
Skewness	**-0.420**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	109.63
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	3.73

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.17	0.16	0.16
-1	-1.25	0.27	0.25	0.40
-0.5	-0.75	0.73	0.67	1.07
0	-0.25	2.92	2.66	3.73
0.5	0.25	10.90	9.94	13.67
1	0.75	22.86	20.85	34.53
1.5	1.25	28.68	26.16	60.69
2	1.75	27.85	25.40	86.09
2.5	2.25	13.68	12.48	98.57
3	2.75	1.45	1.32	99.89
3.5	3.25	0.08	0.07	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.800
5	-0.185
16	0.305
25	0.520
50	1.045
75	1.530
84	1.710
95	2.105
99	2.415

Moment Measures	**(phi)**	**(mm)**
Mean	1.256	0.419
Standard Deviation	0.701	0.615
Skewness	-0.420	
Kurtosis	3.388	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.007	1.020
Standard Deviation	0.703	0.698
Skewness (1)	-0.053	-0.064
Skewness (2)	-0.121	
Kurtosis	0.630	0.929



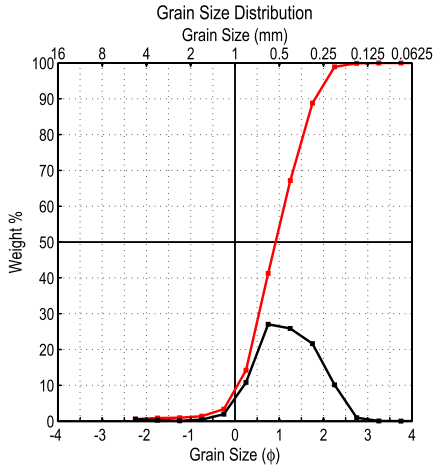
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NSS-04a**
Interval	**Swash**
Mean	**0.479 mm**
STD	**0.463 mm**
Skewness	**-0.997**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	113.26
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	16.85

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.46	2.17	2.17
-1.5	-1.75	1.83	1.62	3.79
-1	-1.25	2.26	2.00	5.78
-0.5	-0.75	4.82	4.26	10.04
0	-0.25	7.71	6.81	16.85
0.5	0.25	10.27	9.07	25.91
1	0.75	14.34	12.66	38.57
1.5	1.25	19.25	17.00	55.57
2	1.75	29.41	25.97	81.54
2.5	2.25	18.06	15.95	97.48
3	2.75	2.52	2.22	99.71
3.5	3.25	0.31	0.27	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.445
16	-0.310
25	0.200
50	1.085
75	1.625
84	1.825
95	2.170
99	2.590

Moment Measures	**(phi)**	**(mm)**
Mean	1.063	0.479
Standard Deviation	1.111	0.463
Skewness	-0.997	
Kurtosis	3.634	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.757	0.867
Standard Deviation	1.067	1.081
Skewness (1)	-0.307	-0.353
Skewness (2)	-0.677	
Kurtosis	0.693	1.040



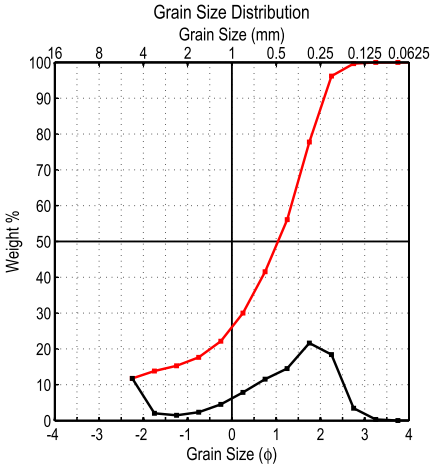
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NSS-04b**
Interval	**LTT**
Mean	**0.447 mm**
STD	**0.608 mm**
Skewness	**-0.751**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	119.75
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	3.37

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.69	0.58	0.58
-1.5	-1.75	0.34	0.28	0.86
-1	-1.25	0.14	0.12	0.98
-0.5	-0.75	0.52	0.43	1.41
0	-0.25	2.35	1.96	3.37
0.5	0.25	12.99	10.85	14.22
1	0.75	32.38	27.04	41.26
1.5	1.25	30.99	25.88	67.14
2	1.75	25.91	21.64	88.78
2.5	2.25	12.15	10.15	98.92
3	2.75	1.18	0.99	99.91
3.5	3.25	0.08	0.07	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.225
5	-0.175
16	0.285
25	0.450
50	0.920
75	1.430
84	1.640
95	2.055
99	2.290

Moment Measures	**(phi)**	**(mm)**
Mean	1.163	0.447
Standard Deviation	0.718	0.608
Skewness	-0.751	
Kurtosis	5.653	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.963	0.948
Standard Deviation	0.677	0.677
Skewness (1)	0.063	0.040
Skewness (2)	0.030	
Kurtosis	0.646	0.933



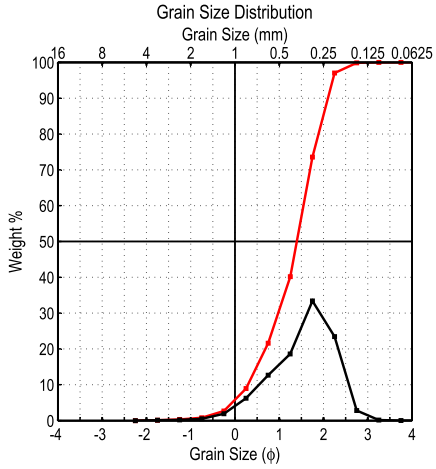
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NSS-05a**
Interval	**Swash**
Mean	**0.558 mm**
STD	**0.359 mm**
Skewness	**-0.975**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	117.35
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	22.15

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	13.83	11.78	11.78
-1.5	-1.75	2.39	2.04	13.82
-1	-1.25	1.74	1.48	15.30
-0.5	-0.75	2.74	2.33	17.64
0	-0.25	5.29	4.51	22.15
0.5	0.25	9.22	7.86	30.00
1	0.75	13.55	11.55	41.55
1.5	1.25	17.05	14.53	56.08
2	1.75	25.42	21.66	77.74
2.5	2.25	21.63	18.43	96.17
3	2.75	4.07	3.47	99.64
3.5	3.25	0.38	0.32	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.100
25	-0.070
50	1.040
75	1.685
84	1.920
95	2.220
99	2.660

Moment Measures	(phi)	(mm)
Mean	0.841	0.558
Standard Deviation	1.479	0.359
Skewness	-0.975	
Kurtosis	2.858	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.410	0.620
Standard Deviation	1.510	1.432
Skewness (1)	-0.417	-0.445
Skewness (2)	-0.699	
Kurtosis	0.480	1.044



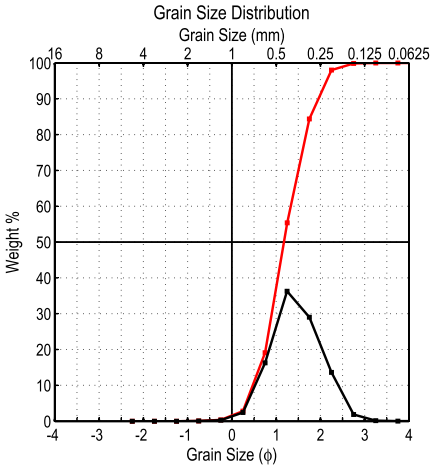
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NSS-05b**
Interval	**LTT**
Mean	**0.348 mm**
STD	**0.615 mm**
Skewness	**-0.821**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	104.89
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	2.70

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.12	0.11	0.11
-1	-1.25	0.20	0.19	0.31
-0.5	-0.75	0.52	0.50	0.80
0	-0.25	1.99	1.90	2.70
0.5	0.25	6.53	6.23	8.92
1	0.75	13.31	12.69	21.61
1.5	1.25	19.49	18.58	40.19
2	1.75	35.01	33.38	73.57
2.5	2.25	24.60	23.45	97.03
3	2.75	2.96	2.82	99.85
3.5	3.25	0.14	0.13	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.700
5	-0.065
16	0.530
25	0.840
50	1.395
75	1.780
84	1.970
95	2.205
99	2.600

Moment Measures	(phi)	(mm)
Mean	1.525	0.348
Standard Deviation	0.701	0.615
Skewness	-0.821	
Kurtosis	3.822	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.250	1.298
Standard Deviation	0.720	0.704
Skewness (1)	-0.201	-0.244
Skewness (2)	-0.451	
Kurtosis	0.576	0.990



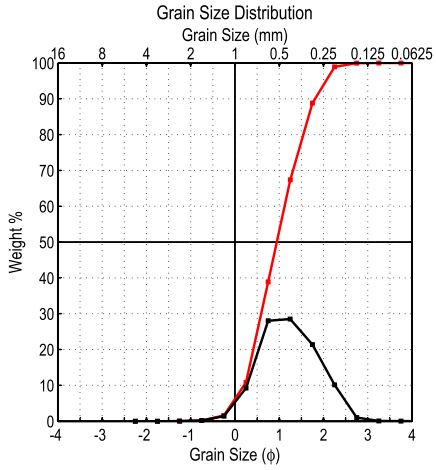
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-01a**
Interval	**Swash**
Mean	**0.366 mm**
STD	**0.688 mm**
Skewness	**0.031**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	108.16
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	0.37

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	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
-0.5	-0.75	0.08	0.07	0.07
0	-0.25	0.32	0.30	0.37
0.5	0.25	2.63	2.43	2.80
1	0.75	17.63	16.30	19.10
1.5	1.25	39.21	36.25	55.35
2	1.75	31.39	29.02	84.38
2.5	2.25	14.73	13.62	97.99
3	2.75	2.00	1.85	99.84
3.5	3.25	0.15	0.14	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.120
5	0.315
16	0.655
25	0.830
50	1.175
75	1.590
84	1.745
95	2.140
99	2.520

Moment Measures	(phi)	(mm)
Mean	1.451	0.366
Standard Deviation	0.540	0.688
Skewness	0.031	
Kurtosis	3.093	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.200	1.192
Standard Deviation	0.545	0.549
Skewness (1)	0.046	0.052
Skewness (2)	0.096	
Kurtosis	0.674	0.984



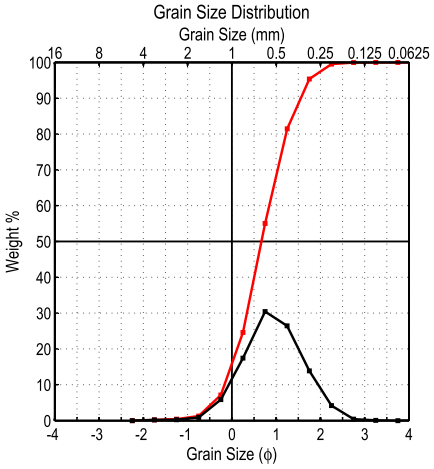
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-01b**
Interval	**LTT**
Mean	**0.430 mm**
STD	**0.651 mm**
Skewness	**0.060**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	113.27
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	1.61

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	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
-0.5	-0.75	0.23	0.20	0.21
0	-0.25	1.58	1.39	1.61
0.5	0.25	10.47	9.24	10.85
1	0.75	31.74	28.02	38.87
1.5	1.25	32.27	28.49	67.36
2	1.75	24.24	21.40	88.76
2.5	2.25	11.49	10.14	98.91
3	2.75	1.16	1.02	99.93
3.5	3.25	0.07	0.06	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.470
5	-0.065
16	0.340
25	0.500
50	0.945
75	1.430
84	1.640
95	2.060
99	2.295

Moment Measures	(phi)	(mm)
Mean	1.218	0.430
Standard Deviation	0.618	0.651
Skewness	0.060	
Kurtosis	2.706	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.990	0.975
Standard Deviation	0.650	0.647
Skewness (1)	0.069	0.059
Skewness (2)	0.081	
Kurtosis	0.635	0.936



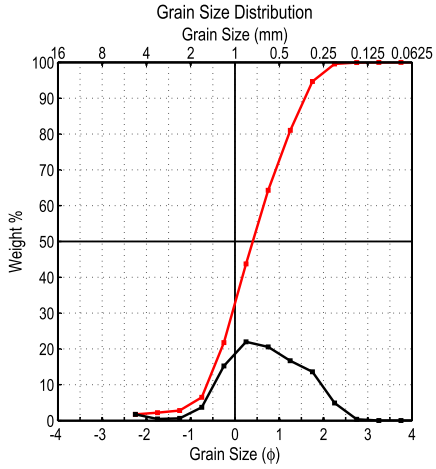
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-02a**
Interval	**Swash**
Mean	**0.526 mm**
STD	**0.634 mm**
Skewness	**-0.106**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	111.58
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	7.15

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.20	0.18	0.18
-1	-1.25	0.25	0.22	0.40
-0.5	-0.75	0.98	0.88	1.28
0	-0.25	6.55	5.87	7.15
0.5	0.25	19.46	17.44	24.59
1	0.75	33.96	30.44	55.03
1.5	1.25	29.50	26.44	81.47
2	1.75	15.48	13.87	95.34
2.5	2.25	4.66	4.18	99.52
3	2.75	0.47	0.42	99.94
3.5	3.25	0.06	0.05	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.910
5	-0.435
16	0.005
25	0.255
50	0.665
75	1.130
84	1.340
95	1.740
99	2.190

Moment Measures	(phi)	(mm)
Mean	0.926	0.526
Standard Deviation	0.657	0.634
Skewness	-0.106	
Kurtosis	3.377	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.672	0.670
Standard Deviation	0.667	0.663
Skewness (1)	0.011	-0.000
Skewness (2)	-0.019	
Kurtosis	0.629	1.019



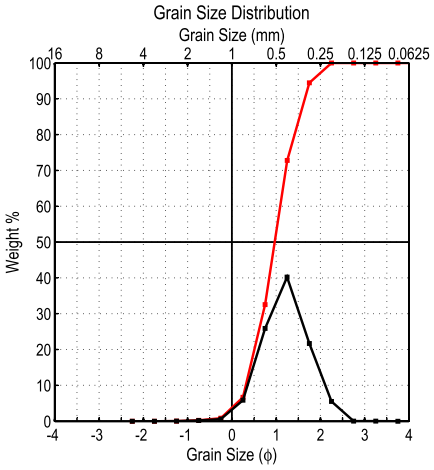
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-02b**
Interval	**LTT**
Mean	**0.633 mm**
STD	**0.538 mm**
Skewness	**-0.429**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	117.67
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	21.76

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.05	1.74	1.74
-1.5	-1.75	0.53	0.45	2.19
-1	-1.25	0.71	0.60	2.80
-0.5	-0.75	4.37	3.71	6.51
0	-0.25	17.94	15.25	21.76
0.5	0.25	25.85	21.97	43.72
1	0.75	24.19	20.56	64.28
1.5	1.25	19.68	16.72	81.01
2	1.75	16.05	13.64	94.65
2.5	2.25	5.77	4.90	99.55
3	2.75	0.45	0.38	99.93
3.5	3.25	0.05	0.04	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-0.955
16	-0.440
25	-0.175
50	0.405
75	1.070
84	1.360
95	1.785
99	2.195

Moment Measures	(phi)	(mm)
Mean	0.659	0.633
Standard Deviation	0.895	0.538
Skewness	-0.429	
Kurtosis	3.720	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.460	0.442
Standard Deviation	0.900	0.865
Skewness (1)	0.061	0.034
Skewness (2)	0.011	
Kurtosis	0.522	0.902



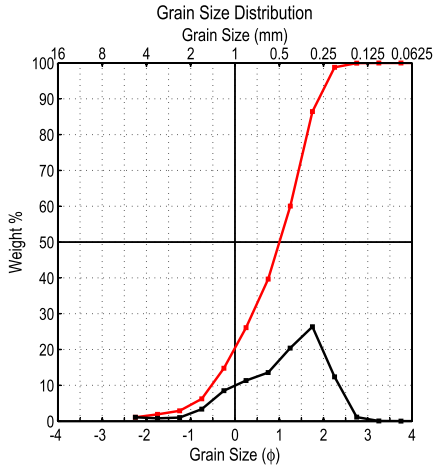
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-03a**
Interval	**Swash**
Mean	**0.431 mm**
STD	**0.705 mm**
Skewness	**-0.140**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	121.57
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	0.82

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.02	0.02	0.02
-0.5	-0.75	0.26	0.21	0.23
0	-0.25	0.72	0.59	0.82
0.5	0.25	7.10	5.84	6.66
1	0.75	31.47	25.89	32.55
1.5	1.25	48.89	40.22	72.76
2	1.75	26.35	21.67	94.44
2.5	2.25	6.72	5.53	99.97
3	2.75	0.03	0.02	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.235
5	0.110
16	0.430
25	0.605
50	0.965
75	1.300
84	1.510
95	1.800
99	2.165

Moment Measures	(phi)	(mm)
Mean	1.213	0.431
Standard Deviation	0.505	0.705
Skewness	-0.140	
Kurtosis	3.257	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.970	0.968
Standard Deviation	0.540	0.526
Skewness (1)	0.009	-0.001
Skewness (2)	-0.019	
Kurtosis	0.565	0.997



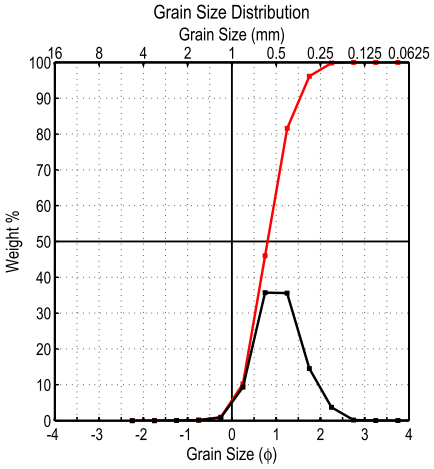
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-03b**
Interval	**LTT**
Mean	**0.479 mm**
STD	**0.513 mm**
Skewness	**-0.891**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	111.75
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	14.78

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.24	1.11	1.11
-1.5	-1.75	0.87	0.78	1.89
-1	-1.25	1.11	0.99	2.88
-0.5	-0.75	3.77	3.37	6.26
0	-0.25	9.53	8.53	14.78
0.5	0.25	12.66	11.33	26.11
1	0.75	15.15	13.56	39.67
1.5	1.25	22.78	20.38	60.05
2	1.75	29.45	26.35	86.41
2.5	2.25	13.83	12.38	98.78
3	2.75	1.28	1.15	99.93
3.5	3.25	0.05	0.04	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-0.935
16	-0.195
25	0.200
50	1.005
75	1.535
84	1.705
95	2.095
99	2.345

Moment Measures	(phi)	(mm)
Mean	1.061	0.479
Standard Deviation	0.962	0.513
Skewness	-0.891	
Kurtosis	3.733	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.755	0.838
Standard Deviation	0.950	0.934
Skewness (1)	-0.263	-0.272
Skewness (2)	-0.447	
Kurtosis	0.595	0.930



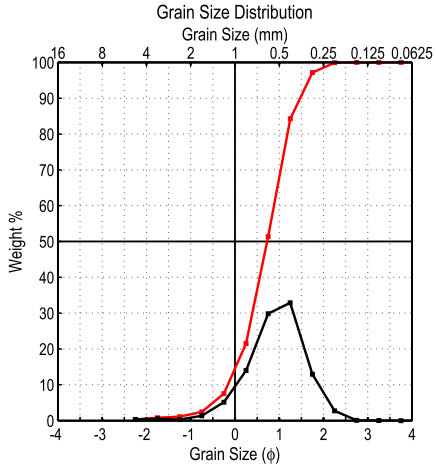
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-04a**
Interval	**Swash**
Mean	**0.474 mm**
STD	**0.705 mm**
Skewness	**0.187**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	123.20
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	0.97

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	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
-0.5	-0.75	0.15	0.12	0.13
0	-0.25	1.04	0.84	0.97
0.5	0.25	11.48	9.32	10.29
1	0.75	43.98	35.70	45.99
1.5	1.25	43.86	35.60	81.59
2	1.75	17.89	14.52	96.11
2.5	2.25	4.56	3.70	99.81
3	2.75	0.21	0.17	99.98
3.5	3.25	0.01	0.01	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.250
5	-0.035
16	0.330
25	0.455
50	0.805
75	1.155
84	1.335
95	1.710
99	2.140

Moment Measures	(phi)	(mm)
Mean	1.076	0.474
Standard Deviation	0.504	0.705
Skewness	0.187	
Kurtosis	3.237	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.833	0.823
Standard Deviation	0.502	0.516
Skewness (1)	0.055	0.046
Skewness (2)	0.065	
Kurtosis	0.736	1.022



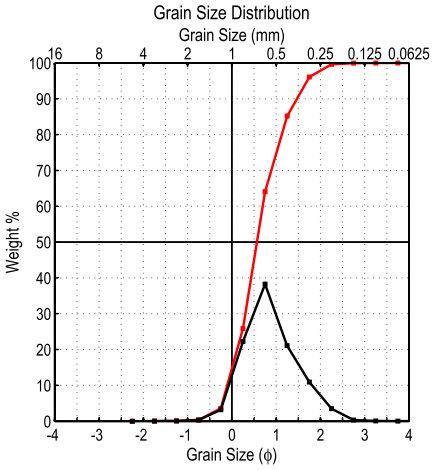
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-04b**
Interval	**LTT**
Mean	**0.529 mm**
STD	**0.633 mm**
Skewness	**-0.879**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	110.38
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.55

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.36	0.33	0.33
-1.5	-1.75	0.53	0.48	0.81
-1	-1.25	0.30	0.27	1.08
-0.5	-0.75	1.50	1.36	2.44
0	-0.25	5.64	5.11	7.55
0.5	0.25	15.43	13.98	21.53
1	0.75	32.95	29.85	51.38
1.5	1.25	36.28	32.87	84.25
2	1.75	14.26	12.92	97.16
2.5	2.25	3.03	2.75	99.91
3	2.75	0.09	0.08	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.395
5	-0.500
16	0.050
25	0.310
50	0.725
75	1.110
84	1.245
95	1.665
99	2.085

Moment Measures	(phi)	(mm)
Mean	0.918	0.529
Standard Deviation	0.660	0.633
Skewness	-0.879	
Kurtosis	5.399	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.647	0.673
Standard Deviation	0.598	0.627
Skewness (1)	-0.130	-0.131
Skewness (2)	-0.238	
Kurtosis	0.812	1.109



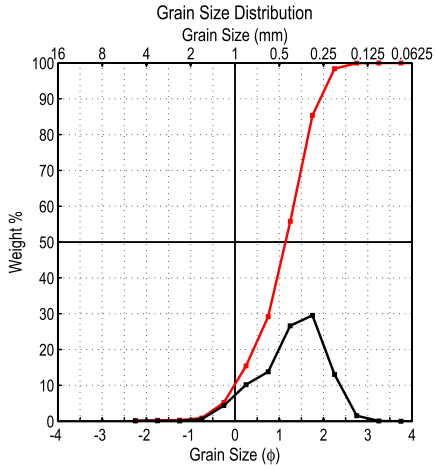
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-05a**
Interval	**Swash**
Mean	**0.545 mm**
STD	**0.668 mm**
Skewness	**0.441**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	111.57
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	3.57

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.01	0.01	0.01
-1	-1.25	0.05	0.04	0.05
-0.5	-0.75	0.34	0.30	0.36
0	-0.25	3.58	3.21	3.57
0.5	0.25	24.84	22.26	25.83
1	0.75	42.68	38.25	64.09
1.5	1.25	23.53	21.09	85.18
2	1.75	12.17	10.91	96.08
2.5	2.25	3.92	3.51	99.60
3	2.75	0.37	0.33	99.93
3.5	3.25	0.06	0.05	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.650
5	-0.220
16	0.030
25	0.230
50	0.565
75	1.010
84	1.220
95	1.700
99	2.165

Moment Measures	(phi)	(mm)
Mean	0.877	0.545
Standard Deviation	0.583	0.668
Skewness	0.441	
Kurtosis	3.318	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.625	0.605
Standard Deviation	0.595	0.588
Skewness (1)	0.101	0.142
Skewness (2)	0.294	
Kurtosis	0.613	1.009



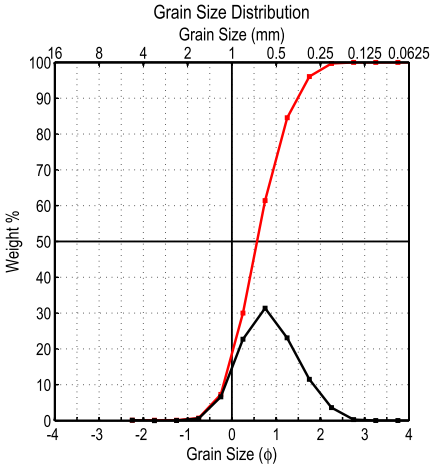
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-05b**
Interval	**LTT**
Mean	**0.407 mm**
STD	**0.605 mm**
Skewness	**-0.647**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	114.63
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	5.23

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.11	0.10	0.10
-1.5	-1.75	0.14	0.12	0.22
-1	-1.25	0.09	0.08	0.30
-0.5	-0.75	0.68	0.59	0.89
0	-0.25	4.97	4.34	5.23
0.5	0.25	11.68	10.19	15.41
1	0.75	15.80	13.78	29.20
1.5	1.25	30.50	26.61	55.81
2	1.75	33.86	29.54	85.34
2.5	2.25	14.94	13.03	98.38
3	2.75	1.77	1.54	99.92
3.5	3.25	0.09	0.08	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.735
5	-0.275
16	0.270
25	0.600
50	1.140
75	1.575
84	1.725
95	2.120
99	2.450

Moment Measures	(phi)	(mm)
Mean	1.296	0.407
Standard Deviation	0.725	0.605
Skewness	-0.647	
Kurtosis	3.541	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.998	1.045
Standard Deviation	0.728	0.727
Skewness (1)	-0.196	-0.189
Skewness (2)	-0.299	
Kurtosis	0.646	1.007



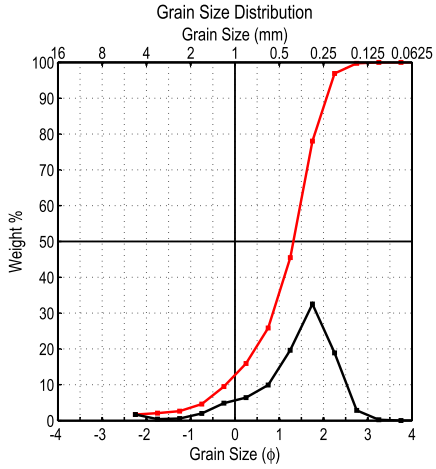
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-06a**
Interval	**Swash**
Mean	**0.555 mm**
STD	**0.644 mm**
Skewness	**0.123**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	111.99
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.30

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.11	0.10	0.10
-1.5	-1.75	0.00	0.00	0.10
-1	-1.25	0.02	0.02	0.12
-0.5	-0.75	0.65	0.58	0.70
0	-0.25	7.40	6.61	7.30
0.5	0.25	25.44	22.72	30.02
1	0.75	35.14	31.38	61.40
1.5	1.25	25.89	23.12	84.52
2	1.75	12.91	11.53	96.04
2.5	2.25	4.07	3.63	99.68
3	2.75	0.32	0.29	99.96
3.5	3.25	0.03	0.03	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.725
5	-0.425
16	-0.060
25	0.140
50	0.570
75	1.045
84	1.240
95	1.705
99	2.155

Moment Measures	(phi)	(mm)
Mean	0.850	0.555
Standard Deviation	0.636	0.644
Skewness	0.123	
Kurtosis	3.257	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.590	0.583
Standard Deviation	0.650	0.648
Skewness (1)	0.031	0.048
Skewness (2)	0.108	
Kurtosis	0.638	0.965



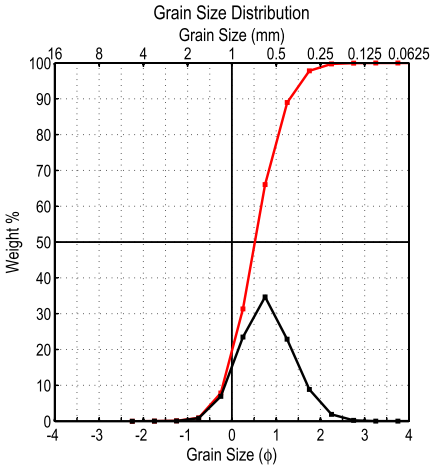
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-06b**
Interval	**LTT**
Mean	**0.396 mm**
STD	**0.519 mm**
Skewness	**-1.428**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	116.83
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	9.49

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.97	1.69	1.69
-1.5	-1.75	0.46	0.39	2.08
-1	-1.25	0.66	0.56	2.64
-0.5	-0.75	2.31	1.98	4.62
0	-0.25	5.69	4.87	9.49
0.5	0.25	7.51	6.43	15.92
1	0.75	11.59	9.92	25.84
1.5	1.25	22.95	19.64	45.48
2	1.75	38.00	32.53	78.01
2.5	2.25	22.06	18.88	96.89
3	2.75	3.31	2.83	99.73
3.5	3.25	0.29	0.25	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-0.710
16	0.255
25	0.710
50	1.320
75	1.705
84	1.910
95	2.200
99	2.620

Moment Measures	(phi)	(mm)
Mean	1.338	0.396
Standard Deviation	0.945	0.519
Skewness	-1.428	
Kurtosis	5.632	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.083	1.162
Standard Deviation	0.828	0.855
Skewness (1)	-0.287	-0.341
Skewness (2)	-0.695	
Kurtosis	0.758	1.199



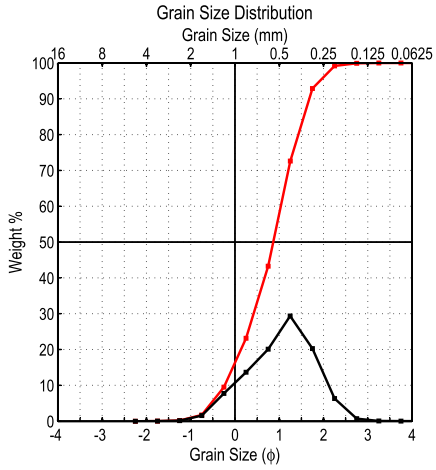
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-07a**
Interval	**Swash**
Mean	**0.580 mm**
STD	**0.663 mm**
Skewness	**0.165**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	114.94
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.86

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.04	0.03	0.03
-1	-1.25	0.06	0.05	0.09
-0.5	-0.75	0.98	0.85	0.94
0	-0.25	7.95	6.92	7.86
0.5	0.25	26.99	23.48	31.34
1	0.75	39.89	34.71	66.04
1.5	1.25	26.32	22.90	88.94
2	1.75	10.19	8.87	97.81
2.5	2.25	2.21	1.92	99.73
3	2.75	0.25	0.22	99.95
3.5	3.25	0.04	0.03	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.745
5	-0.455
16	-0.075
25	0.115
50	0.520
75	0.945
84	1.140
95	1.590
99	2.060

Moment Measures	(phi)	(mm)
Mean	0.786	0.580
Standard Deviation	0.593	0.663
Skewness	0.165	
Kurtosis	3.268	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.532	0.528
Standard Deviation	0.608	0.614
Skewness (1)	0.021	0.034
Skewness (2)	0.078	
Kurtosis	0.683	1.010



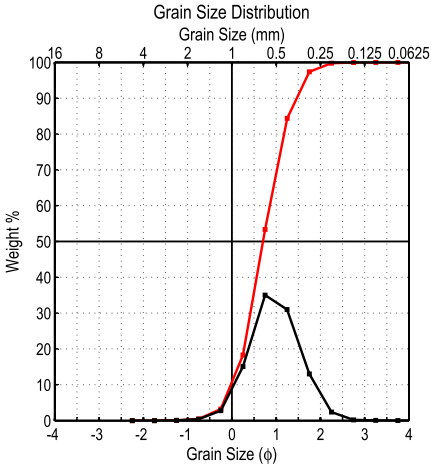
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-07b**
Interval	**LTT**
Mean	**0.487 mm**
STD	**0.605 mm**
Skewness	**-0.301**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	109.83
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	9.51

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.04	0.04	0.04
-1	-1.25	0.18	0.16	0.20
-0.5	-0.75	1.71	1.56	1.76
0	-0.25	8.51	7.75	9.51
0.5	0.25	15.00	13.66	23.16
1	0.75	22.06	20.09	43.25
1.5	1.25	32.24	29.35	72.60
2	1.75	22.24	20.25	92.85
2.5	2.25	6.95	6.33	99.18
3	2.75	0.79	0.72	99.90
3.5	3.25	0.09	0.08	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.995
5	-0.540
16	-0.010
25	0.295
50	0.865
75	1.310
84	1.530
95	1.920
99	2.235

Moment Measures	(phi)	(mm)
Mean	1.038	0.487
Standard Deviation	0.726	0.605
Skewness	-0.301	
Kurtosis	2.806	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.760	0.795
Standard Deviation	0.770	0.758
Skewness (1)	-0.136	-0.139
Skewness (2)	-0.227	
Kurtosis	0.597	0.993



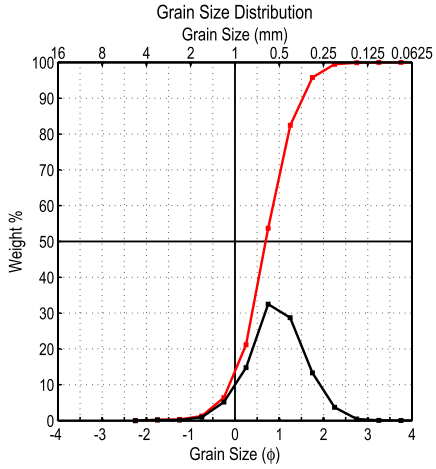
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-08a**
Interval	**Swash**
Mean	**0.512 mm**
STD	**0.683 mm**
Skewness	**0.028**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	106.99
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	3.22

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.05	0.05	0.05
-0.5	-0.75	0.42	0.39	0.44
0	-0.25	2.98	2.79	3.22
0.5	0.25	16.14	15.09	18.31
1	0.75	37.49	35.04	53.35
1.5	1.25	33.17	31.00	84.35
2	1.75	13.94	13.03	97.38
2.5	2.25	2.53	2.36	99.75
3	2.75	0.21	0.20	99.94
3.5	3.25	0.05	0.05	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.650
5	-0.190
16	0.175
25	0.345
50	0.700
75	1.100
84	1.245
95	1.660
99	2.090

Moment Measures	(phi)	(mm)
Mean	0.966	0.512
Standard Deviation	0.550	0.683
Skewness	0.028	
Kurtosis	3.289	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.710	0.707
Standard Deviation	0.535	0.548
Skewness (1)	0.019	0.028
Skewness (2)	0.065	
Kurtosis	0.729	1.004



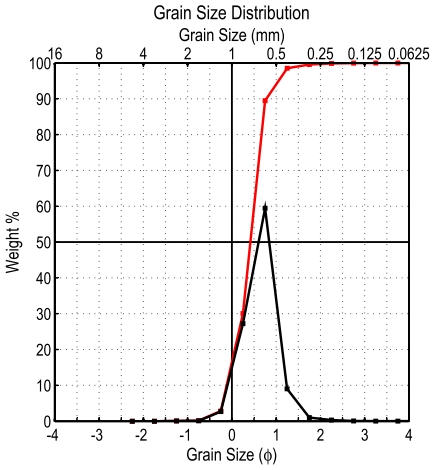
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-08b**
Interval	**LTT**
Mean	**0.519 mm**
STD	**0.645 mm**
Skewness	**-0.144**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	128.74
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	6.42

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.23	0.18	0.18
-1	-1.25	0.19	0.15	0.33
-0.5	-0.75	1.20	0.93	1.26
0	-0.25	6.64	5.16	6.42
0.5	0.25	19.02	14.77	21.19
1	0.75	41.85	32.51	53.70
1.5	1.25	36.99	28.73	82.43
2	1.75	17.17	13.34	95.77
2.5	2.25	4.76	3.70	99.46
3	2.75	0.56	0.43	99.90
3.5	3.25	0.09	0.07	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.890
5	-0.385
16	0.075
25	0.310
50	0.695
75	1.120
84	1.310
95	1.720
99	2.185

Moment Measures	(phi)	(mm)
Mean	0.947	0.519
Standard Deviation	0.633	0.645
Skewness	-0.144	
Kurtosis	3.740	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.692	0.693
Standard Deviation	0.618	0.628
Skewness (1)	-0.004	-0.015
Skewness (2)	-0.045	
Kurtosis	0.704	1.065



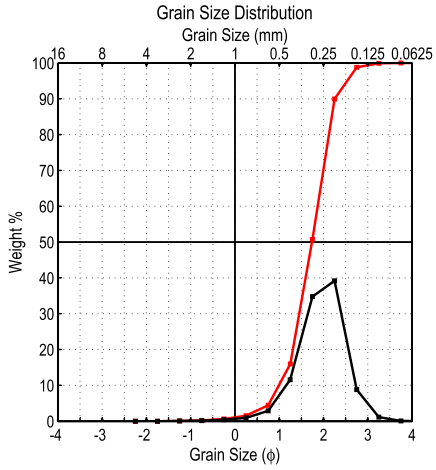
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-09a**
Interval	**Swash**
Mean	**0.638 mm**
STD	**0.773 mm**
Skewness	**0.585**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Well Sorted
Poorly Graded	Fine Skewed
	Very Leptokurtic
Total weight (gram)	119.19
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	2.84

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.06	0.05	0.05
-0.5	-0.75	0.14	0.12	0.17
0	-0.25	3.18	2.67	2.84
0.5	0.25	32.45	27.23	30.06
1	0.75	70.83	59.43	89.49
1.5	1.25	10.77	9.04	98.52
2	1.75	1.20	1.01	99.53
2.5	2.25	0.39	0.33	99.86
3	2.75	0.09	0.08	99.93
3.5	3.25	0.04	0.03	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.595
5	-0.210
16	-0.010
25	0.155
50	0.420
75	0.630
84	0.705
95	1.055
99	1.485

Moment Measures	(phi)	(mm)
Mean	0.648	0.638
Standard Deviation	0.371	0.773
Skewness	0.585	
Kurtosis	8.303	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.348	0.372
Standard Deviation	0.357	0.370
Skewness (1)	-0.203	-0.099
Skewness (2)	0.007	
Kurtosis	0.769	1.091



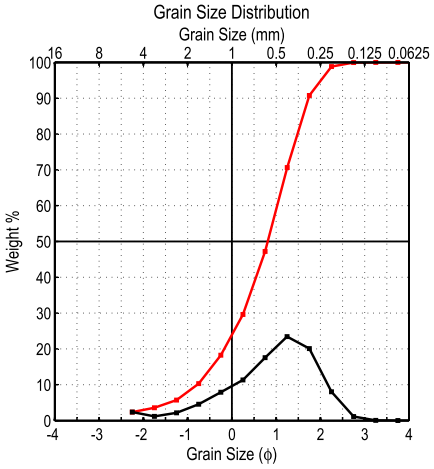
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-09b**
Interval	**LTT**
Mean	**0.261 mm**
STD	**0.689 mm**
Skewness	**-0.830**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	114.07
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.60

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	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
-0.5	-0.75	0.17	0.15	0.19
0	-0.25	0.47	0.41	0.60
0.5	0.25	1.05	0.92	1.53
1	0.75	3.32	2.91	4.44
1.5	1.25	13.18	11.55	15.99
2	1.75	39.65	34.76	50.75
2.5	2.25	44.72	39.20	89.95
3	2.75	10.05	8.81	98.76
3.5	3.25	1.30	1.14	99.90
4	3.75	0.09	0.08	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.035
5	0.775
16	1.250
25	1.380
50	1.740
75	2.060
84	2.175
95	2.535
99	2.855

Moment Measures	(phi)	(mm)
Mean	1.939	0.261
Standard Deviation	0.537	0.689
Skewness	-0.830	
Kurtosis	5.600	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.712	1.722
Standard Deviation	0.462	0.498
Skewness (1)	-0.059	-0.078
Skewness (2)	-0.184	
Kurtosis	0.903	1.061



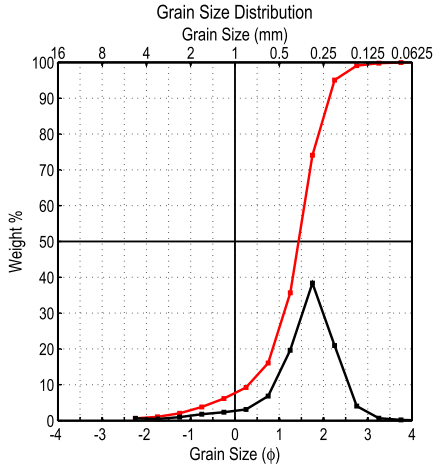
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-10a**
Interval	**Swash**
Mean	**0.550 mm**
STD	**0.489 mm**
Skewness	**-0.924**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	117.96
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	18.25

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.83	2.40	2.40
-1.5	-1.75	1.38	1.17	3.57
-1	-1.25	2.57	2.18	5.75
-0.5	-0.75	5.41	4.59	10.33
0	-0.25	9.34	7.92	18.25
0.5	0.25	13.40	11.36	29.61
1	0.75	20.74	17.58	47.19
1.5	1.25	27.67	23.46	70.65
2	1.75	23.72	20.11	90.76
2.5	2.25	9.49	8.05	98.80
3	2.75	1.33	1.13	99.93
3.5	3.25	0.07	0.06	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.420
16	-0.390
25	0.045
50	0.810
75	1.360
84	1.580
95	2.015
99	2.335

Moment Measures	(phi)	(mm)
Mean	0.864	0.550
Standard Deviation	1.032	0.489
Skewness	-0.924	
Kurtosis	3.778	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.595	0.667
Standard Deviation	0.985	1.013
Skewness (1)	-0.218	-0.258
Skewness (2)	-0.520	
Kurtosis	0.744	1.071



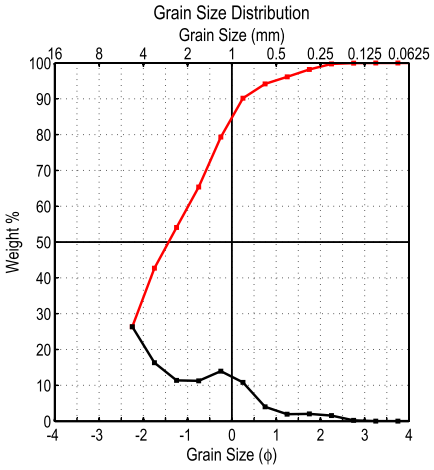
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**NHB-10b**
Interval	**LTT**
Mean	**0.345 mm**
STD	**0.559 mm**
Skewness	**-1.583**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	110.48
% finer than 4.00 phi	0.05
% coarser than -1.00 phi	6.15

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.69	0.62	0.62
-1.5	-1.75	0.48	0.43	1.06
-1	-1.25	1.08	0.98	2.04
-0.5	-0.75	1.95	1.77	3.80
0	-0.25	2.59	2.34	6.15
0.5	0.25	3.42	3.10	9.24
1	0.75	7.56	6.84	16.08
1.5	1.25	21.66	19.61	35.69
2	1.75	42.40	38.38	74.07
2.5	2.25	23.17	20.97	95.04
3	2.75	4.48	4.06	99.09
3.5	3.25	0.73	0.66	99.76
4	3.75	0.22	0.20	99.95
>4.0	4.25	0.05	0.05	100.00

Percentiles	
1	-1.820
5	-0.495
16	0.745
25	0.975
50	1.435
75	1.770
84	1.985
95	2.250
99	2.740

Moment Measures	(phi)	(mm)
Mean	1.537	0.345
Standard Deviation	0.840	0.559
Skewness	-1.583	
Kurtosis	7.006	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.365	1.388
Standard Deviation	0.620	0.726
Skewness (1)	-0.113	-0.260
Skewness (2)	-0.899	
Kurtosis	1.214	1.415



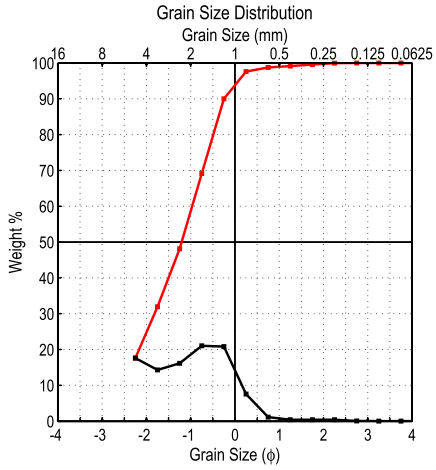
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**KH-01a**
Interval	**Swash**
Mean	**1.973 mm**
STD	**0.447 mm**
Skewness	**0.749**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	119.39
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	79.32

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	31.46	26.35	26.35
-1.5	-1.75	19.51	16.34	42.69
-1	-1.25	13.59	11.39	54.08
-0.5	-0.75	13.47	11.28	65.36
0	-0.25	16.67	13.96	79.32
0.5	0.25	12.93	10.83	90.15
1	0.75	4.79	4.01	94.16
1.5	1.25	2.34	1.96	96.12
2	1.75	2.44	2.04	98.17
2.5	2.25	1.86	1.56	99.72
3	2.75	0.27	0.23	99.95
3.5	3.25	0.03	0.03	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.430
75	-0.405
84	-0.035
95	0.965
99	2.020

Moment Measures	(phi)	(mm)
Mean	-0.980	1.973
Standard Deviation	1.161	0.447
Skewness	0.749	
Kurtosis	2.953	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.143	-1.238
Standard Deviation	1.107	1.041
Skewness (1)	0.260	0.375
Skewness (2)	0.711	
Kurtosis	0.451	0.714



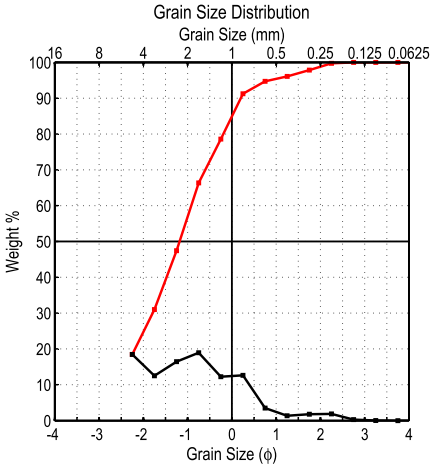
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**KH-01b**
Interval	**LTT**
Mean	**2.011 mm**
STD	**0.547 mm**
Skewness	**0.348**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	123.81
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	89.97

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	21.83	17.63	17.63
-1.5	-1.75	17.74	14.33	31.96
-1	-1.25	20.00	16.15	48.11
-0.5	-0.75	26.03	21.02	69.14
0	-0.25	25.79	20.83	89.97
0.5	0.25	9.40	7.59	97.56
1	0.75	1.43	1.15	98.72
1.5	1.25	0.49	0.40	99.11
2	1.75	0.52	0.42	99.53
2.5	2.25	0.48	0.39	99.92
3	2.75	0.07	0.06	99.98
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.995
50	-1.205
75	-0.610
84	-0.395
95	0.080
99	1.110

Moment Measures	(phi)	(mm)
Mean	-1.008	2.011
Standard Deviation	0.869	0.547
Skewness	0.348	
Kurtosis	3.192	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.323	-1.283
Standard Deviation	0.927	0.817
Skewness (1)	-0.127	-0.012
Skewness (2)	0.129	
Kurtosis	0.256	0.689



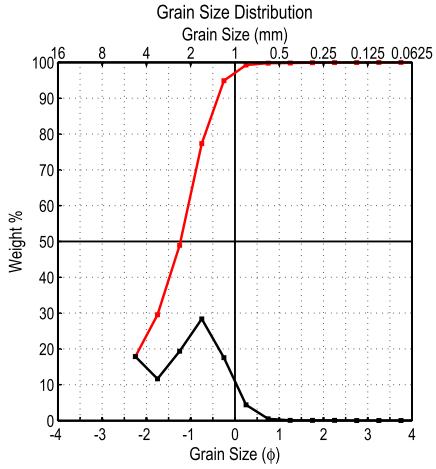
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**KH-02a**
Interval	**Swash**
Mean	**1.811 mm**
STD	**0.472 mm**
Skewness	**0.697**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Mesokurtic
Total weight (gram)	141.23
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	78.58

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	26.08	18.47	18.47
-1.5	-1.75	17.68	12.52	30.98
-1	-1.25	23.22	16.44	47.43
-0.5	-0.75	26.72	18.92	66.35
0	-0.25	17.28	12.24	78.58
0.5	0.25	17.85	12.64	91.22
1	0.75	4.93	3.49	94.71
1.5	1.25	1.91	1.35	96.06
2	1.75	2.50	1.77	97.83
2.5	2.25	2.65	1.88	99.71
3	2.75	0.38	0.27	99.98
3.5	3.25	0.03	0.02	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.990
50	-1.180
75	-0.395
84	-0.035
95	0.855
99	2.060

Moment Measures	(phi)	(mm)
Mean	-0.857	1.811
Standard Deviation	1.084	0.472
Skewness	0.697	
Kurtosis	3.302	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.143	-1.155
Standard Deviation	1.107	1.024
Skewness (1)	0.034	0.172
Skewness (2)	0.436	
Kurtosis	0.402	0.798



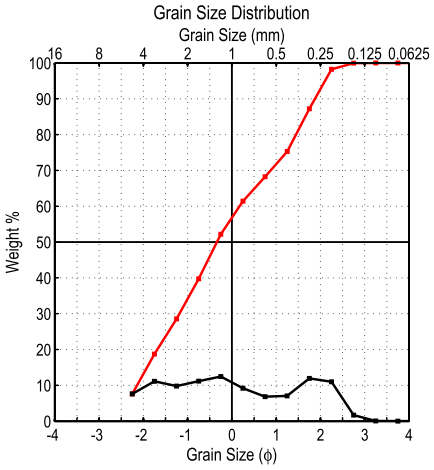
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**KH02b**
Interval	**LTT**
Mean	**2.122 mm**
STD	**0.591 mm**
Skewness	**0.075**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	115.47
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	94.88

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	20.64	17.87	17.87
-1.5	-1.75	13.46	11.66	29.53
-1	-1.25	22.38	19.38	48.91
-0.5	-0.75	32.79	28.40	77.31
0	-0.25	20.29	17.57	94.88
0.5	0.25	5.06	4.38	99.26
1	0.75	0.56	0.48	99.75
1.5	1.25	0.07	0.06	99.81
2	1.75	0.08	0.07	99.88
2.5	2.25	0.07	0.06	99.94
3	2.75	0.02	0.02	99.96
3.5	3.25	0.02	0.02	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.945
50	-1.230
75	-0.790
84	-0.560
95	-0.235
99	0.220

Moment Measures	(phi)	(mm)
Mean	-1.085	2.122
Standard Deviation	0.759	0.591
Skewness	0.075	
Kurtosis	3.123	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.405	-1.347
Standard Deviation	0.845	0.728
Skewness (1)	-0.207	-0.110
Skewness (2)	-0.015	
Kurtosis	0.192	0.715



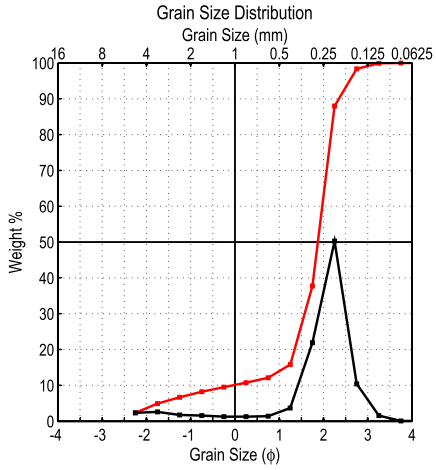
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**KH-03a**
Interval	**Swash**
Mean	**0.956 mm**
STD	**0.361 mm**
Skewness	**0.101**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	136.29
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	52.19

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	10.36	7.60	7.60
-1.5	-1.75	15.18	11.14	18.74
-1	-1.25	13.38	9.82	28.56
-0.5	-0.75	15.23	11.17	39.73
0	-0.25	16.98	12.46	52.19
0.5	0.25	12.55	9.21	61.40
1	0.75	9.32	6.84	68.24
1.5	1.25	9.59	7.04	75.27
2	1.75	16.27	11.94	87.21
2.5	2.25	15.02	11.02	98.23
3	2.75	2.31	1.69	99.92
3.5	3.25	0.08	0.06	99.99
4	3.75	0.02	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.875
25	-1.430
50	-0.340
75	1.230
84	1.615
95	2.105
99	2.475

Moment Measures	(phi)	(mm)
Mean	0.065	0.956
Standard Deviation	1.470	0.361
Skewness	0.101	
Kurtosis	1.786	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.130	-0.200
Standard Deviation	1.745	1.532
Skewness (1)	0.120	0.122
Skewness (2)	0.153	
Kurtosis	0.248	0.671



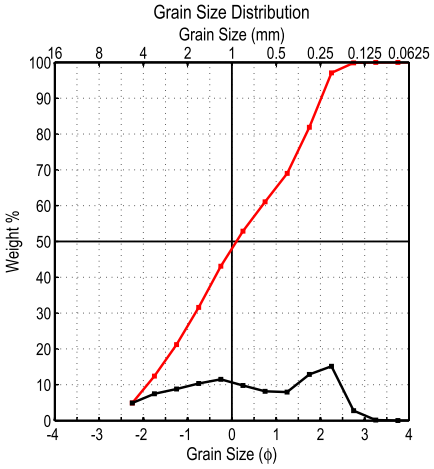
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**KH-03b**
Interval	**LTT**
Mean	**0.292 mm**
STD	**0.452 mm**
Skewness	**-2.232**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	122.99
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	9.51

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.88	2.34	2.34
-1.5	-1.75	3.17	2.58	4.92
-1	-1.25	2.15	1.75	6.67
-0.5	-0.75	1.93	1.57	8.24
0	-0.25	1.57	1.28	9.51
0.5	0.25	1.54	1.25	10.77
1	0.75	1.69	1.37	12.14
1.5	1.25	4.52	3.68	15.81
2	1.75	26.94	21.90	37.72
2.5	2.25	61.80	50.25	87.97
3	2.75	12.77	10.38	98.35
3.5	3.25	1.92	1.56	99.91
4	3.75	0.09	0.07	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.725
16	1.255
25	1.460
50	1.870
75	2.120
84	2.210
95	2.590
99	2.960

Moment Measures	(phi)	(mm)
Mean	1.778	0.292
Standard Deviation	1.147	0.452
Skewness	-2.232	
Kurtosis	7.385	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.732	1.778
Standard Deviation	0.478	0.893
Skewness (1)	-0.288	-0.477
Skewness (2)	-3.010	
Kurtosis	3.518	2.679



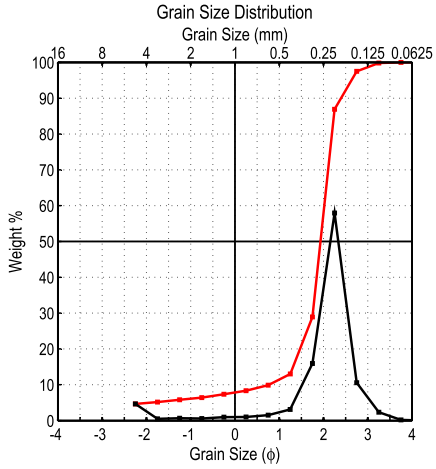
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**KH-04a**
Interval	**Swash**
Mean	**0.771 mm**
STD	**0.365 mm**
Skewness	**-0.117**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	112.05
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	43.09

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.52	4.93	4.93
-1.5	-1.75	8.41	7.51	12.43
-1	-1.25	9.86	8.80	21.23
-0.5	-0.75	11.60	10.35	31.58
0	-0.25	12.89	11.50	43.09
0.5	0.25	10.98	9.80	52.89
1	0.75	9.15	8.17	61.05
1.5	1.25	8.90	7.94	69.00
2	1.75	14.45	12.90	81.89
2.5	2.25	16.99	15.16	97.05
3	2.75	3.11	2.78	99.83
3.5	3.25	0.17	0.15	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.245
16	-1.545
25	-1.070
50	0.105
75	1.485
84	1.820
95	2.180
99	2.600

Moment Measures	(phi)	(mm)
Mean	0.375	0.771
Standard Deviation	1.452	0.365
Skewness	-0.117	
Kurtosis	1.813	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.137	0.127
Standard Deviation	1.682	1.512
Skewness (1)	0.019	-0.021
Skewness (2)	-0.082	
Kurtosis	0.315	0.710



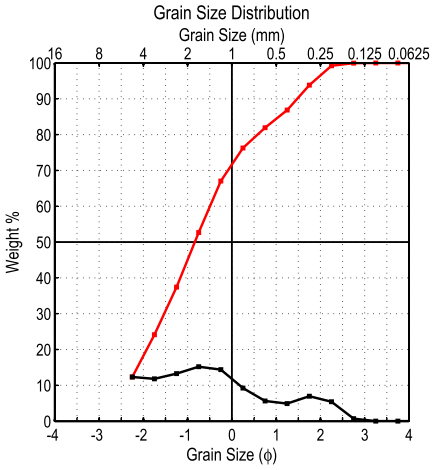
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**KH-04b**
Interval	**LTT**
Mean	**0.271 mm**
STD	**0.457 mm**
Skewness	**-2.642**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	113.22
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	7.34

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.25	4.64	4.64
-1.5	-1.75	0.58	0.51	5.15
-1	-1.25	0.73	0.64	5.79
-0.5	-0.75	0.68	0.60	6.39
0	-0.25	1.07	0.95	7.34
0.5	0.25	1.15	1.02	8.36
1	0.75	1.74	1.54	9.89
1.5	1.25	3.53	3.12	13.01
2	1.75	18.05	15.94	28.95
2.5	2.25	65.61	57.95	86.90
3	2.75	11.97	10.57	97.47
3.5	3.25	2.63	2.32	99.80
4	3.75	0.21	0.19	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.895
16	1.345
25	1.625
50	1.930
75	2.145
84	2.225
95	2.635
99	3.080

Moment Measures	(phi)	(mm)
Mean	1.882	0.271
Standard Deviation	1.131	0.457
Skewness	-2.642	
Kurtosis	9.665	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.785	1.833
Standard Deviation	0.440	0.906
Skewness (1)	-0.330	-0.509
Skewness (2)	-3.545	
Kurtosis	4.148	3.570



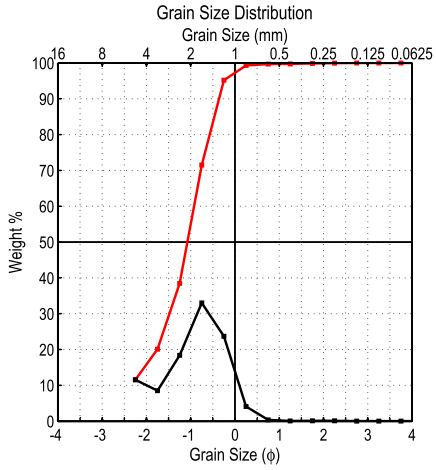
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**KH-05a**
Interval	**Swash**
Mean	**1.326 mm**
STD	**0.396 mm**
Skewness	**0.492**
USCS	**Wentworth**
SW	Very Coarse Sand
Medium Sand	Poorly Sorted
Well Graded	Fine Skewed
	Platykurtic
Total weight (gram)	106.02
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	67.03

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	13.07	12.33	12.33
-1.5	-1.75	12.51	11.80	24.13
-1	-1.25	14.09	13.29	37.42
-0.5	-0.75	16.14	15.22	52.64
0	-0.25	15.25	14.38	67.03
0.5	0.25	9.80	9.24	76.27
1	0.75	5.98	5.64	81.91
1.5	1.25	5.23	4.93	86.84
2	1.75	7.38	6.96	93.80
2.5	2.25	5.74	5.41	99.22
3	2.75	0.77	0.73	99.94
3.5	3.25	0.04	0.04	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.095
25	-1.715
50	-0.835
75	0.180
84	0.960
95	1.860
99	2.230

Moment Measures	(phi)	(mm)
Mean	-0.408	1.326
Standard Deviation	1.336	0.396
Skewness	0.492	
Kurtosis	2.328	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.567	-0.657
Standard Deviation	1.527	1.386
Skewness (1)	0.175	0.243
Skewness (2)	0.419	
Kurtosis	0.345	0.889



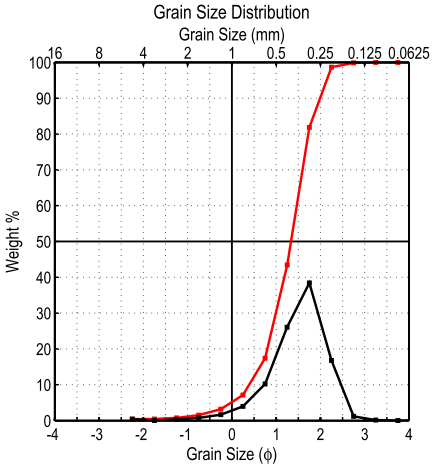
Project	**2203**
Location	**Nags Head NC**
Date	**Mar 2012**
Station	**KH-05b**
Interval	**LTT**
Mean	**1.900 mm**
STD	**0.614 mm**
Skewness	**-0.188**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	104.94
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	95.17

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	12.14	11.57	11.57
-1.5	-1.75	8.95	8.53	20.10
-1	-1.25	19.29	18.38	38.48
-0.5	-0.75	34.63	33.00	71.48
0	-0.25	24.86	23.69	95.17
0.5	0.25	4.32	4.12	99.29
1	0.75	0.39	0.37	99.66
1.5	1.25	0.08	0.08	99.73
2	1.75	0.11	0.10	99.84
2.5	2.25	0.11	0.10	99.94
3	2.75	0.04	0.04	99.98
3.5	3.25	0.01	0.01	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.990
25	-1.615
50	-1.075
75	-0.675
84	-0.485
95	-0.255
99	0.215

Moment Measures	(phi)	(mm)
Mean	-0.926	1.900
Standard Deviation	0.705	0.614
Skewness	-0.188	
Kurtosis	3.556	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.237	-1.183
Standard Deviation	0.752	0.679
Skewness (1)	-0.216	-0.197
Skewness (2)	-0.236	
Kurtosis	0.326	0.870



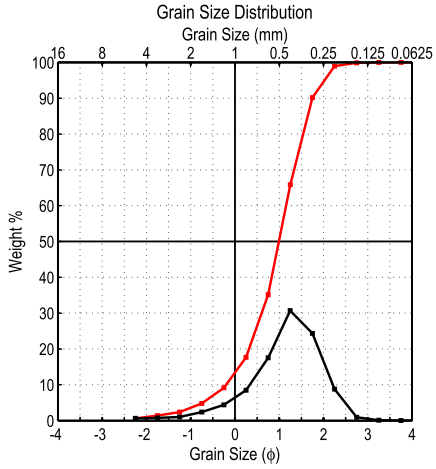
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**B2a**
Interval	**Grab**
Mean	**0.359 mm**
STD	**0.627 mm**
Skewness	**-1.473**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	111.98
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	3.18
% $CaCO_3$	2.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.46	0.41	0.41
-1.5	-1.75	0.03	0.03	0.44
-1	-1.25	0.34	0.30	0.74
-0.5	-0.75	0.86	0.77	1.51
0	-0.25	1.87	1.67	3.18
0.5	0.25	4.45	3.97	7.15
1	0.75	11.45	10.23	17.38
1.5	1.25	29.18	26.06	43.44
2	1.75	43.00	38.40	81.84
2.5	2.25	18.82	16.81	98.64
3	2.75	1.33	1.19	99.83
3.5	3.25	0.15	0.13	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.080
5	-0.020
16	0.685
25	0.895
50	1.335
75	1.660
84	1.815
95	2.140
99	2.400

Moment Measures	(phi)	(mm)
Mean	1.477	0.359
Standard Deviation	0.672	0.627
Skewness	-1.473	
Kurtosis	7.659	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.250	1.278
Standard Deviation	0.565	0.610
Skewness (1)	-0.150	-0.203
Skewness (2)	-0.487	
Kurtosis	0.912	1.157



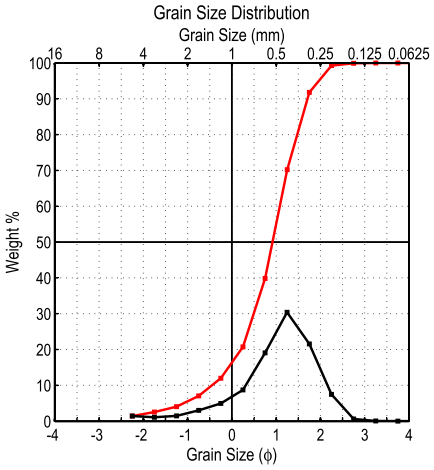
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**B2b**
Interval	**Grab**
Mean	**0.460 mm**
STD	**0.562 mm**
Skewness	**-1.125**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	100.86
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	9.17
% $CaCO_3$	1.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.64	0.63	0.63
-1.5	-1.75	0.75	0.74	1.38
-1	-1.25	1.03	1.02	2.40
-0.5	-0.75	2.40	2.38	4.78
0	-0.25	4.43	4.39	9.17
0.5	0.25	8.55	8.48	17.65
1	0.75	17.66	17.51	35.16
1.5	1.25	30.94	30.68	65.83
2	1.75	24.55	24.34	90.17
2.5	2.25	8.86	8.78	98.96
3	2.75	0.92	0.91	99.87
3.5	3.25	0.10	0.10	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.005
5	-0.725
16	0.155
25	0.460
50	0.990
75	1.440
84	1.625
95	2.025
99	2.270

Moment Measures	(phi)	(mm)
Mean	1.120	0.460
Standard Deviation	0.830	0.562
Skewness	-1.125	
Kurtosis	5.108	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.890	0.923
Standard Deviation	0.735	0.784
Skewness (1)	-0.136	-0.192
Skewness (2)	-0.463	
Kurtosis	0.871	1.150



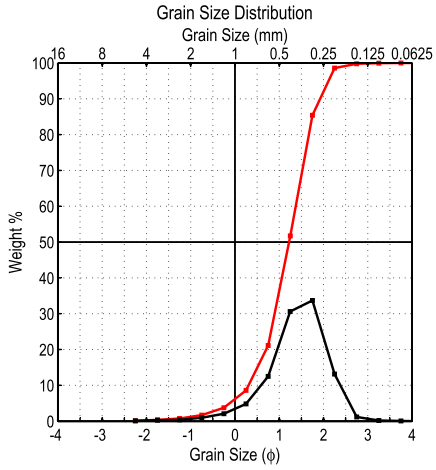
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**B2c**
Interval	**Grab**
Mean	**0.498 mm**
STD	**0.533 mm**
Skewness	**-1.226**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	110.74
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	12.00
% $CaCO_3$	1.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.61	1.45	1.45
-1.5	-1.75	1.20	1.08	2.54
-1	-1.25	1.66	1.50	4.04
-0.5	-0.75	3.35	3.03	7.06
0	-0.25	5.47	4.94	12.00
0.5	0.25	9.67	8.73	20.73
1	0.75	21.14	19.09	39.82
1.5	1.25	33.66	30.40	70.22
2	1.75	23.86	21.55	91.76
2.5	2.25	8.30	7.50	99.26
3	2.75	0.71	0.64	99.90
3.5	3.25	0.08	0.07	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.090
16	-0.020
25	0.360
50	0.915
75	1.360
84	1.570
95	1.965
99	2.235

Moment Measures	(phi)	(mm)
Mean	1.006	0.498
Standard Deviation	0.908	0.533
Skewness	-1.226	
Kurtosis	5.038	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.775	0.822
Standard Deviation	0.795	0.860
Skewness (1)	-0.176	-0.244
Skewness (2)	-0.601	
Kurtosis	0.921	1.252



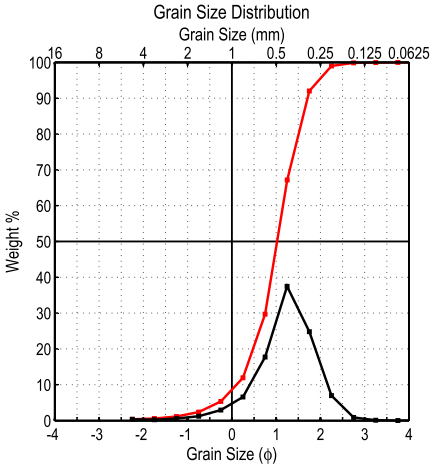
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**B2d**
Interval	**Grab**
Mean	**0.381 mm**
STD	**0.625 mm**
Skewness	**-1.100**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	114.55
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	3.77
% $CaCO_3$	1.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.10	0.09	0.09
-1.5	-1.75	0.34	0.30	0.38
-1	-1.25	0.42	0.37	0.75
-0.5	-0.75	1.09	0.95	1.70
0	-0.25	2.37	2.07	3.77
0.5	0.25	5.54	4.84	8.61
1	0.75	14.32	12.50	21.11
1.5	1.25	35.06	30.61	51.72
2	1.75	38.60	33.70	85.41
2.5	2.25	15.07	13.16	98.57
3	2.75	1.36	1.19	99.76
3.5	3.25	0.21	0.18	99.94
4	3.75	0.05	0.04	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.120
5	-0.125
16	0.545
25	0.815
50	1.220
75	1.595
84	1.730
95	2.115
99	2.430

Moment Measures	(phi)	(mm)
Mean	1.391	0.381
Standard Deviation	0.677	0.625
Skewness	-1.100	
Kurtosis	5.885	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.138	1.165
Standard Deviation	0.593	0.636
Skewness (1)	-0.139	-0.170
Skewness (2)	-0.380	
Kurtosis	0.890	1.177



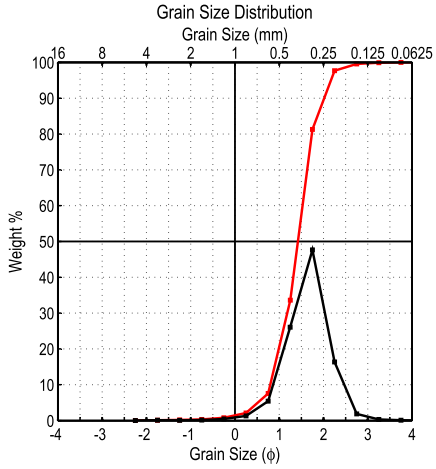
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**B2e**
Interval	**Grab**
Mean	**0.434 mm**
STD	**0.618 mm**
Skewness	**-1.116**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	106.53
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	5.34
% $CaCO_3$	1.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.39	0.37	0.37
-1.5	-1.75	0.24	0.23	0.59
-1	-1.25	0.60	0.56	1.15
-0.5	-0.75	1.31	1.23	2.38
0	-0.25	3.15	2.96	5.34
0.5	0.25	7.03	6.60	11.94
1	0.75	18.91	17.75	29.69
1.5	1.25	39.91	37.46	67.15
2	1.75	26.46	24.84	91.99
2.5	2.25	7.44	6.98	98.98
3	2.75	0.93	0.87	99.85
3.5	3.25	0.10	0.09	99.94
4	3.75	0.04	0.04	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.385
5	-0.310
16	0.365
25	0.620
50	1.020
75	1.410
84	1.590
95	1.965
99	2.265

Moment Measures	(phi)	(mm)
Mean	1.203	0.434
Standard Deviation	0.695	0.618
Skewness	-1.116	
Kurtosis	6.299	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.977	0.992
Standard Deviation	0.613	0.651
Skewness (1)	-0.069	-0.119
Skewness (2)	-0.314	
Kurtosis	0.857	1.180



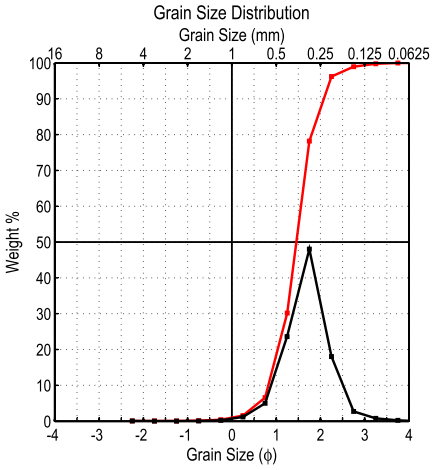
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**B3a**
Interval	**Grab**
Mean	**0.322 mm**
STD	**0.704 mm**
Skewness	**-0.855**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Very Leptokurtic
Total weight (gram)	120.86
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.79
% $CaCO_3$	1.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.02	0.02	0.02
-1.5	-1.75	0.12	0.10	0.12
-1	-1.25	0.08	0.07	0.18
-0.5	-0.75	0.19	0.16	0.34
0	-0.25	0.55	0.46	0.79
0.5	0.25	1.60	1.32	2.12
1	0.75	6.58	5.44	7.56
1.5	1.25	31.50	26.06	33.63
2	1.75	57.60	47.66	81.28
2.5	2.25	19.80	16.38	97.67
3	2.75	2.28	1.89	99.55
3.5	3.25	0.39	0.32	99.88
4	3.75	0.13	0.11	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.170
5	0.515
16	0.910
25	1.085
50	1.420
75	1.685
84	1.835
95	2.170
99	2.605

Moment Measures	(phi)	(mm)
Mean	1.634	0.322
Standard Deviation	0.507	0.704
Skewness	-0.855	
Kurtosis	7.763	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.373	1.388
Standard Deviation	0.462	0.482
Skewness (1)	-0.103	-0.098
Skewness (2)	-0.168	
Kurtosis	0.789	1.130



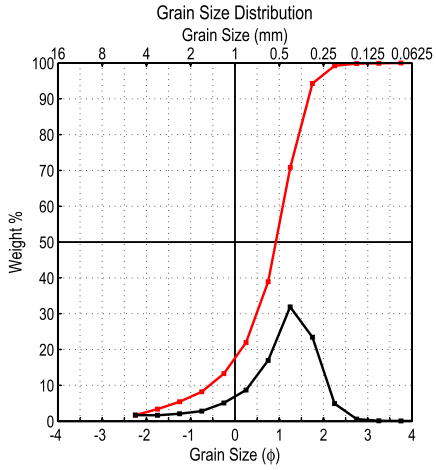
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**B3b**
Interval	**Grab**
Mean	**0.310 mm**
STD	**0.703 mm**
Skewness	**-0.364**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	115.69
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	0.41
% $CaCO_3$	0.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.06	0.05	0.05
-1.5	-1.75	0.02	0.02	0.07
-1	-1.25	0.01	0.01	0.08
-0.5	-0.75	0.09	0.08	0.16
0	-0.25	0.29	0.25	0.41
0.5	0.25	1.35	1.17	1.57
1	0.75	5.78	5.00	6.57
1.5	1.25	27.30	23.60	30.17
2	1.75	55.56	48.02	78.19
2.5	2.25	20.86	18.03	96.22
3	2.75	3.16	2.73	98.95
3.5	3.25	0.92	0.80	99.75
4	3.75	0.26	0.22	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	0.005
5	0.595
16	0.950
25	1.140
50	1.455
75	1.715
84	1.910
95	2.215
99	2.780

Moment Measures	(phi)	(mm)
Mean	1.689	0.310
Standard Deviation	0.508	0.703
Skewness	-0.364	
Kurtosis	6.997	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.430	1.438
Standard Deviation	0.480	0.485
Skewness (1)	-0.052	-0.057
Skewness (2)	-0.104	
Kurtosis	0.687	1.155



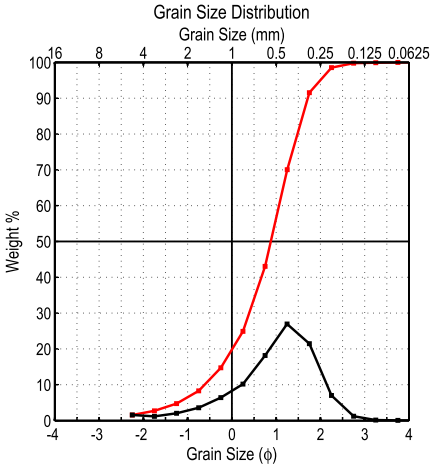
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**B3c**
Interval	**Grab**
Mean	**0.512 mm**
STD	**0.520 mm**
Skewness	**-1.296**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	109.88
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	13.28
% $CaCO_3$	1.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.87	1.70	1.70
-1.5	-1.75	1.81	1.65	3.35
-1	-1.25	2.27	2.07	5.41
-0.5	-0.75	3.07	2.79	8.21
0	-0.25	5.57	5.07	13.28
0.5	0.25	9.53	8.67	21.95
1	0.75	18.66	16.98	38.93
1.5	1.25	35.07	31.92	70.85
2	1.75	25.76	23.44	94.29
2.5	2.25	5.42	4.93	99.23
3	2.75	0.63	0.57	99.80
3.5	3.25	0.11	0.10	99.90
4	3.75	0.08	0.07	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-1.350
16	-0.095
25	0.340
50	0.925
75	1.340
84	1.530
95	1.820
99	2.225

Moment Measures	(phi)	(mm)
Mean	0.966	0.512
Standard Deviation	0.944	0.520
Skewness	-1.296	
Kurtosis	4.998	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.718	0.787
Standard Deviation	0.812	0.887
Skewness (1)	-0.255	-0.345
Skewness (2)	-0.849	
Kurtosis	0.951	1.299



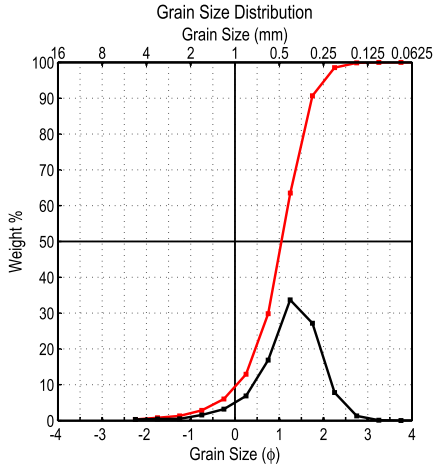
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**B3d**
Interval	**Grab**
Mean	**0.517 mm**
STD	**0.512 mm**
Skewness	**-0.998**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.60
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	14.75
% $CaCO_3$	1.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.60	1.56	1.56
-1.5	-1.75	1.20	1.17	2.73
-1	-1.25	2.07	2.02	4.75
-0.5	-0.75	3.66	3.57	8.31
0	-0.25	6.60	6.43	14.75
0.5	0.25	10.44	10.18	24.92
1	0.75	18.62	18.15	43.07
1.5	1.25	27.65	26.95	70.02
2	1.75	22.05	21.49	91.51
2.5	2.25	7.20	7.02	98.53
3	2.75	1.25	1.22	99.75
3.5	3.25	0.17	0.17	99.91
4	3.75	0.07	0.07	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.215
16	-0.190
25	0.250
50	0.880
75	1.365
84	1.575
95	2.000
99	2.445

Moment Measures	(phi)	(mm)
Mean	0.951	0.517
Standard Deviation	0.965	0.512
Skewness	-0.998	
Kurtosis	4.286	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.692	0.755
Standard Deviation	0.882	0.928
Skewness (1)	-0.212	-0.258
Skewness (2)	-0.552	
Kurtosis	0.822	1.182



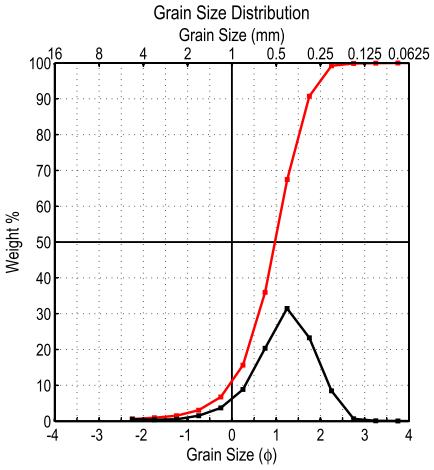
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**B3e**
Interval	**Grab**
Mean	**0.430 mm**
STD	**0.601 mm**
Skewness	**-1.119**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	103.19
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	6.04
% $CaCO_3$	1.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.34	0.33	0.33
-1.5	-1.75	0.48	0.47	0.79
-1	-1.25	0.53	0.51	1.31
-0.5	-0.75	1.60	1.55	2.86
0	-0.25	3.28	3.18	6.04
0.5	0.25	7.11	6.89	12.93
1	0.75	17.43	16.89	29.82
1.5	1.25	34.77	33.70	63.51
2	1.75	28.04	27.17	90.69
2.5	2.25	8.10	7.85	98.54
3	2.75	1.37	1.33	99.86
3.5	3.25	0.11	0.11	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.550
5	-0.415
16	0.340
25	0.605
50	1.050
75	1.460
84	1.625
95	2.025
99	2.425

Moment Measures	(phi)	(mm)
Mean	1.217	0.430
Standard Deviation	0.735	0.601
Skewness	-1.119	
Kurtosis	5.786	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.982	1.005
Standard Deviation	0.643	0.691
Skewness (1)	-0.105	-0.153
Skewness (2)	-0.381	
Kurtosis	0.899	1.170



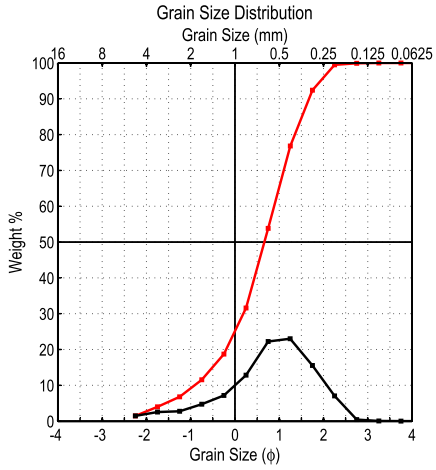
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**BC-E7a**
Interval	**Grab**
Mean	**0.453 mm**
STD	**0.590 mm**
Skewness	**-1.033**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	114.92
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	6.77
% $CaCO_3$	1.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.66	0.57	0.57
-1.5	-1.75	0.45	0.39	0.97
-1	-1.25	0.64	0.56	1.52
-0.5	-0.75	1.76	1.53	3.05
0	-0.25	4.27	3.72	6.77
0.5	0.25	10.19	8.87	15.64
1	0.75	23.39	20.35	35.99
1.5	1.25	36.16	31.47	67.46
2	1.75	26.74	23.27	90.72
2.5	2.25	9.73	8.47	99.19
3	2.75	0.75	0.65	99.84
3.5	3.25	0.10	0.09	99.93
4	3.75	0.05	0.04	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-1.720
5	-0.490
16	0.260
25	0.480
50	0.975
75	1.410
84	1.605
95	2.005
99	2.240

Moment Measures	(phi)	(mm)
Mean	1.142	0.453
Standard Deviation	0.761	0.590
Skewness	-1.033	
Kurtosis	5.597	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.932	0.947
Standard Deviation	0.673	0.714
Skewness (1)	-0.063	-0.119
Skewness (2)	-0.323	
Kurtosis	0.855	1.100



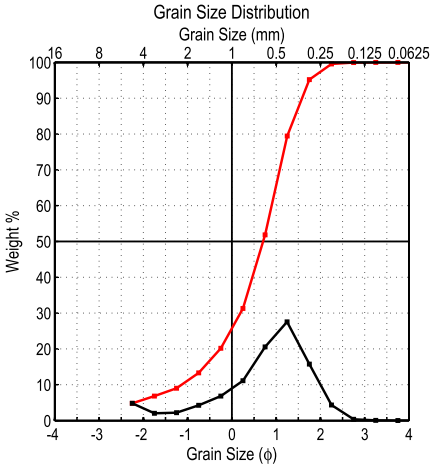
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**BC-E7b**
Interval	**Grab**
Mean	**0.587 mm**
STD	**0.498 mm**
Skewness	**-0.827**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	102.92
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	18.74
% $CaCO_3$	2.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.52	1.48	1.48
-1.5	-1.75	2.63	2.56	4.03
-1	-1.25	2.85	2.77	6.80
-0.5	-0.75	4.88	4.74	11.54
0	-0.25	7.41	7.20	18.74
0.5	0.25	13.21	12.84	31.58
1	0.75	22.89	22.24	53.82
1.5	1.25	23.68	23.01	76.83
2	1.75	16.02	15.57	92.39
2.5	2.25	7.28	7.07	99.47
3	2.75	0.45	0.44	99.90
3.5	3.25	0.06	0.06	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.575
16	-0.440
25	-0.005
50	0.665
75	1.210
84	1.480
95	1.935
99	2.215

Moment Measures	(phi)	(mm)
Mean	0.767	0.587
Standard Deviation	1.006	0.498
Skewness	-0.827	
Kurtosis	3.593	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.520	0.568
Standard Deviation	0.960	1.012
Skewness (1)	-0.151	-0.214
Skewness (2)	-0.505	
Kurtosis	0.828	1.184



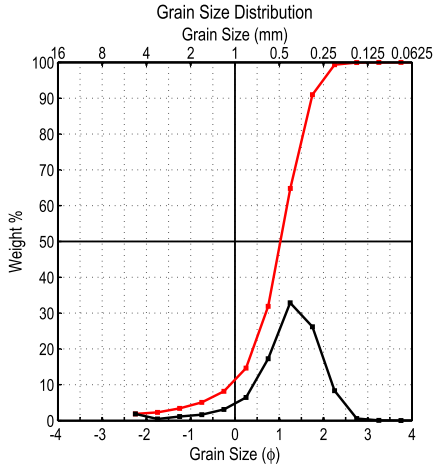
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**BC-E7c**
Interval	**Grab**
Mean	**0.619 mm**
STD	**0.471 mm**
Skewness	**-1.112**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	110.39
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	20.16
% $CaCO_3$	1.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	5.31	4.81	4.81
-1.5	-1.75	2.23	2.02	6.83
-1	-1.25	2.45	2.22	9.05
-0.5	-0.75	4.73	4.28	13.33
0	-0.25	7.54	6.83	20.16
0.5	0.25	12.30	11.14	31.31
1	0.75	22.69	20.55	51.86
1.5	1.25	30.44	27.57	79.44
2	1.75	17.39	15.75	95.19
2.5	2.25	4.81	4.36	99.55
3	2.75	0.42	0.38	99.93
3.5	3.25	0.05	0.05	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.205
16	-0.555
25	-0.035
50	0.705
75	1.170
84	1.395
95	1.745
99	2.185

Moment Measures	(phi)	(mm)
Mean	0.693	0.619
Standard Deviation	1.087	0.471
Skewness	-1.112	
Kurtosis	3.922	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.420	0.515
Standard Deviation	0.975	1.086
Skewness (1)	-0.292	-0.383
Skewness (2)	-0.959	
Kurtosis	1.026	1.343



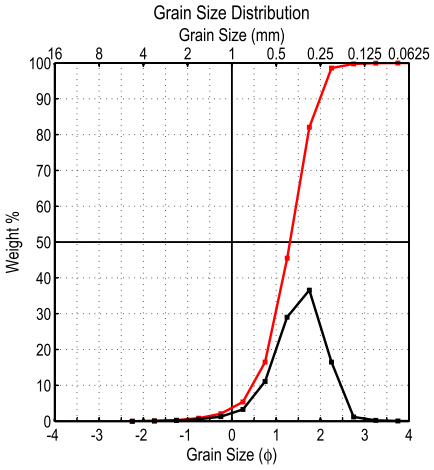
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**BC-E7d**
Interval	**Grab**
Mean	**0.454 mm**
STD	**0.552 mm**
Skewness	**-1.629**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	119.34
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	8.19
% $CaCO_3$	1.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.22	1.86	1.86
-1.5	-1.75	0.53	0.44	2.30
-1	-1.25	1.34	1.12	3.43
-0.5	-0.75	1.98	1.66	5.09
0	-0.25	3.70	3.10	8.19
0.5	0.25	7.69	6.44	14.63
1	0.75	20.62	17.28	31.91
1.5	1.25	39.23	32.87	64.78
2	1.75	31.26	26.19	90.98
2.5	2.25	9.98	8.36	99.34
3	2.75	0.71	0.59	99.93
3.5	3.25	0.07	0.06	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-0.775
16	0.290
25	0.550
50	1.025
75	1.445
84	1.615
95	1.990
99	2.230

Moment Measures	(phi)	(mm)
Mean	1.138	0.454
Standard Deviation	0.857	0.552
Skewness	-1.629	
Kurtosis	6.884	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.952	0.977
Standard Deviation	0.662	0.750
Skewness (1)	-0.109	-0.206
Skewness (2)	-0.630	
Kurtosis	1.087	1.266



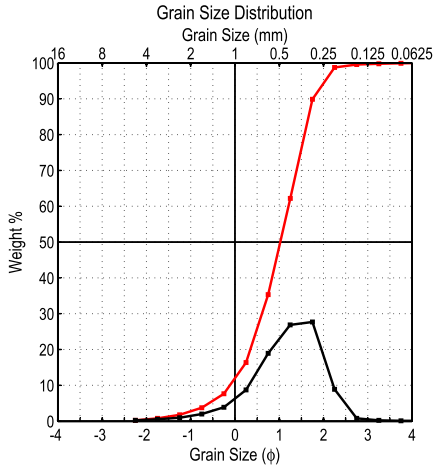
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**BC-E7e**
Interval	**Grab**
Mean	**0.355 mm**
STD	**0.658 mm**
Skewness	**-0.852**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	106.43
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	2.10
% $CaCO_3$	1.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.07	0.07	0.07
-1	-1.25	0.21	0.20	0.26
-0.5	-0.75	0.59	0.55	0.82
0	-0.25	1.36	1.28	2.10
0.5	0.25	3.49	3.28	5.37
1	0.75	11.82	11.11	16.48
1.5	1.25	30.87	29.00	45.49
2	1.75	38.92	36.57	82.05
2.5	2.25	17.55	16.49	98.54
3	2.75	1.24	1.17	99.71
3.5	3.25	0.23	0.22	99.92
4	3.75	0.08	0.08	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.680
5	0.195
16	0.730
25	0.895
50	1.310
75	1.655
84	1.810
95	2.145
99	2.445

Moment Measures	(phi)	(mm)
Mean	1.496	0.355
Standard Deviation	0.604	0.658
Skewness	-0.852	
Kurtosis	5.123	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.270	1.283
Standard Deviation	0.540	0.565
Skewness (1)	-0.074	-0.109
Skewness (2)	-0.259	
Kurtosis	0.806	1.052



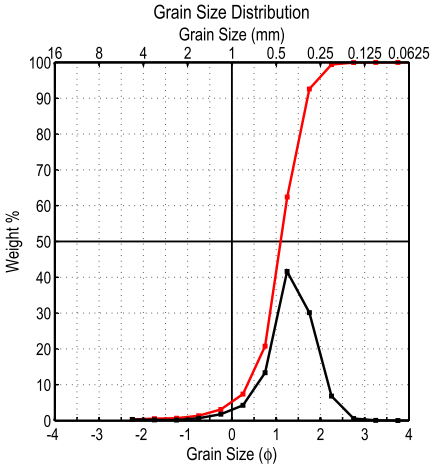
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**BC-E7f**
Interval	**Grab**
Mean	**0.444 mm**
STD	**0.575 mm**
Skewness	**-0.852**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.14
% finer than 4.00 phi	0.13
% coarser than -1.00 phi	7.65
% $CaCO_3$	2.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.26	0.25	0.25
-1.5	-1.75	0.56	0.55	0.80
-1	-1.25	0.98	0.96	1.76
-0.5	-0.75	2.03	1.99	3.75
0	-0.25	3.98	3.90	7.65
0.5	0.25	8.91	8.72	16.37
1	0.75	19.35	18.94	35.31
1.5	1.25	27.44	26.87	62.18
2	1.75	28.27	27.68	89.86
2.5	2.25	9.08	8.89	98.75
3	2.75	0.81	0.79	99.54
3.5	3.25	0.22	0.22	99.76
4	3.75	0.12	0.12	99.87
>4.0	4.25	0.13	0.13	100.00

Percentiles	
1	-1.645
5	-0.590
16	0.230
25	0.480
50	1.025
75	1.480
84	1.645
95	2.040
99	2.410

Moment Measures	(phi)	(mm)
Mean	1.171	0.444
Standard Deviation	0.800	0.575
Skewness	-0.852	
Kurtosis	4.851	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.938	0.967
Standard Deviation	0.708	0.752
Skewness (1)	-0.124	-0.176
Skewness (2)	-0.424	
Kurtosis	0.859	1.078



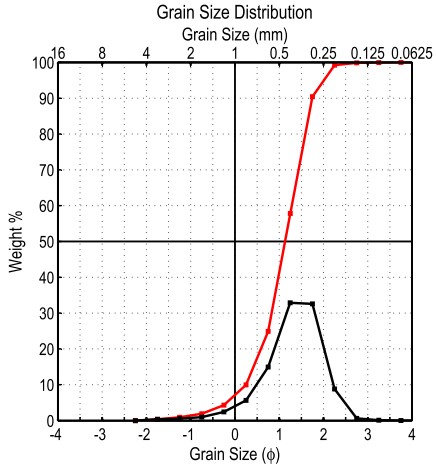
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**BC-E7g**
Interval	**Grab**
Mean	**0.404 mm**
STD	**0.658 mm**
Skewness	**-1.446**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	106.81
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	3.13
% $CaCO_3$	1.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.35	0.33	0.33
-1.5	-1.75	0.21	0.20	0.52
-1	-1.25	0.14	0.13	0.66
-0.5	-0.75	0.72	0.67	1.33
0	-0.25	1.92	1.80	3.13
0.5	0.25	4.55	4.26	7.39
1	0.75	14.29	13.38	20.77
1.5	1.25	44.46	41.62	62.39
2	1.75	32.21	30.16	92.55
2.5	2.25	7.29	6.83	99.37
3	2.75	0.60	0.56	99.93
3.5	3.25	0.05	0.05	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.995
5	-0.030
16	0.570
25	0.800
50	1.100
75	1.460
84	1.610
95	1.930
99	2.225

Moment Measures	**(phi)**	**(mm)**
Mean	1.308	0.404
Standard Deviation	0.605	0.658
Skewness	-1.446	
Kurtosis	8.626	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.090	1.093
Standard Deviation	0.520	0.557
Skewness (1)	-0.019	-0.086
Skewness (2)	-0.288	
Kurtosis	0.885	1.217



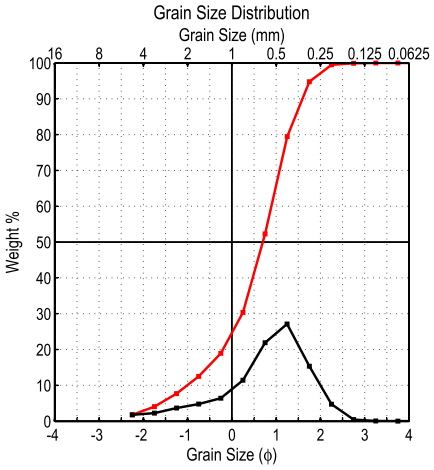
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**BC-E7h**
Interval	**Grab**
Mean	**0.406 mm**
STD	**0.630 mm**
Skewness	**-1.096**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	107.40
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	4.32
% $CaCO_3$	1.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.40	0.37	0.37
-1	-1.25	0.59	0.55	0.92
-0.5	-0.75	1.05	0.98	1.90
0	-0.25	2.60	2.42	4.32
0.5	0.25	6.06	5.64	9.96
1	0.75	16.06	14.95	24.92
1.5	1.25	35.33	32.90	57.81
2	1.75	34.99	32.58	90.39
2.5	2.25	9.49	8.84	99.23
3	2.75	0.67	0.62	99.85
3.5	3.25	0.11	0.10	99.95
4	3.75	0.04	0.04	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.210
5	-0.190
16	0.450
25	0.750
50	1.130
75	1.515
84	1.650
95	2.010
99	2.235

Moment Measures	**(phi)**	**(mm)**
Mean	1.302	0.406
Standard Deviation	0.666	0.630
Skewness	-1.096	
Kurtosis	5.588	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.050	1.077
Standard Deviation	0.600	0.633
Skewness (1)	-0.133	-0.167
Skewness (2)	-0.367	
Kurtosis	0.833	1.179



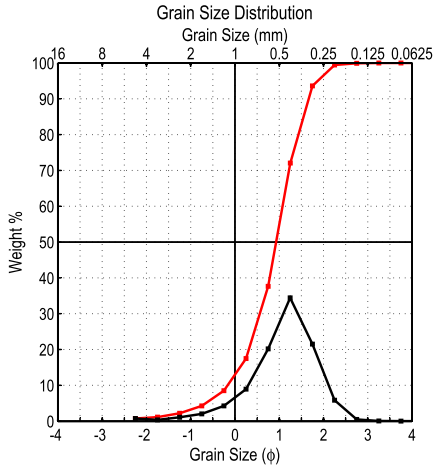
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**BC-E7i**
Interval	**Grab**
Mean	**0.597 mm**
STD	**0.500 mm**
Skewness	**-0.952**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	111.16
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	18.93
% $CaCO_3$	1.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.00	1.80	1.80
-1.5	-1.75	2.52	2.27	4.07
-1	-1.25	4.06	3.65	7.72
-0.5	-0.75	5.32	4.79	12.50
0	-0.25	7.14	6.42	18.93
0.5	0.25	12.69	11.42	30.34
1	0.75	24.36	21.91	52.26
1.5	1.25	30.18	27.15	79.41
2	1.75	17.05	15.34	94.75
2.5	2.25	5.25	4.72	99.47
3	2.75	0.49	0.44	99.91
3.5	3.25	0.07	0.06	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.620
16	-0.480
25	0.015
50	0.700
75	1.170
84	1.400
95	1.775
99	2.200

Moment Measures	**(phi)**	**(mm)**
Mean	0.744	0.597
Standard Deviation	1.001	0.500
Skewness	-0.952	
Kurtosis	3.738	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.460	0.540
Standard Deviation	0.940	0.984
Skewness (1)	-0.255	-0.311
Skewness (2)	-0.662	
Kurtosis	0.806	1.205



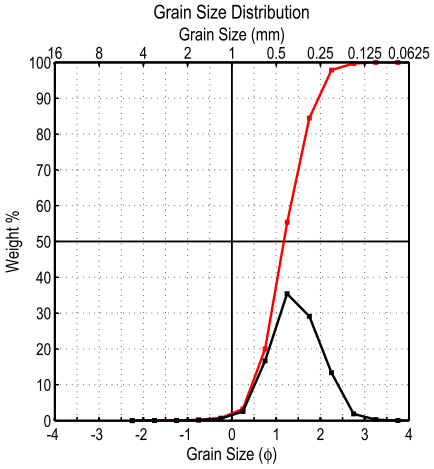
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**BC-E7j**
Interval	**Grab**
Mean	**0.478 mm**
STD	**0.583 mm**
Skewness	**-1.193**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	122.88
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	8.53
% $CaCO_3$	1.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.93	0.76	0.76
-1.5	-1.75	0.45	0.37	1.12
-1	-1.25	1.32	1.07	2.20
-0.5	-0.75	2.52	2.05	4.25
0	-0.25	5.26	4.28	8.53
0.5	0.25	11.00	8.95	17.48
1	0.75	24.78	20.17	37.65
1.5	1.25	42.29	34.42	72.06
2	1.75	26.44	21.52	93.58
2.5	2.25	7.17	5.83	99.41
3	2.75	0.60	0.49	99.90
3.5	3.25	0.09	0.07	99.98
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.920
5	-0.660
16	0.165
25	0.435
50	0.930
75	1.320
84	1.525
95	1.870
99	2.215

Moment Measures	**(phi)**	**(mm)**
Mean	1.065	0.478
Standard Deviation	0.778	0.583
Skewness	-1.193	
Kurtosis	5.689	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.845	0.873
Standard Deviation	0.680	0.723
Skewness (1)	-0.125	-0.191
Skewness (2)	-0.478	
Kurtosis	0.860	1.172



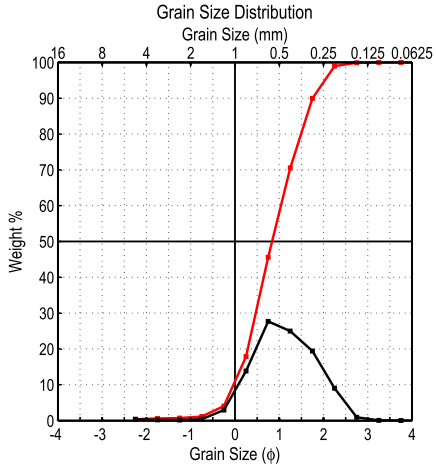
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NSS-01a**
Interval	**Swash**
Mean	**0.368 mm**
STD	**0.678 mm**
Skewness	**-0.094**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	119.10
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	0.72
% $CaCO_3$	1.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.05	0.04	0.04
-1	-1.25	0.01	0.01	0.05
-0.5	-0.75	0.17	0.14	0.19
0	-0.25	0.63	0.53	0.72
0.5	0.25	3.06	2.57	3.29
1	0.75	19.85	16.67	19.96
1.5	1.25	42.17	35.41	55.37
2	1.75	34.66	29.10	84.47
2.5	2.25	15.90	13.35	97.82
3	2.75	2.23	1.87	99.69
3.5	3.25	0.34	0.29	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.195
5	0.300
16	0.630
25	0.820
50	1.175
75	1.585
84	1.740
95	2.145
99	2.565

Moment Measures	(phi)	(mm)
Mean	1.442	0.368
Standard Deviation	0.560	0.678
Skewness	-0.094	
Kurtosis	3.727	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.185	1.182
Standard Deviation	0.555	0.557
Skewness (1)	0.018	0.035
Skewness (2)	0.086	
Kurtosis	0.662	0.988



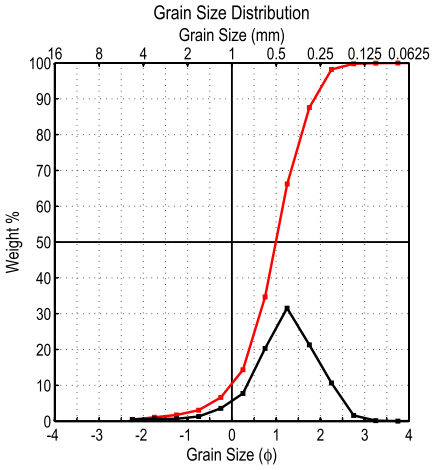
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NSS-01b**
Interval	**LTT**
Mean	**0.466 mm**
STD	**0.611 mm**
Skewness	**-0.425**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	105.22
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	4.06
% $CaCO_3$	1.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.38	0.36	0.36
-1.5	-1.75	0.22	0.21	0.57
-1	-1.25	0.15	0.14	0.71
-0.5	-0.75	0.45	0.43	1.14
0	-0.25	3.07	2.92	4.06
0.5	0.25	14.55	13.83	17.89
1	0.75	29.14	27.69	45.58
1.5	1.25	26.28	24.98	70.56
2	1.75	20.41	19.40	89.95
2.5	2.25	9.48	9.01	98.96
3	2.75	0.97	0.92	99.89
3.5	3.25	0.08	0.08	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.915
5	-0.215
16	0.180
25	0.380
50	0.840
75	1.365
84	1.595
95	2.030
99	2.270

Moment Measures	(phi)	(mm)
Mean	1.102	0.466
Standard Deviation	0.711	0.611
Skewness	-0.425	
Kurtosis	4.547	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.887	0.872
Standard Deviation	0.708	0.694
Skewness (1)	0.067	0.064
Skewness (2)	0.095	
Kurtosis	0.587	0.934



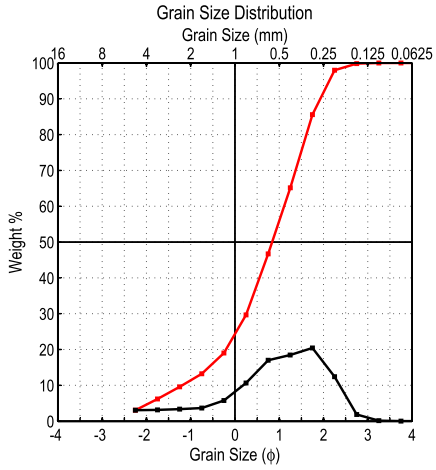
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NSS-02a**
Interval	**Swash**
Mean	**0.441 mm**
STD	**0.580 mm**
Skewness	**-0.952**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	120.13
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	6.63
% $CaCO_3$	1.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.54	0.45	0.45
-1.5	-1.75	0.78	0.65	1.10
-1	-1.25	0.78	0.65	1.75
-0.5	-0.75	1.58	1.32	3.06
0	-0.25	4.29	3.57	6.63
0.5	0.25	9.28	7.72	14.36
1	0.75	24.40	20.31	34.67
1.5	1.25	37.88	31.53	66.20
2	1.75	25.61	21.32	87.52
2.5	2.25	12.80	10.65	98.17
3	2.75	1.93	1.61	99.78
3.5	3.25	0.20	0.17	99.95
4	3.75	0.04	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.825
5	-0.480
16	0.290
25	0.510
50	0.995
75	1.455
84	1.665
95	2.100
99	2.505

Moment Measures	(phi)	(mm)
Mean	1.182	0.441
Standard Deviation	0.785	0.580
Skewness	-0.952	
Kurtosis	5.382	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.978	0.983
Standard Deviation	0.688	0.735
Skewness (1)	-0.025	-0.084
Skewness (2)	-0.269	
Kurtosis	0.876	1.119



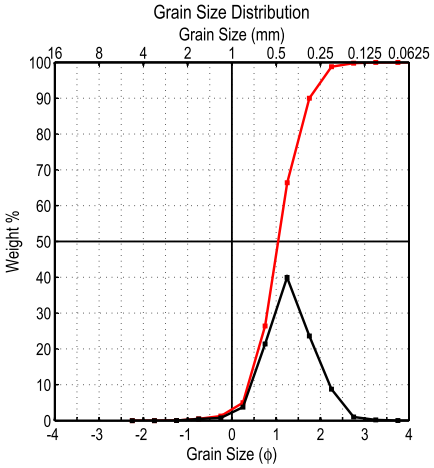
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NSS-02b**
Interval	**LTT**
Mean	**0.547 mm**
STD	**0.443 mm**
Skewness	**-0.902**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	107.81
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	19.01
% $CaCO_3$	2.6

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.31	3.07	3.07
-1.5	-1.75	3.39	3.14	6.21
-1	-1.25	3.63	3.37	9.58
-0.5	-0.75	3.96	3.67	13.25
0	-0.25	6.21	5.76	19.01
0.5	0.25	11.50	10.67	29.68
1	0.75	18.32	16.99	46.68
1.5	1.25	19.89	18.45	65.12
2	1.75	22.02	20.42	85.55
2.5	2.25	13.39	12.42	97.97
3	2.75	1.99	1.85	99.81
3.5	3.25	0.17	0.16	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.945
16	-0.510
25	0.030
50	0.840
75	1.490
84	1.710
95	2.130
99	2.530

Moment Measures	(phi)	(mm)
Mean	0.870	0.547
Standard Deviation	1.173	0.443
Skewness	-0.902	
Kurtosis	3.335	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.600	0.680
Standard Deviation	1.110	1.172
Skewness (1)	-0.216	-0.292
Skewness (2)	-0.673	
Kurtosis	0.836	1.144



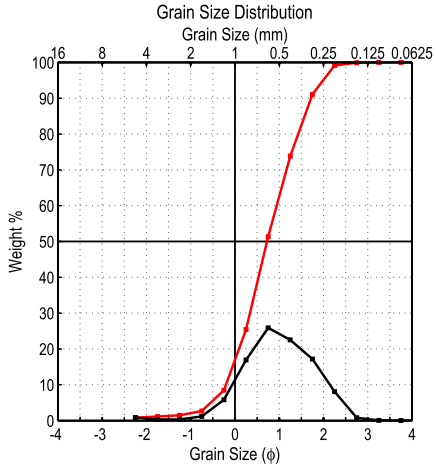
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NSS-03a**
Interval	**Swash**
Mean	**0.403 mm**
STD	**0.682 mm**
Skewness	**-0.084**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	106.47
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	1.25
% $CaCO_3$	1.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.04	0.04	0.04
-0.5	-0.75	0.48	0.45	0.49
0	-0.25	0.81	0.76	1.25
0.5	0.25	4.01	3.77	5.02
1	0.75	22.78	21.40	26.41
1.5	1.25	42.55	39.96	66.38
2	1.75	25.14	23.61	89.99
2.5	2.25	9.34	8.77	98.76
3	2.75	1.08	1.01	99.77
3.5	3.25	0.21	0.20	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.415
5	0.250
16	0.505
25	0.715
50	1.045
75	1.435
84	1.625
95	2.035
99	2.370

Moment Measures	(phi)	(mm)
Mean	1.310	0.403
Standard Deviation	0.552	0.682
Skewness	-0.084	
Kurtosis	4.027	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.065	1.058
Standard Deviation	0.560	0.550
Skewness (1)	0.036	0.072
Skewness (2)	0.174	
Kurtosis	0.594	1.016



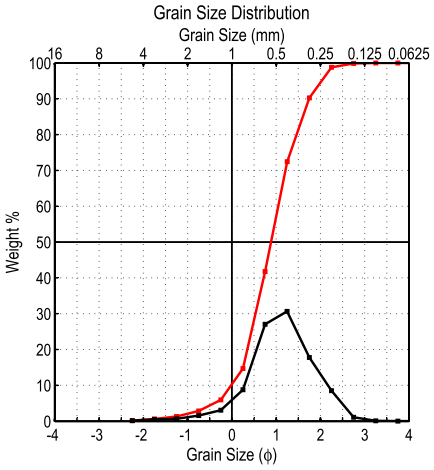
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NSS-03b**
Interval	**LTT**
Mean	**0.509 mm**
STD	**0.576 mm**
Skewness	**-0.602**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	116.47
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	8.47
% $CaCO_3$	2.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.98	0.84	0.84
-1.5	-1.75	0.36	0.31	1.15
-1	-1.25	0.39	0.33	1.49
-0.5	-0.75	1.38	1.18	2.67
0	-0.25	6.75	5.80	8.47
0.5	0.25	19.73	16.94	25.41
1	0.75	30.17	25.90	51.31
1.5	1.25	26.27	22.56	73.86
2	1.75	20.01	17.18	91.04
2.5	2.25	9.41	8.08	99.12
3	2.75	0.91	0.78	99.91
3.5	3.25	0.08	0.07	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.995
5	-0.550
16	-0.030
25	0.240
50	0.725
75	1.285
84	1.545
95	1.995
99	2.240

Moment Measures	(phi)	(mm)
Mean	0.974	0.509
Standard Deviation	0.796	0.576
Skewness	-0.602	
Kurtosis	4.578	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.757	0.747
Standard Deviation	0.788	0.779
Skewness (1)	0.041	0.020
Skewness (2)	-0.003	
Kurtosis	0.616	0.998



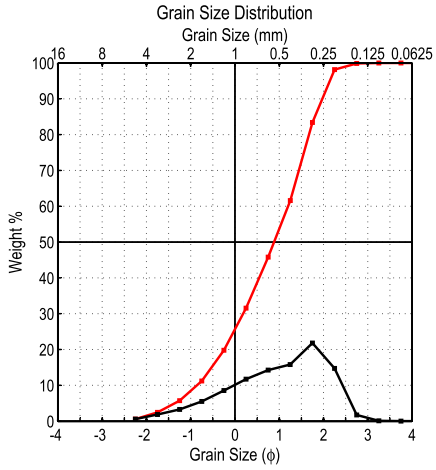
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NSS-04a**
Interval	**Swash**
Mean	**0.464 mm**
STD	**0.604 mm**
Skewness	**-0.668**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	114.15
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	5.93
% $CaCO_3$	1.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.16	0.14	0.14
-1.5	-1.75	0.54	0.47	0.61
-1	-1.25	0.77	0.67	1.29
-0.5	-0.75	1.79	1.57	2.86
0	-0.25	3.51	3.07	5.93
0.5	0.25	10.02	8.78	14.71
1	0.75	30.90	27.07	41.78
1.5	1.25	35.00	30.66	72.44
2	1.75	20.32	17.80	90.24
2.5	2.25	9.74	8.53	98.77
3	2.75	1.25	1.10	99.87
3.5	3.25	0.12	0.11	99.97
4	3.75	0.03	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.465
5	-0.400
16	0.275
25	0.440
50	0.885
75	1.320
84	1.575
95	2.030
99	2.355

Moment Measures	(phi)	(mm)
Mean	1.107	0.464
Standard Deviation	0.727	0.604
Skewness	-0.668	
Kurtosis	4.768	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.925	0.912
Standard Deviation	0.650	0.693
Skewness (1)	0.062	0.002
Skewness (2)	-0.108	
Kurtosis	0.869	1.132



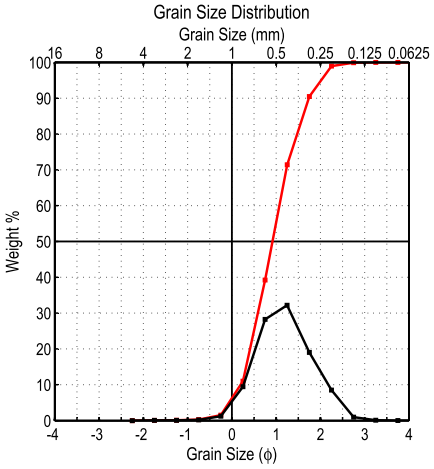
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NSS-04b**
Interval	**LTT**
Mean	**0.517 mm**
STD	**0.473 mm**
Skewness	**-0.636**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	112.04
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	19.79
% $CaCO_3$	3.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.63	0.56	0.56
-1.5	-1.75	2.11	1.88	2.45
-1	-1.25	3.66	3.27	5.71
-0.5	-0.75	6.18	5.52	11.23
0	-0.25	9.59	8.56	19.79
0.5	0.25	13.16	11.75	31.53
1	0.75	15.96	14.24	45.78
1.5	1.25	17.69	15.79	61.57
2	1.75	24.42	21.80	83.36
2.5	2.25	16.53	14.75	98.12
3	2.75	1.95	1.74	99.86
3.5	3.25	0.13	0.12	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.135
5	-1.360
16	-0.470
25	-0.030
50	0.885
75	1.560
84	1.770
95	2.145
99	2.505

Moment Measures	(phi)	(mm)
Mean	0.950	0.517
Standard Deviation	1.080	0.473
Skewness	-0.636	
Kurtosis	2.771	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.650	0.728
Standard Deviation	1.120	1.091
Skewness (1)	-0.210	-0.245
Skewness (2)	-0.440	
Kurtosis	0.565	0.903



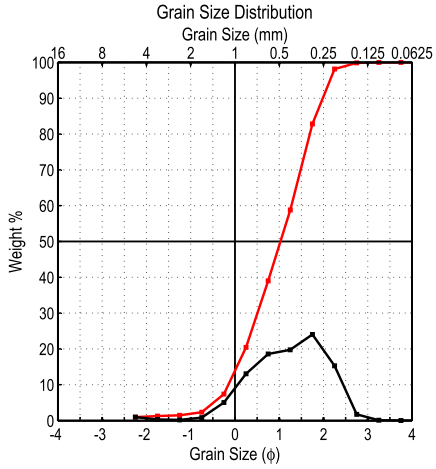
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NSS-05a**
Interval	**Swash**
Mean	**0.440 mm**
STD	**0.659 mm**
Skewness	**0.062**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	107.48
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	1.52
% $CaCO_3$	0.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.05	0.05	0.05
-1	-1.25	0.05	0.05	0.09
-0.5	-0.75	0.20	0.19	0.28
0	-0.25	1.33	1.24	1.52
0.5	0.25	10.19	9.48	11.00
1	0.75	30.35	28.24	39.24
1.5	1.25	34.59	32.18	71.42
2	1.75	20.45	19.03	90.44
2.5	2.25	9.13	8.49	98.94
3	2.75	1.03	0.96	99.90
3.5	3.25	0.10	0.09	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.460
5	-0.065
16	0.340
25	0.500
50	0.915
75	1.345
84	1.580
95	2.020
99	2.280

Moment Measures	(phi)	(mm)
Mean	1.186	0.440
Standard Deviation	0.602	0.659
Skewness	0.062	
Kurtosis	3.197	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.960	0.945
Standard Deviation	0.620	0.626
Skewness (1)	0.073	0.066
Skewness (2)	0.101	
Kurtosis	0.681	1.011



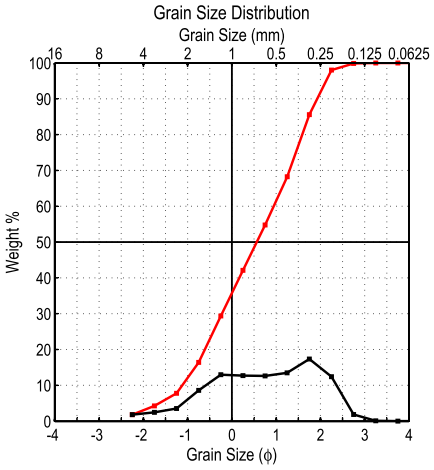
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NSS-05b**
Interval	**LTT**
Mean	**0.439 mm**
STD	**0.551 mm**
Skewness	**-0.834**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	107.26
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	7.38
% $CaCO_3$	1.4

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.03	0.96	0.96
-1.5	-1.75	0.34	0.32	1.28
-1	-1.25	0.23	0.21	1.49
-0.5	-0.75	0.92	0.86	2.35
0	-0.25	5.40	5.03	7.38
0.5	0.25	13.99	13.04	20.43
1	0.75	19.96	18.61	39.04
1.5	1.25	21.19	19.76	58.79
2	1.75	25.78	24.04	82.83
2.5	2.25	16.40	15.29	98.12
3	2.75	1.88	1.75	99.87
3.5	3.25	0.12	0.11	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.185
5	-0.485
16	0.080
25	0.375
50	1.025
75	1.585
84	1.790
95	2.150
99	2.500

Moment Measures	(phi)	(mm)
Mean	1.187	0.439
Standard Deviation	0.859	0.551
Skewness	-0.834	
Kurtosis	4.495	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.935	0.965
Standard Deviation	0.855	0.827
Skewness (1)	-0.105	-0.126
Skewness (2)	-0.225	
Kurtosis	0.541	0.892



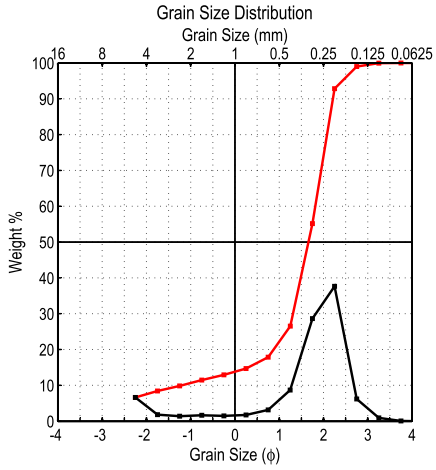
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-01a**
Interval	**Swash**
Mean	**0.612 mm**
STD	**0.443 mm**
Skewness	**-0.394**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	115.40
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	29.37
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.08	1.80	1.80
-1.5	-1.75	2.83	2.45	4.25
-1	-1.25	4.09	3.54	7.80
-0.5	-0.75	9.92	8.60	16.40
0	-0.25	14.97	12.97	29.37
0.5	0.25	14.70	12.74	42.11
1	0.75	14.59	12.64	54.75
1.5	1.25	15.56	13.48	68.23
2	1.75	20.02	17.35	85.58
2.5	2.25	14.32	12.41	97.99
3	2.75	2.17	1.88	99.87
3.5	3.25	0.13	0.11	99.98
4	3.75	0.02	0.02	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.645
16	-0.775
25	-0.420
50	0.560
75	1.445
84	1.705
95	2.130
99	2.520

Moment Measures	(phi)	(mm)
Mean	0.709	0.612
Standard Deviation	1.175	0.443
Skewness	-0.394	
Kurtosis	2.418	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.465	0.497
Standard Deviation	1.240	1.192
Skewness (1)	-0.077	-0.122
Skewness (2)	-0.256	
Kurtosis	0.522	0.830



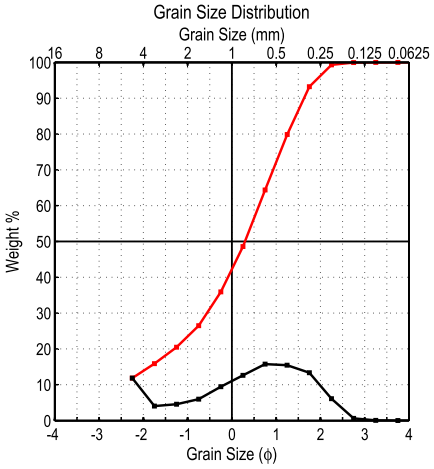
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-01b**
Interval	**LTT**
Mean	**0.360 mm**
STD	**0.398 mm**
Skewness	**-1.808**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	105.39
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	12.94
% $CaCO_3$	2.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.98	6.62	6.62
-1.5	-1.75	1.90	1.80	8.43
-1	-1.25	1.48	1.40	9.83
-0.5	-0.75	1.74	1.65	11.48
0	-0.25	1.54	1.46	12.94
0.5	0.25	1.85	1.76	14.70
1	0.75	3.33	3.16	17.86
1.5	1.25	9.16	8.69	26.55
2	1.75	30.16	28.62	55.17
2.5	2.25	39.68	37.65	92.82
3	2.75	6.53	6.20	99.01
3.5	3.25	0.98	0.93	99.94
4	3.75	0.05	0.05	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	0.455
25	1.160
50	1.660
75	2.015
84	2.135
95	2.425
99	2.750

Moment Measures	(phi)	(mm)
Mean	1.473	0.360
Standard Deviation	1.328	0.398
Skewness	-1.808	
Kurtosis	5.282	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.295	1.417
Standard Deviation	0.840	1.128
Skewness (1)	-0.435	-0.554
Skewness (2)	-1.872	
Kurtosis	1.783	2.241



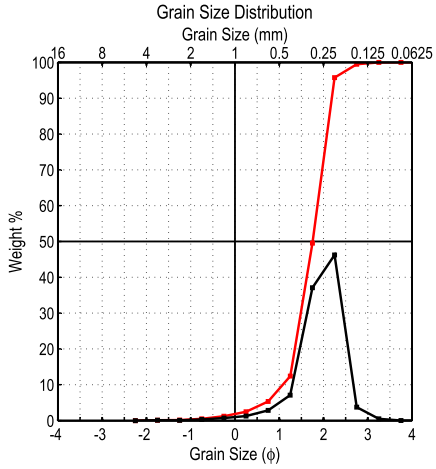
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-02a**
Interval	**Swash**
Mean	**0.829 mm**
STD	**0.387 mm**
Skewness	**-0.499**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	102.48
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	35.95
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	12.15	11.86	11.86
-1.5	-1.75	4.16	4.06	15.92
-1	-1.25	4.70	4.59	20.50
-0.5	-0.75	6.12	5.97	26.47
0	-0.25	9.71	9.48	35.95
0.5	0.25	12.96	12.65	48.59
1	0.75	16.16	15.77	64.36
1.5	1.25	15.86	15.48	79.84
2	1.75	13.70	13.37	93.21
2.5	2.25	6.25	6.10	99.31
3	2.75	0.63	0.61	99.92
3.5	3.25	0.05	0.05	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.740
25	-0.875
50	0.295
75	1.095
84	1.405
95	1.895
99	2.225

Moment Measures	(phi)	(mm)
Mean	0.271	0.829
Standard Deviation	1.369	0.387
Skewness	-0.499	
Kurtosis	2.227	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.167	-0.013
Standard Deviation	1.572	1.414
Skewness (1)	-0.294	-0.261
Skewness (2)	-0.300	
Kurtosis	0.318	0.862



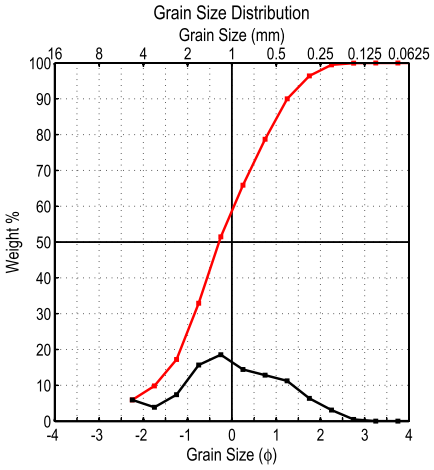
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-02b**
Interval	**LTT**
Mean	**0.265 mm**
STD	**0.693 mm**
Skewness	**-1.875**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	106.57
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	1.21
% $CaCO_3$	1.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.10	0.09	0.09
-1	-1.25	0.06	0.06	0.15
-0.5	-0.75	0.36	0.34	0.49
0	-0.25	0.77	0.72	1.21
0.5	0.25	1.35	1.27	2.48
1	0.75	3.05	2.86	5.34
1.5	1.25	7.55	7.08	12.42
2	1.75	39.52	37.08	49.51
2.5	2.25	49.26	46.22	95.73
3	2.75	4.00	3.75	99.48
3.5	3.25	0.54	0.51	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.395
5	0.690
16	1.300
25	1.420
50	1.755
75	2.025
84	2.125
95	2.240
99	2.685

Moment Measures	(phi)	(mm)
Mean	1.916	0.265
Standard Deviation	0.528	0.693
Skewness	-1.875	
Kurtosis	9.784	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.712	1.727
Standard Deviation	0.413	0.441
Skewness (1)	-0.103	-0.239
Skewness (2)	-0.703	
Kurtosis	0.879	1.050



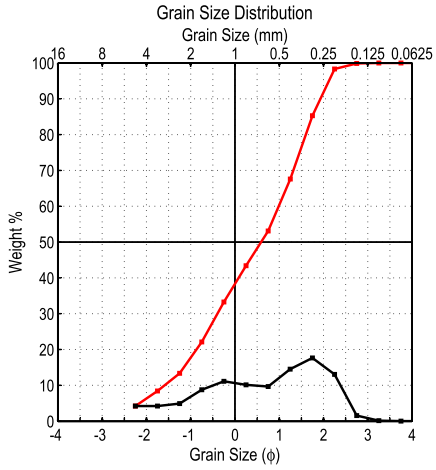
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-03a**
Interval	**Swash**
Mean	**0.992 mm**
STD	**0.455 mm**
Skewness	**-0.036**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	108.07
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	51.44
% $CaCO_3$	3.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.44	5.96	5.96
-1.5	-1.75	4.18	3.87	9.83
-1	-1.25	8.01	7.41	17.24
-0.5	-0.75	16.93	15.67	32.90
0	-0.25	20.03	18.53	51.44
0.5	0.25	15.60	14.44	65.87
1	0.75	13.88	12.84	78.72
1.5	1.25	12.17	11.26	89.98
2	1.75	6.90	6.38	96.36
2.5	2.25	3.35	3.10	99.46
3	2.75	0.53	0.49	99.95
3.5	3.25	0.04	0.04	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.335
25	-1.000
50	-0.290
75	0.605
84	0.985
95	1.645
99	2.175

Moment Measures	(phi)	(mm)
Mean	0.011	0.992
Standard Deviation	1.135	0.455
Skewness	-0.036	
Kurtosis	2.517	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.175	-0.213
Standard Deviation	1.160	1.170
Skewness (1)	0.099	0.046
Skewness (2)	-0.011	
Kurtosis	0.679	0.995



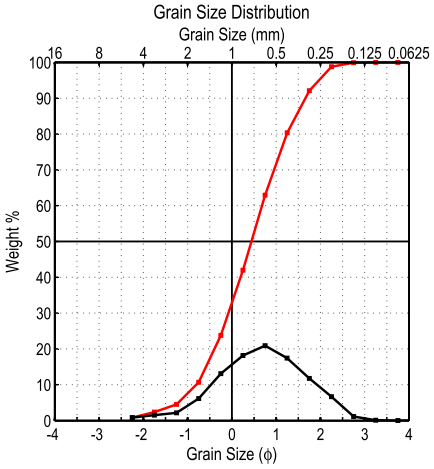
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-03b**
Interval	**LTT**
Mean	**0.657 mm**
STD	**0.402 mm**
Skewness	**-0.472**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	108.70
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	33.27
% $CaCO_3$	5.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	4.57	4.20	4.20
-1.5	-1.75	4.58	4.21	8.42
-1	-1.25	5.36	4.93	13.35
-0.5	-0.75	9.53	8.77	22.12
0	-0.25	12.12	11.15	33.27
0.5	0.25	11.02	10.14	43.40
1	0.75	10.51	9.67	53.07
1.5	1.25	15.80	14.54	67.61
2	1.75	19.17	17.64	85.24
2.5	2.25	14.20	13.06	98.31
3	2.75	1.69	1.55	99.86
3.5	3.25	0.14	0.13	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.155
16	-1.100
25	-0.620
50	0.590
75	1.460
84	1.715
95	2.125
99	2.475

Moment Measures	(phi)	(mm)
Mean	0.606	0.657
Standard Deviation	1.315	0.402
Skewness	-0.472	
Kurtosis	2.245	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.307	0.402
Standard Deviation	1.408	1.352
Skewness (1)	-0.201	-0.242
Skewness (2)	-0.430	
Kurtosis	0.520	0.843



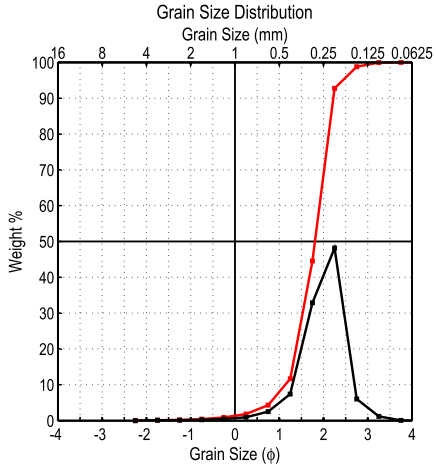
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-04a**
Interval	**Swash**
Mean	**0.633 mm**
STD	**0.513 mm**
Skewness	**-0.308**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	108.32
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	23.80
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.92	0.85	0.85
-1.5	-1.75	1.66	1.53	2.38
-1	-1.25	2.33	2.15	4.53
-0.5	-0.75	6.68	6.17	10.70
0	-0.25	14.19	13.10	23.80
0.5	0.25	19.69	18.18	41.98
1	0.75	22.66	20.92	62.90
1.5	1.25	18.87	17.42	80.32
2	1.75	12.74	11.76	92.08
2.5	2.25	7.24	6.68	98.76
3	2.75	1.23	1.14	99.90
3.5	3.25	0.10	0.09	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.200
5	-1.210
16	-0.550
25	-0.215
50	0.440
75	1.095
84	1.405
95	1.970
99	2.355

Moment Measures	(phi)	(mm)
Mean	0.659	0.633
Standard Deviation	0.964	0.513
Skewness	-0.308	
Kurtosis	3.050	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.427	0.432
Standard Deviation	0.977	0.971
Skewness (1)	-0.013	-0.025
Skewness (2)	-0.061	
Kurtosis	0.627	0.995



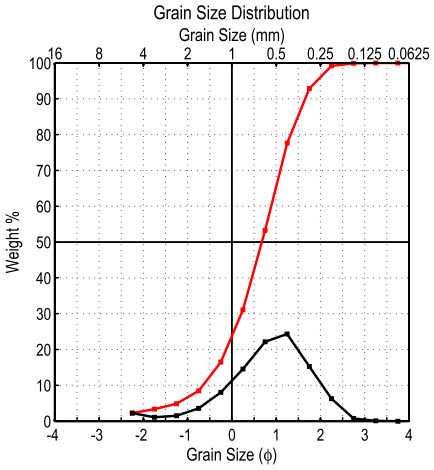
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-04b**
Interval	**LTT**
Mean	**0.255 mm**
STD	**0.695 mm**
Skewness	**-1.618**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	115.15
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	0.87
% $CaCO_3$	1.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.11	0.10	0.10
-1	-1.25	0.10	0.09	0.18
-0.5	-0.75	0.28	0.24	0.43
0	-0.25	0.51	0.44	0.87
0.5	0.25	1.08	0.94	1.81
1	0.75	2.87	2.49	4.30
1.5	1.25	8.50	7.38	11.68
2	1.75	37.86	32.88	44.56
2.5	2.25	55.46	48.16	92.72
3	2.75	6.96	6.04	98.77
3.5	3.25	1.36	1.18	99.95
4	3.75	0.06	0.05	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.180
5	0.800
16	1.315
25	1.455
50	1.805
75	2.065
84	2.160
95	2.440
99	2.850

Moment Measures	(phi)	(mm)
Mean	1.973	0.255
Standard Deviation	0.526	0.695
Skewness	-1.618	
Kurtosis	9.675	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.738	1.760
Standard Deviation	0.423	0.460
Skewness (1)	-0.160	-0.193
Skewness (2)	-0.438	
Kurtosis	0.941	1.102



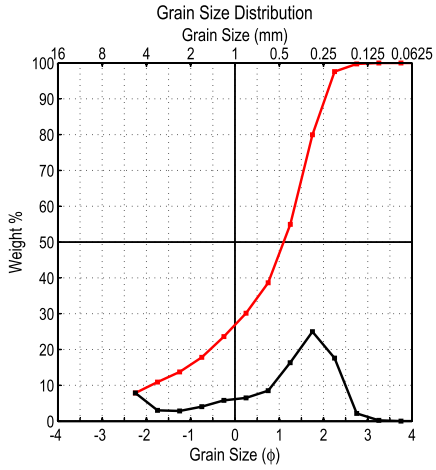
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-05a**
Interval	**Swash**
Mean	**0.573 mm**
STD	**0.515 mm**
Skewness	**-0.907**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.18
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	16.51
% $CaCO_3$	3.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.31	2.26	2.26
-1.5	-1.75	1.12	1.10	3.36
-1	-1.25	1.55	1.52	4.87
-0.5	-0.75	3.66	3.58	8.46
0	-0.25	8.23	8.05	16.51
0.5	0.25	14.90	14.58	31.09
1	0.75	22.65	22.17	53.26
1.5	1.25	24.89	24.36	77.62
2	1.75	15.57	15.24	92.86
2.5	2.25	6.43	6.29	99.15
3	2.75	0.76	0.74	99.89
3.5	3.25	0.11	0.11	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.230
16	-0.280
25	0.040
50	0.675
75	1.195
84	1.460
95	1.920
99	2.240

Moment Measures	(phi)	(mm)
Mean	0.803	0.573
Standard Deviation	0.959	0.515
Skewness	-0.907	
Kurtosis	4.235	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.590	0.618
Standard Deviation	0.870	0.912
Skewness (1)	-0.098	-0.154
Skewness (2)	-0.379	
Kurtosis	0.810	1.118



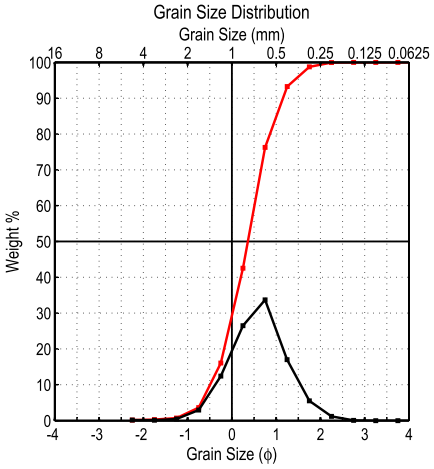
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-05b**
Interval	**LTT**
Mean	**0.545 mm**
STD	**0.380 mm**
Skewness	**-0.984**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	134.31
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	23.62
% $CaCO_3$	2.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	10.58	7.88	7.88
-1.5	-1.75	4.07	3.03	10.91
-1	-1.25	3.82	2.84	13.75
-0.5	-0.75	5.47	4.07	17.82
0	-0.25	7.79	5.80	23.62
0.5	0.25	8.72	6.49	30.12
1	0.75	11.43	8.51	38.63
1.5	1.25	21.93	16.33	54.95
2	1.75	33.57	24.99	79.95
2.5	2.25	23.65	17.61	97.56
3	2.75	2.92	2.17	99.73
3.5	3.25	0.34	0.25	99.99
4	3.75	0.02	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-0.975
25	-0.145
50	1.100
75	1.650
84	1.865
95	2.175
99	2.580

Moment Measures	(phi)	(mm)
Mean	0.875	0.545
Standard Deviation	1.398	0.380
Skewness	-0.984	
Kurtosis	2.899	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.445	0.663
Standard Deviation	1.420	1.380
Skewness (1)	-0.461	-0.488
Skewness (2)	-0.801	
Kurtosis	0.558	1.010



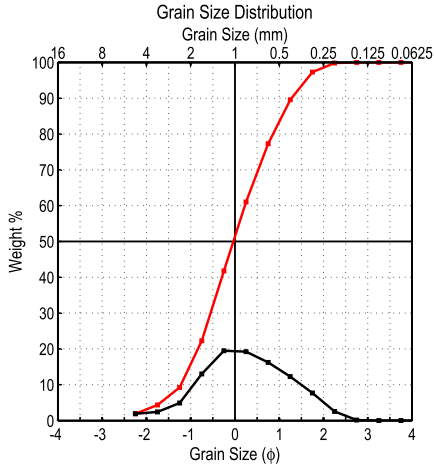
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-06a**
Interval	**Swash**
Mean	**0.663 mm**
STD	**0.646 mm**
Skewness	**-0.141**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	108.31
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	16.05
% $CaCO_3$	1.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.16	0.15	0.15
-1.5	-1.75	0.12	0.11	0.26
-1	-1.25	0.47	0.43	0.69
-0.5	-0.75	3.18	2.94	3.63
0	-0.25	13.45	12.42	16.05
0.5	0.25	28.68	26.48	42.53
1	0.75	36.51	33.71	76.23
1.5	1.25	18.41	17.00	93.23
2	1.75	5.97	5.51	98.74
2.5	2.25	1.28	1.18	99.93
3	2.75	0.08	0.07	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.200
5	-0.695
16	-0.250
25	-0.080
50	0.360
75	0.730
84	0.980
95	1.410
99	1.860

Moment Measures	(phi)	(mm)
Mean	0.593	0.663
Standard Deviation	0.630	0.646
Skewness	-0.141	
Kurtosis	3.674	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.365	0.363
Standard Deviation	0.615	0.626
Skewness (1)	0.008	0.003
Skewness (2)	-0.004	
Kurtosis	0.711	1.065



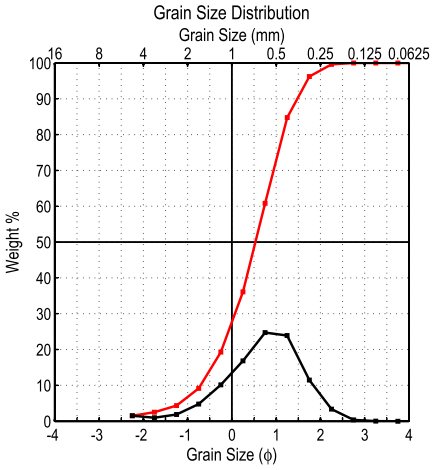
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-06b**
Interval	**LTT**
Mean	**0.854 mm**
STD	**0.508 mm**
Skewness	**-0.117**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	123.62
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	41.77
% $CaCO_3$	3.1

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.37	1.92	1.92
-1.5	-1.75	3.00	2.43	4.34
-1	-1.25	6.06	4.90	9.25
-0.5	-0.75	16.11	13.03	22.28
0	-0.25	24.10	19.50	41.77
0.5	0.25	23.80	19.25	61.03
1	0.75	20.08	16.24	77.27
1.5	1.25	15.19	12.29	89.56
2	1.75	9.52	7.70	97.26
2.5	2.25	3.16	2.56	99.81
3	2.75	0.20	0.16	99.98
3.5	3.25	0.02	0.02	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.685
16	-0.990
25	-0.680
50	-0.035
75	0.680
84	1.025
95	1.605
99	2.090

Moment Measures	(phi)	(mm)
Mean	0.228	0.854
Standard Deviation	0.978	0.508
Skewness	-0.117	
Kurtosis	2.767	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.018	0.000
Standard Deviation	1.007	1.002
Skewness (1)	0.052	0.025
Skewness (2)	-0.005	
Kurtosis	0.633	0.991



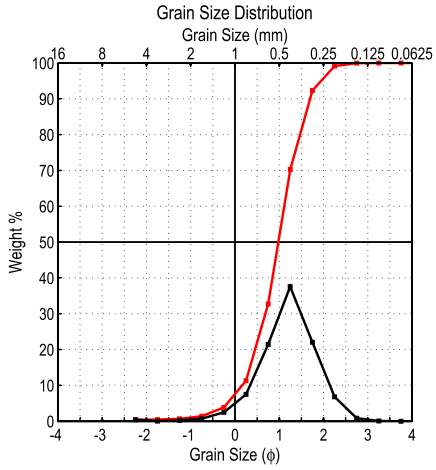
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-07a**
Interval	**Swash**
Mean	**0.625 mm**
STD	**0.541 mm**
Skewness	**-0.765**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	124.50
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	19.29
% $CaCO_3$	1.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.90	1.53	1.53
-1.5	-1.75	1.20	0.96	2.49
-1	-1.25	2.32	1.86	4.35
-0.5	-0.75	5.98	4.80	9.16
0	-0.25	12.61	10.13	19.29
0.5	0.25	20.94	16.82	36.10
1	0.75	30.78	24.72	60.83
1.5	1.25	29.78	23.92	84.75
2	1.75	14.27	11.46	96.21
2.5	2.25	4.21	3.38	99.59
3	2.75	0.46	0.37	99.96
3.5	3.25	0.05	0.04	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-1.185
16	-0.410
25	-0.080
50	0.530
75	1.045
84	1.235
95	1.695
99	2.165

Moment Measures	(phi)	(mm)
Mean	0.679	0.625
Standard Deviation	0.887	0.541
Skewness	-0.765	
Kurtosis	3.988	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.412	0.452
Standard Deviation	0.823	0.848
Skewness (1)	-0.143	-0.167
Skewness (2)	-0.334	
Kurtosis	0.751	1.049



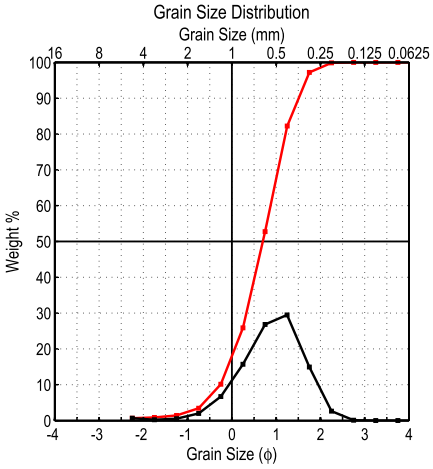
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-07b**
Interval	**LTT**
Mean	**0.439 mm**
STD	**0.638 mm**
Skewness	**-0.942**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	113.99
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	3.82
% $CaCO_3$	2.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.47	0.41	0.41
-1.5	-1.75	0.04	0.04	0.45
-1	-1.25	0.25	0.22	0.67
-0.5	-0.75	0.81	0.71	1.38
0	-0.25	2.79	2.45	3.82
0.5	0.25	8.53	7.48	11.31
1	0.75	24.41	21.41	32.72
1.5	1.25	42.82	37.56	70.29
2	1.75	25.11	22.03	92.32
2.5	2.25	7.76	6.81	99.12
3	2.75	0.94	0.82	99.95
3.5	3.25	0.06	0.05	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.015
5	-0.170
16	0.360
25	0.570
50	0.980
75	1.355
84	1.560
95	1.945
99	2.240

Moment Measures	(phi)	(mm)
Mean	1.188	0.439
Standard Deviation	0.647	0.638
Skewness	-0.942	
Kurtosis	6.359	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.960	0.967
Standard Deviation	0.600	0.620
Skewness (1)	-0.033	-0.060
Skewness (2)	-0.154	
Kurtosis	0.762	1.104



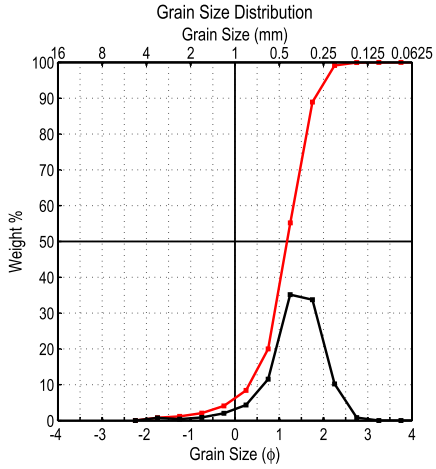
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-08a**
Interval	**Swash**
Mean	**0.544 mm**
STD	**0.606 mm**
Skewness	**-0.859**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	102.45
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	10.15
% $CaCO_3$	1.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.69	0.67	0.67
-1.5	-1.75	0.22	0.21	0.89
-1	-1.25	0.56	0.55	1.43
-0.5	-0.75	2.06	2.01	3.45
0	-0.25	6.87	6.71	10.15
0.5	0.25	16.13	15.74	25.90
1	0.75	27.51	26.85	52.75
1.5	1.25	30.21	29.49	82.24
2	1.75	15.33	14.96	97.20
2.5	2.25	2.72	2.65	99.85
3	2.75	0.11	0.11	99.96
3.5	3.25	0.03	0.03	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.650
5	-0.635
16	-0.065
25	0.220
50	0.700
75	1.125
84	1.310
95	1.675
99	2.090

Moment Measures	**(phi)**	**(mm)**
Mean	0.878	0.544
Standard Deviation	0.722	0.606
Skewness	-0.859	
Kurtosis	4.961	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.623	0.648
Standard Deviation	0.687	0.694
Skewness (1)	-0.113	-0.134
Skewness (2)	-0.262	
Kurtosis	0.680	1.046



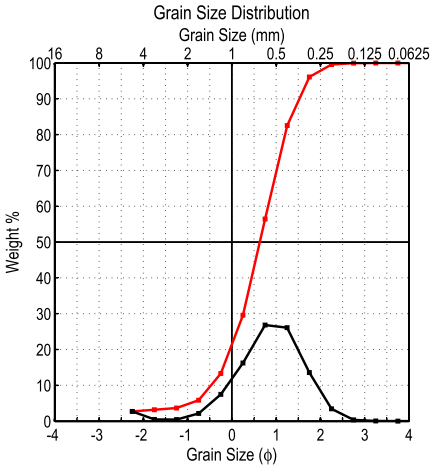
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-08b**
Interval	**LTT**
Mean	**0.392 mm**
STD	**0.629 mm**
Skewness	**-1.463**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	106.62
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	4.12
% $CaCO_3$	1.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.03	0.03	0.03
-1.5	-1.75	0.81	0.76	0.79
-1	-1.25	0.44	0.41	1.20
-0.5	-0.75	0.92	0.86	2.06
0	-0.25	2.19	2.05	4.12
0.5	0.25	4.62	4.33	8.45
1	0.75	12.33	11.56	20.02
1.5	1.25	37.50	35.17	55.19
2	1.75	35.96	33.73	88.91
2.5	2.25	10.90	10.22	99.14
3	2.75	0.87	0.82	99.95
3.5	3.25	0.04	0.04	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.495
5	-0.150
16	0.575
25	0.820
50	1.175
75	1.545
84	1.675
95	2.050
99	2.245

Moment Measures	**(phi)**	**(mm)**
Mean	1.351	0.392
Standard Deviation	0.669	0.629
Skewness	-1.463	
Kurtosis	7.167	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.125	1.142
Standard Deviation	0.550	0.608
Skewness (1)	-0.091	-0.148
Skewness (2)	-0.409	
Kurtosis	1.000	1.244



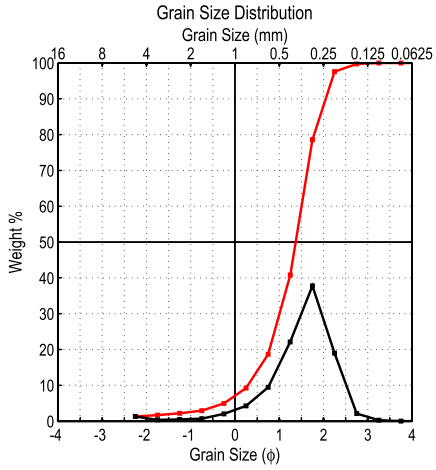
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-09a**
Interval	**Swash**
Mean	**0.580 mm**
STD	**0.548 mm**
Skewness	**-1.171**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	113.97
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	13.34
% $CaCO_3$	1.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.09	2.71	2.71
-1.5	-1.75	0.57	0.50	3.21
-1	-1.25	0.52	0.46	3.67
-0.5	-0.75	2.47	2.17	5.83
0	-0.25	8.55	7.50	13.34
0.5	0.25	18.52	16.25	29.59
1	0.75	30.58	26.83	56.42
1.5	1.25	29.74	26.09	82.51
2	1.75	15.48	13.58	96.10
2.5	2.25	3.95	3.47	99.56
3	2.75	0.41	0.36	99.92
3.5	3.25	0.08	0.07	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-0.945
16	-0.170
25	0.110
50	0.630
75	1.105
84	1.305
95	1.710
99	2.170

Moment Measures	**(phi)**	**(mm)**
Mean	0.786	0.580
Standard Deviation	0.869	0.548
Skewness	-1.171	
Kurtosis	5.580	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.568	0.588
Standard Deviation	0.738	0.771
Skewness (1)	-0.085	-0.136
Skewness (2)	-0.336	
Kurtosis	0.800	1.094



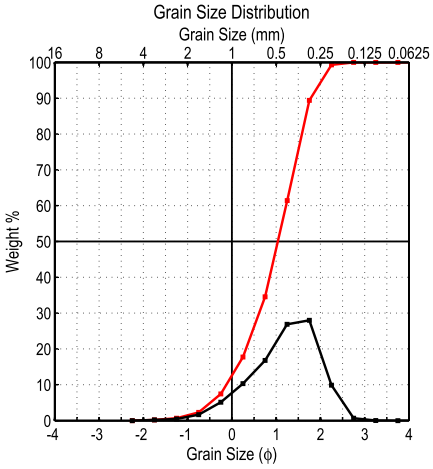
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-09b**
Interval	**LTT**
Mean	**0.363 mm**
STD	**0.567 mm**
Skewness	**-1.877**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	103.87
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	4.97
% $CaCO_3$	3.3

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.37	1.32	1.32
-1.5	-1.75	0.40	0.39	1.70
-1	-1.25	0.52	0.50	2.20
-0.5	-0.75	0.75	0.72	2.93
0	-0.25	2.12	2.04	4.97
0.5	0.25	4.44	4.27	9.24
1	0.75	9.81	9.44	18.69
1.5	1.25	22.97	22.11	40.80
2	1.75	39.23	37.77	78.57
2.5	2.25	19.73	18.99	97.56
3	2.75	2.22	2.14	99.70
3.5	3.25	0.27	0.26	99.96
4	3.75	0.04	0.04	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-0.245
16	0.610
25	0.895
50	1.370
75	1.705
84	1.895
95	2.185
99	2.585

Moment Measures	**(phi)**	**(mm)**
Mean	1.462	0.363
Standard Deviation	0.818	0.567
Skewness	-1.877	
Kurtosis	8.534	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.252	1.292
Standard Deviation	0.643	0.689
Skewness (1)	-0.183	-0.256
Skewness (2)	-0.623	
Kurtosis	0.891	1.230



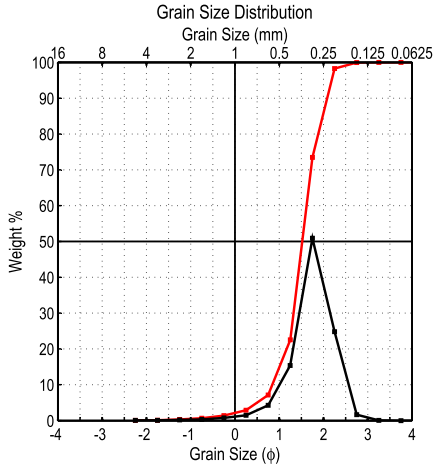
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-10a**
Interval	**Swash**
Mean	**0.440 mm**
STD	**0.597 mm**
Skewness	**-0.691**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	103.27
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	7.43
% $CaCO_3$	1.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.19	0.18	0.18
-1	-1.25	0.48	0.46	0.65
-0.5	-0.75	1.72	1.67	2.31
0	-0.25	5.28	5.11	7.43
0.5	0.25	10.65	10.32	17.75
1	0.75	17.36	16.81	34.56
1.5	1.25	27.74	26.86	61.42
2	1.75	28.89	27.98	89.40
2.5	2.25	10.22	9.90	99.29
3	2.75	0.69	0.67	99.96
3.5	3.25	0.04	0.04	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-1.145
5	-0.485
16	0.165
25	0.465
50	1.035
75	1.495
84	1.655
95	2.035
99	2.235

Moment Measures	(phi)	(mm)
Mean	1.185	0.440
Standard Deviation	0.744	0.597
Skewness	-0.691	
Kurtosis	3.386	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.910	0.952
Standard Deviation	0.745	0.754
Skewness (1)	-0.168	-0.187
Skewness (2)	-0.349	
Kurtosis	0.691	1.003



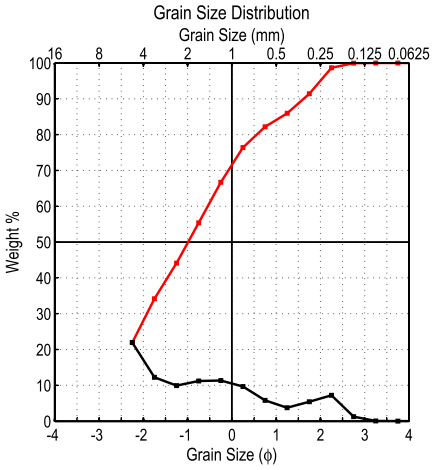
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**NHB-10b**
Interval	**LTT**
Mean	**0.304 mm**
STD	**0.693 mm**
Skewness	**-1.766**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	102.48
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	1.41
% $CaCO_3$	2.7

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.05	0.05	0.05
-1.5	-1.75	0.08	0.08	0.13
-1	-1.25	0.18	0.18	0.30
-0.5	-0.75	0.35	0.34	0.64
0	-0.25	0.79	0.77	1.41
0.5	0.25	1.50	1.46	2.88
1	0.75	4.39	4.28	7.16
1.5	1.25	15.77	15.39	22.55
2	1.75	52.16	50.90	73.45
2.5	2.25	25.43	24.81	98.26
3	2.75	1.70	1.66	99.92
3.5	3.25	0.08	0.08	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-0.520
5	0.500
16	1.035
25	1.275
50	1.520
75	1.780
84	1.965
95	2.185
99	2.470

Moment Measures	(phi)	(mm)
Mean	1.716	0.304
Standard Deviation	0.528	0.693
Skewness	-1.766	
Kurtosis	9.860	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.500	1.507
Standard Deviation	0.465	0.488
Skewness (1)	-0.043	-0.127
Skewness (2)	-0.382	
Kurtosis	0.812	1.367



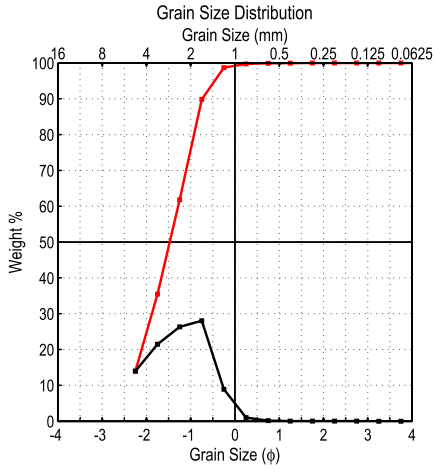
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**KH-01a**
Interval	**Swash**
Mean	**1.448 mm**
STD	**0.361 mm**
Skewness	**0.544**
USCS	**Wentworth**
SW	Very Coarse Sand
Medium Sand	Poorly Sorted
Well Graded	Fine Skewed
	Platykurtic
Total weight (gram)	111.93
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	66.70
% $CaCO_3$	2.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	24.58	21.96	21.96
-1.5	-1.75	13.69	12.23	34.19
-1	-1.25	11.13	9.94	44.13
-0.5	-0.75	12.56	11.22	55.36
0	-0.25	12.70	11.35	66.70
0.5	0.25	10.84	9.68	76.39
1	0.75	6.50	5.81	82.19
1.5	1.25	4.21	3.76	85.96
2	1.75	6.08	5.43	91.39
2.5	2.25	8.11	7.25	98.63
3	2.75	1.44	1.29	99.92
3.5	3.25	0.08	0.07	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.125
50	-0.990
75	0.180
84	0.990
95	2.000
99	2.395

Moment Measures	(phi)	(mm)
Mean	-0.534	1.448
Standard Deviation	1.471	0.361
Skewness	0.544	
Kurtosis	2.196	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.630	-0.750
Standard Deviation	1.620	1.454
Skewness (1)	0.222	0.315
Skewness (2)	0.534	
Kurtosis	0.312	0.756



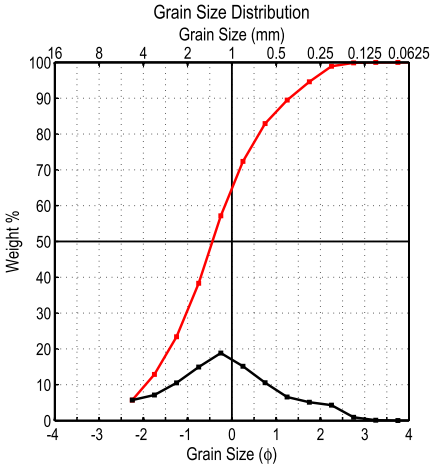
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**KH-01b**
Interval	**LTT**
Mean	**2.372 mm**
STD	**0.648 mm**
Skewness	**0.131**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	122.74
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	98.70
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	17.12	13.95	13.95
-1.5	-1.75	26.38	21.49	35.44
-1	-1.25	32.33	26.34	61.78
-0.5	-0.75	34.39	28.02	89.80
0	-0.25	10.93	8.91	98.70
0.5	0.25	1.26	1.03	99.73
1	0.75	0.21	0.17	99.90
1.5	1.25	0.04	0.03	99.93
2	1.75	0.03	0.02	99.96
2.5	2.25	0.04	0.03	99.99
3	2.75	0.01	0.01	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.200
25	-1.995
50	-1.475
75	-1.015
84	-0.855
95	-0.460
99	-0.105

Moment Measures	(phi)	(mm)
Mean	-1.246	2.372
Standard Deviation	0.626	0.648
Skewness	0.131	
Kurtosis	2.870	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.528	-1.510
Standard Deviation	0.673	0.607
Skewness (1)	-0.078	0.028
Skewness (2)	0.178	
Kurtosis	0.331	0.749



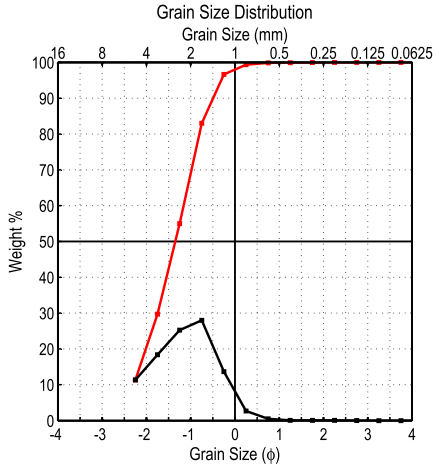
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**KH-02a**
Interval	**Swash**
Mean	**1.092 mm**
STD	**0.442 mm**
Skewness	**0.258**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	121.65
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	57.18
% $CaCO_3$	3.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.95	5.71	5.71
-1.5	-1.75	8.71	7.16	12.87
-1	-1.25	12.80	10.52	23.39
-0.5	-0.75	18.17	14.94	38.33
0	-0.25	22.93	18.85	57.18
0.5	0.25	18.43	15.15	72.33
1	0.75	12.85	10.56	82.89
1.5	1.25	7.99	6.57	89.46
2	1.75	6.24	5.13	94.59
2.5	2.25	5.27	4.33	98.92
3	2.75	1.14	0.94	99.86
3.5	3.25	0.13	0.11	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.600
25	-1.195
50	-0.440
75	0.375
84	0.835
95	1.795
99	2.290

Moment Measures	(phi)	(mm)
Mean	-0.128	1.092
Standard Deviation	1.178	0.442
Skewness	0.258	
Kurtosis	2.616	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.383	-0.402
Standard Deviation	1.218	1.222
Skewness (1)	0.047	0.076
Skewness (2)	0.175	
Kurtosis	0.661	1.056



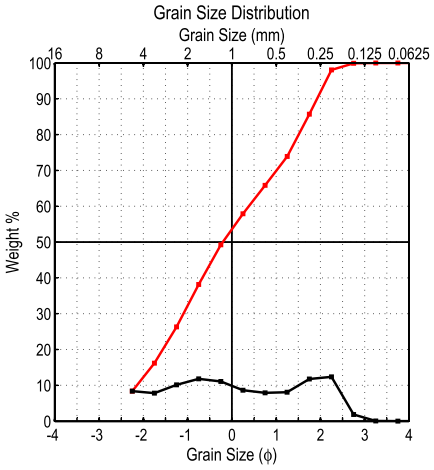
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**KH02b**
Interval	**LTT**
Mean	**2.179 mm**
STD	**0.630 mm**
Skewness	**0.141**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	111.58
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	96.65
% $CaCO_3$	5.0

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	12.66	11.35	11.35
-1.5	-1.75	20.50	18.37	29.72
-1	-1.25	28.18	25.26	54.97
-0.5	-0.75	31.24	28.00	82.97
0	-0.25	15.26	13.68	96.65
0.5	0.25	3.01	2.70	99.35
1	0.75	0.54	0.48	99.83
1.5	1.25	0.08	0.07	99.90
2	1.75	0.05	0.04	99.95
2.5	2.25	0.05	0.04	99.99
3	2.75	0.01	0.01	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.125
25	-1.880
50	-1.350
75	-0.890
84	-0.710
95	-0.310
99	0.185

Moment Measures	(phi)	(mm)
Mean	-1.123	2.179
Standard Deviation	0.668	0.630
Skewness	0.141	
Kurtosis	2.937	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.418	-1.395
Standard Deviation	0.708	0.648
Skewness (1)	-0.095	-0.012
Skewness (2)	0.099	
Kurtosis	0.371	0.803



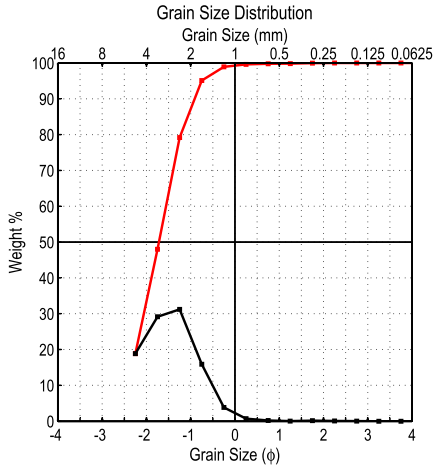
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**KH-03a**
Interval	**Swash**
Mean	**0.900 mm**
STD	**0.359 mm**
Skewness	**0.009**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	107.06
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	49.24
% $CaCO_3$	2.9

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	8.97	8.38	8.38
-1.5	-1.75	8.38	7.83	16.21
-1	-1.25	10.84	10.13	26.33
-0.5	-0.75	12.67	11.83	38.17
0	-0.25	11.86	11.08	49.24
0.5	0.25	9.27	8.66	57.90
1	0.75	8.47	7.91	65.81
1.5	1.25	8.67	8.10	73.91
2	1.75	12.60	11.77	85.68
2.5	2.25	13.23	12.36	98.04
3	2.75	2.00	1.87	99.91
3.5	3.25	0.09	0.08	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.765
25	-1.315
50	-0.205
75	1.295
84	1.680
95	2.125
99	2.505

Moment Measures	(phi)	(mm)
Mean	0.152	0.900
Standard Deviation	1.479	0.359
Skewness	0.009	
Kurtosis	1.782	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.042	-0.097
Standard Deviation	1.723	1.524
Skewness (1)	0.094	0.080
Skewness (2)	0.083	
Kurtosis	0.270	0.687



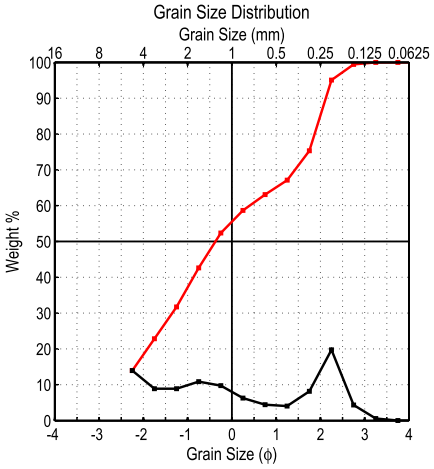
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**KH-03b**
Interval	**LTT**
Mean	**2.723 mm**
STD	**0.665 mm**
Skewness	**0.761**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Fine Skewed
	Leptokurtic
Total weight (gram)	115.02
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	98.90
% $CaCO_3$	6.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	21.67	18.84	18.84
-1.5	-1.75	33.52	29.14	47.98
-1	-1.25	35.89	31.20	79.19
-0.5	-0.75	18.27	15.88	95.07
0	-0.25	4.40	3.83	98.90
0.5	0.25	0.79	0.69	99.58
1	0.75	0.20	0.17	99.76
1.5	1.25	0.04	0.03	99.79
2	1.75	0.16	0.14	99.93
2.5	2.25	0.07	0.06	99.99
3	2.75	0.01	0.01	100.00
3.5	3.25	0.00	0.00	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.145
50	-1.720
75	-1.315
84	-1.100
95	-0.750
99	-0.175

Moment Measures	(phi)	(mm)
Mean	-1.445	2.723
Standard Deviation	0.589	0.665
Skewness	0.761	
Kurtosis	4.964	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.675	-1.690
Standard Deviation	0.575	0.515
Skewness (1)	0.078	0.186
Skewness (2)	0.383	
Kurtosis	0.304	0.741



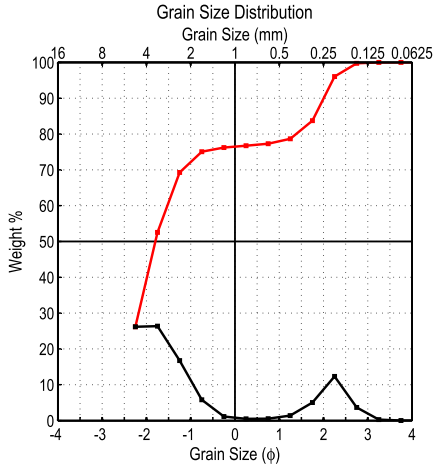
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**KH-04a**
Interval	**Swash**
Mean	**0.908 mm**
STD	**0.307 mm**
Skewness	**0.081**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	132.54
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	52.37
% $CaCO_3$	2.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	18.48	13.94	13.94
-1.5	-1.75	11.77	8.88	22.82
-1	-1.25	11.80	8.90	31.73
-0.5	-0.75	14.42	10.88	42.61
0	-0.25	12.94	9.76	52.37
0.5	0.25	8.35	6.30	58.67
1	0.75	5.86	4.42	63.09
1.5	1.25	5.36	4.04	67.13
2	1.75	10.81	8.16	75.29
2.5	2.25	26.21	19.78	95.07
3	2.75	5.76	4.35	99.41
3.5	3.25	0.74	0.56	99.97
4	3.75	0.04	0.03	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.135
25	-1.630
50	-0.370
75	1.730
84	1.970
95	2.250
99	2.705

Moment Measures	(phi)	(mm)
Mean	0.140	0.908
Standard Deviation	1.703	0.307
Skewness	0.081	
Kurtosis	1.571	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.083	-0.178
Standard Deviation	2.052	1.708
Skewness (1)	0.140	0.152
Skewness (2)	0.180	
Kurtosis	0.096	0.549



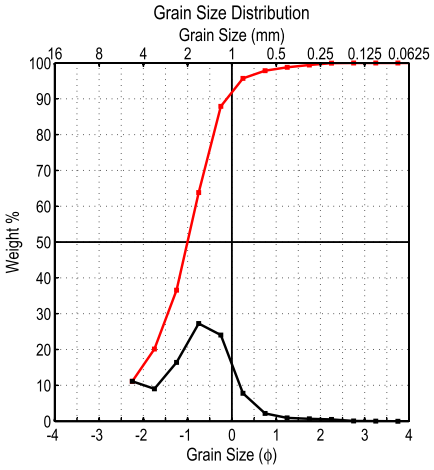
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**KH-04b**
Interval	**LTT**
Mean	**1.750 mm**
STD	**0.308 mm**
Skewness	**1.088**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Fine Skewed
	Platykurtic
Total weight (gram)	100.43
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	76.22
% $CaCO_3$	3.2

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	26.30	26.19	26.19
-1.5	-1.75	26.46	26.35	52.53
-1	-1.25	16.81	16.74	69.27
-0.5	-0.75	5.82	5.80	75.07
0	-0.25	1.16	1.16	76.22
0.5	0.25	0.49	0.49	76.71
1	0.75	0.56	0.56	77.27
1.5	1.25	1.41	1.40	78.67
2	1.75	5.06	5.04	83.71
2.5	2.25	12.39	12.34	96.05
3	2.75	3.68	3.66	99.71
3.5	3.25	0.28	0.28	99.99
4	3.75	0.01	0.01	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.800
75	-0.755
84	1.760
95	2.210
99	2.655

Moment Measures	(phi)	(mm)
Mean	-0.807	1.750
Standard Deviation	1.700	0.308
Skewness	1.088	
Kurtosis	2.545	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.245	-0.763
Standard Deviation	2.005	1.678
Skewness (1)	0.776	0.787
Skewness (2)	0.888	
Kurtosis	0.112	1.223



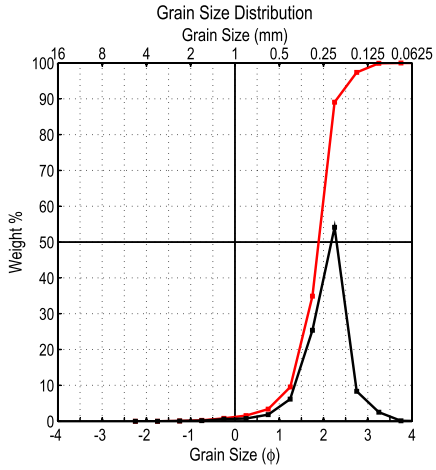
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**KH-05a**
Interval	**Swash**
Mean	**1.748 mm**
STD	**0.560 mm**
Skewness	**0.270**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	102.65
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	87.89
% $CaCO_3$	2.8

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	11.41	11.12	11.12
-1.5	-1.75	9.28	9.04	20.16
-1	-1.25	16.83	16.40	36.55
-0.5	-0.75	28.00	27.28	63.83
0	-0.25	24.70	24.06	87.89
0.5	0.25	7.99	7.78	95.67
1	0.75	2.23	2.17	97.85
1.5	1.25	0.94	0.92	98.76
2	1.75	0.69	0.67	99.43
2.5	2.25	0.50	0.49	99.92
3	2.75	0.07	0.07	99.99
3.5	3.25	0.01	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.980
25	-1.600
50	-1.005
75	-0.520
84	-0.330
95	0.205
99	1.425

Moment Measures	(phi)	(mm)
Mean	-0.806	1.748
Standard Deviation	0.835	0.560
Skewness	0.270	
Kurtosis	3.738	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.155	-1.105
Standard Deviation	0.825	0.784
Skewness (1)	-0.182	-0.098
Skewness (2)	-0.021	
Kurtosis	0.488	0.932



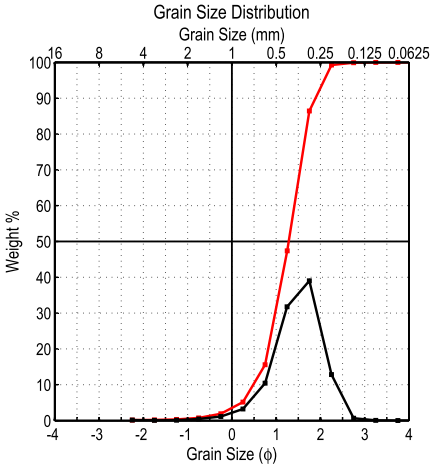
Project	**2203**
Location	**Nags Head NC**
Date	**Jun 2012**
Station	**KH-05b**
Interval	**LTT**
Mean	**0.239 mm**
STD	**0.698 mm**
Skewness	**-1.296**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Very Leptokurtic
Total weight (gram)	100.95
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	0.79
% $CaCO_3$	1.5

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.07	0.07	0.07
-0.5	-0.75	0.16	0.16	0.23
0	-0.25	0.57	0.56	0.79
0.5	0.25	0.76	0.75	1.55
1	0.75	1.86	1.84	3.39
1.5	1.25	6.20	6.14	9.53
2	1.75	25.61	25.37	34.90
2.5	2.25	54.64	54.13	89.02
3	2.75	8.41	8.33	97.36
3.5	3.25	2.55	2.53	99.88
4	3.75	0.11	0.11	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.110
5	0.880
16	1.380
25	1.555
50	1.890
75	2.120
84	2.205
95	2.610
99	3.075

Moment Measures	(phi)	(mm)
Mean	2.066	0.239
Standard Deviation	0.519	0.698
Skewness	-1.296	
Kurtosis	8.148	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.793	1.825
Standard Deviation	0.413	0.468
Skewness (1)	-0.236	-0.202
Skewness (2)	-0.352	
Kurtosis	1.097	1.255



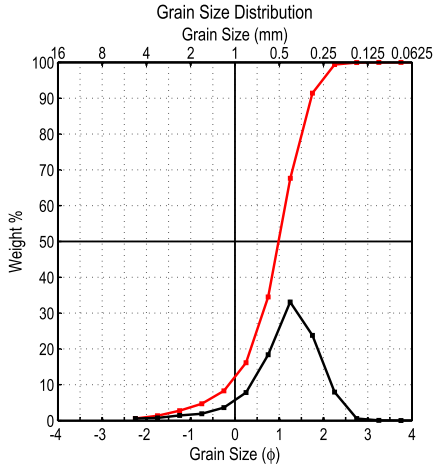
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**B2a**
Interval	**Grab**
Mean	**0.362 mm**
STD	**0.671 mm**
Skewness	**-1.219**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	104.22
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	1.92

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.17	0.16	0.16
-1.5	-1.75	0.05	0.05	0.21
-1	-1.25	0.10	0.10	0.31
-0.5	-0.75	0.48	0.46	0.77
0	-0.25	1.20	1.15	1.92
0.5	0.25	3.38	3.24	5.16
1	0.75	10.89	10.45	15.61
1.5	1.25	33.12	31.78	47.39
2	1.75	40.66	39.02	86.40
2.5	2.25	13.37	12.83	99.23
3	2.75	0.71	0.68	99.91
3.5	3.25	0.07	0.07	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-0.650
5	0.225
16	0.755
25	0.900
50	1.285
75	1.605
84	1.720
95	2.085
99	2.240

Moment Measures	(phi)	(mm)
Mean	1.465	0.362
Standard Deviation	0.577	0.671
Skewness	-1.219	
Kurtosis	7.315	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.237	1.253
Standard Deviation	0.482	0.523
Skewness (1)	-0.098	-0.119
Skewness (2)	-0.269	
Kurtosis	0.927	1.081



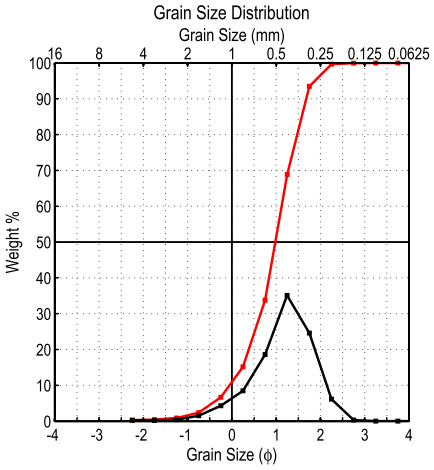
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**B2b**
Interval	**Grab**
Mean	**0.461 mm**
STD	**0.572 mm**
Skewness	**-1.254**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	111.99
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	8.31

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.66	0.59	0.59
-1.5	-1.75	0.84	0.75	1.34
-1	-1.25	1.60	1.43	2.77
-0.5	-0.75	2.15	1.92	4.69
0	-0.25	4.06	3.63	8.31
0.5	0.25	8.78	7.84	16.15
1	0.75	20.58	18.38	34.53
1.5	1.25	37.05	33.08	67.61
2	1.75	26.63	23.78	91.39
2.5	2.25	8.92	7.96	99.36
3	2.75	0.64	0.57	99.93
3.5	3.25	0.05	0.04	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.975
5	-0.705
16	0.240
25	0.490
50	0.985
75	1.405
84	1.595
95	1.975
99	2.230

Moment Measures	(phi)	(mm)
Mean	1.117	0.461
Standard Deviation	0.806	0.572
Skewness	-1.254	
Kurtosis	5.583	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.917	0.940
Standard Deviation	0.677	0.745
Skewness (1)	-0.100	-0.180
Skewness (2)	-0.517	
Kurtosis	0.978	1.200



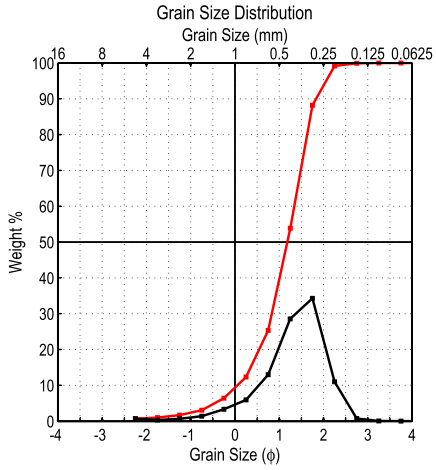
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**B2c**
Interval	**Grab**
Mean	**0.453 mm**
STD	**0.617 mm**
Skewness	**-1.001**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	109.17
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	6.68

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.31	0.28	0.28
-1.5	-1.75	0.19	0.17	0.46
-1	-1.25	0.45	0.41	0.87
-0.5	-0.75	1.64	1.50	2.37
0	-0.25	4.70	4.31	6.68
0.5	0.25	9.26	8.48	15.16
1	0.75	20.32	18.61	33.77
1.5	1.25	38.34	35.12	68.89
2	1.75	26.84	24.59	93.48
2.5	2.25	6.70	6.14	99.62
3	2.75	0.37	0.34	99.95
3.5	3.25	0.03	0.03	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.205
5	-0.445
16	0.275
25	0.515
50	0.980
75	1.375
84	1.555
95	1.875
99	2.200

Moment Measures	(phi)	(mm)
Mean	1.142	0.453
Standard Deviation	0.697	0.617
Skewness	-1.001	
Kurtosis	5.135	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.915	0.937
Standard Deviation	0.640	0.672
Skewness (1)	-0.102	-0.165
Skewness (2)	-0.414	
Kurtosis	0.812	1.106



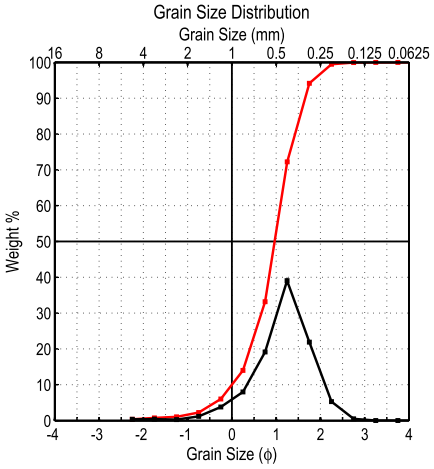
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**B2d**
Interval	**Grab**
Mean	**0.408 mm**
STD	**0.586 mm**
Skewness	**-1.474**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	107.03
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	6.42

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.75	0.70	0.70
-1.5	-1.75	0.35	0.33	1.03
-1	-1.25	0.72	0.67	1.70
-0.5	-0.75	1.48	1.38	3.08
0	-0.25	3.57	3.34	6.42
0.5	0.25	6.35	5.93	12.35
1	0.75	13.88	12.97	25.32
1.5	1.25	30.56	28.55	53.87
2	1.75	36.71	34.30	88.17
2.5	2.25	11.76	10.99	99.16
3	2.75	0.79	0.74	99.90
3.5	3.25	0.08	0.07	99.97
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.790
5	-0.465
16	0.390
25	0.740
50	1.180
75	1.560
84	1.690
95	2.060
99	2.245

Moment Measures	(phi)	(mm)
Mean	1.292	0.408
Standard Deviation	0.771	0.586
Skewness	-1.474	
Kurtosis	6.614	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.040	1.087
Standard Deviation	0.650	0.708
Skewness (1)	-0.215	-0.259
Skewness (2)	-0.588	
Kurtosis	0.942	1.262



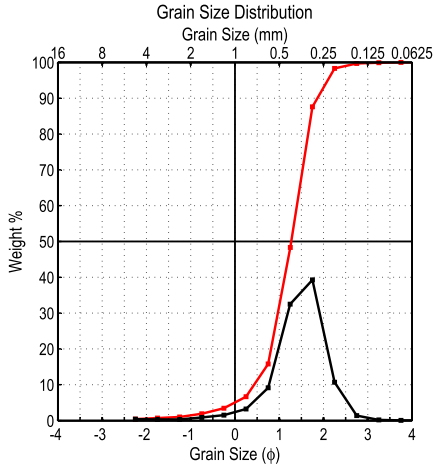
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**B2e**
Interval	**Grab**
Mean	**0.456 mm**
STD	**0.622 mm**
Skewness	**-1.148**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	112.85
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	6.04

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.42	0.37	0.37
-1.5	-1.75	0.45	0.40	0.77
-1	-1.25	0.33	0.29	1.06
-0.5	-0.75	1.34	1.19	2.25
0	-0.25	4.28	3.79	6.04
0.5	0.25	9.01	7.98	14.03
1	0.75	21.60	19.14	33.17
1.5	1.25	44.09	39.07	72.24
2	1.75	24.71	21.90	94.13
2.5	2.25	6.00	5.32	99.45
3	2.75	0.55	0.49	99.94
3.5	3.25	0.04	0.04	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.360
5	-0.390
16	0.300
25	0.535
50	0.965
75	1.315
84	1.520
95	1.830
99	2.210

Moment Measures	(phi)	(mm)
Mean	1.133	0.456
Standard Deviation	0.685	0.622
Skewness	-1.148	
Kurtosis	6.232	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.910	0.928
Standard Deviation	0.610	0.641
Skewness (1)	-0.090	-0.155
Skewness (2)	-0.402	
Kurtosis	0.820	1.166



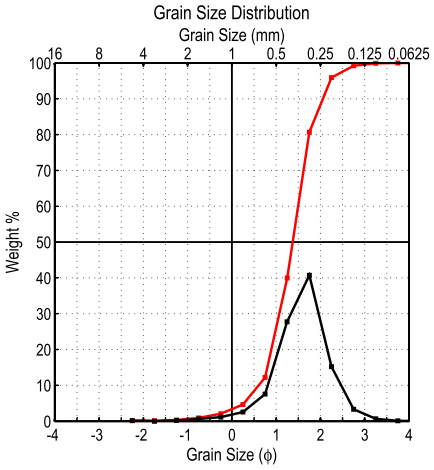
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**B3a**
Interval	**Grab**
Mean	**0.371 mm**
STD	**0.631 mm**
Skewness	**-1.652**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	108.91
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	3.43

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.45	0.41	0.41
-1.5	-1.75	0.34	0.31	0.73
-1	-1.25	0.33	0.30	1.03
-0.5	-0.75	0.96	0.88	1.91
0	-0.25	1.66	1.52	3.43
0.5	0.25	3.51	3.22	6.66
1	0.75	9.96	9.15	15.80
1.5	1.25	35.41	32.51	48.32
2	1.75	42.77	39.27	87.59
2.5	2.25	11.68	10.72	98.31
3	2.75	1.51	1.39	99.70
3.5	3.25	0.23	0.21	99.91
4	3.75	0.08	0.07	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.295
5	-0.005
16	0.755
25	0.890
50	1.270
75	1.590
84	1.705
95	2.095
99	2.500

Moment Measures	(phi)	(mm)
Mean	1.431	0.371
Standard Deviation	0.664	0.631
Skewness	-1.652	
Kurtosis	9.209	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.230	1.243
Standard Deviation	0.475	0.556
Skewness (1)	-0.084	-0.149
Skewness (2)	-0.474	
Kurtosis	1.211	1.230



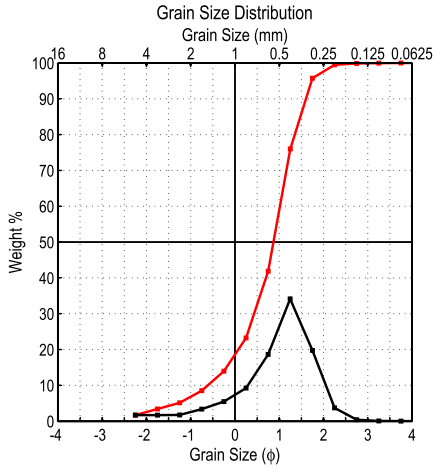
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**B3b**
Interval	**Grab**
Mean	**0.337 mm**
STD	**0.650 mm**
Skewness	**-0.966**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	104.89
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	2.08

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.17	0.16	0.16
-1.5	-1.75	0.00	0.00	0.16
-1	-1.25	0.18	0.17	0.33
-0.5	-0.75	0.63	0.60	0.93
0	-0.25	1.20	1.14	2.08
0.5	0.25	2.69	2.56	4.64
1	0.75	7.94	7.57	12.21
1.5	1.25	29.11	27.75	39.97
2	1.75	42.72	40.73	80.69
2.5	2.25	15.95	15.21	95.90
3	2.75	3.48	3.32	99.22
3.5	3.25	0.70	0.67	99.89
4	3.75	0.10	0.10	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.720
5	0.275
16	0.820
25	0.980
50	1.375
75	1.680
84	1.860
95	2.220
99	2.715

Moment Measures	(phi)	(mm)
Mean	1.569	0.337
Standard Deviation	0.621	0.650
Skewness	-0.966	
Kurtosis	7.043	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.340	1.352
Standard Deviation	0.520	0.555
Skewness (1)	-0.067	-0.099
Skewness (2)	-0.245	
Kurtosis	0.870	1.139



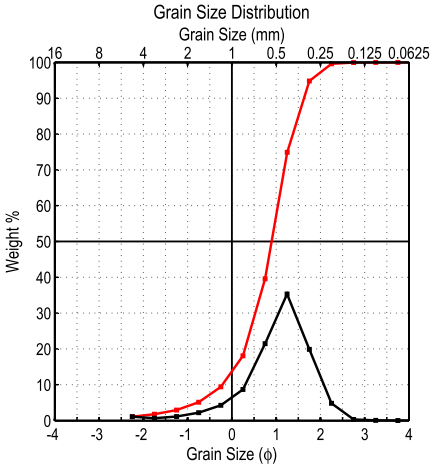
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**B3c**
Interval	**Grab**
Mean	**0.534 mm**
STD	**0.528 mm**
Skewness	**-1.293**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	106.54
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	13.98

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.80	1.69	1.69
-1.5	-1.75	1.82	1.71	3.40
-1	-1.25	1.86	1.75	5.14
-0.5	-0.75	3.59	3.37	8.51
0	-0.25	5.82	5.46	13.98
0.5	0.25	9.85	9.25	23.22
1	0.75	19.87	18.65	41.87
1.5	1.25	36.37	34.14	76.01
2	1.75	21.03	19.74	95.75
2.5	2.25	3.96	3.72	99.46
3	2.75	0.43	0.41	99.87
3.5	3.25	0.08	0.08	99.94
4	3.75	0.03	0.03	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-1.290
16	-0.140
25	0.300
50	0.870
75	1.235
84	1.450
95	1.730
99	2.190

Moment Measures	(phi)	(mm)
Mean	0.906	0.534
Standard Deviation	0.923	0.528
Skewness	-1.293	
Kurtosis	4.998	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.655	0.727
Standard Deviation	0.795	0.855
Skewness (1)	-0.270	-0.350
Skewness (2)	-0.818	
Kurtosis	0.899	1.324



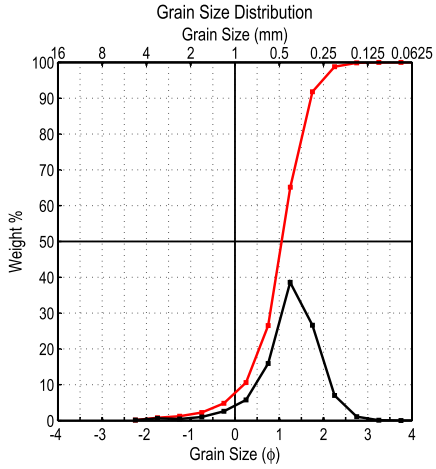
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**B3d**
Interval	**Grab**
Mean	**0.495 mm**
STD	**0.573 mm**
Skewness	**-1.361**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	105.11
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	9.40

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.17	1.11	1.11
-1.5	-1.75	0.72	0.68	1.80
-1	-1.25	1.18	1.12	2.92
-0.5	-0.75	2.32	2.21	5.13
0	-0.25	4.49	4.27	9.40
0.5	0.25	9.14	8.70	18.10
1	0.75	22.57	21.47	39.57
1.5	1.25	37.14	35.33	74.90
2	1.75	20.88	19.86	94.77
2.5	2.25	5.08	4.83	99.60
3	2.75	0.34	0.32	99.92
3.5	3.25	0.05	0.05	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-0.780
16	0.130
25	0.410
50	0.900
75	1.250
84	1.480
95	1.775
99	2.190

Moment Measures	**(phi)**	**(mm)**
Mean	1.014	0.495
Standard Deviation	0.804	0.573
Skewness	-1.361	
Kurtosis	6.087	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.805	0.837
Standard Deviation	0.675	0.725
Skewness (1)	-0.141	-0.228
Skewness (2)	-0.596	
Kurtosis	0.893	1.247



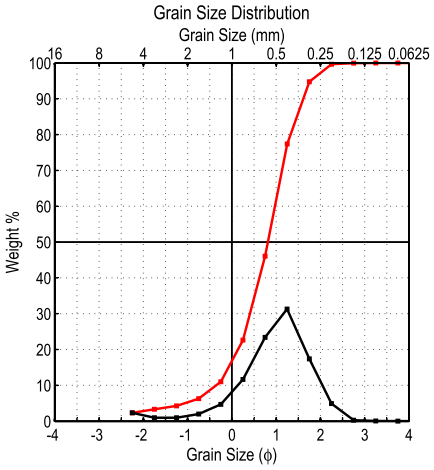
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**B3e**
Interval	**Grab**
Mean	**0.423 mm**
STD	**0.622 mm**
Skewness	**-1.204**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	110.63
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	4.84

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.18	0.16	0.16
-1.5	-1.75	0.69	0.62	0.79
-1	-1.25	0.49	0.44	1.23
-0.5	-0.75	1.12	1.01	2.24
0	-0.25	2.88	2.60	4.84
0.5	0.25	6.37	5.76	10.60
1	0.75	17.63	15.94	26.54
1.5	1.25	42.71	38.61	65.15
2	1.75	29.47	26.64	91.78
2.5	2.25	7.74	7.00	98.78
3	2.75	1.19	1.08	99.86
3.5	3.25	0.12	0.11	99.96
4	3.75	0.03	0.03	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.510
5	-0.235
16	0.420
25	0.700
50	1.055
75	1.435
84	1.605
95	1.980
99	2.350

Moment Measures	**(phi)**	**(mm)**
Mean	1.240	0.423
Standard Deviation	0.684	0.622
Skewness	-1.204	
Kurtosis	6.604	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.013	1.027
Standard Deviation	0.593	0.632
Skewness (1)	-0.072	-0.118
Skewness (2)	-0.308	
Kurtosis	0.869	1.235



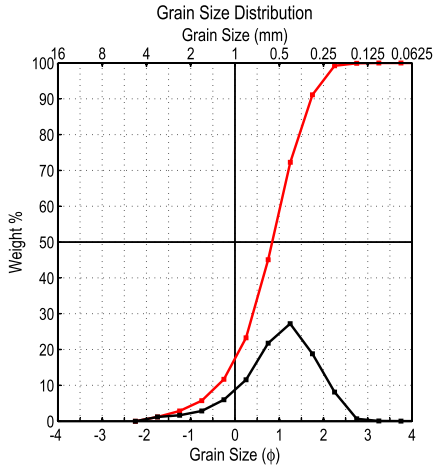
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**BC-E8a**
Interval	**Grab**
Mean	**0.531 mm**
STD	**0.541 mm**
Skewness	**-1.377**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	111.65
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	11.00

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.62	2.35	2.35
-1.5	-1.75	1.08	0.97	3.31
-1	-1.25	1.08	0.97	4.28
-0.5	-0.75	2.24	2.01	6.29
0	-0.25	5.26	4.71	11.00
0.5	0.25	13.01	11.65	22.65
1	0.75	26.13	23.40	46.05
1.5	1.25	34.96	31.31	77.37
2	1.75	19.40	17.38	94.74
2.5	2.25	5.47	4.90	99.64
3	2.75	0.31	0.28	99.92
3.5	3.25	0.05	0.04	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.070
16	-0.035
25	0.300
50	0.815
75	1.210
84	1.440
95	1.775
99	2.185

Moment Measures	**(phi)**	**(mm)**
Mean	0.912	0.531
Standard Deviation	0.886	0.541
Skewness	-1.377	
Kurtosis	5.887	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.702	0.740
Standard Deviation	0.738	0.800
Skewness (1)	-0.153	-0.239
Skewness (2)	-0.627	
Kurtosis	0.929	1.281



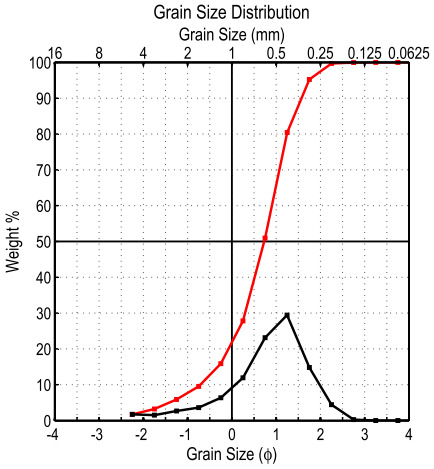
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**BC-E8b**
Interval	**Grab**
Mean	**0.504 mm**
STD	**0.557 mm**
Skewness	**-0.733**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	115.44
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	11.70

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	1.37	1.19	1.19
-1	-1.25	1.93	1.67	2.86
-0.5	-0.75	3.30	2.86	5.72
0	-0.25	6.91	5.99	11.70
0.5	0.25	13.36	11.57	23.28
1	0.75	25.14	21.78	45.05
1.5	1.25	31.41	27.21	72.26
2	1.75	21.73	18.82	91.09
2.5	2.25	9.38	8.13	99.21
3	2.75	0.79	0.68	99.90
3.5	3.25	0.08	0.07	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.830
5	-0.875
16	-0.065
25	0.290
50	0.840
75	1.325
84	1.560
95	1.990
99	2.235

Moment Measures	**(phi)**	**(mm)**
Mean	0.989	0.504
Standard Deviation	0.844	0.557
Skewness	-0.733	
Kurtosis	3.771	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.748	0.778
Standard Deviation	0.812	0.840
Skewness (1)	-0.114	-0.156
Skewness (2)	-0.348	
Kurtosis	0.763	1.134



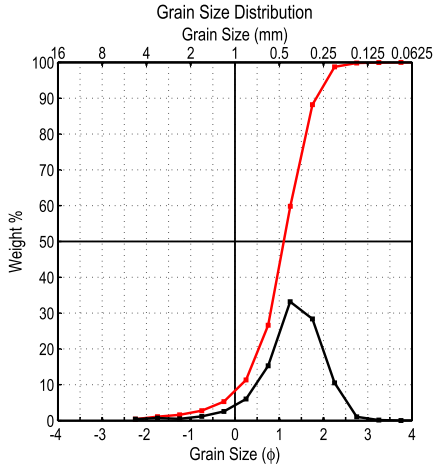
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**BC-E8c**
Interval	**Grab**
Mean	**0.575 mm**
STD	**0.525 mm**
Skewness	**-1.082**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	107.09
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	15.89

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.84	1.72	1.72
-1.5	-1.75	1.62	1.51	3.23
-1	-1.25	2.86	2.67	5.90
-0.5	-0.75	3.88	3.62	9.52
0	-0.25	6.82	6.37	15.89
0.5	0.25	12.78	11.93	27.83
1	0.75	24.77	23.13	50.96
1.5	1.25	31.54	29.45	80.41
2	1.75	15.86	14.81	95.22
2.5	2.25	4.76	4.44	99.66
3	2.75	0.30	0.28	99.94
3.5	3.25	0.04	0.04	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.420
16	-0.245
25	0.130
50	0.730
75	1.160
84	1.370
95	1.745
99	2.175

Moment Measures	(phi)	(mm)
Mean	0.799	0.575
Standard Deviation	0.931	0.525
Skewness	-1.082	
Kurtosis	4.394	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.563	0.618
Standard Deviation	0.808	0.883
Skewness (1)	-0.207	-0.283
Skewness (2)	-0.703	
Kurtosis	0.960	1.259



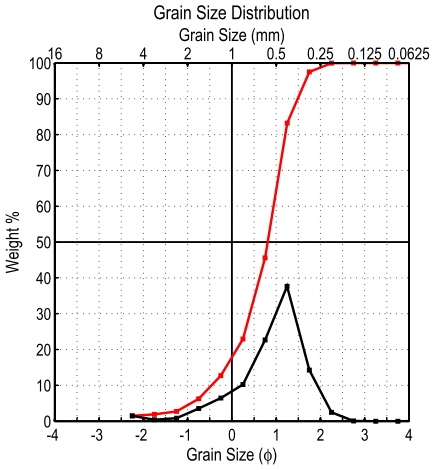
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**BC-E8d**
Interval	**Grab**
Mean	**0.414 mm**
STD	**0.597 mm**
Skewness	**-1.282**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	126.51
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	5.30

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.49	0.39	0.39
-1.5	-1.75	0.89	0.70	1.09
-1	-1.25	0.63	0.50	1.59
-0.5	-0.75	1.47	1.16	2.75
0	-0.25	3.22	2.55	5.30
0.5	0.25	7.65	6.05	11.34
1	0.75	19.33	15.28	26.62
1.5	1.25	42.00	33.20	59.82
2	1.75	35.88	28.36	88.18
2.5	2.25	13.35	10.55	98.74
3	2.75	1.35	1.07	99.80
3.5	3.25	0.17	0.13	99.94
4	3.75	0.05	0.04	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-1.815
5	-0.310
16	0.400
25	0.695
50	1.100
75	1.520
84	1.675
95	2.075
99	2.375

Moment Measures	(phi)	(mm)
Mean	1.272	0.414
Standard Deviation	0.744	0.597
Skewness	-1.282	
Kurtosis	6.542	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.037	1.058
Standard Deviation	0.637	0.680
Skewness (1)	-0.098	-0.140
Skewness (2)	-0.341	
Kurtosis	0.871	1.185



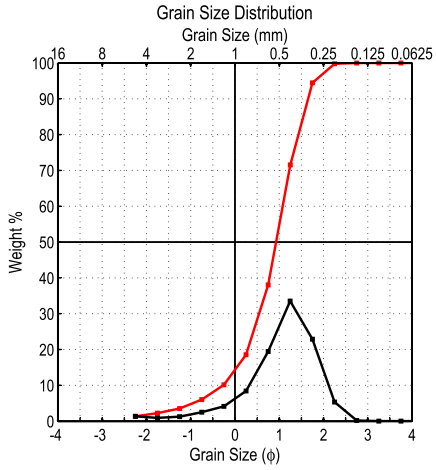
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**BC-E8e**
Interval	**Grab**
Mean	**0.544 mm**
STD	**0.574 mm**
Skewness	**-1.361**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	110.72
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	12.70

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.65	1.49	1.49
-1.5	-1.75	0.45	0.41	1.90
-1	-1.25	0.91	0.82	2.72
-0.5	-0.75	3.90	3.52	6.24
0	-0.25	7.15	6.46	12.70
0.5	0.25	11.34	10.24	22.94
1	0.75	25.08	22.65	45.59
1.5	1.25	41.66	37.63	83.22
2	1.75	15.78	14.25	97.47
2.5	2.25	2.74	2.47	99.95
3	2.75	0.05	0.05	99.99
3.5	3.25	0.00	0.00	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-0.925
16	-0.090
25	0.295
50	0.810
75	1.140
84	1.275
95	1.665
99	2.060

Moment Measures	(phi)	(mm)
Mean	0.879	0.544
Standard Deviation	0.800	0.574
Skewness	-1.361	
Kurtosis	5.742	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.593	0.665
Standard Deviation	0.682	0.734
Skewness (1)	-0.319	-0.329
Skewness (2)	-0.645	
Kurtosis	0.897	1.256



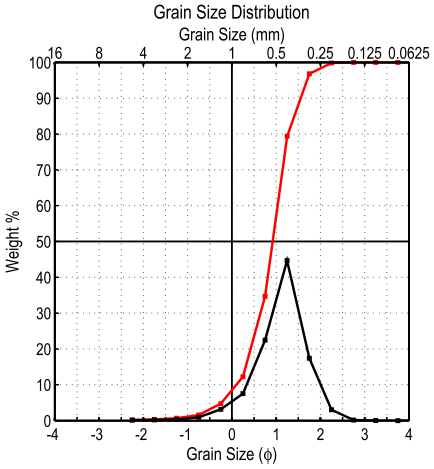
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**BC-E8f**
Interval	**Grab**
Mean	**0.492 mm**
STD	**0.556 mm**
Skewness	**-1.435**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	104.26
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	10.16

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.39	1.33	1.33
-1.5	-1.75	0.96	0.92	2.25
-1	-1.25	1.33	1.28	3.53
-0.5	-0.75	2.60	2.49	6.02
0	-0.25	4.31	4.13	10.16
0.5	0.25	8.77	8.41	18.57
1	0.75	20.29	19.46	38.03
1.5	1.25	34.94	33.51	71.54
2	1.75	23.86	22.89	94.43
2.5	2.25	5.56	5.33	99.76
3	2.75	0.21	0.20	99.96
3.5	3.25	0.02	0.02	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-0.955
16	0.095
25	0.415
50	0.930
75	1.325
84	1.520
95	1.805
99	2.180

Moment Measures	(phi)	(mm)
Mean	1.022	0.492
Standard Deviation	0.847	0.556
Skewness	-1.435	
Kurtosis	5.881	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.807	0.848
Standard Deviation	0.713	0.774
Skewness (1)	-0.172	-0.269
Skewness (2)	-0.709	
Kurtosis	0.937	1.243



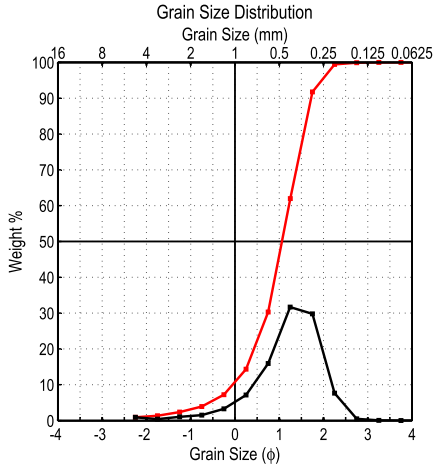
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**BC-E8g**
Interval	**Grab**
Mean	**0.467 mm**
STD	**0.664 mm**
Skewness	**-1.075**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	116.06
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	4.72

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.16	0.14	0.14
-1.5	-1.75	0.23	0.20	0.34
-1	-1.25	0.36	0.31	0.65
-0.5	-0.75	1.08	0.93	1.58
0	-0.25	3.65	3.14	4.72
0.5	0.25	8.73	7.52	12.24
1	0.75	26.05	22.45	34.69
1.5	1.25	51.88	44.70	79.39
2	1.75	20.20	17.40	96.79
2.5	2.25	3.51	3.02	99.82
3	2.75	0.18	0.16	99.97
3.5	3.25	0.02	0.02	99.99
4	3.75	0.00	0.00	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.060
5	-0.230
16	0.335
25	0.535
50	0.920
75	1.200
84	1.380
95	1.700
99	2.115

Moment Measures	**(phi)**	**(mm)**
Mean	1.098	0.467
Standard Deviation	0.591	0.664
Skewness	-1.075	
Kurtosis	6.246	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.857	0.878
Standard Deviation	0.522	0.554
Skewness (1)	-0.120	-0.156
Skewness (2)	-0.354	
Kurtosis	0.847	1.189



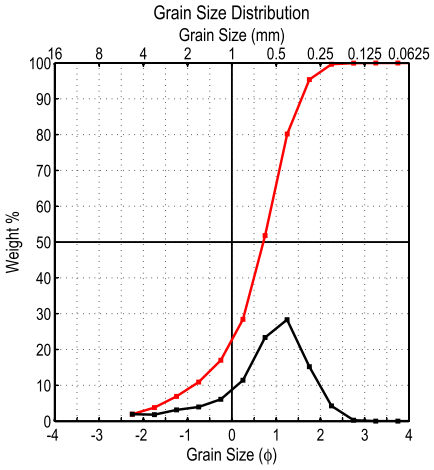
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**BC-E8h**
Interval	**Grab**
Mean	**0.441 mm**
STD	**0.578 mm**
Skewness	**-1.480**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	110.80
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	7.23

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.04	0.94	0.94
-1.5	-1.75	0.47	0.42	1.36
-1	-1.25	1.15	1.04	2.40
-0.5	-0.75	1.71	1.54	3.94
0	-0.25	3.64	3.29	7.23
0.5	0.25	7.90	7.13	14.36
1	0.75	17.65	15.93	30.29
1.5	1.25	35.09	31.67	61.96
2	1.75	33.01	29.79	91.75
2.5	2.25	8.50	7.67	99.42
3	2.75	0.53	0.48	99.90
3.5	3.25	0.08	0.07	99.97
4	3.75	0.01	0.01	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.180
5	-0.590
16	0.300
25	0.585
50	1.060
75	1.470
84	1.620
95	1.960
99	2.220

Moment Measures	**(phi)**	**(mm)**
Mean	1.182	0.441
Standard Deviation	0.792	0.578
Skewness	-1.480	
Kurtosis	6.571	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.960	0.993
Standard Deviation	0.660	0.716
Skewness (1)	-0.152	-0.223
Skewness (2)	-0.568	
Kurtosis	0.932	1.181



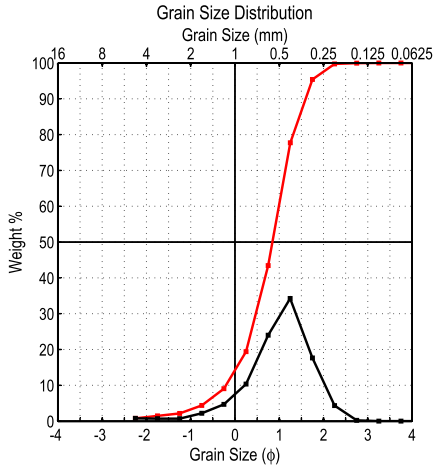
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**BC-E8i**
Interval	**Grab**
Mean	**0.586 mm**
STD	**0.513 mm**
Skewness	**-1.077**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	121.49
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	17.00

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	2.39	1.97	1.97
-1.5	-1.75	2.20	1.81	3.78
-1	-1.25	3.83	3.15	6.93
-0.5	-0.75	4.82	3.97	10.90
0	-0.25	7.41	6.10	17.00
0.5	0.25	13.90	11.44	28.44
1	0.75	28.39	23.37	51.81
1.5	1.25	34.45	28.36	80.16
2	1.75	18.47	15.20	95.37
2.5	2.25	5.21	4.29	99.65
3	2.75	0.36	0.30	99.95
3.5	3.25	0.04	0.03	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-1.555
16	-0.330
25	0.100
50	0.710
75	1.160
84	1.375
95	1.740
99	2.175

Moment Measures	**(phi)**	**(mm)**
Mean	0.770	0.586
Standard Deviation	0.964	0.513
Skewness	-1.077	
Kurtosis	4.183	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.522	0.585
Standard Deviation	0.853	0.925
Skewness (1)	-0.220	-0.297
Skewness (2)	-0.724	
Kurtosis	0.933	1.274



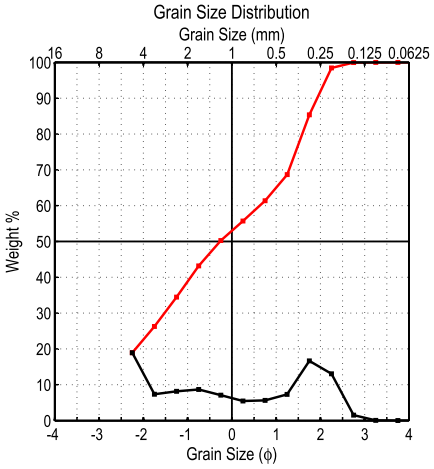
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**BC-E8j**
Interval	**Grab**
Mean	**0.506 mm**
STD	**0.589 mm**
Skewness	**-1.204**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	113.11
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	9.09

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.90	0.80	0.80
-1.5	-1.75	0.78	0.69	1.49
-1	-1.25	0.78	0.69	2.17
-0.5	-0.75	2.52	2.23	4.40
0	-0.25	5.30	4.69	9.09
0.5	0.25	11.70	10.34	19.43
1	0.75	27.13	23.99	43.42
1.5	1.25	38.77	34.28	77.69
2	1.75	19.99	17.67	95.37
2.5	2.25	4.94	4.37	99.73
3	2.75	0.25	0.22	99.96
3.5	3.25	0.03	0.03	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.100
5	-0.685
16	0.085
25	0.365
50	0.845
75	1.210
84	1.430
95	1.740
99	2.165

Moment Measures	**(phi)**	**(mm)**
Mean	0.982	0.506
Standard Deviation	0.764	0.589
Skewness	-1.204	
Kurtosis	5.811	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.758	0.787
Standard Deviation	0.673	0.704
Skewness (1)	-0.130	-0.196
Skewness (2)	-0.472	
Kurtosis	0.803	1.176



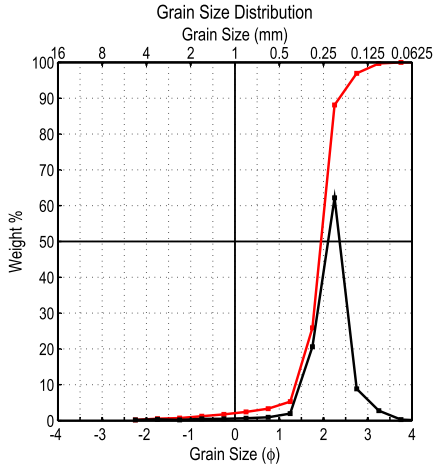
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NSS-01a**
Interval	**Swash**
Mean	**0.975 mm**
STD	**0.313 mm**
Skewness	**-0.036**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	142.39
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	50.26

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	26.97	18.94	18.94
-1.5	-1.75	10.46	7.35	26.29
-1	-1.25	11.66	8.19	34.48
-0.5	-0.75	12.38	8.69	43.17
0	-0.25	10.10	7.09	50.26
0.5	0.25	7.77	5.46	55.72
1	0.75	8.03	5.64	61.36
1.5	1.25	10.41	7.31	68.67
2	1.75	23.76	16.69	85.36
2.5	2.25	18.61	13.07	98.43
3	2.75	2.14	1.50	99.93
3.5	3.25	0.08	0.06	99.99
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.840
50	-0.270
75	1.440
84	1.710
95	2.120
99	2.440

Moment Measures	(phi)	(mm)
Mean	0.037	0.975
Standard Deviation	1.676	0.313
Skewness	-0.036	
Kurtosis	1.502	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.270	-0.270
Standard Deviation	1.980	1.652
Skewness (1)	0.000	0.047
Skewness (2)	0.104	
Kurtosis	0.104	0.546



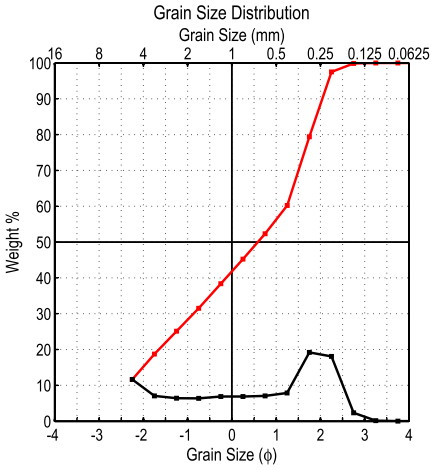
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NSS-01b**
Interval	**LTT**
Mean	**0.230 mm**
STD	**0.663 mm**
Skewness	**-3.014**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	111.89
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	1.72

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.21	0.19	0.19
-1.5	-1.75	0.40	0.36	0.55
-1	-1.25	0.20	0.18	0.72
-0.5	-0.75	0.55	0.49	1.22
0	-0.25	0.57	0.51	1.72
0.5	0.25	0.76	0.68	2.40
1	0.75	1.05	0.94	3.34
1.5	1.25	2.19	1.96	5.30
2	1.75	23.05	20.60	25.90
2.5	2.25	69.57	62.18	88.08
3	2.75	9.92	8.87	96.94
3.5	3.25	3.08	2.75	99.70
4	3.75	0.32	0.29	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.970
5	1.175
16	1.510
25	1.730
50	1.945
75	2.145
84	2.215
95	2.640
99	3.125

Moment Measures	(phi)	(mm)
Mean	2.120	0.230
Standard Deviation	0.594	0.663
Skewness	-3.014	
Kurtosis	19.522	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.862	1.890
Standard Deviation	0.353	0.398
Skewness (1)	-0.234	-0.143
Skewness (2)	-0.106	
Kurtosis	1.078	1.447



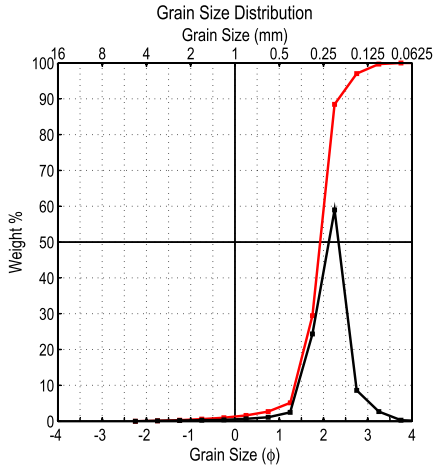
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NSS-02a**
Interval	**Swash**
Mean	**0.732 mm**
STD	**0.326 mm**
Skewness	**-0.393**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	155.68
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	38.39

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	18.13	11.65	11.65
-1.5	-1.75	11.01	7.07	18.72
-1	-1.25	9.98	6.41	25.13
-0.5	-0.75	9.94	6.38	31.51
0	-0.25	10.71	6.88	38.39
0.5	0.25	10.69	6.87	45.26
1	0.75	10.99	7.06	52.32
1.5	1.25	12.27	7.88	60.20
2	1.75	29.90	19.21	79.41
2.5	2.25	28.16	18.09	97.49
3	2.75	3.65	2.34	99.84
3.5	3.25	0.22	0.14	99.98
4	3.75	0.02	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.940
25	-1.260
50	0.585
75	1.635
84	1.875
95	2.180
99	2.570

Moment Measures	(phi)	(mm)
Mean	0.451	0.732
Standard Deviation	1.615	0.326
Skewness	-0.393	
Kurtosis	1.730	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.032	0.173
Standard Deviation	1.908	1.625
Skewness (1)	-0.324	-0.302
Skewness (2)	-0.325	
Kurtosis	0.161	0.627



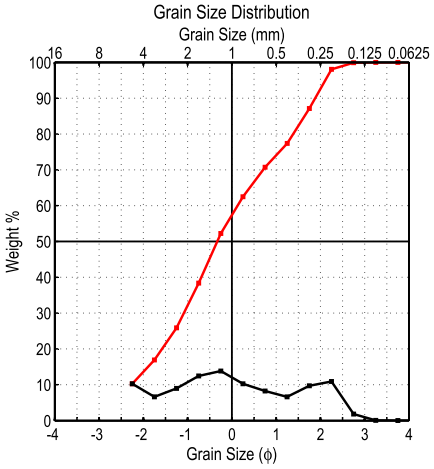
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NSS-02b**
Interval	**LTT**
Mean	**0.230 mm**
STD	**0.701 mm**
Skewness	**-2.031**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	125.52
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.95

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.14	0.11	0.11
-1	-1.25	0.22	0.18	0.29
-0.5	-0.75	0.37	0.29	0.58
0	-0.25	0.46	0.37	0.95
0.5	0.25	0.81	0.65	1.59
1	0.75	1.35	1.08	2.67
1.5	1.25	3.07	2.45	5.11
2	1.75	30.55	24.34	29.45
2.5	2.25	74.03	58.98	88.43
3	2.75	10.77	8.58	97.01
3.5	3.25	3.37	2.68	99.70
4	3.75	0.36	0.29	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.210
5	1.225
16	1.475
25	1.660
50	1.925
75	2.135
84	2.210
95	2.635
99	3.120

Moment Measures	(phi)	(mm)
Mean	2.121	0.230
Standard Deviation	0.513	0.701
Skewness	-2.031	
Kurtosis	14.618	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.843	1.870
Standard Deviation	0.367	0.397
Skewness (1)	-0.224	-0.109
Skewness (2)	0.014	
Kurtosis	0.918	1.217



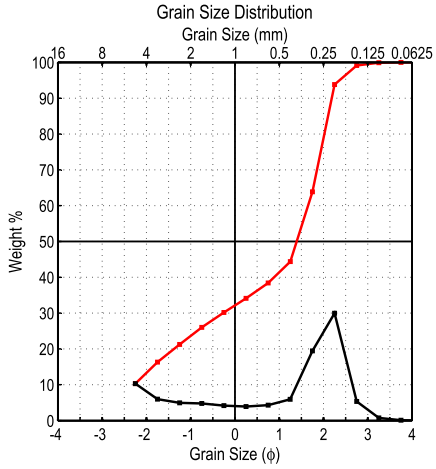
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NSS-03a**
Interval	**Swash**
Mean	**0.963 mm**
STD	**0.366 mm**
Skewness	**0.089**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	145.29
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	52.22

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	14.94	10.28	10.28
-1.5	-1.75	9.64	6.63	16.92
-1	-1.25	13.05	8.98	25.90
-0.5	-0.75	18.12	12.47	38.37
0	-0.25	20.12	13.85	52.22
0.5	0.25	14.94	10.28	62.50
1	0.75	11.97	8.24	70.74
1.5	1.25	9.63	6.63	77.37
2	1.75	14.14	9.73	87.10
2.5	2.25	15.89	10.94	98.04
3	2.75	2.68	1.84	99.88
3.5	3.25	0.12	0.08	99.97
4	3.75	0.03	0.02	99.99
>4.0	4.25	0.02	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.820
25	-1.300
50	-0.330
75	1.070
84	1.590
95	2.110
99	2.510

Moment Measures	(phi)	(mm)
Mean	0.054	0.963
Standard Deviation	1.450	0.366
Skewness	0.089	
Kurtosis	1.938	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.115	-0.187
Standard Deviation	1.705	1.513
Skewness (1)	0.126	0.123
Skewness (2)	0.152	
Kurtosis	0.279	0.754



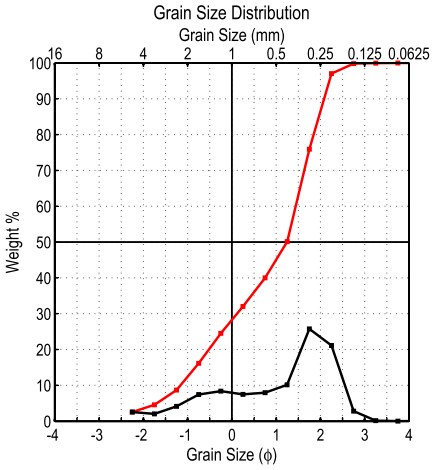
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NSS-03b**
Interval	**LTT**
Mean	**0.550 mm**
STD	**0.313 mm**
Skewness	**-0.741**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Platykurtic
Total weight (gram)	127.98
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	30.20

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	13.22	10.33	10.33
-1.5	-1.75	7.65	5.98	16.31
-1	-1.25	6.32	4.94	21.25
-0.5	-0.75	6.11	4.77	26.02
0	-0.25	5.35	4.18	30.20
0.5	0.25	5.02	3.92	34.12
1	0.75	5.50	4.30	38.42
1.5	1.25	7.62	5.95	44.37
2	1.75	24.92	19.47	63.85
2.5	2.25	38.35	29.97	93.81
3	2.75	6.82	5.33	99.14
3.5	3.25	0.96	0.75	99.89
4	3.75	0.12	0.09	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.775
25	-0.855
50	1.395
75	1.935
84	2.085
95	2.360
99	2.735

Moment Measures	(phi)	(mm)
Mean	0.862	0.550
Standard Deviation	1.674	0.313
Skewness	-0.741	
Kurtosis	2.049	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.155	0.568
Standard Deviation	1.930	1.663
Skewness (1)	-0.642	-0.612
Skewness (2)	-0.694	
Kurtosis	0.194	0.677



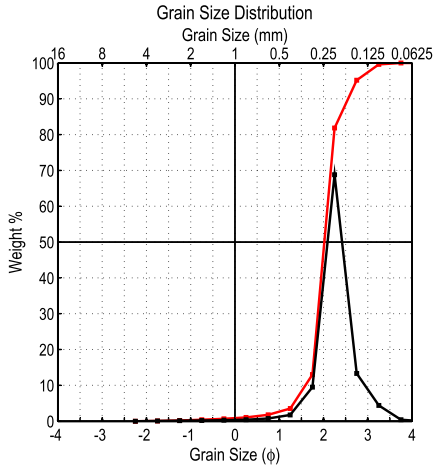
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NSS-04a**
Interval	**Swash**
Mean	**0.502 mm**
STD	**0.414 mm**
Skewness	**-0.793**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	139.01
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	24.54

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.53	2.54	2.54
-1.5	-1.75	2.83	2.04	4.58
-1	-1.25	5.73	4.12	8.70
-0.5	-0.75	10.37	7.46	16.16
0	-0.25	11.65	8.38	24.54
0.5	0.25	10.42	7.50	32.03
1	0.75	11.08	7.97	40.00
1.5	1.25	14.08	10.13	50.13
2	1.75	35.83	25.78	75.91
2.5	2.25	29.35	21.11	97.02
3	2.75	3.88	2.79	99.81
3.5	3.25	0.20	0.14	99.96
4	3.75	0.03	0.02	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-2.250
5	-1.700
16	-0.760
25	-0.220
50	1.245
75	1.730
84	1.940
95	2.200
99	2.605

Moment Measures	(phi)	(mm)
Mean	0.993	0.502
Standard Deviation	1.271	0.414
Skewness	-0.793	
Kurtosis	2.633	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.590	0.808
Standard Deviation	1.350	1.266
Skewness (1)	-0.485	-0.498
Skewness (2)	-0.737	
Kurtosis	0.444	0.820



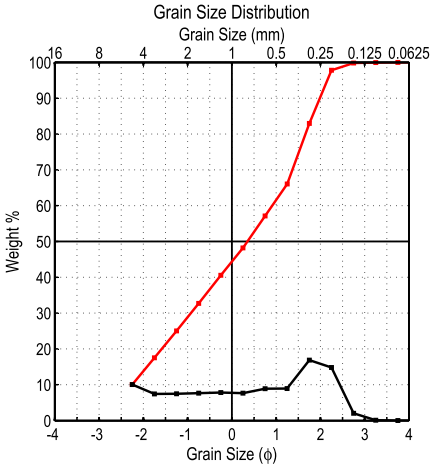
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NSS-04b**
Interval	**LTT**
Mean	**0.208 mm**
STD	**0.721 mm**
Skewness	**-2.036**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	121.44
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	0.67

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.08	0.07	0.07
-1	-1.25	0.16	0.13	0.20
-0.5	-0.75	0.25	0.21	0.40
0	-0.25	0.32	0.26	0.67
0.5	0.25	0.48	0.40	1.06
1	0.75	0.89	0.73	1.80
1.5	1.25	2.13	1.75	3.55
2	1.75	11.52	9.49	13.04
2.5	2.25	83.55	68.80	81.83
3	2.75	16.18	13.32	95.16
3.5	3.25	5.36	4.41	99.57
4	3.75	0.49	0.40	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	0.170
5	1.325
16	1.770
25	1.835
50	2.020
75	2.200
84	2.330
95	2.745
99	3.185

Moment Measures	(phi)	(mm)
Mean	2.263	0.208
Standard Deviation	0.472	0.721
Skewness	-2.036	
Kurtosis	17.118	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	2.050	2.040
Standard Deviation	0.280	0.355
Skewness (1)	0.107	0.064
Skewness (2)	0.054	
Kurtosis	1.536	1.594



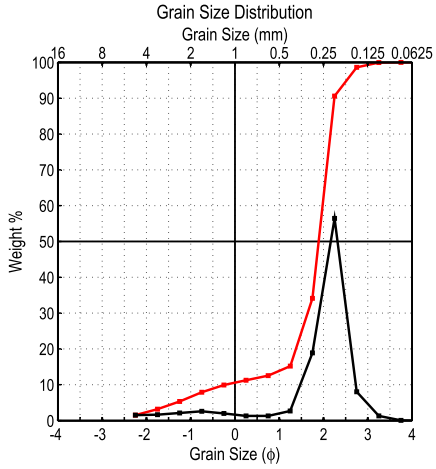
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NSS-05a**
Interval	**Swash**
Mean	**0.778 mm**
STD	**0.341 mm**
Skewness	**-0.288**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	149.27
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	40.56

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	15.03	10.07	10.07
-1.5	-1.75	11.14	7.46	17.53
-1	-1.25	11.20	7.50	25.04
-0.5	-0.75	11.46	7.68	32.71
0	-0.25	11.71	7.84	40.56
0.5	0.25	11.41	7.64	48.20
1	0.75	13.29	8.90	57.10
1.5	1.25	13.37	8.96	66.06
2	1.75	25.19	16.88	82.94
2.5	2.25	22.15	14.84	97.78
3	2.75	3.06	2.05	99.83
3.5	3.25	0.19	0.13	99.95
4	3.75	0.04	0.03	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.855
25	-1.250
50	0.350
75	1.515
84	1.785
95	2.155
99	2.550

Moment Measures	(phi)	(mm)
Mean	0.361	0.778
Standard Deviation	1.553	0.341
Skewness	-0.288	
Kurtosis	1.755	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.035	0.093
Standard Deviation	1.820	1.577
Skewness (1)	-0.212	-0.196
Skewness (2)	-0.218	
Kurtosis	0.210	0.653



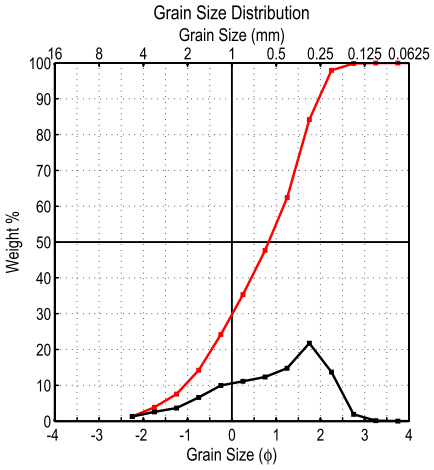
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NSS-05b**
Interval	**LTT**
Mean	**0.287 mm**
STD	**0.470 mm**
Skewness	**-2.224**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	107.09
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	9.94

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.65	1.54	1.54
-1.5	-1.75	1.76	1.64	3.18
-1	-1.25	2.29	2.14	5.32
-0.5	-0.75	2.79	2.61	7.93
0	-0.25	2.15	2.01	9.94
0.5	0.25	1.42	1.33	11.26
1	0.75	1.38	1.29	12.55
1.5	1.25	2.86	2.67	15.22
2	1.75	20.25	18.91	34.13
2.5	2.25	60.44	56.44	90.57
3	2.75	8.62	8.05	98.62
3.5	3.25	1.39	1.30	99.92
4	3.75	0.07	0.07	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.325
16	1.270
25	1.510
50	1.890
75	2.110
84	2.190
95	2.525
99	2.895

Moment Measures	(phi)	(mm)
Mean	1.799	0.287
Standard Deviation	1.089	0.470
Skewness	-2.224	
Kurtosis	7.342	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.730	1.783
Standard Deviation	0.460	0.813
Skewness (1)	-0.348	-0.509
Skewness (2)	-2.804	
Kurtosis	3.185	2.630



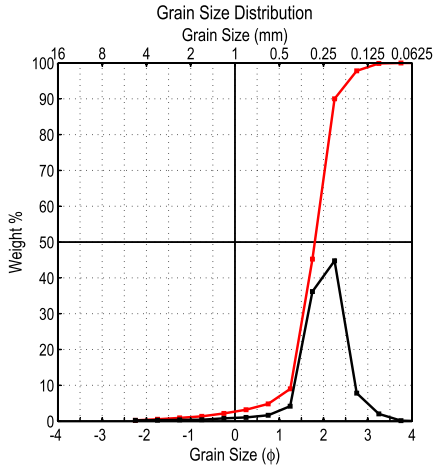
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-01a**
Interval	**Swash**
Mean	**0.552 mm**
STD	**0.448 mm**
Skewness	**-0.602**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	116.64
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	24.19

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.52	1.30	1.30
-1.5	-1.75	3.02	2.59	3.89
-1	-1.25	4.30	3.69	7.58
-0.5	-0.75	7.74	6.64	14.21
0	-0.25	11.63	9.97	24.19
0.5	0.25	12.98	11.13	35.31
1	0.75	14.41	12.35	47.67
1.5	1.25	17.22	14.76	62.43
2	1.75	25.39	21.77	84.20
2.5	2.25	15.98	13.70	97.90
3	2.75	2.25	1.93	99.83
3.5	3.25	0.16	0.14	99.97
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.600
16	-0.660
25	-0.215
50	0.830
75	1.540
84	1.745
95	2.145
99	2.535

Moment Measures	(phi)	(mm)
Mean	0.858	0.552
Standard Deviation	1.159	0.448
Skewness	-0.602	
Kurtosis	2.620	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.542	0.638
Standard Deviation	1.203	1.169
Skewness (1)	-0.239	-0.268
Skewness (2)	-0.464	
Kurtosis	0.557	0.875



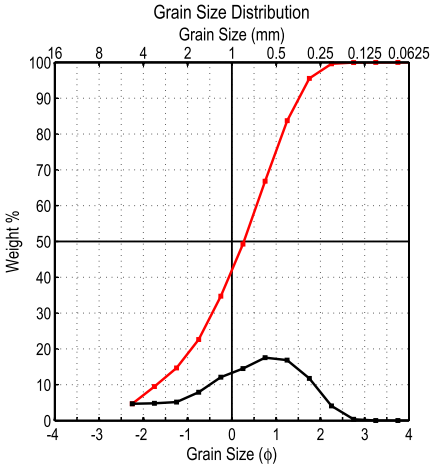
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-01b**
Interval	**LTT**
Mean	**0.254 mm**
STD	**0.641 mm**
Skewness	**-2.447**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	161.23
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	2.15

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.41	0.25	0.25
-1.5	-1.75	0.45	0.28	0.53
-1	-1.25	0.61	0.38	0.91
-0.5	-0.75	0.69	0.43	1.34
0	-0.25	1.30	0.81	2.15
0.5	0.25	1.70	1.05	3.20
1	0.75	2.64	1.64	4.84
1.5	1.25	6.77	4.20	9.04
2	1.75	58.36	36.20	45.23
2.5	2.25	72.15	44.75	89.98
3	2.75	12.61	7.82	97.80
3.5	3.25	3.29	2.04	99.84
4	3.75	0.22	0.14	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-1.145
5	0.770
16	1.345
25	1.470
50	1.805
75	2.085
84	2.185
95	2.570
99	3.045

Moment Measures	(phi)	(mm)
Mean	1.974	0.254
Standard Deviation	0.641	0.641
Skewness	-2.447	
Kurtosis	14.433	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.765	1.778
Standard Deviation	0.420	0.483
Skewness (1)	-0.095	-0.123
Skewness (2)	-0.321	
Kurtosis	1.143	1.200



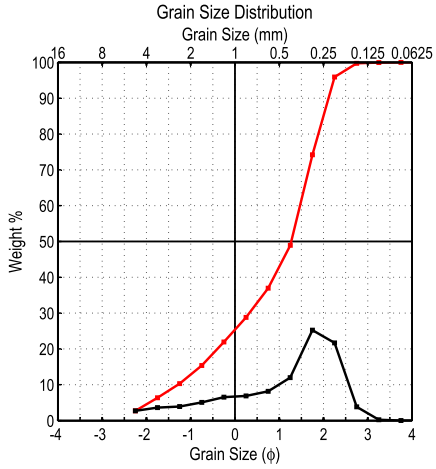
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-02a**
Interval	**Swash**
Mean	**0.788 mm**
STD	**0.444 mm**
Skewness	**-0.491**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	145.60
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	34.73

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	6.86	4.71	4.71
-1.5	-1.75	7.00	4.81	9.52
-1	-1.25	7.55	5.19	14.70
-0.5	-0.75	11.53	7.92	22.62
0	-0.25	17.63	12.11	34.73
0.5	0.25	21.16	14.53	49.27
1	0.75	25.57	17.56	66.83
1.5	1.25	24.60	16.90	83.72
2	1.75	17.16	11.79	95.51
2.5	2.25	5.96	4.09	99.60
3	2.75	0.51	0.35	99.95
3.5	3.25	0.04	0.03	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.02	0.01	100.00

Percentiles	
1	-2.250
5	-2.220
16	-1.170
25	-0.650
50	0.270
75	0.990
84	1.260
95	1.730
99	2.175

Moment Measures	(phi)	(mm)
Mean	0.344	0.788
Standard Deviation	1.172	0.444
Skewness	-0.491	
Kurtosis	2.556	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.045	0.120
Standard Deviation	1.215	1.206
Skewness (1)	-0.185	-0.223
Skewness (2)	-0.424	
Kurtosis	0.626	0.987



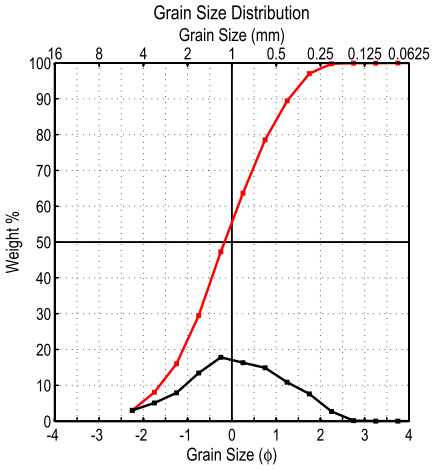
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-02b**
Interval	**LTT**
Mean	**0.485 mm**
STD	**0.407 mm**
Skewness	**-0.924**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	113.17
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	21.93

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.10	2.74	2.74
-1.5	-1.75	4.11	3.63	6.37
-1	-1.25	4.46	3.94	10.31
-0.5	-0.75	5.73	5.06	15.38
0	-0.25	7.42	6.56	21.93
0.5	0.25	7.78	6.87	28.81
1	0.75	9.23	8.16	36.96
1.5	1.25	13.55	11.97	48.94
2	1.75	28.57	25.25	74.18
2.5	2.25	24.56	21.70	95.88
3	2.75	4.34	3.83	99.72
3.5	3.25	0.27	0.24	99.96
4	3.75	0.03	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.940
16	-0.700
25	-0.025
50	1.270
75	1.770
84	1.975
95	2.230
99	2.655

Moment Measures	(phi)	(mm)
Mean	1.044	0.485
Standard Deviation	1.298	0.407
Skewness	-0.924	
Kurtosis	2.890	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.638	0.848
Standard Deviation	1.337	1.301
Skewness (1)	-0.473	-0.506
Skewness (2)	-0.841	
Kurtosis	0.559	0.952



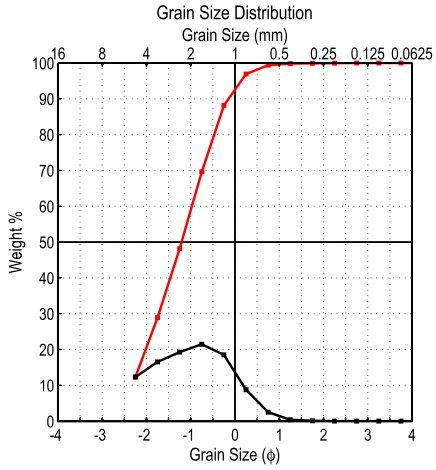
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-03a**
Interval	**Swash**
Mean	**0.940 mm**
STD	**0.473 mm**
Skewness	**-0.058**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	109.69
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	47.32

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	3.31	3.02	3.02
-1.5	-1.75	5.58	5.09	8.10
-1	-1.25	8.69	7.92	16.03
-0.5	-0.75	14.75	13.45	29.47
0	-0.25	19.57	17.84	47.32
0.5	0.25	17.90	16.32	63.63
1	0.75	16.35	14.91	78.54
1.5	1.25	11.95	10.89	89.43
2	1.75	8.34	7.60	97.04
2.5	2.25	3.00	2.73	99.77
3	2.75	0.17	0.15	99.93
3.5	3.25	0.03	0.03	99.95
4	3.75	0.02	0.02	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-2.055
16	-1.250
25	-0.915
50	-0.170
75	0.630
84	1.000
95	1.615
99	2.110

Moment Measures	(phi)	(mm)
Mean	0.089	0.940
Standard Deviation	1.081	0.473
Skewness	-0.058	
Kurtosis	2.510	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.125	-0.140
Standard Deviation	1.125	1.119
Skewness (1)	0.040	0.006
Skewness (2)	-0.044	
Kurtosis	0.631	0.974



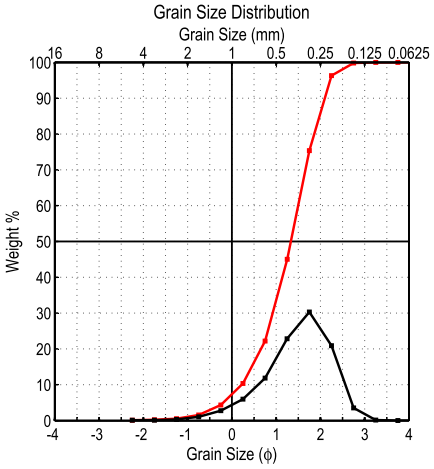
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-03b**
Interval	**LTT**
Mean	**1.952 mm**
STD	**0.567 mm**
Skewness	**0.235**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Symmetrical
	Mesokurtic
Total weight (gram)	166.21
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	88.14

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	20.53	12.35	12.35
-1.5	-1.75	27.48	16.53	28.88
-1	-1.25	32.02	19.26	48.15
-0.5	-0.75	35.67	21.46	69.61
0	-0.25	30.80	18.53	88.14
0.5	0.25	14.55	8.75	96.89
1	0.75	4.14	2.49	99.38
1.5	1.25	0.70	0.42	99.81
2	1.75	0.18	0.11	99.91
2.5	2.25	0.07	0.04	99.96
3	2.75	0.02	0.01	99.97
3.5	3.25	0.02	0.01	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.02	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.140
25	-1.865
50	-1.205
75	-0.605
84	-0.360
95	0.140
99	0.675

Moment Measures	(phi)	(mm)
Mean	-0.965	1.952
Standard Deviation	0.819	0.567
Skewness	0.235	
Kurtosis	2.790	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.250	-1.235
Standard Deviation	0.890	0.807
Skewness (1)	-0.051	0.037
Skewness (2)	0.169	
Kurtosis	0.343	0.777



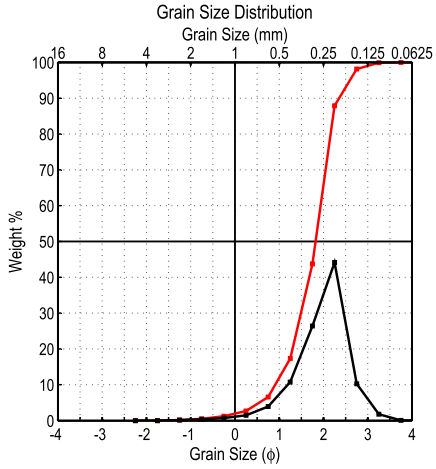
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-04a**
Interval	**Swash**
Mean	**0.361 mm**
STD	**0.595 mm**
Skewness	**-0.892**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	106.25
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	4.35

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.12	0.11	0.11
-1.5	-1.75	0.11	0.10	0.22
-1	-1.25	0.34	0.32	0.54
-0.5	-0.75	1.10	1.04	1.57
0	-0.25	2.95	2.78	4.35
0.5	0.25	6.38	6.00	10.35
1	0.75	12.60	11.86	22.21
1.5	1.25	24.26	22.83	45.04
2	1.75	32.21	30.32	75.36
2.5	2.25	22.24	20.93	96.29
3	2.75	3.75	3.53	99.82
3.5	3.25	0.15	0.14	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.025
5	-0.195
16	0.490
25	0.810
50	1.330
75	1.745
84	1.955
95	2.220
99	2.635

Moment Measures	(phi)	(mm)
Mean	1.471	0.361
Standard Deviation	0.749	0.595
Skewness	-0.892	
Kurtosis	4.349	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.222	1.258
Standard Deviation	0.733	0.732
Skewness (1)	-0.147	-0.205
Skewness (2)	-0.433	
Kurtosis	0.648	1.059



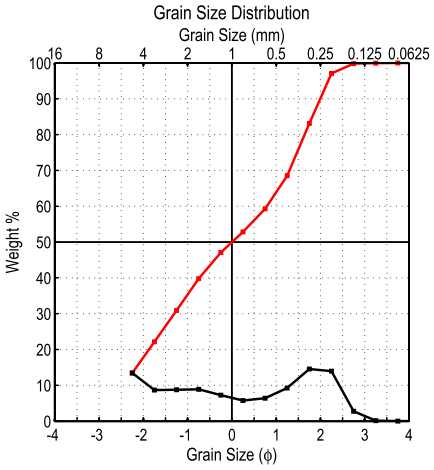
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-04b**
Interval	**LTT**
Mean	**0.257 mm**
STD	**0.654 mm**
Skewness	**-1.176**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	113.69
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	1.21

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.00	0.00	0.00
-1	-1.25	0.15	0.13	0.13
-0.5	-0.75	0.43	0.38	0.51
0	-0.25	0.79	0.69	1.21
0.5	0.25	1.66	1.46	2.67
1	0.75	4.47	3.93	6.60
1.5	1.25	12.23	10.76	17.35
2	1.75	30.00	26.39	43.74
2.5	2.25	50.17	44.13	87.87
3	2.75	11.68	10.27	98.14
3.5	3.25	2.00	1.76	99.90
4	3.75	0.08	0.07	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-0.400
5	0.545
16	1.185
25	1.395
50	1.820
75	2.105
84	2.205
95	2.595
99	2.995

Moment Measures	(phi)	(mm)
Mean	1.960	0.257
Standard Deviation	0.613	0.654
Skewness	-1.176	
Kurtosis	6.044	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.695	1.737
Standard Deviation	0.510	0.566
Skewness (1)	-0.245	-0.245
Skewness (2)	-0.490	
Kurtosis	1.010	1.183



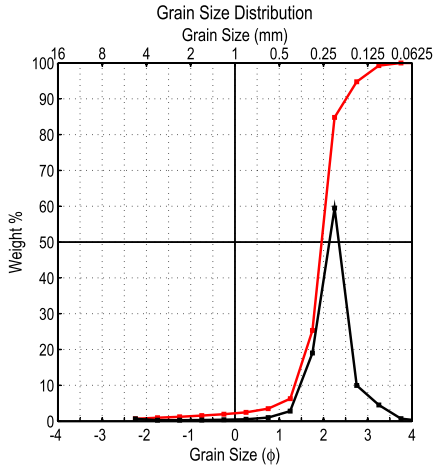
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-05a**
Interval	**Swash**
Mean	**0.883 mm**
STD	**0.322 mm**
Skewness	**-0.098**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	110.90
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	47.10

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	14.93	13.46	13.46
-1.5	-1.75	9.62	8.67	22.14
-1	-1.25	9.73	8.77	30.91
-0.5	-0.75	9.87	8.90	39.81
0	-0.25	8.08	7.29	47.10
0.5	0.25	6.38	5.75	52.85
1	0.75	7.13	6.43	59.28
1.5	1.25	10.26	9.25	68.53
2	1.75	16.16	14.57	83.10
2.5	2.25	15.48	13.96	97.06
3	2.75	3.05	2.75	99.81
3.5	3.25	0.16	0.14	99.95
4	3.75	0.03	0.03	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.105
25	-1.585
50	0.000
75	1.470
84	1.780
95	2.175
99	2.605

Moment Measures	(phi)	(mm)
Mean	0.180	0.883
Standard Deviation	1.635	0.322
Skewness	-0.098	
Kurtosis	1.585	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.163	-0.108
Standard Deviation	1.942	1.642
Skewness (1)	-0.084	-0.050
Skewness (2)	-0.019	
Kurtosis	0.139	0.594



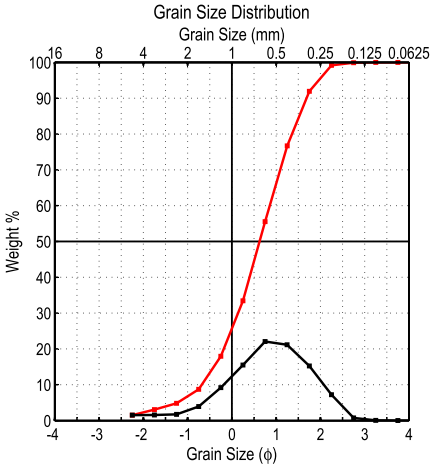
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-05b**
Interval	**LTT**
Mean	**0.227 mm**
STD	**0.625 mm**
Skewness	**-3.004**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	171.44
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	1.96

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.14	0.66	0.66
-1.5	-1.75	0.48	0.28	0.94
-1	-1.25	0.47	0.27	1.22
-0.5	-0.75	0.56	0.33	1.55
0	-0.25	0.71	0.41	1.96
0.5	0.25	0.89	0.52	2.48
1	0.75	1.72	1.00	3.48
1.5	1.25	4.82	2.81	6.29
2	1.75	32.61	19.02	25.31
2.5	2.25	101.95	59.47	84.78
3	2.75	17.10	9.97	94.76
3.5	3.25	7.73	4.51	99.27
4	3.75	1.23	0.72	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-1.650
5	1.020
16	1.505
25	1.740
50	1.960
75	2.170
84	2.245
95	2.775
99	3.220

Moment Measures	(phi)	(mm)
Mean	2.137	0.227
Standard Deviation	0.679	0.625
Skewness	-3.004	
Kurtosis	19.184	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.875	1.903
Standard Deviation	0.370	0.451
Skewness (1)	-0.230	-0.150
Skewness (2)	-0.169	
Kurtosis	1.372	1.673



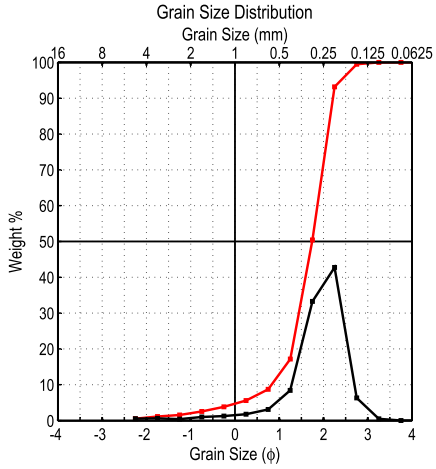
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-06a**
Interval	**Swash**
Mean	**0.580 mm**
STD	**0.513 mm**
Skewness	**-0.708**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	109.10
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	17.94

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.65	1.51	1.51
-1.5	-1.75	1.69	1.55	3.06
-1	-1.25	1.91	1.75	4.81
-0.5	-0.75	4.27	3.91	8.73
0	-0.25	10.05	9.21	17.94
0.5	0.25	16.92	15.51	33.45
1	0.75	24.08	22.07	55.52
1.5	1.25	23.09	21.16	76.68
2	1.75	16.62	15.23	91.92
2.5	2.25	7.89	7.23	99.15
3	2.75	0.82	0.75	99.90
3.5	3.25	0.07	0.06	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-1.225
16	-0.355
25	-0.020
50	0.625
75	1.210
84	1.490
95	1.965
99	2.240

Moment Measures	(phi)	(mm)
Mean	0.787	0.580
Standard Deviation	0.963	0.513
Skewness	-0.708	
Kurtosis	3.746	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.567	0.587
Standard Deviation	0.922	0.945
Skewness (1)	-0.062	-0.111
Skewness (2)	-0.276	
Kurtosis	0.729	1.063



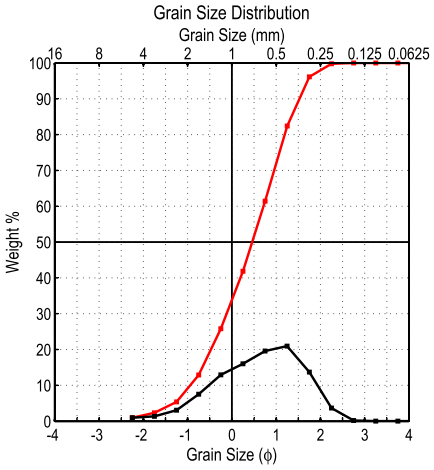
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-06b**
Interval	**LTT**
Mean	**0.281 mm**
STD	**0.591 mm**
Skewness	**-2.430**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	122.25
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	3.82

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.63	0.52	0.52
-1.5	-1.75	0.75	0.61	1.13
-1	-1.25	0.51	0.42	1.55
-0.5	-0.75	1.22	1.00	2.54
0	-0.25	1.56	1.28	3.82
0.5	0.25	2.18	1.78	5.60
1	0.75	3.81	3.12	8.72
1.5	1.25	10.32	8.44	17.16
2	1.75	40.65	33.25	50.41
2.5	2.25	52.24	42.73	93.15
3	2.75	7.74	6.33	99.48
3.5	3.25	0.59	0.48	99.96
4	3.75	0.03	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-1.855
5	0.080
16	1.180
25	1.370
50	1.745
75	2.040
84	2.145
95	2.395
99	2.710

Moment Measures	(phi)	(mm)
Mean	1.830	0.281
Standard Deviation	0.760	0.591
Skewness	-2.430	
Kurtosis	11.218	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.663	1.690
Standard Deviation	0.482	0.592
Skewness (1)	-0.171	-0.305
Skewness (2)	-1.052	
Kurtosis	1.399	1.416



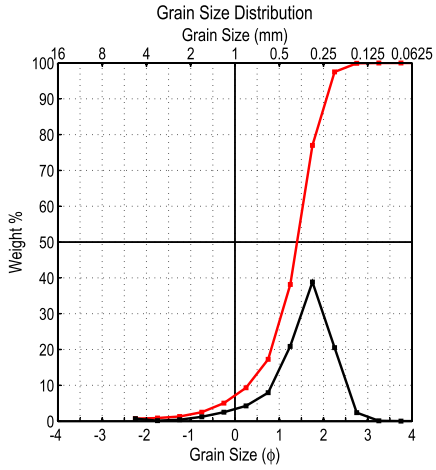
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-07a**
Interval	**Swash**
Mean	**0.657 mm**
STD	**0.519 mm**
Skewness	**-0.494**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	154.89
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	25.82

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.51	0.97	0.97
-1.5	-1.75	2.09	1.35	2.32
-1	-1.25	4.74	3.06	5.38
-0.5	-0.75	11.64	7.52	12.90
0	-0.25	20.01	12.92	25.82
0.5	0.25	24.83	16.03	41.85
1	0.75	30.32	19.58	61.42
1.5	1.25	32.45	20.95	82.37
2	1.75	21.26	13.73	96.10
2.5	2.25	5.68	3.67	99.77
3	2.75	0.30	0.19	99.96
3.5	3.25	0.03	0.02	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.02	0.01	100.00

Percentiles	
1	-2.240
5	-1.315
16	-0.630
25	-0.280
50	0.460
75	1.075
84	1.310
95	1.710
99	2.145

Moment Measures	(phi)	(mm)
Mean	0.606	0.657
Standard Deviation	0.946	0.519
Skewness	-0.494	
Kurtosis	2.959	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.340	0.380
Standard Deviation	0.970	0.943
Skewness (1)	-0.124	-0.149
Skewness (2)	-0.271	
Kurtosis	0.559	0.915



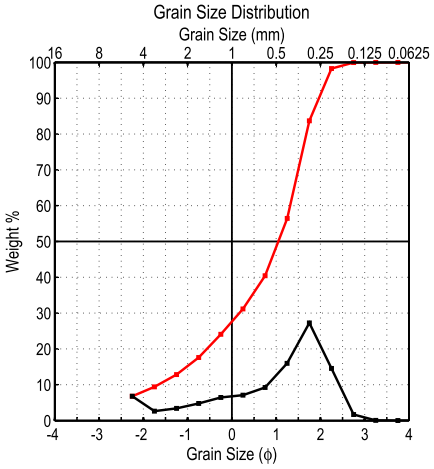
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-07b**
Interval	**LTT**
Mean	**0.353 mm**
STD	**0.586 mm**
Skewness	**-1.686**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	111.11
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	5.04

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.80	0.72	0.72
-1.5	-1.75	0.19	0.17	0.89
-1	-1.25	0.45	0.41	1.30
-0.5	-0.75	1.37	1.23	2.53
0	-0.25	2.79	2.51	5.04
0.5	0.25	4.76	4.28	9.32
1	0.75	8.82	7.94	17.26
1.5	1.25	23.21	20.89	38.15
2	1.75	43.14	38.83	76.98
2.5	2.25	22.80	20.52	97.50
3	2.75	2.65	2.39	99.88
3.5	3.25	0.10	0.09	99.97
4	3.75	0.02	0.02	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-1.615
5	-0.260
16	0.670
25	0.935
50	1.405
75	1.725
84	1.920
95	2.190
99	2.565

Moment Measures	(phi)	(mm)
Mean	1.502	0.353
Standard Deviation	0.771	0.586
Skewness	-1.686	
Kurtosis	7.560	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.295	1.332
Standard Deviation	0.625	0.684
Skewness (1)	-0.176	-0.268
Skewness (2)	-0.704	
Kurtosis	0.960	1.271



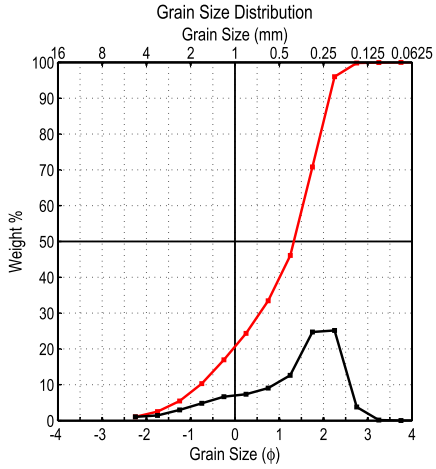
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-08a**
Interval	**Swash**
Mean	**0.556 mm**
STD	**0.394 mm**
Skewness	**-0.967**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	125.50
% finer than 4.00 phi	0.01
% coarser than -1.00 phi	24.09

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	8.52	6.79	6.79
-1.5	-1.75	3.31	2.64	9.43
-1	-1.25	4.29	3.42	12.84
-0.5	-0.75	6.00	4.78	17.63
0	-0.25	8.11	6.46	24.09
0.5	0.25	8.91	7.10	31.19
1	0.75	11.61	9.25	40.44
1.5	1.25	20.05	15.98	56.41
2	1.75	34.21	27.26	83.67
2.5	2.25	18.30	14.58	98.25
3	2.75	2.10	1.67	99.93
3.5	3.25	0.07	0.06	99.98
4	3.75	0.01	0.01	99.99
>4.0	4.25	0.01	0.01	100.00

Percentiles	
1	-2.250
5	-2.250
16	-0.920
25	-0.185
50	1.050
75	1.590
84	1.760
95	2.140
99	2.475

Moment Measures	**(phi)**	**(mm)**
Mean	0.847	0.556
Standard Deviation	1.344	0.394
Skewness	-0.967	
Kurtosis	2.920	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.420	0.630
Standard Deviation	1.340	1.335
Skewness (1)	-0.470	-0.487
Skewness (2)	-0.825	
Kurtosis	0.638	1.014



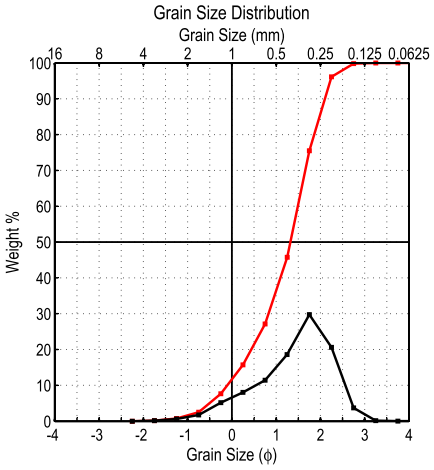
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-08b**
Interval	**LTT**
Mean	**0.430 mm**
STD	**0.455 mm**
Skewness	**-0.980**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Poorly Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	117.98
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	16.98

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	1.26	1.07	1.07
-1.5	-1.75	1.69	1.43	2.50
-1	-1.25	3.50	2.97	5.47
-0.5	-0.75	5.70	4.83	10.30
0	-0.25	7.88	6.68	16.98
0.5	0.25	8.70	7.37	24.35
1	0.75	10.71	9.08	33.43
1.5	1.25	14.92	12.65	46.08
2	1.75	29.20	24.75	70.83
2.5	2.25	29.69	25.17	95.99
3	2.75	4.48	3.80	99.79
3.5	3.25	0.19	0.16	99.95
4	3.75	0.03	0.03	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-2.250
5	-1.330
16	-0.325
25	0.285
50	1.330
75	1.835
84	2.010
95	2.230
99	2.645

Moment Measures	**(phi)**	**(mm)**
Mean	1.217	0.430
Standard Deviation	1.137	0.455
Skewness	-0.980	
Kurtosis	3.244	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	0.843	1.005
Standard Deviation	1.167	1.123
Skewness (1)	-0.418	-0.456
Skewness (2)	-0.754	
Kurtosis	0.525	0.941



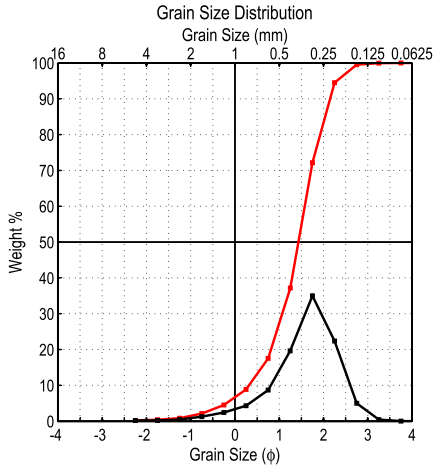
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-09a**
Interval	**Swash**
Mean	**0.380 mm**
STD	**0.560 mm**
Skewness	**-0.793**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Mesokurtic
Total weight (gram)	125.65
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	7.66

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.21	0.17	0.17
-1	-1.25	0.76	0.60	0.77
-0.5	-0.75	2.16	1.72	2.49
0	-0.25	6.50	5.17	7.66
0.5	0.25	10.10	8.04	15.70
1	0.75	14.39	11.45	27.15
1.5	1.25	23.36	18.59	45.75
2	1.75	37.38	29.75	75.50
2.5	2.25	25.89	20.60	96.10
3	2.75	4.65	3.70	99.80
3.5	3.25	0.20	0.16	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-1.185
5	-0.510
16	0.265
25	0.655
50	1.320
75	1.740
84	1.955
95	2.225
99	2.640

Moment Measures	**(phi)**	**(mm)**
Mean	1.395	0.380
Standard Deviation	0.836	0.560
Skewness	-0.793	
Kurtosis	3.353	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.110	1.180
Standard Deviation	0.845	0.837
Skewness (1)	-0.249	-0.293
Skewness (2)	-0.547	
Kurtosis	0.618	1.033



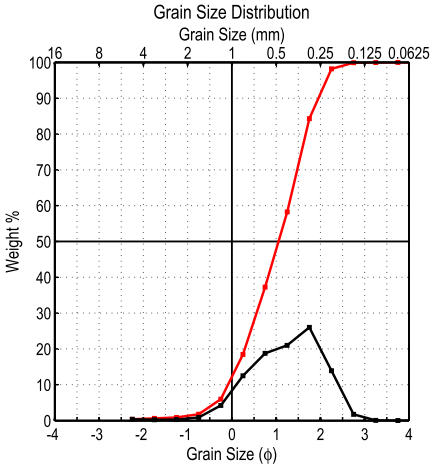
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-09b**
Interval	**LTT**
Mean	**0.339 mm**
STD	**0.587 mm**
Skewness	**-1.203**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	113.98
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	4.54

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.24	0.21	0.21
-1.5	-1.75	0.22	0.19	0.40
-1	-1.25	0.51	0.45	0.85
-0.5	-0.75	1.44	1.26	2.11
0	-0.25	2.76	2.42	4.54
0.5	0.25	4.91	4.31	8.84
1	0.75	9.90	8.69	17.53
1.5	1.25	22.37	19.63	37.16
2	1.75	39.86	34.97	72.13
2.5	2.25	25.50	22.37	94.50
3	2.75	5.69	4.99	99.49
3.5	3.25	0.50	0.44	99.93
4	3.75	0.04	0.04	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-1.190
5	-0.195
16	0.660
25	0.940
50	1.435
75	1.815
84	2.015
95	2.300
99	2.700

Moment Measures	**(phi)**	**(mm)**
Mean	1.562	0.339
Standard Deviation	0.768	0.587
Skewness	-1.203	
Kurtosis	5.620	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.337	1.370
Standard Deviation	0.677	0.717
Skewness (1)	-0.144	-0.225
Skewness (2)	-0.565	
Kurtosis	0.841	1.169



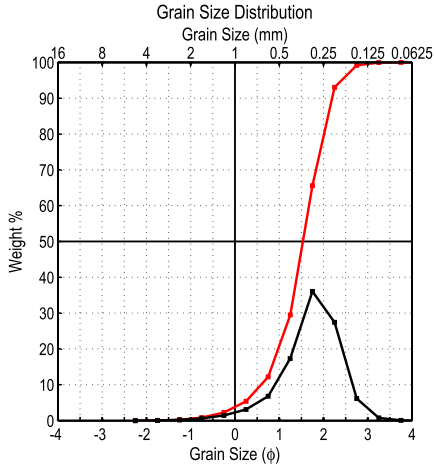
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-10a**
Interval	**Swash**
Mean	**0.429 mm**
STD	**0.576 mm**
Skewness	**-0.643**
USCS	**Wentworth**
SP	Medium Sand
Medium Sand	Moderately Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	112.93
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	5.98

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.42	0.37	0.37
-1.5	-1.75	0.26	0.23	0.60
-1	-1.25	0.30	0.27	0.87
-0.5	-0.75	1.01	0.89	1.76
0	-0.25	4.76	4.22	5.98
0.5	0.25	14.13	12.51	18.49
1	0.75	21.21	18.78	37.27
1.5	1.25	23.70	20.99	58.26
2	1.75	29.36	26.00	84.26
2.5	2.25	15.70	13.90	98.16
3	2.75	1.95	1.73	99.88
3.5	3.25	0.08	0.07	99.96
4	3.75	0.02	0.02	99.97
>4.0	4.25	0.03	0.03	100.00

Percentiles	
1	-1.175
5	-0.365
16	0.150
25	0.425
50	1.055
75	1.570
84	1.745
95	2.135
99	2.495

Moment Measures	(phi)	(mm)
Mean	1.221	0.429
Standard Deviation	0.796	0.576
Skewness	-0.643	
Kurtosis	3.939	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.948	0.983
Standard Deviation	0.798	0.778
Skewness (1)	-0.135	-0.135
Skewness (2)	-0.213	
Kurtosis	0.567	0.895



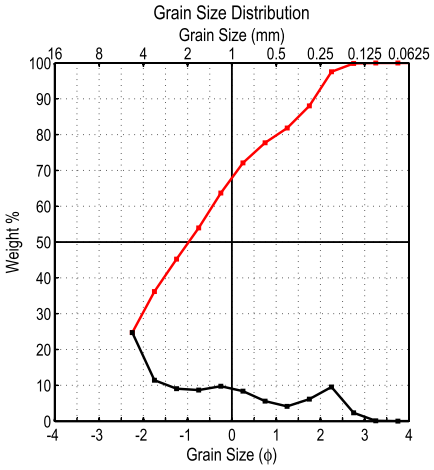
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**NHB-10b**
Interval	**LTT**
Mean	**0.306 mm**
STD	**0.630 mm**
Skewness	**-0.955**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Coarse Skewed
	Leptokurtic
Total weight (gram)	113.68
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	2.26

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.00	0.00	0.00
-1.5	-1.75	0.02	0.02	0.02
-1	-1.25	0.23	0.20	0.22
-0.5	-0.75	0.69	0.61	0.83
0	-0.25	1.63	1.43	2.26
0.5	0.25	3.54	3.11	5.37
1	0.75	7.75	6.82	12.19
1.5	1.25	19.68	17.31	29.50
2	1.75	41.01	36.07	65.58
2.5	2.25	31.19	27.44	93.02
3	2.75	7.01	6.17	99.18
3.5	3.25	0.85	0.75	99.93
4	3.75	0.06	0.05	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.690
5	0.190
16	0.860
25	1.120
50	1.535
75	1.920
84	2.085
95	2.410
99	2.735

Moment Measures	(phi)	(mm)
Mean	1.710	0.306
Standard Deviation	0.668	0.630
Skewness	-0.955	
Kurtosis	4.906	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.472	1.493
Standard Deviation	0.613	0.643
Skewness (1)	-0.102	-0.157
Skewness (2)	-0.384	
Kurtosis	0.812	1.137



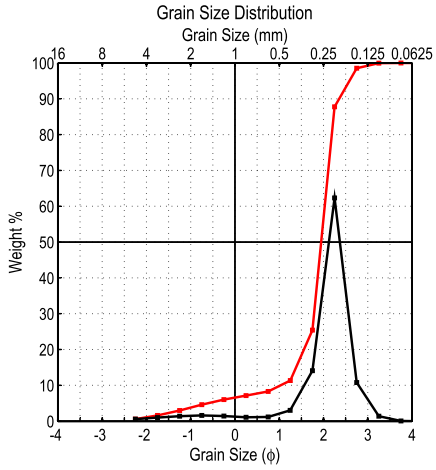
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**KH-01a**
Interval	**Swash**
Mean	**1.370 mm**
STD	**0.330 mm**
Skewness	**0.488**
USCS	**Wentworth**
SW	Very Coarse Sand
Medium Sand	Poorly Sorted
Well Graded	Fine Skewed
	Platykurtic
Total weight (gram)	103.61
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	63.70

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	25.64	24.75	24.75
-1.5	-1.75	11.83	11.42	36.17
-1	-1.25	9.41	9.08	45.25
-0.5	-0.75	9.01	8.70	53.94
0	-0.25	10.11	9.76	63.70
0.5	0.25	8.70	8.40	72.10
1	0.75	5.81	5.61	77.71
1.5	1.25	4.29	4.14	81.85
2	1.75	6.38	6.16	88.00
2.5	2.25	9.87	9.53	97.53
3	2.75	2.41	2.33	99.86
3.5	3.25	0.11	0.11	99.96
4	3.75	0.02	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.240
50	-0.975
75	0.510
84	1.425
95	2.115
99	2.565

Moment Measures	(phi)	(mm)
Mean	-0.454	1.370
Standard Deviation	1.600	0.330
Skewness	0.488	
Kurtosis	1.950	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-0.413	-0.600
Standard Deviation	1.837	1.580
Skewness (1)	0.306	0.361
Skewness (2)	0.494	
Kurtosis	0.188	0.651



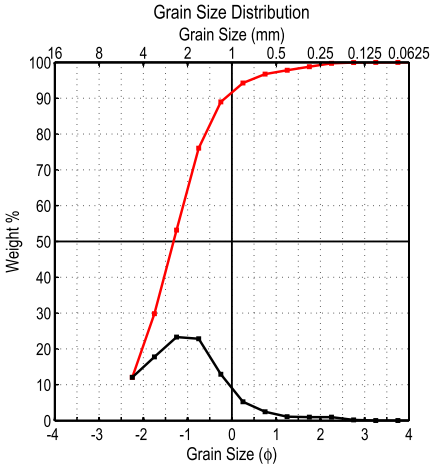
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**KH-01b**
Interval	**LTT**
Mean	**0.254 mm**
STD	**0.540 mm**
Skewness	**-2.726**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	124.55
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	6.05

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.74	0.59	0.59
-1.5	-1.75	1.25	1.00	1.60
-1	-1.25	1.74	1.40	2.99
-0.5	-0.75	1.99	1.60	4.59
0	-0.25	1.81	1.45	6.05
0.5	0.25	1.34	1.08	7.12
1	0.75	1.49	1.20	8.32
1.5	1.25	3.79	3.04	11.36
2	1.75	17.53	14.07	25.44
2.5	2.25	77.59	62.30	87.73
3	2.75	13.43	10.78	98.51
3.5	3.25	1.76	1.41	99.93
4	3.75	0.06	0.05	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-2.050
5	-0.610
16	1.415
25	1.735
50	1.945
75	2.150
84	2.220
95	2.585
99	2.920

Moment Measures	(phi)	(mm)
Mean	1.979	0.254
Standard Deviation	0.890	0.540
Skewness	-2.726	
Kurtosis	10.886	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	1.817	1.860
Standard Deviation	0.402	0.685
Skewness (1)	-0.317	-0.458
Skewness (2)	-2.379	
Kurtosis	2.969	3.155



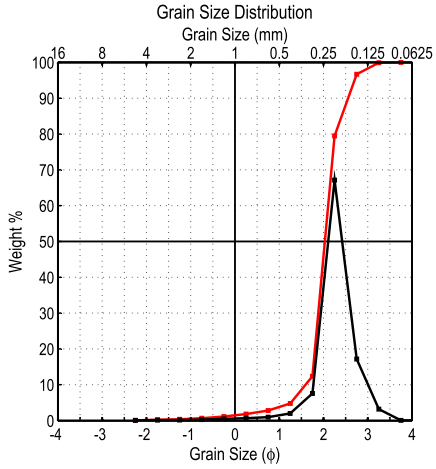
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**KH-02a**
Interval	**Swash**
Mean	**1.980 mm**
STD	**0.533 mm**
Skewness	**1.044**
USCS	**Wentworth**
SP	Very Coarse Sand
Medium Sand	Moderately Sorted
Poorly Graded	Fine Skewed
	Leptokurtic
Total weight (gram)	154.16
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	88.95

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	18.59	12.06	12.06
-1.5	-1.75	27.41	17.78	29.84
-1	-1.25	35.96	23.33	53.17
-0.5	-0.75	35.24	22.86	76.02
0	-0.25	19.93	12.93	88.95
0.5	0.25	8.12	5.27	94.22
1	0.75	3.83	2.48	96.70
1.5	1.25	1.70	1.10	97.81
2	1.75	1.47	0.95	98.76
2.5	2.25	1.50	0.97	99.73
3	2.75	0.31	0.20	99.94
3.5	3.25	0.04	0.03	99.96
4	3.75	0.03	0.02	99.98
>4.0	4.25	0.03	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.140
25	-1.885
50	-1.320
75	-0.770
84	-0.440
95	0.405
99	1.875

Moment Measures	(phi)	(mm)
Mean	-0.986	1.980
Standard Deviation	0.906	0.533
Skewness	1.044	
Kurtosis	4.966	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.290	-1.300
Standard Deviation	0.850	0.827
Skewness (1)	0.035	0.167
Skewness (2)	0.468	
Kurtosis	0.562	0.976



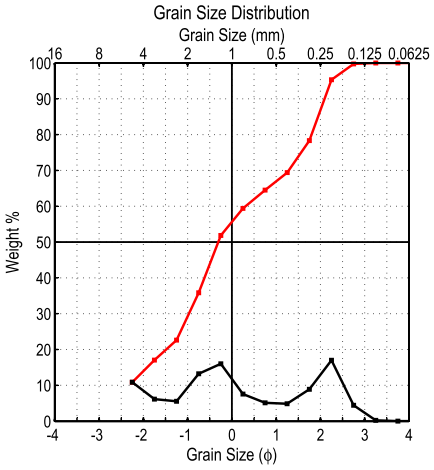
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**KH02b**
Interval	**LTT**
Mean	**0.210 mm**
STD	**0.694 mm**
Skewness	**-2.931**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Well Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	129.59
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	1.16

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.07	0.05	0.05
-1.5	-1.75	0.21	0.16	0.22
-1	-1.25	0.18	0.14	0.35
-0.5	-0.75	0.38	0.29	0.65
0	-0.25	0.66	0.51	1.16
0.5	0.25	0.87	0.67	1.83
1	0.75	1.27	0.98	2.81
1.5	1.25	2.58	1.99	4.80
2	1.75	9.81	7.57	12.37
2.5	2.25	86.98	67.12	79.49
3	2.75	22.29	17.20	96.69
3.5	3.25	4.16	3.21	99.90
4	3.75	0.11	0.08	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-0.405
5	1.265
16	1.775
25	1.845
50	2.030
75	2.215
84	2.380
95	2.700
99	3.110

Moment Measures	(phi)	(mm)
Mean	2.248	0.210
Standard Deviation	0.527	0.694
Skewness	-2.931	
Kurtosis	19.613	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	2.077	2.062
Standard Deviation	0.302	0.369
Skewness (1)	0.157	0.045
Skewness (2)	-0.157	
Kurtosis	1.372	1.589



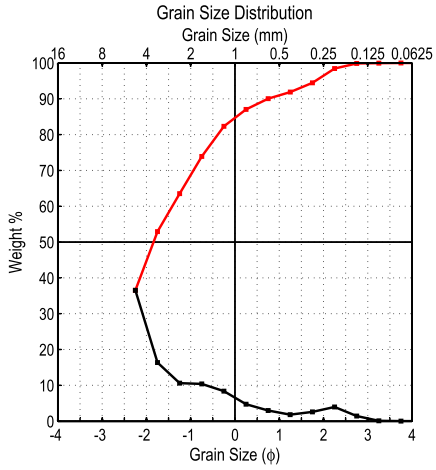
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**KH-03a**
Interval	**Swash**
Mean	**0.855 mm**
STD	**0.337 mm**
Skewness	**0.035**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Platykurtic
Total weight (gram)	131.62
% finer than 4.00 phi	0.02
% coarser than -1.00 phi	51.85

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	14.31	10.87	10.87
-1.5	-1.75	8.12	6.17	17.04
-1	-1.25	7.33	5.57	22.61
-0.5	-0.75	17.40	13.22	35.83
0	-0.25	21.08	16.02	51.85
0.5	0.25	9.96	7.57	59.41
1	0.75	6.72	5.11	64.52
1.5	1.25	6.42	4.88	69.40
2	1.75	11.72	8.90	78.30
2.5	2.25	22.38	17.00	95.30
3	2.75	5.84	4.44	99.74
3.5	3.25	0.29	0.22	99.96
4	3.75	0.03	0.02	99.98
>4.0	4.25	0.02	0.02	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.835
25	-1.160
50	-0.310
75	1.565
84	1.920
95	2.240
99	2.665

Moment Measures	(phi)	(mm)
Mean	0.226	0.855
Standard Deviation	1.571	0.337
Skewness	0.035	
Kurtosis	1.785	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	0.042	-0.075
Standard Deviation	1.877	1.619
Skewness (1)	0.188	0.162
Skewness (2)	0.162	
Kurtosis	0.196	0.675



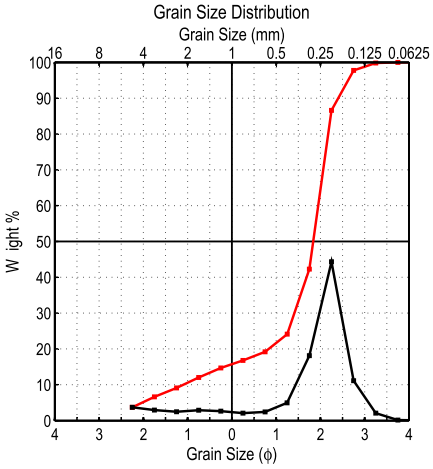
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**KH-03b**
Interval	**LTT**
Mean	**2.149 mm**
STD	**0.393 mm**
Skewness	**1.256**
USCS	**Wentworth**
SW	Granule
Coarse Sand	Poorly Sorted
Well Graded	Fine Skewed
	Leptokurtic
Total weight (gram)	128.55
% finer than 4.00 phi	0.03
% coarser than -1.00 phi	82.29

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	46.95	36.52	36.52
-1.5	-1.75	21.06	16.38	52.91
-1	-1.25	13.65	10.62	63.52
-0.5	-0.75	13.35	10.39	73.91
0	-0.25	10.77	8.38	82.29
0.5	0.25	6.10	4.75	87.03
1	0.75	3.85	2.99	90.03
1.5	1.25	2.37	1.84	91.87
2	1.75	3.31	2.57	94.45
2.5	2.25	5.12	3.98	98.43
3	2.75	1.83	1.42	99.85
3.5	3.25	0.12	0.09	99.95
4	3.75	0.03	0.02	99.97
>4.0	4.25	0.04	0.03	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-2.250
50	-1.840
75	-0.685
84	-0.070
95	1.820
99	2.450

Moment Measures	(phi)	(mm)
Mean	-1.104	2.149
Standard Deviation	1.348	0.393
Skewness	1.256	
Kurtosis	3.749	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	Inman 1952	Folk & Ward 1957
Mean	-1.160	-1.387
Standard Deviation	1.090	1.162
Skewness (1)	0.624	0.711
Skewness (2)	1.491	
Kurtosis	0.867	1.066



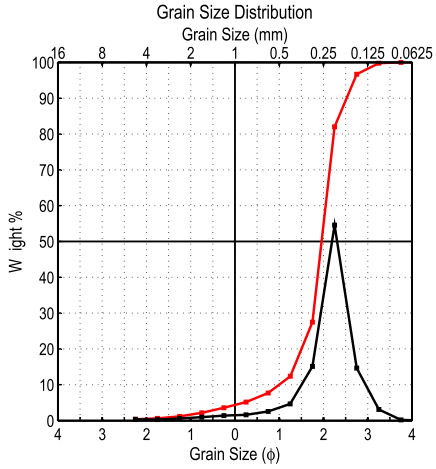
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**KH-04a**
Interval	**Swash**
Mean	**0.333 mm**
STD	**0.395 mm**
Skewness	**-1.630**
USCS	**Wentworth**
SP	Medium Sand
Fine Sand	Poorly Sorted
Poorly Graded	Strongly Coarse Skewed
	Leptokurtic
Total weight (gram)	120.95
% finer than 4.00 phi	0.03
% coarser than 1.00 phi	14.68

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	4.49	3.71	3.71
-1.5	-1.75	3.54	2.93	6.64
-1	-1.25	3.00	2.48	9.12
-0.5	-0.75	3.52	2.91	12.03
0	-0.25	3.20	2.65	14.68
0.5	0.25	2.54	2.10	16.78
1	0.75	2.91	2.41	19.18
1.5	1.25	6.00	4.96	24.14
2	1.75	21.92	18.12	42.27
2.5	2.25	53.60	44.32	86.58
3	2.75	13.48	11.15	97.73
3.5	3.25	2.52	2.08	99.81
4	3.75	0.19	0.16	99.97
>4.0	4.25	0.04	0.03	100.00

Percentiles	
1	-2.250
5	-2.030
16	0.065
25	1.275
50	1.835
75	2.120
84	2.220
95	2.630
99	3.055

Moment Measures	**(phi)**	**(mm)**
Mean	1.587	0.333
Standard Deviation	1.341	0.395
Skewness	-1.630	
Kurtosis	4.649	
Dispersion		
Standard Deviation		
D viation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.142	1.373
Standard Deviation	1.077	1.245
Skewness (1)	-0.643	-0.651
Skewness (2)	-1.425	
Kurtosis	1.162	2.260



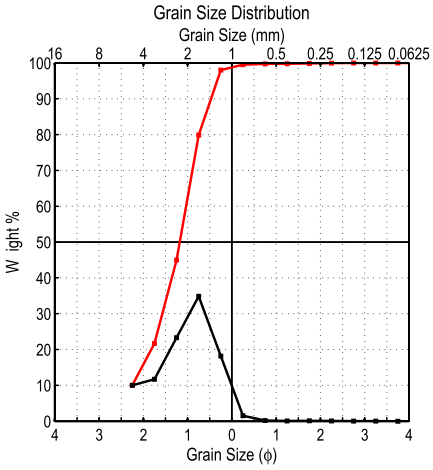
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**KH-04b**
Interval	**LTT**
Mean	**0.241 mm**
STD	**0.584 mm**
Skewness	**-2.326**
USCS	**Wentworth**
SP	Fine Sand
Fine Sand	Moderately Sorted
Poorly Graded	Strongly Coarse Skewed
	Very Leptokurtic
Total weight (gram)	110.38
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	3.57

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	0.39	0.35	0.35
-1.5	-1.75	0.30	0.27	0.63
-1	-1.25	0.62	0.56	1.19
-0.5	-0.75	1.08	0.98	2.17
0	-0.25	1.55	1.40	3.57
0.5	0.25	1.78	1.61	5.18
1	0.75	2.80	2.54	7.72
1.5	1.25	5.13	4.65	12.37
2	1.75	16.68	15.11	27.48
2.5	2.25	60.20	54.54	82.02
3	2.75	16.18	14.66	96.68
3.5	3.25	3.43	3.11	99.78
4	3.75	0.20	0.18	99.96
>4.0	4.25	0.04	0.04	100.00

Percentiles	
1	-1.415
5	0.195
16	1.370
25	1.670
50	1.955
75	2.185
84	2.320
95	2.695
99	3.125

Moment Measures	**(phi)**	**(mm)**
Mean	2.055	0.241
Standard Deviation	0.775	0.584
Skewness	-2.326	
Kurtosis	10.650	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	1.845	1.882
Standard Deviation	0.475	0.616
Skewness (1)	-0.232	-0.320
Skewness (2)	-1.074	
Kurtosis	1.632	1.989



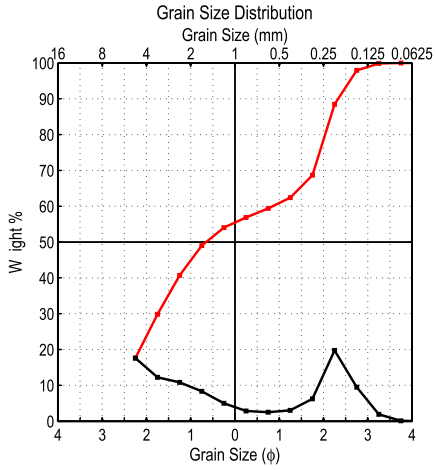
Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**KH-05a**
Interval	**Swash**
Mean	**2.024 mm**
STD	**0.640 mm**
Skewness	**-0.081**
USCS	**Wentworth**
SP	Granule
Coarse Sand	Moderately Well Sorted
Poorly Graded	Symmetrical
	Leptokurtic
Total weight (gram)	151.44
% finer than 4.00 phi	0.00
% coarser than -1.00 phi	98.02

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	15.14	10.00	10.00
-1.5	-1.75	17.71	11.69	21.69
-1	-1.25	35.30	23.31	45.00
-0.5	-0.75	52.76	34.84	79.84
0	-0.25	27.53	18.18	98.02
0.5	0.25	2.28	1.51	99.52
1	0.75	0.29	0.19	99.72
1.5	1.25	0.10	0.07	99.78
2	1.75	0.13	0.09	99.87
2.5	2.25	0.12	0.08	99.95
3	2.75	0.06	0.04	99.99
3.5	3.25	0.02	0.01	100.00
4	3.75	0.00	0.00	100.00
>4.0	4.25	0.00	0.00	100.00

Percentiles	
1	-2.250
5	-2.250
16	-1.995
25	-1.680
50	-1.180
75	-0.820
84	-0.635
95	-0.335
99	0.075

Moment Measures	**(phi)**	**(mm)**
Mean	-1.017	2.024
Standard Deviation	0.645	0.640
Skewness	-0.081	
Kurtosis	3.870	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-1.315	-1.270
Standard Deviation	0.680	0.630
Skewness (1)	-0.199	-0.158
Skewness (2)	-0.165	
Kurtosis	0.408	0.913



Project	**2203**
Location	**Nags Head NC**
Date	**Aug 2012**
Station	**KH-05b**
Interval	**LTT**
Mean	**0.916 mm**
STD	**0.265 mm**
Skewness	**0.153**
USCS	**Wentworth**
SP	Coarse Sand
Medium Sand	Poorly Sorted
Poorly Graded	Symmetrical
	Very Platykurtic
Total weight (gram)	128.44
% finer than 4.00 phi	0.04
% coarser than -1.00 phi	54.02

Class Limits (ϕ)	Mid Point (ϕ)	Weight (gram)	Weight %	Cumm. Wt %
-2	-2.25	22.62	17.61	17.61
-1.5	-1.75	15.73	12.25	29.86
-1	-1.25	13.89	10.81	40.67
-0.5	-0.75	10.74	8.36	49.03
0	-0.25	6.40	4.98	54.02
0.5	0.25	3.67	2.86	56.87
1	0.75	3.23	2.51	59.39
1.5	1.25	3.89	3.03	62.42
2	1.75	8.03	6.25	68.67
2.5	2.25	25.39	19.77	88.44
3	2.75	12.18	9.48	97.92
3.5	3.25	2.46	1.92	99.84
4	3.75	0.16	0.12	99.96
>4.0	4.25	0.05	0.04	100.00

Percentiles	
1	-2.250
5	-2.250
16	-2.250
25	-1.950
50	-0.655
75	1.910
84	2.140
95	2.595
99	3.030

Moment Measures	**(phi)**	**(mm)**
Mean	0.126	0.916
Standard Deviation	1.916	0.265
Skewness	0.153	
Kurtosis	1.391	
Dispersion		
Standard Deviation		
Deviation from Normal		

Graphic Phi Parameters	**Inman 1952**	**Folk & Ward 1957**
Mean	-0.055	-0.255
Standard Deviation	2.195	1.832
Skewness (1)	0.273	0.307
Skewness (2)	0.377	
Kurtosis	0.104	0.514