TOWN OF SUNSET BEACH
PRE-DREDGE ANALYSIS
SEDIMENT ANALYSIS

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PREPARED FOR:

TOWN OF SUNSET BEACH, NC
700 SUNSET BOULEVARD NORTH
SUNSET BEACH, NC. 28468

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SEDIMIENT ANALYSIS SUMMARY TABLE

Work Area	Sub-Area	Stations		Volume (CY)		Composite Summary (% By Wt. Passing)					Mean	Sorting	Skewness	Kurtosis
		Start	Stop	Compatible	Non-Compatible	Fines	Sand	Granular	Gravel	Total	(mm)	(σ)	(α)	(β)
Jinks Creek														
	1	0+00	12+25	6,975		6.35%	72.69%	4.20%	16.76%	100%	0.44	2.77	-0.45	0.66
	2	12+25	25+00	8,342		12.80%	73.72%	2.46%	11.02%	100%	0.21	1.68	-0.28	2.30
	3	25+00	45+00	17,005		2.64%	85.25%	3.03%	9.09%	100%	0.26	1.23	-0.32	1.77
	4	45+00	51+00		13,246	51.88%	47.92%	0.05%	0.15%	100%	0.05	2.21	0.14	0.33
	5	51+00	68+50	68,660		3.29%	96.71%	0.00%	0.00%	100%	0.17	0.46	0.03	0.81
SubTotal		**0+00**	**68+50**	**100,982**	**13,246**	**9.71%**	**86.20%**	**0.89%**	**3.20%**	**100%**	**0.19**	**1.01**	**-0.06**	**0.99**
Feeder Canal														
	1	Finger Canals			10,659	65.27%	34.54%	0.07%	0.12%	100%	0.04	2.30	-0.05	0.24
	2	8+00	21+50		6,672	50.34%	49.63%	0.03%	0.00%	100%	0.07	1.59	-0.05	0.23
	3	21+50	40+00		11,944	33.34%	66.48%	0.09%	0.09%	100%	0.11	1.16	0.29	0.24
	4	40+00	42+00	3,585		4.40%	95.60%	0.00%	0.00%	100%	0.15	0.57	0.12	0.51
SubTotal		**0+00**	**42+00**	**3,585**	**29,275**	**44%**	**56%**	**0%**	**0%**	**100%**	**0.08**	**1.55**	**0.09**	**0.27**
Bay Area														
	1	-0+50	20+50		17,555	87.08%	12.67%	0.09%	0.17%	100%	0.00	5.92	0.00	0.33
	2	20+50	21+00	645		2.40%	97.60%	0.00%	0.00%	100%	0.17	0.42	0.00	1.27
SubTotal		**-0+50**	**21+00**	**645**	**17,555**	**84.08%**	**15.68%**	**0.08%**	**0.16%**	**100%**	**0.01**	**5.72**	**0.00**	**0.36**
Mary's Creek														
	n/a	**0+00**	**10+75**		**8,066**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Turtle Creek														
	n/a	**0+00**	**11+00**		**7,830**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Notes:

1 Composite values determined by weighted averages.

2 Mary's & Turtle Creek were only tested for chemical analysis. Historically the material from these systems has been placed in an USACE material placement site. Therefore, a grain size analysis was not conducted as the material is assumed to be fine grained and not beach compatible.

3 Conceptual plans include utilizing material from Jinks Creek Subarea 1 & 2 for a marsh restoration project between Mary's & Turtle Creek adjacent to the AIWW.

4 Total volumetric quantities equal 105,212 CY for compatible material and 75,972 CY for non-compatible material.

5 Compatible & non-compatible volumes are estimated and the qualifying statistics must be confirmed with NCDCM. Additional testing of the recipient beach or placement area may be required to confirm the compatibility designations.

TOWN OF SUNSET BEACH
PRE-DREDGE ANALYSIS
SEDIMENT SAMPLING MAP

APPENDIX A
JINKS CREEK GRAIN SIZE ANALYSIS

SHEET INDEX

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SHT A3-1 THRU A3-5 JINKS SUBAREA COMPOSITES
SHT A4 JINKS COMPOSITE SUMMARY
SHT A5-1 THRU A5-13 JINKS COMPOSITE RESULTS

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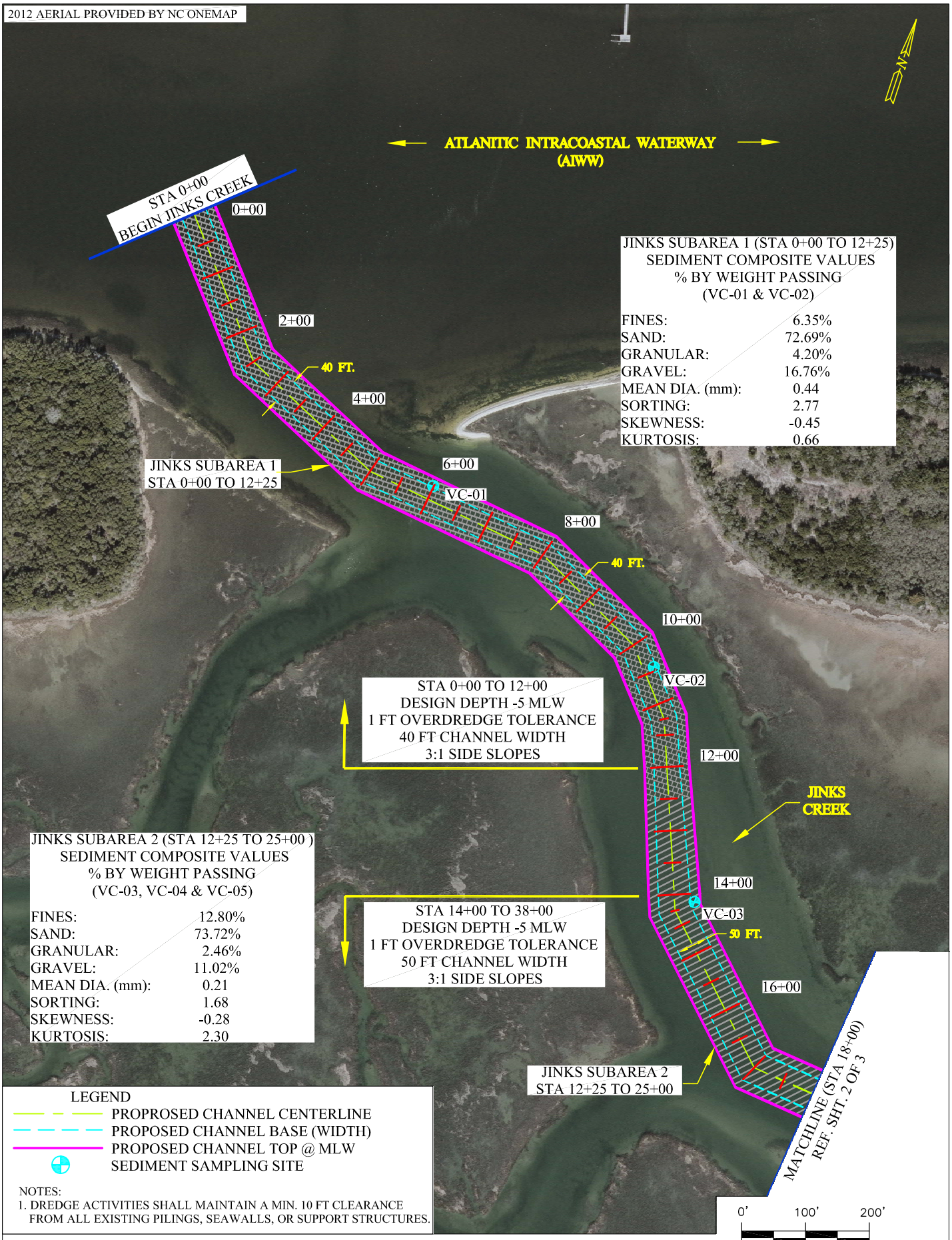

JINKS SUBAREA 1 (STA 0+00 TO 12+25)
SEDIMENT COMPOSITE VALUES
% BY WEIGHT PASSING
(VC-01 & VC-02)

FINES:	6.35%
SAND:	72.69%
GRANULAR:	4.20%
GRAVEL:	16.76%
MEAN DIA. (mm):	0.44
SORTING:	2.77
SKEWNESS:	-0.45
KURTOSIS:	0.66

JINKS SUBAREA 2 (STA 12+25 TO 25+00)
SEDIMENT COMPOSITE VALUES
% BY WEIGHT PASSING
(VC-03, VC-04 & VC-05)

FINES:	12.80%
SAND:	73.72%
GRANULAR:	2.46%
GRAVEL:	11.02%
MEAN DIA. (mm):	0.21
SORTING:	1.68
SKEWNESS:	-0.28
KURTOSIS:	2.30

LEGEND
- PROPROSED CHANNEL CENTERLINE
- PROPOSED CHANNEL BASE (WIDTH)
- PROPOSED CHANNEL TOP @ MLW
- SEDIMENT SAMPLING SITE

NOTES:
1. DREDGE ACTIVITIES SHALL MAINTAIN A MIN. 10 FT CLEARANCE FROM ALL EXISTING PILINGS, SEAWALLS, OR SUPPORT STRUCTURES.

TOWN OF SUNSET BEACH
PRE-DREDGE ANALYSIS
JINKS CREEK SEDIMENT ANALYSIS
PLAN VIEW

A1–1

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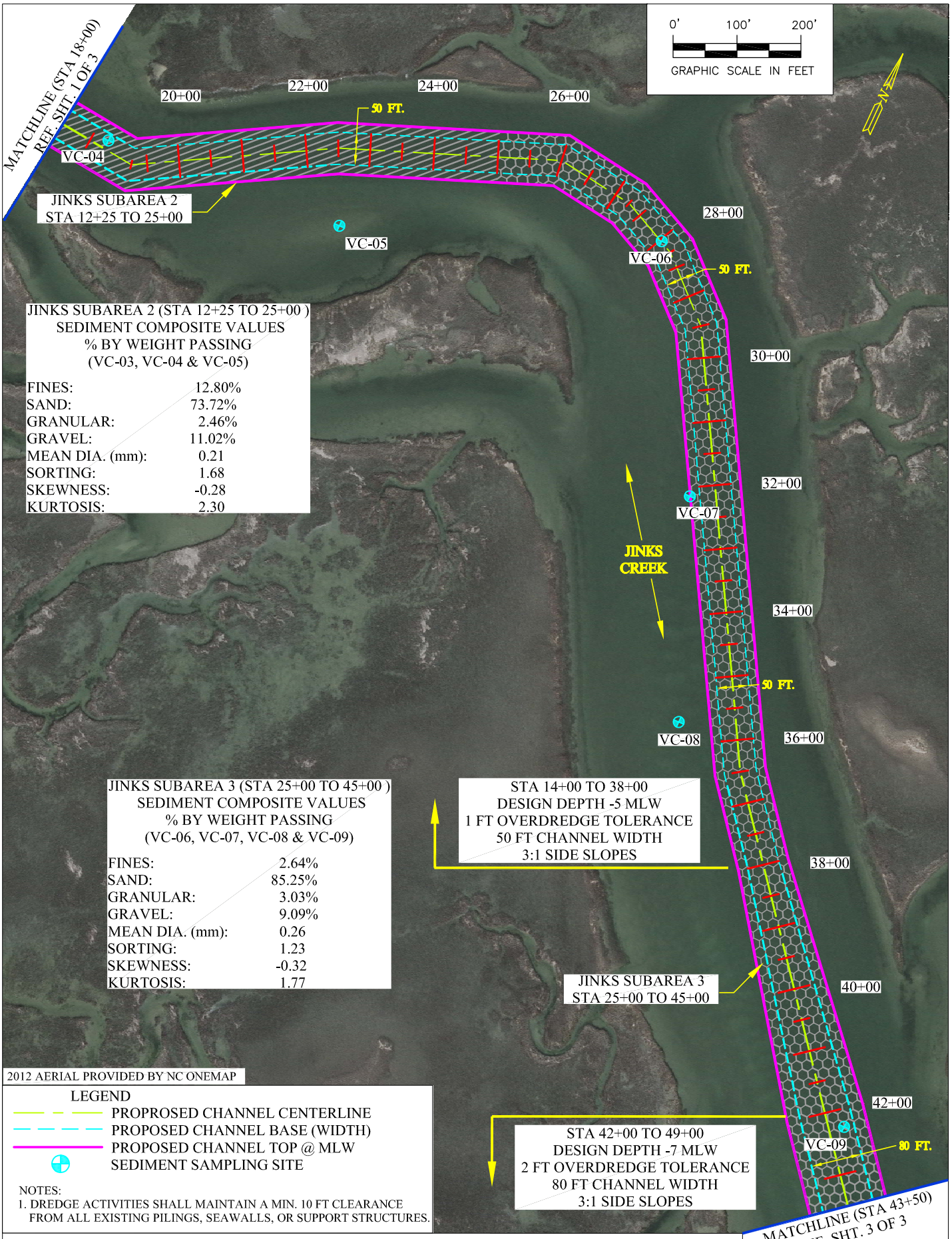

TOWN OF SUNSET BEACH
PRE-DREDGE ANALYSIS
JINKS CREEK SEDIMENT ANALYSIS
PLAN VIEW

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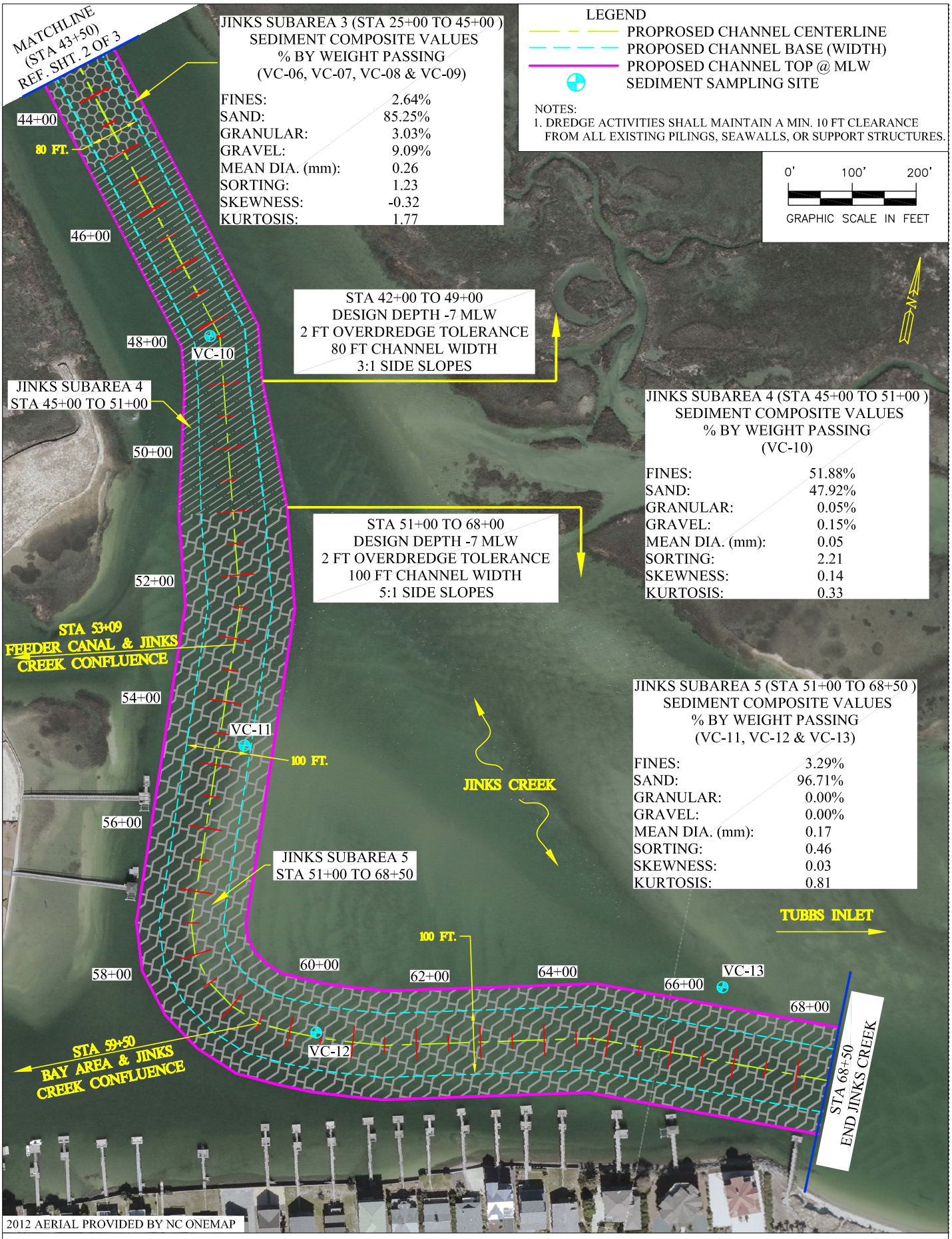
A1-2



TOWN OF SUNSET BEACH
PRE-DREDGE ANALYSIS
JINKS CREEK SEDIMENT ANALYSIS
PLAN VIEW

A1-3

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Town of Sunset Beach
JINKS CREEK SUBAREA COMPOSITE SUMMARY
Summary Table

Per 15A NCAC 07H.0312
Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

	Vibracores	Representative Staions		Representative Volume (CY)	Composite Summary (% By Wt. Passing)					Mean	Sorting	Skewness	Kurtosis
SubArea		Start	Stop		Fines	Sand	Granular	Gravel	Total	(mm)	(σ)	(α)	(β)
1	VC-01 & VC-02	0+00	12+25	6,975	6.35%	72.69%	4.20%	16.76%	100%	0.44	2.77	-0.45	0.66
2	VC-03, VC-04 & VC-05	12+25	25+00	8,342	12.80%	73.72%	2.46%	11.02%	100%	0.21	1.68	-0.28	2.30
3	VC-06, VC-07, VC-08 & VC-09	25+00	45+00	17,005	2.64%	85.25%	3.03%	9.09%	100%	0.26	1.23	-0.32	1.77
4	VC-10	45+00	51+00	13,246	51.88%	47.92%	0.05%	0.15%	100%	0.05	2.21	0.14	0.33
5	VC-11, VC-12 & VC-13	51+00	68+50	68,660	3.29%	96.71%	0.00%	0.00%	100%	0.17	0.46	0.03	0.81

Material Type	Volume (CY)	Stations
Beach Compatible Material	100,982	0+00 - 45+00 & 51+00 - 68+50
Non-Compatible Materail	13,246	45+00 - 51+00
Total	114,228	0+00 - 68+50

1. Volumes Include OverDredge Tolerance.

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Sunset Beach
Pre-Dredge Analysis
Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_{5}) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

JINKS CREEK SUBAREA COMPOSITES
Design Depth --5 to -7 MLW

SubArea 1 (Vibracores VC-01 & VC-02)

Sieve (Phi)	SubArea 1 Sample Cumulative % by Weight Retained			
	VC-01	VC-02	n/a	n/a
-4.25	5.60	1.00		
-4.00	8.29	1.00		
-3.00	18.05	2.40		
-2.00	23.39	3.40		
-1.00	28.63	5.50		
0.00	32.53	7.80		
1.00	34.68	9.70		
2.00	37.02	17.80		
3.00	74.83	78.40		
3.75	93.39	93.20		
4.00	93.77	93.40		

SubArea 1 Sample Cumulative % by Weight Passing			
VC-01	VC-02	n/a	n/a
94.4	99.0		
91.7	99.0		
81.9	97.6		
76.6	96.6		
71.4	94.5		
67.5	92.2		
65.3	90.3		
63.0	82.2		
25.2	21.6		
6.6	6.8		
6.2	6.6		

Weighted Composite	
% Retained	% Passing
4.07	95.93
5.87	94.13
12.86	87.14
16.76	83.24
20.96	79.04
24.33	75.67
26.39	73.61
30.64	69.36
76.02	23.98
93.33	6.67
93.65	6.35

SubArea 1	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Volume	Percent	USCS
VC-01	0+00	8+25	4,662	66.84%	
VC-02	8+25	12+25	2,313	33.17%	SP-SM
Composite	**0+00**	**12+25**	**6,975**	**100%**	

SubArea 1	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
VC-01	-4.31	-3.21	-1.69	2.34	3.01	3.37	4.81
VC-02	-1.24	1.78	2.12	2.53	2.94	3.28	6.00
Composite	**-4.12**	**-2.19**	**0.33**	**2.43**	**2.98**	**3.35**	**5.05**

SubArea 1

Composite Grain Size Distribution (% by Weight Passing)					
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
VC-01	6.23	65.14	5.25	23.39	100%
VC-02	6.60	87.90	2.10	3.40	100%
Composite	**6.35**	**72.69**	**4.20**	**16.76**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

SubArea 1					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
VC-01	2.34	0.20	0.83	0.56	3.29	-0.46	0.38
VC-02	2.53	0.17	2.53	0.17	0.75	0.00	3.81
Composite	**2.43**	**0.19**	**1.19**	**0.44**	**2.77**	**-0.45**	**0.66**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_{5}) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

JINKS CREEK SUBAREA COMPOSITES

Design Depth --5 to -7 MLW

SubArea 2 (Vibracores VC-03, VC-04 & VC-05)

Sieve (Phi)	SubArea 2 Sample Cumulative % by Weight Retained			
	VC-03	VC-04	VC-05	n/a
-4.25	3.54	4.89	6.87	
-4.00	4.78	6.24	7.67	
-3.00	6.63	10.47	10.03	
-2.00	8.92	14.55	11.53	
-1.00	11.37	19.37	12.37	
0.00	13.17	23.65	13.30	
1.00	14.74	25.94	13.77	
2.00	17.72	27.60	14.67	
3.00	63.08	70.97	57.27	
3.75	85.59	89.68	85.60	
4.00	86.32	90.00	86.50	

SubArea 2 Sample Cumulative % by Weight Passing			
VC-03	VC-04	VC-05	n/a
96.5	95.1	93.1	
95.2	93.8	92.3	
93.4	89.5	90.0	
91.1	85.4	88.5	
88.6	80.6	87.6	
86.8	76.4	86.7	
85.3	74.1	86.2	
82.3	72.4	85.3	
36.9	29.0	42.7	
14.4	10.3	14.4	
13.7	10.0	13.5	

Weighted Composite	
% Retained	% Passing
4.91	95.09
6.03	93.97
8.58	91.42
11.02	88.98
13.48	86.52
15.56	84.44
16.94	83.06
18.96	81.04
62.98	37.02
86.51	13.49
87.20	12.80

SubArea 2	Station Interval (Feet)		Representative Values		
Sample	Start	Stop	Volume	Percent	USCS
VC-03	12+25	16+50	3,797	45.52%	
VC-04	16+50	20+75	1,868	22.39%	
VC-05	20+75	25+00	2,677	32.09%	
Composite	**12+25**	**25+00**	**8,342**	**100%**	

SubArea 2	Moment Statistics and Properties in Phi Units						
Sample	ϕ_5	ϕ_{16}	ϕ_{25}	ϕ_{50}	ϕ_{75}	ϕ_{84}	ϕ_{95}
VC-03	-3.88	1.42	2.16	2.71	3.40	3.70	6.98
VC-04	-4.23	-1.70	0.59	2.52	3.16	3.52	7.86
VC-05	-4.83	2.03	2.24	2.83	3.47	3.71	6.36
Composite	**-4.23**	**0.32**	**2.14**	**2.71**	**3.38**	**3.67**	**6.81**

SubArea 2

Composite Grain Size Distribution (% by Weight Passing)					
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
VC-03	13.68	74.95	2.44	8.92	100%
VC-04	10.00	70.63	4.81	14.55	100%
VC-05	13.50	74.13	0.83	11.53	100%
Composite	**12.80**	**73.72**	**2.46**	**11.02**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

SubArea 2					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
VC-03	2.71	0.15	2.61	0.16	1.14	-0.09	3.77
VC-04	2.52	0.17	1.45	0.37	2.61	-0.41	1.32
VC-05	2.83	0.14	2.86	0.14	0.84	0.03	5.68
Composite	**2.71**	**0.15**	**2.23**	**0.21**	**1.68**	**-0.28**	**2.30**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_{5}) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

JINKS CREEK SUBAREA COMPOSITES

Design Depth --5 to -7 MLW

SubArea 3 (Vibracores VC-06, VC-07, VC-08 & VC-09)

Sieve (Phi)	SubArea 3 Sample Cumulative % by Weight Retained VC-06	VC-07	VC-08	VC-09
-4.25	1.10	0.00	1.01	1.82
-4.00	1.10	0.23	2.34	3.03
-3.00	1.10	3.00	4.40	7.96
-2.00	1.10	5.87	6.41	13.02
-1.00	1.20	7.97	8.34	17.47
0.00	1.30	9.63	9.68	21.11
1.00	1.40	11.65	11.16	25.48
2.00	3.80	25.31	25.15	47.04
3.00	73.30	84.78	83.47	91.52
3.75	97.10	98.62	96.20	97.28
4.00	97.30	98.80	96.34	97.38

SubArea 3 Sample Cumulative % by Weight Passing VC-06	VC-07	VC-08	VC-09
98.9	100.0	99.0	98.2
98.9	99.8	97.7	97.0
98.9	97.0	95.6	92.0
98.9	94.1	93.6	87.0
98.8	92.0	91.7	82.5
98.7	90.4	90.3	78.9
98.6	88.3	88.8	74.5
96.2	74.7	74.9	53.0
26.7	15.2	16.5	8.5
2.9	1.4	3.8	2.7
2.7	1.2	3.7	2.6

Weighted Composite % Retained	% Passing
1.32	98.68
2.25	97.75
5.63	94.37
9.09	90.91
12.12	87.88
14.54	85.46
17.44	82.56
33.73	66.27
86.45	13.55
97.23	2.77
97.36	2.64

SubArea 3	Station Interval (Feet) Start	Stop	Representative Values Volume	Percent	USCS
VC-06	25+00	30+00	2,500	14.70%	SP
VC-07	30+00	34+00	2,262	13.30%	
VC-08	34+00	38+75	3,158	18.57%	
VC-09	38+75	45+00	9,086	53.43%	SP
Composite	**25+00**	**45+00**	**17,005**	**100%**	

SubArea 3 Sample	Moment Statistics and Properties in Phi Units φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
VC-06	2.02	2.18	2.31	2.66	3.05	3.34	3.68
VC-07	-2.30	1.32	1.98	2.42	2.84	2.99	3.55
VC-08	-2.70	1.35	1.99	2.43	2.85	3.03	3.68
VC-09	-3.60	-1.33	0.89	2.07	-19.09	2.83	3.45
Composite	**-3.19**	**0.50**	**1.46**	**2.31**	**2.78**	**2.95**	**3.59**

SubArea 3

Composite Grain Size Distribution (% by Weight Passing) Sample	Fines	Sand	Granular	Gravel	Total
VC-06	2.70	96.10	0.10	1.10	100%
VC-07	1.20	90.83	2.10	5.87	100%
VC-08	3.66	88.00	1.92	6.41	100%
VC-09	2.62	79.91	4.45	13.02	100%
Composite	**2.64**	**85.25**	**3.03**	**9.09**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

SubArea 3 Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Parameters in Phi Units Sorting (σ)	Skewness (α)	Kurtosis (β)
VC-06	2.66	0.16	2.73	0.15	0.58	0.11	0.43
VC-07	2.42	0.19	2.24	0.21	0.83	-0.21	2.51
VC-08	2.43	0.19	2.27	0.21	0.84	-0.19	2.79
VC-09	2.07	0.24	1.19	0.44	2.08	-0.42	0.70
Composite	**2.31**	**0.20**	**1.92**	**0.26**	**1.23**	**-0.32**	**1.77**

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Sunset Beach
Pre-Dredge Analysis
Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_{5}) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

JINKS CREEK SUBAREA COMPOSITES
Design Depth --5 to -7 MLW

SubArea 4 (Vibracores VC-10)

Sieve (Phi)	SubArea 4 Sample Cumulative % by Weight Retained			
	VC-10	0	0	0
-4.25	0.00			
-4.00	0.00			
-3.00	0.07			
-2.00	0.15			
-1.00	0.19			
0.00	0.34			
1.00	0.79			
2.00	6.52			
3.00	35.12			
3.75	47.41			
4.00	48.12			

SubArea 4 Sample Cumulative % by Weight Passing			
VC-10			
100.0			
100.0			
99.9			
99.9			
99.8			
99.7			
99.2			
93.5			
64.9			
52.6			
51.9			

Weighted Composite	
% Retained	% Passing
0.00	100.00
0.00	100.00
0.07	99.93
0.15	99.85
0.20	99.80
0.34	99.66
0.79	99.21
6.52	93.48
35.12	64.88
47.41	52.59
48.12	51.88

SubArea 4	Station Interval (Feet)		Representative Values		
Sample	Start	Stop	Volume	Percent	USCS
VC-10	45+00	51+00	13,246	100.00%	
Composite	**45+00**	**51+00**	**13,246**	**100%**	

SubArea 4	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
VC-10	1.74	2.33	2.65	4.09	6.07	6.76	7.61
Composite	**1.73**	**2.33**	**2.65**	**4.09**	**6.07**	**6.76**	**7.61**

SubArea 4

Composite Grain Size Distribution (% by Weight Passing)					
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
VC-10	51.88	47.92	0.05	0.15	100%
Composite	**51.88**	**47.92**	**0.05**	**0.15**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

SubArea 4					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
VC-10	4.09	0.06	4.39	0.05	2.21	0.14	0.33
Composite	**4.09**	**0.06**	**4.39**	**0.05**	**2.21**	**0.14**	**0.33**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_{5}) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

JINKS CREEK SUBAREA COMPOSITES

Design Depth --5 to -7 MLW

SubArea 5 (Vibracores VC-11, VC-12 & VC-13)

Sieve (Phi)	SubArea 5 Sample Cumulative % by Weight Retained VC-11	VC-12	VC-13	
-4.25	0.00	0.00	0.00	
-4.00	0.00	0.00	0.00	
-3.00	0.00	0.00	0.00	
-2.00	0.00	0.00	0.00	
-1.00	0.00	0.00	0.00	
0.00	0.00	0.10	0.20	
1.00	0.30	0.70	0.30	
2.00	3.40	7.50	3.60	
3.00	75.90	89.00	88.40	
3.75	95.40	97.50	97.80	
4.00	95.60	97.60	97.80	

SubArea 5 Sample Cumulative % by Weight Passing VC-11	VC-12	VC-13	
100.0	100.0	100.0	
100.0	100.0	100.0	
100.0	100.0	100.0	
100.0	100.0	100.0	
100.0	100.0	100.0	
100.0	99.9	99.8	
99.7	99.3	99.7	
96.6	92.5	96.4	
24.1	11.0	11.6	
4.6	2.5	2.2	
4.4	2.4	2.2	

Weighted Composite % Retained	% Passing
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.07	99.93
0.45	99.55
4.96	95.04
82.88	17.12
96.59	3.41
96.71	3.29

SubArea 5	Station Interval (Feet) Start	Stop	Representative Values Volume	Percent	USCS
VC-11	51+00	57+50	31,562	45.97%	SP
VC-12	57+50	63+50	25,475	37.10%	SP
VC-13	63+50	68+50	11,623	16.93%	SP
Composite	**51+00**	**68+50**	**68,660**	**100%**	**SP**

SubArea 5 Sample	Moment Statistics and Properties in Phi Units φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
VC-11	2.02	2.17	2.30	2.64	2.99	3.31	3.73
VC-12	1.63	2.10	2.21	2.52	2.83	2.94	3.53
VC-13	2.02	2.15	2.25	2.55	2.84	2.95	3.53
Composite	**2.00**	**2.14**	**2.26**	**2.58**	**2.90**	**3.06**	**3.66**

SubArea 5

Composite Grain Size Distribution (% by Weight Passing) Sample	Fines	Sand	Granular	Gravel	Total
VC-11	4.40	95.60	0.00	0.00	100%
VC-12	2.40	97.60	0.00	0.00	100%
VC-13	2.20	97.80	0.00	0.00	100%
Composite	**3.29**	**96.71**	**0.00**	**0.00**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

SubArea 5 Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Parameters in Phi Units Sorting (σ)	Skewness (α)	Kurtosis (β)
VC-11	2.64	0.16	2.71	0.15	0.57	0.12	0.51
VC-12	2.52	0.17	2.52	0.17	0.42	0.00	1.27
VC-13	2.55	0.17	2.55	0.17	0.40	0.00	0.88
Composite	**2.58**	**0.17**	**2.59**	**0.17**	**0.46**	**0.03**	**0.81**

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Town of Sunset Beach
Jinks Creek Sediment Composites
Summary Table

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

	Representative Staions		Representative Volume (CY)	Sample Elevation (FT-MLW)		Max. Disturbance (FT-MLW)	% Coverage of Disturbance Depth	Composite Summary (% By Wt. Passing)					Mean	Sorting	Skewness	Kurtosis
Vibracore	Start	Stop		Top	Bottom			Fines	Sand	Granular	Gravel	Total	(mm)	(σ)	(α)	(β)
VC-01	0+00	8+25	4,662	-2.5	-6	-6	100%	6.23	65.14	5.25	23.39	1.00	0.56	3.29	-0.46	0.38
VC-02	8+25	12+25	2,313	-3.6	-6	-6	100%	6.60	87.90	2.10	3.40	1.00	0.17	0.75	0.00	3.81
VC-03	12+25	16+50	3,797	-1.8	-6	-6	100%	13.68	74.95	2.44	8.92	1.00	0.16	1.14	-0.09	3.77
VC-04	16+50	20+75	1,868	-3.9	-6	-6	100%	10.00	70.63	4.81	14.55	1.00	0.37	2.61	-0.41	1.32
VC-05	20+75	25+00	2,677	2	-5.5	-6	92%	13.50	74.13	0.83	11.53	1.00	0.14	0.84	0.03	5.68
VC-06	25+00	30+00	2,500	-1.7	-6	-6	100%	2.70	96.10	0.10	1.10	1.00	0.15	0.58	0.11	0.43
VC-07	30+00	34+00	2,262	-2.1	-6	-6	100%	1.20	90.83	2.10	5.87	1.00	0.21	0.83	-0.21	2.51
VC-08	34+00	38+75	3,158	-1.6	-5.9	-6	98%	3.66	88.00	1.92	6.41	1.00	0.21	0.84	-0.19	2.79
VC-09	38+75	45+00	9,086	-4.7	-9	-9	100%	2.62	79.91	4.45	13.02	1.00	0.44	2.08	-0.42	0.70
VC-10	45+00	51+00	13,246	-1.5	-8.1	-9	90%	51.88	47.92	0.05	0.15	1.00	0.05	2.21	0.14	0.33
VC-11	51+00	57+50	31,562	-0.4	-9	-9	100%	4.40	95.60	0.00	0.00	1.00	0.15	0.57	0.12	0.51
VC-12	57+50	63+50	25,475	-0.2	-9	-9	100%	2.40	97.60	0.00	0.00	1.00	0.17	0.42	0.00	1.27
VC-13	63+50	68+50	11,623	3	-6.5	-9	72%	2.20	97.80	0.00	0.00	1.00	0.17	0.40	0.00	0.88

Area	Volume (CY)	Stations
Beach Compatible Material	100,982	0+00 - 45+00 & 51+00 - 68+50
Non-Compatible Materail	13,246	45+00 - 51+00
Total	114,228	0+00 - 68+50

1. Max. Disturbance Depth Includes OverDredge Tolerance.

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_{5}) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Jinks Creek

Design Depth --5 to -7 MLW

Vibracore VC-1 (Max. Dredge Depth -6 MLW)

Sieve (Phi)	VC-1 Sample Cumulative % by Weight Retained #1	#2	#3	#4
-4.25	4.30	8.30	0.00	
-4.00	10.90	10.50	0.50	
-3.00	27.70	19.90	5.00	
-2.00	38.60	23.90	8.80	
-1.00	48.20	28.20	12.60	
0.00	55.80	31.40	15.00	
1.00	59.90	33.20	16.30	
2.00	65.80	34.80	17.40	
3.00	88.80	78.60	53.20	
3.75	98.40	95.60	83.50	
4.00	98.70	95.80	84.40	

VC-1 Sample Cumulative % by Weight Passing #1	#2	#3	#4
95.7	91.7	100.0	
89.1	89.5	99.5	
72.3	80.1	95.0	
61.4	76.1	91.2	
51.8	71.8	87.4	
44.2	68.6	85.0	
40.1	66.8	83.7	
34.2	65.2	82.6	
11.2	21.4	46.8	
1.6	4.4	16.5	
1.3	4.2	15.6	

Weighted Composite % Retained	% Passing
5.60	94.40
8.29	91.71
18.05	81.95
23.39	76.61
28.63	71.37
32.53	67.47
34.68	65.32
37.02	62.98
74.83	25.17
93.39	6.61
93.77	6.23

C-1	Depth Interval (MLW) Top	Bottom	Representative Values Length (ft)	Percent	USCS
1	-2.5	-3.2	0.7	20.00%	GW
2	-3.2	-5.2	2	57.14%	SP
3	-5.2	-6	0.8	22.86%	SM
Composite	**-2.5**	**-6**	**3.5**	**100.00%**	

C-1	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	-4.22	-3.70	-3.16	-0.76	2.40	2.79	3.48
2	-4.63	-3.41	-1.74	2.35	2.92	3.24	3.72
3	-3.00	0.77	2.21	2.91	3.54	3.89	6.94
Composite	**-4.31**	**-3.21**	**-1.69**	**2.34**	**3.01**	**3.37**	**4.81**

VC-1

Composite Grain Size Distribution (% by Weight Passing)					
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
1.00	1.30	50.50	9.60	38.60	100%
2.00	4.20	67.60	4.30	23.90	100%
3.00	15.60	71.80	3.80	8.80	100%
Composite	**6.23**	**65.14**	**5.25**	**23.39**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

C-1					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	-0.76	1.70	-0.56	1.47	3.24	0.06	0.19
2	2.35	0.20	0.72	0.61	3.33	-0.49	0.25
3	2.91	0.13	2.52	0.17	1.56	-0.25	2.19
Composite	**2.34**	**0.20**	**0.83**	**0.56**	**3.29**	**-0.46**	**0.38**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_{5}) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Jinks Creek

Design Depth --5 to -7 MLW

Vibracore VC-2 (Max. Dredge Depth -6 MLW)

Sieve (Phi)	VC-2 Sample Cumulative % by Weight Retained #1	#2	#3	#4
-4.25	1.00			
-4.00	1.00			
-3.00	2.40			
-2.00	3.40			
-1.00	5.50			
0.00	7.80			
1.00	9.70			
2.00	17.80			
3.00	78.40			
3.75	93.20			
4.00	93.40			

VC-2 Sample Cumulative % by Weight Passing #1	#2	#3	#4
99.0			
99.0			
97.6			
96.6			
94.5			
92.2			
90.3			
82.2			
21.6			
6.8			
6.6			

Weighted Composite % Retained	% Passing
1.00	99.00
1.00	99.00
2.40	97.60
3.40	96.60
5.50	94.50
7.80	92.20
9.70	90.30
17.80	82.20
78.40	21.60
93.20	6.80
93.40	6.60

VC-2	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-3.6	-6	2.4	100.00%	SP-SM
Composite	**-3.6**	**-6**	**2.4**	**100.00%**	**SP-SM**

VC-2	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	-1.24	1.78	2.12	2.53	2.94	3.28	6.00
Composite	**-1.24**	**1.78**	**2.12**	**2.53**	**2.94**	**3.28**	**6.00**

VC-2	Composite Grain Size Distribution (% by Weight Passing)				
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
1.00	6.60	87.90	2.10	3.40	100%
Composite	**6.60**	**87.90**	**2.10**	**3.40**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

VC-2					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	2.53	0.17	2.53	0.17	0.75	0.00	3.81
Composite	**2.53**	**0.17**	**2.53**	**0.17**	**0.75**	**0.00**	**3.81**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Jinks Creek

Design Depth --5 to -7 MLW

Vibracore VC-3 (Max. Dredge Depth -6 MLW)

Sieve (Phi)	VC-3 Sample Cumulative % by Weight Retained #1	#2	#3	#4
-4.25	0.00	11.50	2.80	0.00
-4.00	0.70	11.60	6.70	0.00
-3.00	0.80	16.80	8.80	0.00
-2.00	1.30	24.10	10.50	0.00
-1.00	2.10	32.20	11.90	0.00
0.00	3.10	37.60	13.10	0.10
1.00	4.40	40.50	15.40	0.20
2.00	11.40	45.60	17.40	0.80
3.00	75.00	88.40	73.80	30.70
3.75	97.10	97.70	92.60	66.00
4.00	97.40	97.90	93.20	67.40

VC-3 Sample Cumulative % by Weight Passing #1	#2	#3	#4
100.0	88.5	97.2	100.0
99.3	88.4	93.3	100.0
99.2	83.2	91.2	100.0
98.7	75.9	89.5	100.0
97.9	67.8	88.1	100.0
96.9	62.4	86.9	99.9
95.6	59.5	84.6	99.8
88.6	54.4	82.6	99.2
25.0	11.6	26.2	69.3
2.9	2.3	7.4	34.0
2.6	2.1	6.8	32.6

Weighted Composite % Retained	% Passing
3.54	96.46
4.78	95.22
6.63	93.37
8.92	91.08
11.37	88.63
13.17	86.83
14.74	85.26
17.72	82.28
63.08	36.92
85.59	14.41
86.32	13.68

VC-3	Depth Interval (MLW) Top	Bottom	Representative Values Length (ft)	Percent	USCS
1	-1.8	-2.4	0.6	14.29%	SP
2	-2.4	-3.4	1	23.81%	SP
3	-3.4	-4.6	1.2	28.57%	SP/SM
4	-4.6	-6	1.4	33.33%	SM
Composite	**-1.8**	**-6**	**4.2**	**100.00%**	

VC-3	Moment Statistics and Properties in Phi Units φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	1.09	2.07	2.21	2.61	3.00	3.31	3.68
2	-20.50	-3.15	-1.89	2.10	2.69	2.90	3.53
3	-4.11	1.30	2.13	2.58	3.05	3.41	4.75
4	2.14	2.51	2.81	3.41	5.36	6.96	8.93
Composite	**-3.88**	**1.42**	**2.16**	**2.71**	**3.40**	**3.70**	**6.98**

VC-3	Composite Grain Size Distribution (% by Weight Passing) Fines	Sand	Granular	Gravel	Total
1.00	2.60	95.30	0.80	1.30	100%
2.00	2.10	65.70	8.10	24.10	100%
3.00	6.80	81.30	1.40	10.50	100%
4.00	32.60	67.40	0.00	0.00	100%
Composite	**13.68**	**74.95**	**2.44**	**8.92**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

VC-3					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	2.61	0.16	2.66	0.16	0.62	0.09	1.10
2	2.10	0.23	0.62	0.65	3.03	-0.49	2.97
3	2.58	0.17	2.43	0.19	1.05	-0.14	3.20
4	3.41	0.09	4.29	0.05	2.23	0.40	0.52
Composite	**2.71**	**0.15**	**2.61**	**0.16**	**1.14**	**-0.09**	**3.77**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Jinks Creek

Design Depth --5 to -7 MLW

Vibracore VC-4 (Max. Dredge Depth -6 MLW)

Sieve (Phi)	VC-4 Sample Cumulative % by Weight Retained #1	#2	#3	#4
-4.25	5.40	0.00		
-4.00	6.90	0.00		
-3.00	11.50	0.70		
-2.00	16.00	0.80		
-1.00	21.30	1.00		
0.00	26.00	1.30		
1.00	28.50	1.60		
2.00	30.30	2.00		
3.00	75.20	30.80		
3.75	93.00	58.10		
4.00	93.20	59.60		

VC-4 Sample Cumulative % by Weight Passing #1	#2	#3	#4
94.6	100.0		
93.1	100.0		
88.5	99.3		
84.0	99.2		
78.7	99.0		
74.0	98.7		
71.5	98.4		
69.7	98.0		
24.8	69.2		
7.0	41.9		
6.8	40.4		

Weighted Composite % Retained	% Passing
4.89	95.11
6.24	93.76
10.47	89.53
14.55	85.45
19.37	80.63
23.65	76.35
25.94	74.06
27.60	72.40
70.97	29.03
89.68	10.32
90.00	10.00

VC-4	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-3.9	-5.8	1.9	90.48%	SP-SM
2	-5.8	-6	0.2	9.52%	SM
Composite	**-3.9**	**-6**	**2.1**	**100.00%**	

VC-4	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	-4.41	-2.00	-0.21	2.44	3.00	3.37	6.25
2	2.10	2.49	2.80	3.53	6.57	8.07	9.90
Composite	**-4.23**	**-1.70**	**0.59**	**2.52**	**3.16**	**3.52**	**7.86**

VC-4	Composite Grain Size Distribution (% by Weight Passing)				
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
1.00	6.80	71.90	5.30	16.00	100%
2.00	40.40	58.60	0.20	0.80	100%
Composite	**10.00**	**70.63**	**4.81**	**14.55**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

VC-4					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	2.44	0.18	1.27	0.41	2.69	-0.44	0.99
2	3.53	0.09	4.69	0.04	2.79	0.42	0.40
Composite	**2.52**	**0.17**	**1.45**	**0.37**	**2.61**	**-0.41**	**1.32**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_{5}) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Jinks Creek

Design Depth --5 to -7 MLW

Vibracore VC-5 (Max. Dredge Depth -6 MLW)

Sieve (Phi)	VC-5 Sample Cumulative % by Weight Retained #1	#2	#3	#4
-4.25	0.00	20.60		
-4.00	0.00	23.00		
-3.00	0.00	30.10		
-2.00	0.00	34.60		
-1.00	0.10	36.90		
0.00	0.30	39.30		
1.00	0.60	40.10		
2.00	1.60	40.80		
3.00	57.50	56.80		
3.75	88.30	80.20		
4.00	88.80	81.90		

VC-5 Sample Cumulative % by Weight Passing #1	#2	#3	#4
100.0	79.4		
100.0	77.0		
100.0	69.9		
100.0	65.4		
99.9	63.1		
99.7	60.7		
99.4	59.9		
98.4	59.2		
42.5	43.2		
11.7	19.8		
11.2	18.1		

Weighted Composite % Retained	% Passing
6.87	93.13
7.67	92.33
10.03	89.97
11.53	88.47
12.37	87.63
13.30	86.70
13.77	86.23
14.67	85.33
57.27	42.73
85.60	14.40
86.50	13.50

VC-5	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	2	-3	5	66.67%	SP-SM
2	-3	-5.5	2.5	33.33%	SM
Composite	**2**	**-5.5**	**7.5**	**100.00%**	

VC-5	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	2.06	2.26	2.42	2.87	3.43	3.65	7.10
2	-5.88	-4.73	-3.72	2.58	3.58	4.31	5.93
Composite	**-4.83**	**2.03**	**2.24**	**2.83**	**3.47**	**3.71**	**6.36**

VC-5	Composite Grain Size Distribution (% by Weight Passing)				
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
1.00	11.20	88.70	0.10	0.00	100%
2.00	18.10	45.00	2.30	34.60	100%
Composite	**13.50**	**74.13**	**0.83**	**11.53**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

VC-5					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	2.87	0.14	2.92	0.13	0.69	0.08	2.63
2	2.58	0.17	0.72	0.61	4.52	-0.41	0.31
Composite	**2.83**	**0.14**	**2.86**	**0.14**	**0.84**	**0.03**	**5.68**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Jinks Creek

Design Depth --5 to -7 MLW

Vibracore VC-6 (Max. Dredge Depth -6 MLW)

Sieve (Phi)	VC-6 Sample Cumulative % by Weight Retained #1	#2	#3	#4
-4.25	1.10			
-4.00	1.10			
-3.00	1.10			
-2.00	1.10			
-1.00	1.20			
0.00	1.30			
1.00	1.40			
2.00	3.80			
3.00	73.30			
3.75	97.10			
4.00	97.30			

VC-6 Sample Cumulative % by Weight Passing #1	#2	#3	#4
98.9			
98.9			
98.9			
98.9			
98.8			
98.7			
98.6			
96.2			
26.7			
2.9			
2.7			

Weighted Composite % Retained	% Passing
1.10	98.90
1.10	98.90
1.10	98.90
1.10	98.90
1.20	98.80
1.30	98.70
1.40	98.60
3.80	96.20
73.30	26.70
97.10	2.90
97.30	2.70

VC-6	Depth Interval (MLW) Sample	Top	Bottom	Representative Values Length (ft)	Percent	USCS
	1	-1.7	-6	4.3	100.00%	SP
Composite	**-1.7**	**-6**		**4.3**	**100.00%**	**SP**

VC-6	Moment Statistics and Properties in Phi Units Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
	1	2.02	2.18	2.31	2.66	3.05	3.34	3.68
Composite		**2.02**	**2.18**	**2.31**	**2.66**	**3.05**	**3.34**	**3.68**

VC-6	Composite Grain Size Distribution (% by Weight Passing) Sample	Fines	Sand	Granular	Gravel	Total
	1.00	2.70	96.10	0.10	1.10	100%
Composite		**2.70**	**96.10**	**0.10**	**1.10**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

VC-6	Parameters in Phi Units Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
	1	2.66	0.16	2.73	0.15	0.58	0.11	0.43
Composite		**2.66**	**0.16**	**2.73**	**0.15**	**0.58**	**0.11**	**0.43**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

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Design Depth --5 to -7 MLW

Vibracore VC-7 (Max. Dredge Depth -6 MLW)

Sieve (Phi)	VC-7 Sample Cumulative % by Weight Retained #1	#2	#3	#4
-4.25	0.00	0.00		
-4.00	0.00	0.90		
-3.00	0.00	11.70		
-2.00	0.00	22.90		
-1.00	0.10	30.80		
0.00	0.40	36.40		
1.00	1.50	41.10		
2.00	16.80	50.00		
3.00	83.40	88.80		
3.75	98.70	98.40		
4.00	98.90	98.50		

VC-7 Sample Cumulative % by Weight Passing #1	#2	#3	#4
100.0	100.0		
100.0	99.1		
100.0	88.3		
100.0	77.1		
99.9	69.2		
99.6	63.6		
98.5	58.9		
83.2	50.0		
16.6	11.2		
1.3	1.6		
1.1	1.5		

Weighted Composite % Retained	% Passing
0.00	100.00
0.23	99.77
3.00	97.00
5.87	94.13
7.97	92.03
9.63	90.37
11.65	88.35
25.31	74.69
84.78	15.22
98.62	1.38
98.80	1.20

VC-7	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-2.1	-5	2.9	74.36%	SP
2	-5	-6	1	25.64%	SW
Composite	**-2.1**	**-6**	**3.9**	**100.00%**	

VC-7	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	1.23	1.95	2.12	2.50	2.87	3.03	3.57
2	-3.62	-2.62	-1.73	2.00	2.64	2.88	3.48
Composite	**-2.30**	**1.32**	**1.98**	**2.42**	**2.84**	**2.99**	**3.55**

VC-7	Composite Grain Size Distribution (% by Weight Passing)				
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
1.00	1.10	98.80	0.10	0.00	100%
2.00	1.50	67.70	7.90	22.90	100%
Composite	**1.20**	**90.83**	**2.10**	**5.87**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

VC-7					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	2.50	0.18	2.49	0.18	0.54	-0.01	1.16
2	2.00	0.25	0.75	0.59	2.75	-0.45	0.29
Composite	**2.42**	**0.19**	**2.24**	**0.21**	**0.83**	**-0.21**	**2.51**

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Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Jinks Creek

Design Depth --5 to -7 MLW

Vibracore VC-8 (Max. Dredge Depth -6 MLW)

Sieve (Phi)	VC-8 Sample Cumulative % by Weight Retained #1	#2	#3	#4
-4.25	0.00	3.10		
-4.00	0.00	7.20		
-3.00	0.00	13.50		
-2.00	0.00	19.70		
-1.00	0.10	25.40		
0.00	0.30	29.10		
1.00	1.10	32.00		
2.00	18.70	38.50		
3.00	86.40	77.40		
3.75	99.20	90.00		
4.00	99.30	90.20		

VC-8 Sample Cumulative % by Weight Passing #1	#2	#3	#4
100.0	96.9		
100.0	92.8		
100.0	86.5		
100.0	80.3		
99.9	74.6		
99.7	70.9		
98.9	68.0		
81.3	61.5		
13.6	22.6		
0.8	10.0		
0.7	9.8		

Weighted Composite % Retained	% Passing
1.01	98.99
2.34	97.66
4.40	95.60
6.41	93.59
8.34	91.66
9.68	90.32
11.16	88.84
25.15	74.85
83.47	16.53
96.20	3.80
96.34	3.66

VC-8	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-1.6	-4.5	2.9	67.44%	SP
2	-4.5	-5.9	1.4	32.56%	SP/SM
Composite	**-1.6**	**-5.9**	**4.3**	**100.00%**	

VC-8	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	1.22	1.85	2.09	2.46	2.83	2.96	3.50
2	-4.13	-2.60	-1.07	2.30	2.94	3.39	10.00
Composite	**-2.70**	**1.35**	**1.99**	**2.43**	**2.85**	**3.03**	**3.68**

VC-8

Composite Grain Size Distribution (% by Weight Passing)					
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
1.00	0.70	99.20	0.10	0.00	100%
2.00	9.80	64.80	5.70	19.70	100%
Composite	**3.66**	**88.00**	**1.92**	**6.41**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

VC-8					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	2.46	0.18	2.42	0.19	0.56	-0.07	1.04
2	2.30	0.20	1.03	0.49	2.99	-0.42	1.36
Composite	**2.43**	**0.19**	**2.27**	**0.21**	**0.84**	**-0.19**	**2.79**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Jinks Creek

Design Depth --5 to -7 MLW

Vibracore VC-9 (Max. Dredge Depth -9 MLW)

Sieve (Phi)	VC-9 Sample Cumulative % by Weight Retained #1	#2	#3	#4
-4.25	0.00	2.70		
-4.00	0.00	4.50		
-3.00	0.00	11.80		
-2.00	0.00	19.30		
-1.00	0.00	25.90		
0.00	0.20	31.20		
1.00	0.80	37.40		
2.00	11.30	64.30		
3.00	83.70	95.30		
3.75	96.20	97.80		
4.00	96.30	97.90		

VC-9 Sample Cumulative % by Weight Passing #1	#2	#3	#4
100.0	97.3		
100.0	95.5		
100.0	88.2		
100.0	80.7		
100.0	74.1		
99.8	68.8		
99.2	62.6		
88.7	35.7		
16.3	4.7		
3.8	2.2		
3.7	2.1		

Weighted Composite % Retained	% Passing
1.82	98.18
3.03	96.97
7.96	92.04
13.02	86.98
17.47	82.53
21.11	78.89
25.48	74.52
47.04	52.96
91.52	8.48
97.28	2.72
97.38	2.62

VC-9	Depth Interval (MLW) Top	Bottom	Representative Values Length (ft)	Percent	USCS
1	-4.7	-6.1	1.4	32.56%	SP
2	-6.1	-9	2.9	67.44%	SP
Composite	**-4.7**	**-9**	**4.3**	**100.00%**	**SP**

VC-9 Sample	Moment Statistics and Properties in Phi Units φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	1.40	2.06	2.19	2.53	2.88	3.02	3.68
2	-3.93	-2.44	-1.14	1.47	2.35	2.64	2.99
Composite	**-3.60**	**-1.33**	**0.89**	**2.07**	**2.63**	**2.83**	**3.45**

VC-9	Composite Grain Size Distribution (% by Weight Passing)				
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
1.00	3.70	96.30	0.00	0.00	100%
2.00	2.10	72.00	6.60	19.30	100%
Composite	**2.62**	**79.91**	**4.45**	**13.02**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

VC-9 Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Parameters in Phi Units Sorting (σ)	Skewness (α)	Kurtosis (β)
1	2.53	0.17	2.54	0.17	0.48	0.01	1.39
2	1.47	0.36	0.55	0.68	2.54	-0.36	0.36
Composite	**2.07**	**0.24**	**1.19**	**0.44**	**2.08**	**-0.42**	**0.70**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Jinks Creek

Design Depth --5 to -7 MLW

Vibracore VC-10 (Max. Dredge Depth -9 MLW)

Sieve (Phi)	VC-10 Sample Cumulative % by Weight Retained #1	#2	#3	#4
-4.25	0.00	0.00		
-4.00	0.00	0.00		
-3.00	0.30	0.00		
-2.00	0.60	0.00		
-1.00	0.80	0.00		
0.00	1.10	0.10		
1.00	2.00	0.40		
2.00	17.20	3.10		
3.00	85.80	18.90		
3.75	96.20	31.80		
4.00	96.30	32.70		

VC-10 Sample Cumulative % by Weight Passing #1	#2	#3	#4
100.0	100.0		
100.0	100.0		
99.7	100.0		
99.4	100.0		
99.2	100.0		
98.9	99.9		
98.0	99.6		
82.8	96.9		
14.2	81.1		
3.8	68.2		
3.7	67.3		

Weighted Composite % Retained	% Passing
0.00	100.00
0.00	100.00
0.07	99.93
0.15	99.85
0.19	99.81
0.34	99.66
0.79	99.21
6.52	93.48
35.12	64.88
47.41	52.59
48.12	51.88

VC-10	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-1.5	-3.1	1.6	24.24%	SP
2	-3.1	-8.1	5	75.76%	CL
Composite	**-1.5**	**-8.1**	**6.6**	**100.00%**	

VC-10	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	1.20	1.92	2.11	2.48	2.84	2.97	3.66
2	2.12	2.82	3.35	5.17	7.07	18.25	21.31
Composite	**1.74**	**2.33**	**2.65**	**4.09**	**6.07**	**6.76**	**7.61**

VC-10	Composite Grain Size Distribution (% by Weight Passing)				
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
1.00	3.70	95.50	0.20	0.60	100%
2.00	67.30	32.70	0.00	0.00	100%
Composite	**51.88**	**47.92**	**0.05**	**0.15**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

VC-10					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	2.48	0.18	2.46	0.18	0.53	-0.04	1.34
2	5.17	0.03	8.75	0.00	7.72	0.46	0.24
Composite	**4.09**	**0.06**	**4.39**	**0.05**	**2.21**	**0.14**	**0.33**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Jinks Creek

Design Depth --5 to -7 MLW

Vibracore VC-11 (Max. Dredge Depth -9 MLW)

Sieve (Phi)	VC-11 Sample Cumulative % by Weight Retained #1	#2	#3	#4
-4.25	0.00			
-4.00	0.00			
-3.00	0.00			
-2.00	0.00			
-1.00	0.00			
0.00	0.00			
1.00	0.30			
2.00	3.40			
3.00	75.90			
3.75	95.40			
4.00	95.60			

VC-11 Sample Cumulative % by Weight Passing #1	#2	#3	#4
100.0			
100.0			
100.0			
100.0			
100.0			
100.0			
99.7			
96.6			
24.1			
4.6			
4.4			

Weighted Composite % Retained	% Passing
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.30	99.70
3.40	96.60
75.90	24.10
95.40	4.60
95.60	4.40

VC-11	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-0.4	-9	8.6	100.00%	SP
Composite	**-0.4**	**-9**	**8.6**	**100.00%**	**SP**

VC-11	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	2.02	2.17	2.30	2.64	2.99	3.31	3.73
Composite	**2.02**	**2.17**	**2.30**	**2.64**	**2.99**	**3.31**	**3.73**

VC-11	Composite Grain Size Distribution (% by Weight Passing)				
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
1.00	4.40	95.60	0.00	0.00	100%
Composite	**4.40**	**95.60**	**0.00**	**0.00**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

VC-11					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	2.64	0.16	2.71	0.15	0.57	0.12	0.51
Composite	**2.64**	**0.16**	**2.71**	**0.15**	**0.57**	**0.12**	**0.51**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Jinks Creek

Design Depth --5 to -7 MLW

Vibracore VC-12 (Max. Dredge Depth -9 MLW)

Sieve (Phi)	VC-12 Sample Cumulative % by Weight Retained #1	#2	#3	#4
-4.25	0.00			
-4.00	0.00			
-3.00	0.00			
-2.00	0.00			
-1.00	0.00			
0.00	0.10			
1.00	0.70			
2.00	7.50			
3.00	89.00			
3.75	97.50			
4.00	97.60			

VC-12 Sample Cumulative % by Weight Passing #1	#2	#3	#4
100.0			
100.0			
100.0			
100.0			
100.0			
99.9			
99.3			
92.5			
11.0			
2.5			
2.4			

Weighted Composite % Retained	% Passing
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.10	99.90
0.70	99.30
7.50	92.50
89.00	11.00
97.50	2.50
97.60	2.40

VC-12	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-0.2	-9	8.8	100.00%	SP
Composite	**-0.2**	**-9**	**8.8**	**100.00%**	**SP**

VC-12	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	1.63	2.10	2.21	2.52	2.83	2.94	3.53
Composite	**1.63**	**2.10**	**2.21**	**2.52**	**2.83**	**2.94**	**3.53**

VC-12	Composite Grain Size Distribution (% by Weight Passing)				
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
1.00	2.40	97.60	0.00	0.00	100%
Composite	**2.40**	**97.60**	**0.00**	**0.00**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

VC-12					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	2.52	0.17	2.52	0.17	0.42	0.00	1.27
Composite	**2.52**	**0.17**	**2.52**	**0.17**	**0.42**	**0.00**	**1.27**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Jinks Creek

Design Depth --5 to -7 MLW

Vibracore VC-13 (Max. Dredge Depth -9 MLW)

Sieve (Phi)	VC-13 Sample Cumulative % by Weight Retained #1	#2	#3	#4
-4.25	0.00			
-4.00	0.00			
-3.00	0.00			
-2.00	0.00			
-1.00	0.00			
0.00	0.20			
1.00	0.30			
2.00	3.60			
3.00	88.40			
3.75	97.80			
4.00	97.80			

VC-13 Sample Cumulative % by Weight Passing #1	#2	#3	#4
100.0			
100.0			
100.0			
100.0			
100.0			
99.8			
99.7			
96.4			
11.6			
2.2			
2.2			

Weighted Composite % Retained	% Passing
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.20	99.80
0.30	99.70
3.60	96.40
88.40	11.60
97.80	2.20
97.80	2.20

VC-13	Depth Interval (MLW) Top	Bottom	Representative Values Length (ft)	Percent	USCS
Sample					
1	3	-6.5	9.5	100.00%	SP
Composite	**3**	**-6.5**	**9.5**	**100.00%**	**SP**

VC-13	Moment Statistics and Properties in Phi Units φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
Sample							
1	2.02	2.15	2.25	2.55	2.84	2.95	3.53
Composite	**2.02**	**2.15**	**2.25**	**2.55**	**2.84**	**2.95**	**3.53**

VC-13	Composite Grain Size Distribution (% by Weight Passing) Fines	Sand	Granular	Gravel	Total
Sample					
1.00	2.20	97.80	0.00	0.00	100%
Composite	**2.20**	**97.80**	**0.00**	**0.00**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

VC-13					Parameters in Phi Units Sorting	Skewness	Kurtosis
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	(σ)	(α)	(β)
1	2.55	0.17	2.55	0.17	0.40	0.00	0.88
Composite	**2.55**	**0.17**	**2.55**	**0.17**	**0.40**	**0.00**	**0.88**

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APPENDIX B
FEEDER CANAL GRAIN SIZE ANALYSIS

SHEET INDEX

SHT B1-1 THRU B1-3 - SEDIMENT ANALYSIS PLAN VIEW
SHT B2 - FEEDER CANAL SUBAREA COMPOSITE SUMMARY
SHT B3-1 THRU B3-4 FEEDER CANAL SUBAREA COMPOSITES
SHT B4 FEEDER CANAL COMPOSITE SUMMARY
SHT B5-1 THRU B5-9 FEEDER CANAL COMPOSITE RESULTS

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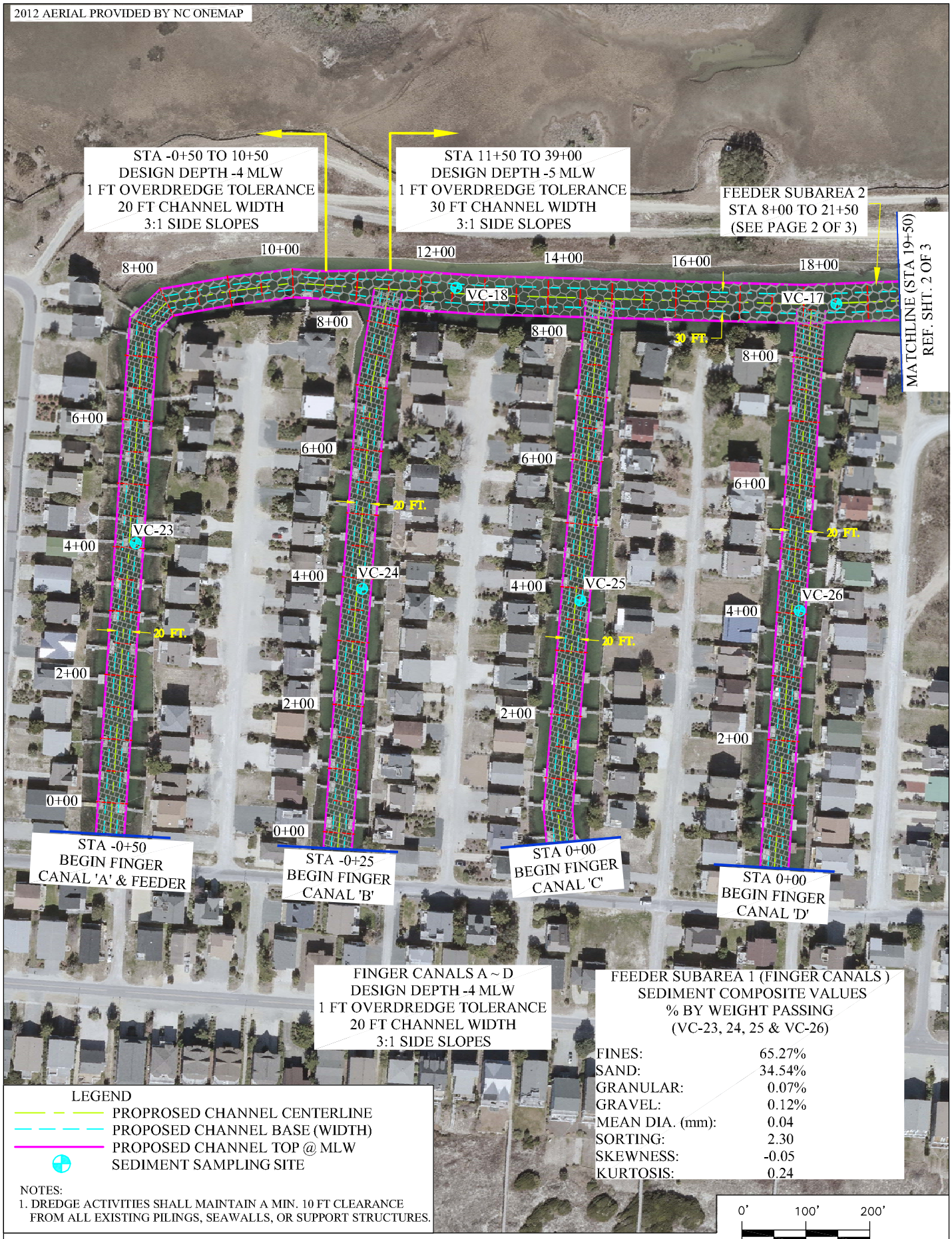
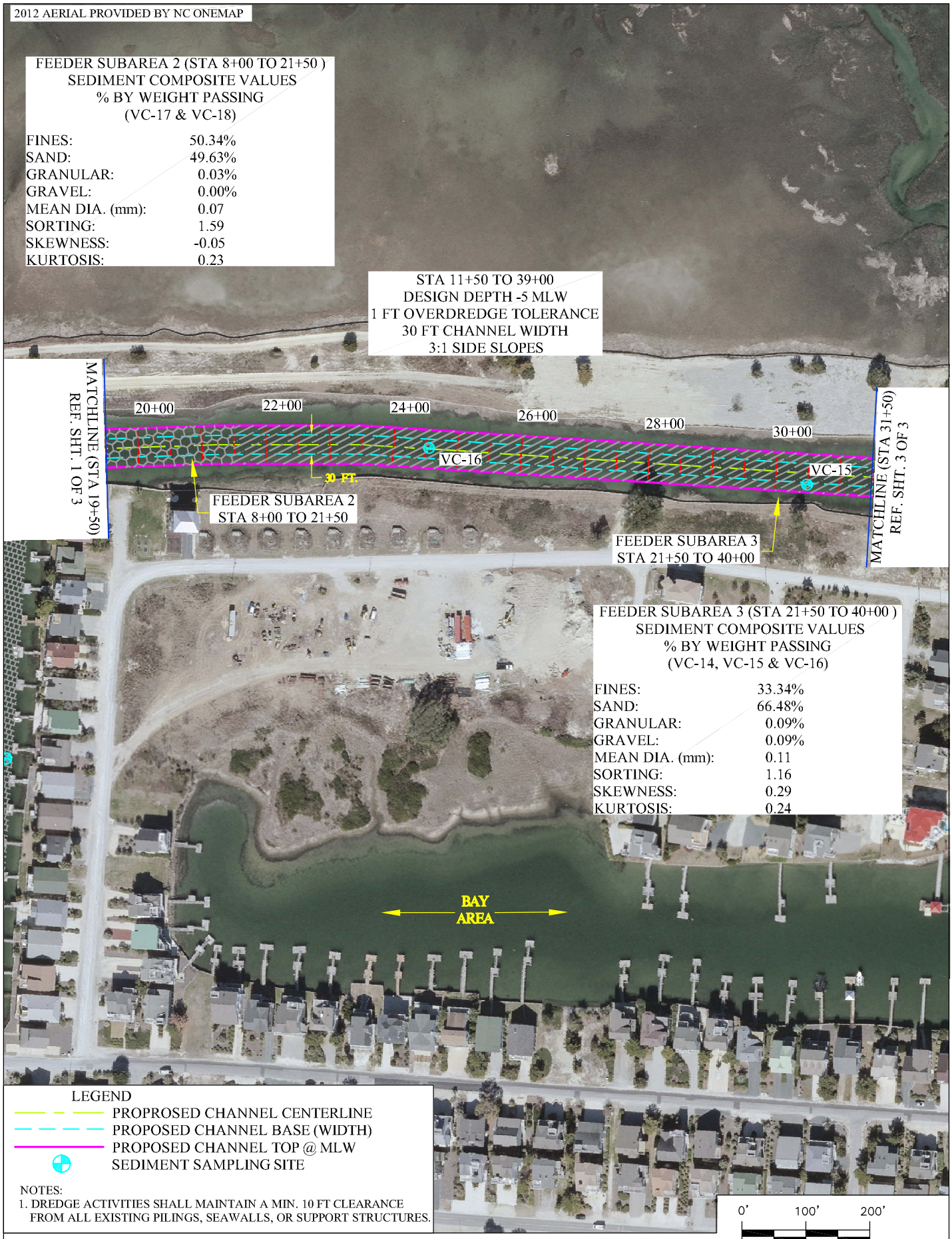


TOWN OF SUNSET BEACH
PRE-DREDGE ANALYSIS
FEEDER CHANNEL SEDIMENT ANALYSIS
PLAN VIEW

B1-1



TOWN OF SUNSET BEACH
PRE-DREDGE ANALYSIS
FEEDER CHANNEL SEDIMENT ANALYSIS
PLAN VIEW

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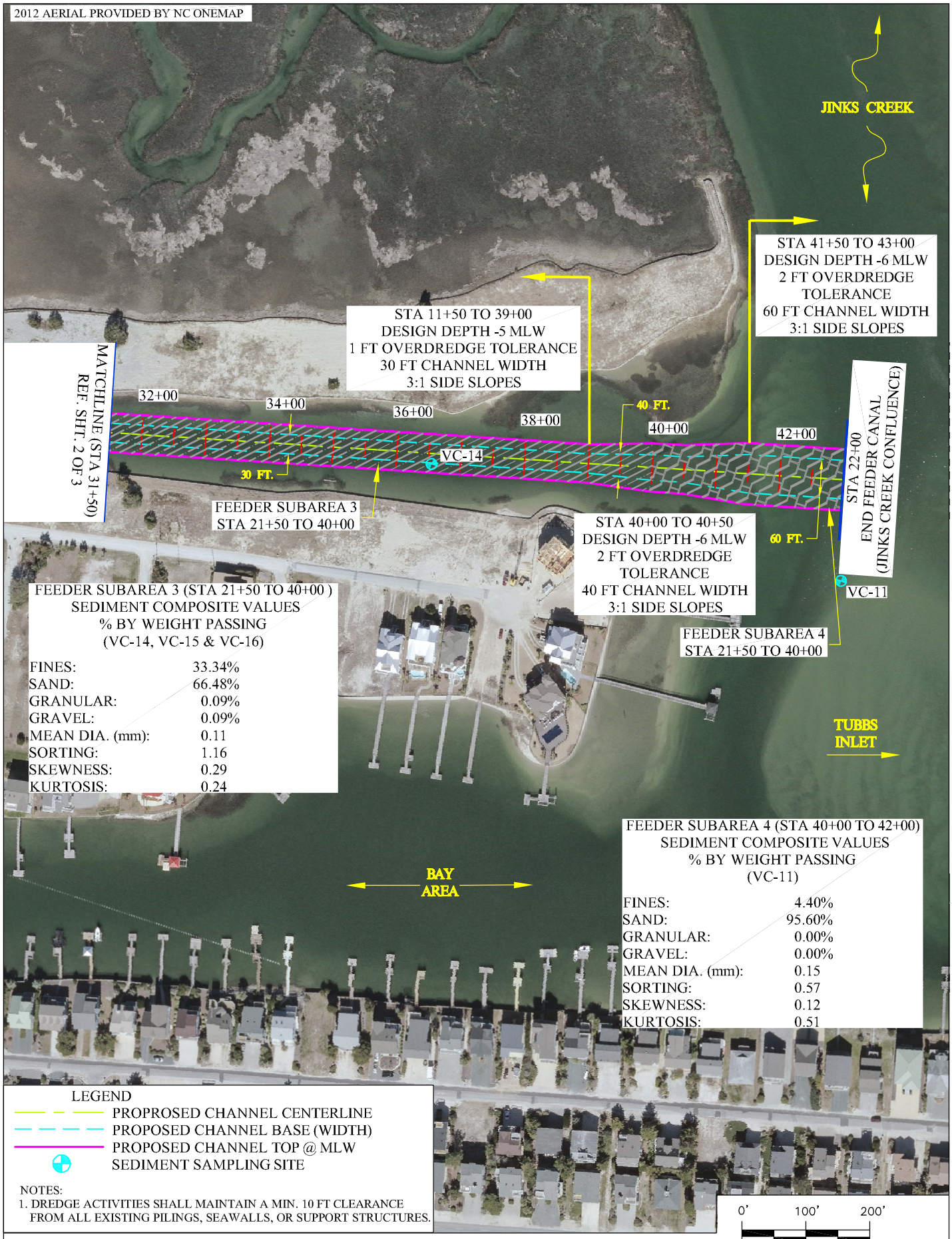
B1-2



TOWN OF SUNSET BEACH
PRE-DREDGE ANALYSIS
FEEDER CHANNEL SEDIMENT ANALYSIS
PLAN VIEW

B1-3

9269
Town of Sunset Beach
FEEDER CANAL SUBAREA COMPOSITE SUMMARY
Summary Table

Per 15A NCAC 07H.0312
Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

	Vibracores	Representative Staions		Representative Volume (CY)	Composite Summary (% By Wt. Passing)					Mean	Sorting	Skewness	Kurtosis
SubArea		Start	Stop		Fines	Sand	Granular	Gravel	Total	(mm)	(σ)	(α)	(β)
1	VC-23, VC-24, VC-25, VC-26	Finger Canals		10,659	65.27%	34.54%	0.07%	0.12%	100%	0.04	2.30	-0.05	0.24
2	VC-17 & VC-18	8+00	21+50	6,672	50.34%	49.63%	0.03%	0.00%	100%	0.07	1.59	-0.05	0.23
3	VC-14, VC-15, VC-16	21+50	40+00	11,944	33.34%	66.48%	0.09%	0.09%	100%	0.11	1.16	0.29	0.24
4	VC-11	40+00	42+00	3,585	4.40%	95.60%	0.00%	0.00%	100%	0.15	0.57	0.12	0.51

Material Type	Volume (CY)	Stations
Beach Compatible Material	3,585	40+00 - 42+00
Non-Compatible Materail	29,275	Finger Canals & 8+00 - 40+00
Total	32,860	Finger Canals & 8+00 - 42+00

1. Volumes Include OverDredge Tolerance.

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_{5}) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

FEEDER CHANNEL SUBAREA COMPOSITES

Design Depth -4 to -6 MLW

SubArea 1 (Vibracores VC-23, 24, 25 & 26)

Sieve (Phi)	SubArea 1 Sample Cumulative % by Weight Retained			
	VC-23	VC-24	VC-25	VC-26
-4.25	0.00	0.00	0.00	0.00
-4.00	0.00	0.00	0.00	0.00
-3.00	0.00	0.00	0.50	0.00
-2.00	0.00	0.00	0.50	0.00
-1.00	0.09	0.10	0.60	0.00
0.00	0.17	0.20	0.80	0.10
1.00	0.54	0.40	0.90	0.20
2.00	3.71	2.20	2.60	2.10
3.00	52.54	28.60	22.00	19.30
3.75	59.38	33.00	24.90	21.60
4.00	59.56	33.20	25.10	21.80

SubArea 1 Sample Cumulative % by Weight Passing			
VC-23	VC-24	VC-25	VC-26
100.0	100.0	100.0	100.0
100.0	100.0	100.0	100.0
100.0	100.0	99.5	100.0
100.0	100.0	99.5	100.0
99.9	99.9	99.4	100.0
99.8	99.8	99.2	99.9
99.5	99.6	99.1	99.8
96.3	97.8	97.4	97.9
47.5	71.4	78.0	80.7
40.6	67.0	75.1	78.4
40.4	66.8	74.9	78.2

Weighted Composite	
% Retained	% Passing
0.00	100.00
0.00	100.00
0.12	99.88
0.12	99.88
0.19	99.81
0.31	99.69
0.50	99.50
2.64	97.36
30.44	69.56
34.53	65.47
34.73	65.27

SubArea 1	Station Interval (Feet)		Representative Values		
Sample	Start	Stop	Volume	Percent	USCS
VC-23	-0+50	8+00	2,590	24.30%	
VC-24	-0+25	8+50	2,779	26.07%	OL/OH
VC-25	0+00	8+50	2,511	23.56%	OL/OH
VC-26	0+00	8+75	2,779	26.07%	OL/OH
Composite	**-0+50**	**8+75**	**10,659**	**100%**	

SubArea 1	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
VC-23	2.03	2.25	2.44	2.95	4.55	4.88	5.27
VC-24	2.11	2.52	2.86	5.08	6.70	7.28	7.99
VC-25	2.12	2.69	3.88	6.21	8.44	9.24	10.21
VC-26	2.17	2.81	4.32	6.86	9.40	10.31	11.43
Composite	**2.09**	**2.48**	**2.80**	**4.95**	**6.51**	**7.07**	**7.76**

SubArea 1

Composite Grain Size Distribution (% by Weight Passing)					
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
VC-23	40.44	59.48	0.09	0.00	100%
VC-24	66.80	33.10	0.10	0.00	100%
VC-25	74.90	24.50	0.10	0.50	100%
VC-26	78.20	21.80	0.00	0.00	100%
Composite	**65.27**	**34.54**	**0.07**	**0.12**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

SubArea 1					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
VC-23	2.95	0.13	3.36	0.10	1.31	0.31	0.24
VC-24	5.08	0.03	4.96	0.03	2.38	-0.05	0.24
VC-25	6.21	0.01	6.05	0.02	3.27	-0.05	0.24
VC-26	6.86	0.01	6.66	0.01	3.75	-0.05	0.23
Composite	**4.95**	**0.03**	**4.83**	**0.04**	**2.30**	**-0.05**	**0.24**

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Sunset Beach
Pre-Dredge Analysis
Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_{5}) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

FEEDER CHANNEL SUBAREA COMPOSITES
Design Depth -4 to -6 MLW

SubArea 2 (Vibracores VC-17 & VC-18)

Sieve (Phi)	SubArea 2 Sample Cumulative % by Weight Retained VC-17	VC-18		
-4.25	0.00	0.00	100.00	100.00
-4.00	0.00	0.00	100.00	100.00
-3.00	0.00	0.00	100.00	100.00
-2.00	0.00	0.00	100.00	100.00
-1.00	0.00	0.05	100.00	100.00
0.00	0.10	0.05	100.00	100.00
1.00	0.20	0.21	100.00	100.00
2.00	1.60	4.50	100.00	100.00
3.00	14.90	70.46	100.00	100.00
3.75	18.10	75.68	100.00	100.00
4.00	18.50	75.84	100.00	100.00

SubArea 2 Sample Cumulative % by Weight Passing VC-17	VC-18		
100.0	100.0		
100.0	100.0		
100.0	100.0		
100.0	100.0		
100.0	99.9		
99.9	99.9		
99.8	99.8		
98.4	95.5		
85.1	29.5		
81.9	24.3		
81.5	24.2		

Weighted Composite % Retained	% Passing
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.03	99.97
0.07	99.93
0.20	99.80
3.18	96.82
45.10	54.90
49.40	50.60
49.66	50.34

SubArea 2	Station Interval (Feet) Start	Stop	Representative Values Volume	Percent	USCS
VC-17	15+50	21+50	3,046	45.65%	OL/OH
VC-18	8+00	15+50	3,626	54.35%	SM
Composite	**8+00**	**21+50**	**6,672**	**100%**	

SubArea 2	Moment Statistics and Properties in Phi Units φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
VC-17	2.26	3.26	4.77	7.73	10.69	11.75	13.05
VC-18	2.01	2.17	2.31	2.69	3.65	4.23	4.54
Composite	**2.04**	**2.31**	**2.52**	**4.01**	**5.09**	**5.48**	**5.95**

SubArea 2

Composite Grain Size Distribution (% by Weight Passing) Sample	Fines	Sand	Granular	Gravel	Total
VC-17	81.50	18.50	0.00	0.00	100%
VC-18	24.16	75.78	0.05	0.00	100%
Composite	**50.34**	**49.63**	**0.03**	**0.00**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

SubArea 2 Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Parameters in Phi Units Sorting (σ)	Skewness (α)	Kurtosis (β)
VC-17	7.73	0.00	7.58	0.01	4.25	-0.04	0.27
VC-18	2.69	0.15	3.03	0.12	1.03	0.33	0.23
Composite	**4.01**	**0.06**	**3.93**	**0.07**	**1.59**	**-0.05**	**0.23**

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_{5}) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

FEEDER CHANNEL SUBAREA COMPOSITES

Design Depth -4 to -6 MLW

SubArea 3 (Vibracores VC-14, VC-15 & VC-16)

Sieve (Phi)	SubArea 3 Sample Cumulative % by Weight Retained VC-14	VC-15	VC-16	
-4.25	0.00	0.00	0.00	
-4.00	0.09	0.00	0.00	
-3.00	0.09	0.00	0.00	
-2.00	0.18	0.00	0.10	
-1.00	0.27	0.00	0.30	
0.00	0.37	0.07	0.40	
1.00	0.56	0.17	0.60	
2.00	2.13	6.50	2.70	
3.00	40.64	84.95	38.00	
3.75	55.43	92.89	45.30	
4.00	56.35	93.12	45.90	

SubArea 3 Sample Cumulative % by Weight Passing VC-14	VC-15	VC-16	
100.0	100.0	100.0	
99.9	100.0	100.0	
99.9	100.0	100.0	
99.8	100.0	99.9	
99.7	100.0	99.7	
99.6	99.9	99.6	
99.4	99.8	99.4	
97.9	93.5	97.3	
59.4	15.0	62.0	
44.6	7.1	54.7	
43.7	6.9	54.1	

Weighted Composite % Retained	% Passing
0.00	100.00
0.03	99.97
0.03	99.97
0.09	99.91
0.18	99.82
0.27	99.73
0.43	99.57
3.91	96.09
56.11	43.89
66.09	33.91
66.66	33.34

SubArea 3	Station Interval (Feet) Start	Stop	Representative Values Volume	Percent	USCS
VC-14	34+50	40+00	3,913	32.76%	
VC-15	27+50	34+50	4,386	36.72%	
VC-16	21+50	27+50	3,645	30.52%	
Composite	**21+50**	**40+00**	**11,944**	**100%**	**0.00%**

SubArea 3	Moment Statistics and Properties in Phi Units φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
VC-14	2.07	2.36	2.59	3.47	5.19	5.76	6.46
VC-15	1.76	2.12	2.24	2.55	2.87	2.99	4.04
VC-16	2.07	2.38	2.63	4.19	5.35	5.76	6.27
Composite	**2.02**	**2.23**	**2.40**	**2.88**	**4.27**	**4.55**	**4.90**

SubArea 3

Composite Grain Size Distribution (% by Weight Passing) Sample	Fines	Sand	Granular	Gravel	Total
VC-14	43.65	56.07	0.09	0.18	100%
VC-15	6.88	93.12	0.00	0.00	100%
VC-16	54.10	45.60	0.20	0.10	100%
Composite	**33.34**	**66.48**	**0.09**	**0.09**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

SubArea 3 Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Parameters in Phi Units Sorting (σ)	Skewness (α)	Kurtosis (β)
VC-14	3.47	0.09	3.87	0.07	1.70	0.23	0.29
VC-15	2.55	0.17	2.55	0.17	0.43	0.00	1.63
VC-16	4.19	0.05	4.11	0.06	1.69	-0.05	0.24
Composite	**2.88**	**0.14**	**3.22**	**0.11**	**1.16**	**0.29**	**0.24**

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Sunset Beach
Pre-Dredge Analysis
Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_{5}) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

FEEDER CHANNEL SUBAREA COMPOSITES
Design Depth -4 to -6 MLW

SubArea 4 (Vibracores VC-11)

Sieve (Phi)	SubArea 4 Sample Cumulative % by Weight Retained: VC-11			
-4.25	0.00			
-4.00	0.00			
-3.00	0.00			
-2.00	0.00			
-1.00	0.00			
0.00	0.00			
1.00	0.30			
2.00	3.40			
3.00	75.90			
3.75	95.40			
4.00	95.60			

SubArea 4 Sample Cumulative % by Weight Passing: VC-11			
100.0			
100.0			
100.0			
100.0			
100.0			
100.0			
99.7			
96.6			
24.1			
4.6			
4.4			

Weighted Composite	
% Retained	% Passing
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.30	99.70
3.40	96.60
75.90	24.10
95.40	4.60
95.60	4.40

SubArea 4	Station Interval (Feet)		Representative Values		
Sample	Start	Stop	Volume	Percent	USCS
VC-11	40+00	42+00	3,585	100.00%	SP
Composite	**40+00**	**42+00**	**3,585**	**100%**	**0.00%**

SubArea 4	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
VC-11	2.02	2.17	2.30	2.64	2.99	3.31	3.73
Composite	**2.02**	**2.17**	**2.30**	**2.64**	**2.99**	**3.31**	**3.73**

SubArea 4

Composite Grain Size Distribution (% by Weight Passing)					
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
VC-11	4.40	95.60	0.00	0.00	100%
Composite	**4.40**	**95.60**	**0.00**	**0.00**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

SubArea 4					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
VC-11	2.64	0.16	2.71	0.15	0.57	0.12	0.51
Composite	**2.64**	**0.16**	**2.71**	**0.15**	**0.57**	**0.12**	**0.51**

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Town of Sunset Beach
Feeder Canal Sediment Composites
Summary Table

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

	Representative Staions		Representative Volume (CY)	Sample Elevation (FT-MLW)		Max. Disturbance (FT-MLW)	% Coverage of Disturbance Depth	Composite Summary (% By Wt. Passing)					Mean	Sorting	Skewness	Kurtosis
Vibracore	Start	Stop		Top	Bottom			Fines	Sand	Granular	Gravel	Total	(mm)	(σ)	(α)	(β)
VC-26	0+00	8+75	2,779	-2.4	-5	-5	100%	78.20	21.80	0.00	0.00	1.00	0.01	3.75	-0.05	0.23
VC-25	0+00	8+50	2,511	-2.4	-5	-5	100%	74.90	24.50	0.10	0.50	1.00	0.02	3.27	-0.05	0.24
VC-24	-0+25	8+50	2,779	-3.1	-5	-5	100%	66.80	33.10	0.10	0.00	1.00	0.03	2.38	-0.05	0.24
VC-23	-0+50	8+00	2,590	-4.2	-5	-5	100%	40.44	59.48	0.09	0.00	1.00	0.10	1.31	0.31	0.24
VC-18	8+00	15+50	3,626	-2.2	-6	-6	100%	24.16	75.78	0.05	0.00	1.00	0.12	1.03	0.33	0.23
VC-17	15+50	21+50	3,046	-4.6	-6	-6	100%	81.50	18.50	0.00	0.00	1.00	0.01	4.25	-0.04	0.27
VC-16	21+50	27+50	3,645	-4.9	-6	-6	100%	54.10	45.60	0.20	0.10	1.00	0.06	1.69	-0.05	0.24
VC-15	27+50	34+50	4,386	-1	-6	-6	100%	6.88	93.12	0.00	0.00	1.00	0.17	0.43	0.00	1.63
VC-14	34+50	40+00	3,913	-2.1	-8	-8	100%	43.65	56.07	0.09	0.18	1.00	0.07	1.70	0.23	0.29
VC-11	40+00	42+00	3,585	-0.4	-8	-8	100%	4.40	95.60	0.00	0.00	1.00	0.15	0.57	0.12	0.51

Area	Volume (CY)	Stations
Beach Compatible Material	3,585	40+00 to 42+00
Non-Compatible Materail	29,275	0+00 - 40+00
Total	32,860	0+00 - 42+00

1. Max. Disturbance Depth Includes OverDredge Tolerance.
2. See Appendix A for VC-11 Composite Information.

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Sunset Beach
Pre-Dredge Analysis
Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{z\phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{z\phi}-\Phi_{50})/\sigma_\phi]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\phi_I}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Feeder Channel & Adjoining Finger Canals
Design Depth -4 to -6 MLW

Vibracore VC-14 Max Dredge Depth -8 MLW

	VC-14			
	Sample Cumlative % by Retained			Weight
Sieve (Phi)	#1	#2	#3	#4
-4.25	0.00	0.00		
-4.00	0.10	0.00		
-3.00	0.10	0.00		
-2.00	0.20	0.00		
-1.00	0.30	0.00		
0.00	0.40	0.00		
1.00	0.60	0.10		
2.00	1.60	7.90		
3.00	35.70	94.00		
3.75	51.40	98.90		
4.00	52.40	99.00		

VC-14			
Sample Cumlative % by Weight Passing			
#1	#2	#3	#4
100.0	100.0		
99.9	100.0		
99.9	100.0		
99.8	100.0		
99.7	100.0		
99.6	100.0		
99.4	99.9		
98.4	92.1		
64.3	6.0		
48.6	1.1		
47.6	1.0		

Composite VC-14	
Weighted Composite (% Retained)	Weighted Composite (% Passing)
0.00	100.00
0.09	99.91
0.09	99.91
0.18	99.82
0.27	99.73
0.37	99.63
0.56	99.44
2.13	97.87
40.64	59.36
55.43	44.57
56.35	43.65

VC-14	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-2.1	-7.5	5.4	91.53%	OL/OH
2	-7.5	-8	0.5	8.47%	SP
3					
4					
Composite	**-2.1**	**-8**	**5.9**	**100.00%**	

VC-14	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	2.10	2.42	2.69	3.68	5.35	5.89	6.55
2	1.63	2.09	2.20	2.49	2.78	2.88	3.15
3							
4							
Composite	**2.07**	**2.36**	**2.59**	**3.47**	**5.19**	**5.76**	**6.46**

VC-14	Composite Grain Size Distribution (% by Weight Passing)				
SubSample	**% Fines**	**% Sand**	**% Granular**	**% Gravel**	**Total**
1.00	47.60	52.10	0.10	0.20	100%
2.00	1.00	99.00	0.00	0.00	100%
3.00					
4.00					
Composite	**43.65**	**56.07**	**0.09**	**0.18**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) siecve.

Per 15A NCAC 07H.0312

% Fines: X < 0.0625 mm
% Sand: 0.0625 ≤ X < 2 mm
% Granular: 2 mm ≤ X < 4.76 mm
% Gravel: 4.76 ≤ X < 76 mm

VC-14					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	3.68	0.08	4.00	0.06	1.73	0.18	0.28
2	2.49	0.18	2.49	0.18	0.39	0.00	0.93
3							
4							
Composite	**3.47**	**0.09**	**3.87**	**0.07**	**1.70**	**0.23**	**0.29**

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Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{z\phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{z\phi}-\Phi_{50})/\sigma_\phi]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\phi_I}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Feeder Channel & Adjoining Finger Canals
Design Depth -4 to -6 MLW

Vibracore VC-15 Max Dredge Depth -6 MLW

VC-15	Sample Cumlative % by Weight Retained			
Sieve (Phi)	#1	#2	#3	#4
-4.25	0.00	0.00		
-4.00	0.00	0.00		
-3.00	0.00	0.00		
-2.00	0.00	0.00		
-1.00	0.00	0.00		
0.00	0.10	0.00		
1.00	0.20	0.10		
2.00	6.50	6.50		
3.00	85.60	83.70		
3.75	91.80	95.00		
4.00	92.00	95.30		

VC-15	Sample Cumlative % by Weight Passing			
	#1	#2	#3	#4
-4.25	100.0	100.0		
-4.00	100.0	100.0		
-3.00	100.0	100.0		
-2.00	100.0	100.0		
-1.00	100.0	100.0		
0.00	99.9	100.0		
1.00	99.8	99.9		
2.00	93.5	93.5		
3.00	14.4	16.3		
3.75	8.2	5.0		
4.00	8.0	4.7		

Composite VC-15	
Weighted Composite (% Retained)	Weighted Composite (% Passing)
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.07	99.93
0.17	99.83
6.50	93.50
84.95	15.05
92.89	7.11
93.12	6.88

VC-15	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-1	-4.3	3.3	66.00%	SP/SM
2	-4.3	-6	1.7	34.00%	SP
3					
4					
Composite	**-1**	**-6**	**5**	**100.00%**	

VC-15	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	1.76	2.12	2.23	2.55	2.87	2.98	4.07
2	1.77	2.12	2.24	2.56	2.89	3.02	3.75
3							
4							
Composite	**1.76**	**2.12**	**2.24**	**2.55**	**2.87**	**2.99**	**4.04**

VC-15	Composite Grain Size Distribution (% by Weight Passing)				
SubSample	% Fines	% Sand	% Granular	% Gravel	Total
1.00	8.00	92.00	0.00	0.00	100%
2.00	4.70	95.30	0.00	0.00	100%
Composite	**6.88**	**93.12**	**0.00**	**0.00**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) siecve.

Per 15A NCAC 07H.0312

% Fines: X < 0.0625 mm
% Sand: 0.0625 ≤ X < 2 mm
% Granular: 2 mm ≤ X < 4.76 mm
% Gravel: 4.76 ≤ X < 76 mm

VC-15					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	2.55	0.17	2.55	0.17	0.43	0.00	1.69
2	2.56	0.17	2.57	0.17	0.45	0.01	1.21
Composite	**2.55**	**0.17**	**2.55**	**0.17**	**0.43**	**0.00**	**1.63**

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Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{z\phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{z\phi}-\Phi_{50})/\sigma_\phi]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\phi_I}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Feeder Channel & Adjoining Finger Canals
Design Depth -4 to -6 MLW

Vibracore VC-16 Max Dredge Depth -6 MLW

	VC-16			
	Sample Cumlative % by Weight Retained			
Sieve (Phi)	#1	#2	#3	#4
-4.25	0.00			
-4.00	0.00			
-3.00	0.00			
-2.00	0.10			
-1.00	0.30			
0.00	0.40			
1.00	0.60			
2.00	2.70			
3.00	38.00			
3.75	45.30			
4.00	45.90			

VC-16			
Sample Cumlative % by Weight Passing			
#1	#2	#3	#4
100.0			
100.0			
100.0			
99.9			
99.7			
99.6			
99.4			
97.3			
62.0			
54.7			
54.1			

Composite VC-16	
Weighted Composite (% Retained)	Weighted Composite (% Passing)
0.00	100.00
0.00	100.00
0.00	100.00
0.10	99.90
0.30	99.70
0.40	99.60
0.60	99.40
2.70	97.30
38.00	62.00
45.30	54.70
45.90	54.10

VC-16	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-4.9	-6	1.1	100.00%	OL/OH
2					
3					
4					
Composite	**-4.9**	**-6**	**1.1**	**100.00%**	

VC-16	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	2.07	2.38	2.63	4.19	5.35	5.76	6.27
2							
3							
4							
Composite	**2.07**	**2.38**	**2.63**	**4.19**	**5.35**	**5.76**	**6.27**

VC-16	Composite Grain Size Distribution (% by Weight Passing)				
SubSample	**% Fines**	**% Sand**	**% Granular**	**% Gravel**	**Total**
1.00	54.10	45.60	0.20	0.10	100%
2.00					
3.00					
4.00					
Composite	**54.10**	**45.60**	**0.20**	**0.10**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) siecve.

Per 15A NCAC 07H.0312

% Fines: X < 0.0625 mm
% Sand: 0.0625 ≤ X < 2 mm
% Granular: 2 mm ≤ X < 4.76 mm
% Gravel: 4.76 ≤ X < 76 mm

VC-16					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	4.19	0.05	4.11	0.06	1.69	-0.05	0.24
2							
3							
4							
Composite	**4.19**	**0.05**	**4.11**	**0.06**	**1.69**	**-0.05**	**0.24**

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Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{z\phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{z\phi}-\Phi_{50})/\sigma_\phi]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\phi_1}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Feeder Channel & Adjoining Finger Canals
Design Depth -4 to -6 MLW

Vibracore VC-17 Max Dredge Depth -6 MLW

	VC-17			
	Sample Cumlative % by Weight Retained			
Sieve (Phi)	#1	#2	#3	#4
-4.25	0.00			
-4.00	0.00			
-3.00	0.00			
-2.00	0.00			
-1.00	0.00			
0.00	0.10			
1.00	0.20			
2.00	1.60			
3.00	14.90			
3.75	18.10			
4.00	18.50			

VC-17			
Sample Cumlative % by Weight Passing			
#1	#2	#3	#4
100.0			
100.0			
100.0			
100.0			
100.0			
99.9			
99.8			
98.4			
85.1			
81.9			
81.5			

Composite VC-17	
Weighted Composite (% Retained)	Weighted Composite (% Passing)
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.10	99.90
0.20	99.80
1.60	98.40
14.90	85.10
18.10	81.90
18.50	81.50

VC-17	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-4.6	-6	1.4	100.00%	OL/OH
2					
3					
4					
Composite	**-4.6**	**-6**	**1.4**	**100.00%**	**OL/OH**

VC-17	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	2.26	3.26	4.77	7.73	10.69	11.75	13.05
2							
3							
4							
Composite	**2.26**	**3.26**	**4.77**	**7.73**	**10.69**	**11.75**	**13.05**

VC-17	Composite Grain Size Distribution (% by Weight Passing)				
SubSample	**% Fines**	**% Sand**	**% Granular**	**% Gravel**	**Total**
1.00	81.50	18.50	0.00	0.00	100%
2.00					
3.00					
4.00					
Composite	**81.50**	**18.50**	**0.00**	**0.00**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) siecve.

Per 15A NCAC 07H.0312

% Fines: X < 0.0625 mm
% Sand: 0.0625 ≤ X < 2 mm
% Granular: 2 mm ≤ X < 4.76 mm
% Gravel: 4.76 ≤ X < 76 mm

VC-17					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	7.73	0.00	7.58	0.01	4.25	-0.04	0.27
Composite	**7.73**	**0.00**	**7.58**	**0.01**	**4.25**	**-0.04**	**0.27**

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Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{z\phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{z\phi}-\Phi_{50})/\sigma_\phi]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\phi_I}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Feeder Channel & Adjoining Finger Canals
Design Depth -4 to -6 MLW

Vibracore VC-18 Max Dredge Depth -6 MLW

	VC-18			
	Sample Cumlative % by Weight Retained			
Sieve (Phi)	#1	#2	#3	#4
-4.25	0.00	0.00		
-4.00	0.00	0.00		
-3.00	0.00	0.00		
-2.00	0.00	0.00		
-1.00	0.10	0.00		
0.00	0.10	0.00		
1.00	0.30	0.10		
2.00	4.50	4.50		
3.00	67.10	74.20		
3.75	72.70	79.00		
4.00	72.90	79.10		

VC-18			
Sample Cumlative % by Weight Passing			
#1	#2	#3	#4
100.0	100.0		
100.0	100.0		
100.0	100.0		
100.0	100.0		
99.9	100.0		
99.9	100.0		
99.7	99.9		
95.5	95.5		
32.9	25.8		
27.3	21.0		
27.1	20.9		

Composite VC-18	
Weighted Composite (% Retained)	Weighted Composite (% Passing)
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.05	99.95
0.05	99.95
0.21	99.79
4.50	95.50
70.46	29.54
75.68	24.32
75.84	24.16

VC-18	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-2.2	-4.2	2	52.63%	SM
2	-4.2	-6	1.8	47.37%	SM
3					
4					
Composite	**-2.2**	**-6**	**3.8**	**100.00%**	**SM**

VC-18	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	2.01	2.18	2.33	2.73	4.06	4.32	4.65
2	2.01	2.16	2.29	2.65	3.13	4.13	4.43
3							
4							
Composite	**2.01**	**2.17**	**2.31**	**2.69**	**3.65**	**4.23**	**4.54**

VC-18	Composite Grain Size Distribution (% by Weight Passing)				
SubSample	**% Fines**	**% Sand**	**% Granular**	**% Gravel**	**Total**
1.00	27.10	72.80	0.10	0.00	100%
2.00	20.90	79.10	0.00	0.00	100%
3.00					
4.00					
Composite	**24.16**	**75.78**	**0.05**	**0.00**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) siecve.

Per 15A NCAC 07H.0312

% Fines: X < 0.0625 mm
% Sand: 0.0625 ≤ X < 2 mm
% Granular: 2 mm ≤ X < 4.76 mm
% Gravel: 4.76 ≤ X < 76 mm

VC-18					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	2.73	0.15	3.08	0.12	1.07	0.33	0.23
2	2.65	0.16	2.98	0.13	0.98	0.34	0.23
3							
4							
Composite	**2.69**	**0.15**	**3.03**	**0.12**	**1.03**	**0.33**	**0.23**

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Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{z\phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{z\phi}-\Phi_{50})/\sigma_\phi]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\phi_I}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Feeder Channel & Adjoining Finger Canals
Design Depth -4 to -6 MLW

Vibracore VC-23 Max Dredge Depth -5 MLW

VC-23	Sample Cumlative % by Weight Retained			
Sieve (Phi)	#1	#2	#3	#4
-4.25	0.00	0.00		
-4.00	0.00	0.00		
-3.00	0.00	0.00		
-2.00	0.00	0.00		
-1.00	0.10	0.00		
0.00	0.20	0.00		
1.00	0.60	0.10		
2.00	3.90	2.40		
3.00	47.00	91.30		
3.75	53.70	99.10		
4.00	53.90	99.20		

VC-23	Sample Cumlative % by Weight Passing			
	#1	#2	#3	#4
	100.0	100.0		
	100.0	100.0		
	100.0	100.0		
	100.0	100.0		
	99.9	100.0		
	99.8	100.0		
	99.4	99.9		
	96.1	97.6		
	53.0	8.7		
	46.3	0.9		
	46.1	0.8		

Composite VC-23	
Weighted Composite (% Retained)	Weighted Composite (% Passing)
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.09	99.91
0.17	99.83
0.54	99.46
3.71	96.29
52.54	47.46
59.38	40.63
59.56	40.44

VC-23	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-4.2	-4.9	0.7	87.50%	OL/OH/SM
2	-4.9	-5	0.1	12.50%	SP
3					
4					
Composite	**-4.2**	**-5**	**0.8**	**100.00%**	

VC-23	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	2.03	2.28	2.49	3.34	4.84	5.20	5.64
2	2.03	2.15	2.25	2.54	2.82	2.92	3.36
3							
4							
Composite	**2.03**	**2.25**	**2.44**	**2.95**	**4.55**	**4.88**	**5.27**

VC-23	Composite Grain Size Distribution (% by Weight Passing)				
SubSample	**% Fines**	**% Sand**	**% Granular**	**% Gravel**	**Total**
1.00	46.10	53.80	0.10	0.00	100%
2.00	0.80	99.20	0.00	0.00	100%
3.00					
4.00					
Composite	**40.44**	**59.48**	**0.09**	**0.00**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) siecve.

Per 15A NCAC 07H.0312

% Fines: X < 0.0625 mm
% Sand: 0.0625 ≤ X < 2 mm
% Granular: 2 mm ≤ X < 4.76 mm
% Gravel: 4.76 ≤ X < 76 mm

VC-23					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	3.34	0.10	3.61	0.08	1.46	0.19	0.24
2	2.54	0.17	2.54	0.17	0.38	0.00	0.73
3							
4							
Composite	**2.95**	**0.13**	**3.36**	**0.10**	**1.31**	**0.31**	**0.24**

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Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{z\phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{z\phi}-\Phi_{50})/\sigma_\phi]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\phi_I}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Feeder Channel & Adjoining Finger Canals
Design Depth -4 to -6 MLW

Vibracore VC-24 Max Dredge Depth -5 MLW

VC-24	Sample Cumlative % by Weight Retained			
Sieve (Phi)	#1	#2	#3	#4
-4.25	0.00			
-4.00	0.00			
-3.00	0.00			
-2.00	0.00			
-1.00	0.10			
0.00	0.20			
1.00	0.40			
2.00	2.20			
3.00	28.60			
3.75	33.00			
4.00	33.20			

VC-24	Sample Cumlative % by Weight Passing			
	#1	#2	#3	#4
	100.0			
	100.0			
	100.0			
	100.0			
	99.9			
	99.8			
	99.6			
	97.8			
	71.4			
	67.0			
	66.8			

Composite VC-24	
Weighted Composite (% Retained)	Weighted Composite (% Passing)
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.10	99.90
0.20	99.80
0.40	99.60
2.20	97.80
28.60	71.40
33.00	67.00
33.20	66.80

VC-24	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-3.1	-5	1.9	100.00%	OL/OH
2					
3					
4					
Composite	**-3.1**	**-5**	**1.9**	**100.00%**	**OL/OH**

VC-24	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	2.11	2.52	2.86	5.08	6.70	7.28	7.99
2							
3							
4							
Composite	**2.11**	**2.52**	**2.86**	**5.08**	**6.70**	**7.28**	**7.99**

VC-24	Composite Grain Size Distribution (% by Weight Passing)				
SubSample	% Fines	% Sand	% Granular	% Gravel	Total
1.00	66.80	33.10	0.10	0.00	100%
2.00					
3.00					
4.00					
Composite	**66.80**	**33.10**	**0.10**	**0.00**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) siecve.

Per 15A NCAC 07H.0312

% Fines: X < 0.0625 mm
% Sand: 0.0625 ≤ X < 2 mm
% Granular: 2 mm ≤ X < 4.76 mm
% Gravel: 4.76 ≤ X < 76 mm

VC-24					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	5.08	0.03	4.96	0.03	2.38	-0.05	0.24
2							
3							
4							
Composite	**5.08**	**0.03**	**4.96**	**0.03**	**2.38**	**-0.05**	**0.24**

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Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{z\phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{z\phi}-\Phi_{50})/\sigma_\phi]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\phi_I}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Feeder Channel & Adjoining Finger Canals
Design Depth -4 to -6 MLW

Vibracore VC-25 Max Dredge Depth -5 MLW

VC-25	Sample Cumlative % by Weight Retained			
Sieve (Phi)	#1	#2	#3	#4
-4.25	0.00			
-4.00	0.00			
-3.00	0.50			
-2.00	0.50			
-1.00	0.60			
0.00	0.80			
1.00	0.90			
2.00	2.60			
3.00	22.00			
3.75	24.90			
4.00	25.10			

VC-25	Sample Cumlative % by Weight Passing		
#1	#2	#3	#4
100.0			
100.0			
99.5			
99.5			
99.4			
99.2			
99.1			
97.4			
78.0			
75.1			
74.9			

Composite VC-25	
Weighted Composite (% Retained)	Weighted Composite (% Passing)
0.00	100.00
0.00	100.00
0.50	99.50
0.50	99.50
0.60	99.40
0.80	99.20
0.90	99.10
2.60	97.40
22.00	78.00
24.90	75.10
25.10	74.90

VC-25	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-2.4	-5	2.6	100.00%	OL/OH
2					
3					
4					
Composite	**-2.4**	**-5**	**2.6**	**100.00%**	**OL/OH**

VC-25	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	2.12	2.69	3.88	6.21	8.44	9.24	10.21
2							
3							
4							
Composite	**2.12**	**2.69**	**3.88**	**6.21**	**8.44**	**9.24**	**10.21**

VC-25	Composite Grain Size Distribution (% by Weight Passing)				
SubSample	**% Fines**	**% Sand**	**% Granular**	**% Gravel**	**Total**
1.00	74.90	24.50	0.10	0.50	100%
2.00					
3.00					
4.00					
Composite	**74.90**	**24.50**	**0.10**	**0.50**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) siecve.

Per 15A NCAC 07H.0312

% Fines: X < 0.0625 mm
% Sand: 0.0625 ≤ X < 2 mm
% Granular: 2 mm ≤ X < 4.76 mm
% Gravel: 4.76 ≤ X < 76 mm

VC-25					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	6.21	0.01	6.05	0.02	3.27	-0.05	0.24
2							
3							
4							
Composite	**6.21**	**0.01**	**6.05**	**0.02**	**3.27**	**-0.05**	**0.24**

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Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{z\phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{z\phi}-\Phi_{50})/\sigma_\phi]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\phi_I}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Feeder Channel & Adjoining Finger Canals
Design Depth -4 to -6 MLW

Vibracore VC-26 Max Dredge Depth -5 MLW

VC-26	Sample Cumlative % by Weight Retained			
Sieve (Phi)	#1	#2	#3	#4
-4.25	0.00			
-4.00	0.00			
-3.00	0.00			
-2.00	0.00			
-1.00	0.00			
0.00	0.10			
1.00	0.20			
2.00	2.10			
3.00	19.30			
3.75	21.60			
4.00	21.80			

VC-26	Sample Cumlative % by Weight Passing			
	#1	#2	#3	#4
	100.0			
	100.0			
	100.0			
	100.0			
	100.0			
	99.9			
	99.8			
	97.9			
	80.7			
	78.4			
	78.2			

Composite VC-26	
Weighted Composite (% Retained)	Weighted Composite (% Passing)
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.10	99.90
0.20	99.80
2.10	97.90
19.30	80.70
21.60	78.40
21.80	78.20

VC-26	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-2.4	-5	2.6	100.00%	OL/OH
2					
3					
4					
Composite	**-2.4**	**-5**	**2.6**	**100.00%**	**OL/OH**

VC-26	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	2.17	2.81	4.32	6.86	9.40	10.31	11.43
2							
3							
4							
Composite	**2.17**	**2.81**	**4.32**	**6.86**	**9.40**	**10.31**	**11.43**

VC-26	Composite Grain Size Distribution (% by Weight Passing)				
SubSample	**% Fines**	**% Sand**	**% Granular**	**% Gravel**	**Total**
1.00	78.20	21.80	0.00	0.00	100%
2.00					
3.00					
4.00					
Composite	**78.20**	**21.80**	**0.00**	**0.00**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) siecve.

Per 15A NCAC 07H.0312

% Fines: X < 0.0625 mm
% Sand: 0.0625 ≤ X < 2 mm
% Granular: 2 mm ≤ X < 4.76 mm
% Gravel: 4.76 ≤ X < 76 mm

VC-26					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	6.86	0.01	6.66	0.01	3.75	-0.05	0.23
2							
3							
4							
Composite	**6.86**	**0.01**	**6.66**	**0.01**	**3.75**	**-0.05**	**0.23**

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APPENDIX C
BAY AREA GRAIN SIZE ANALYSIS

SHEET INDEX

SHT C1-1 THRU C1-2 - SEDIMENT ANALYSIS PLAN VIEW
SHT C2 - BAY AREA SUBAREA COMPOSITE SUMMARY
SHT C3-1 THRU C3-2 BAY AREA SUBAREA COMPOSITES
SHT C4 BAY AREA COMPOSITE SUMMARY
SHT C5-1 THRU C5-4 BAY AREA COMPOSITE RESULTS

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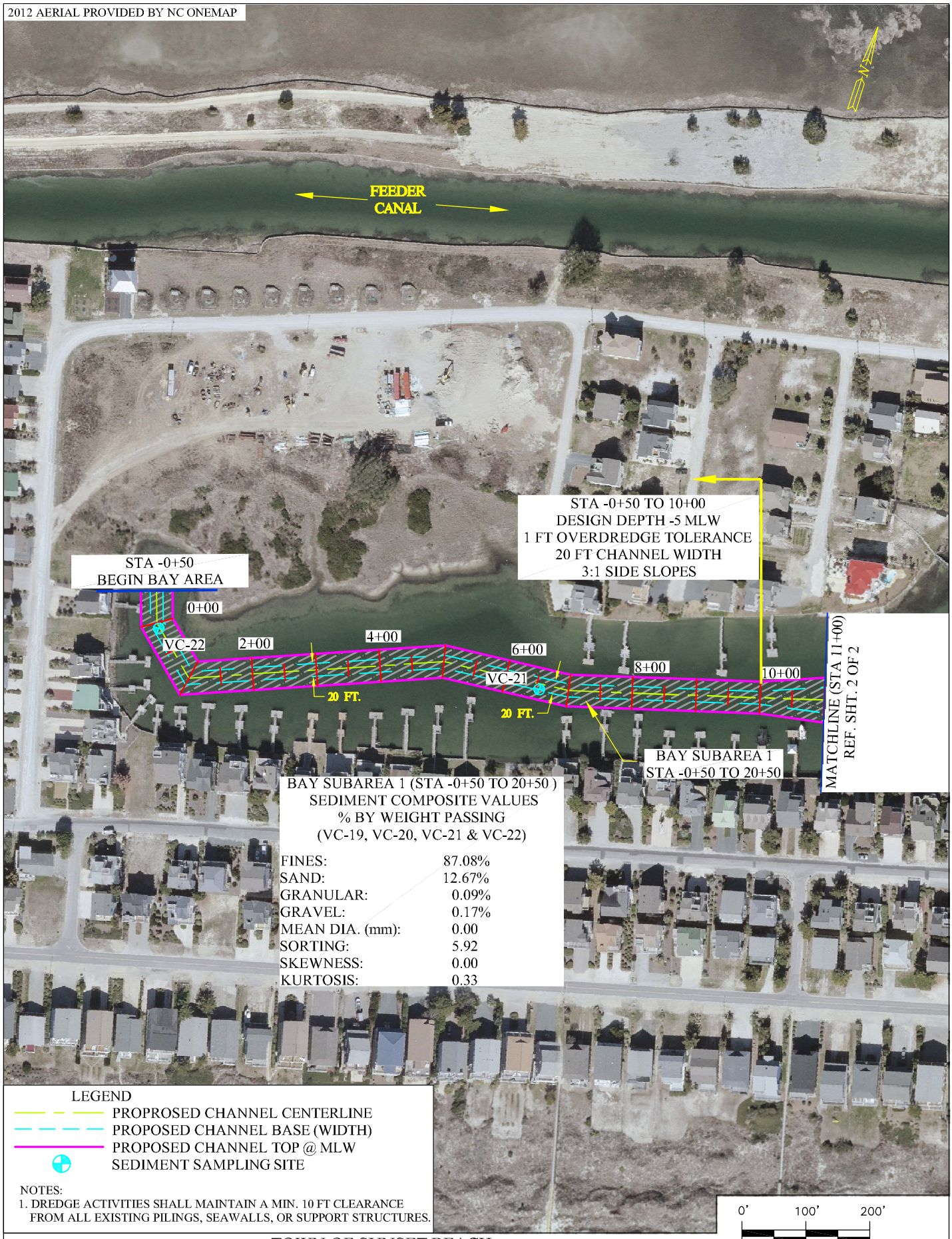

TOWN OF SUNSET BEACH
PRE-DREDGE ANALYSIS
BAY AREA SEDIMENT ANALYSIS
PLAN VIEW

C1-1

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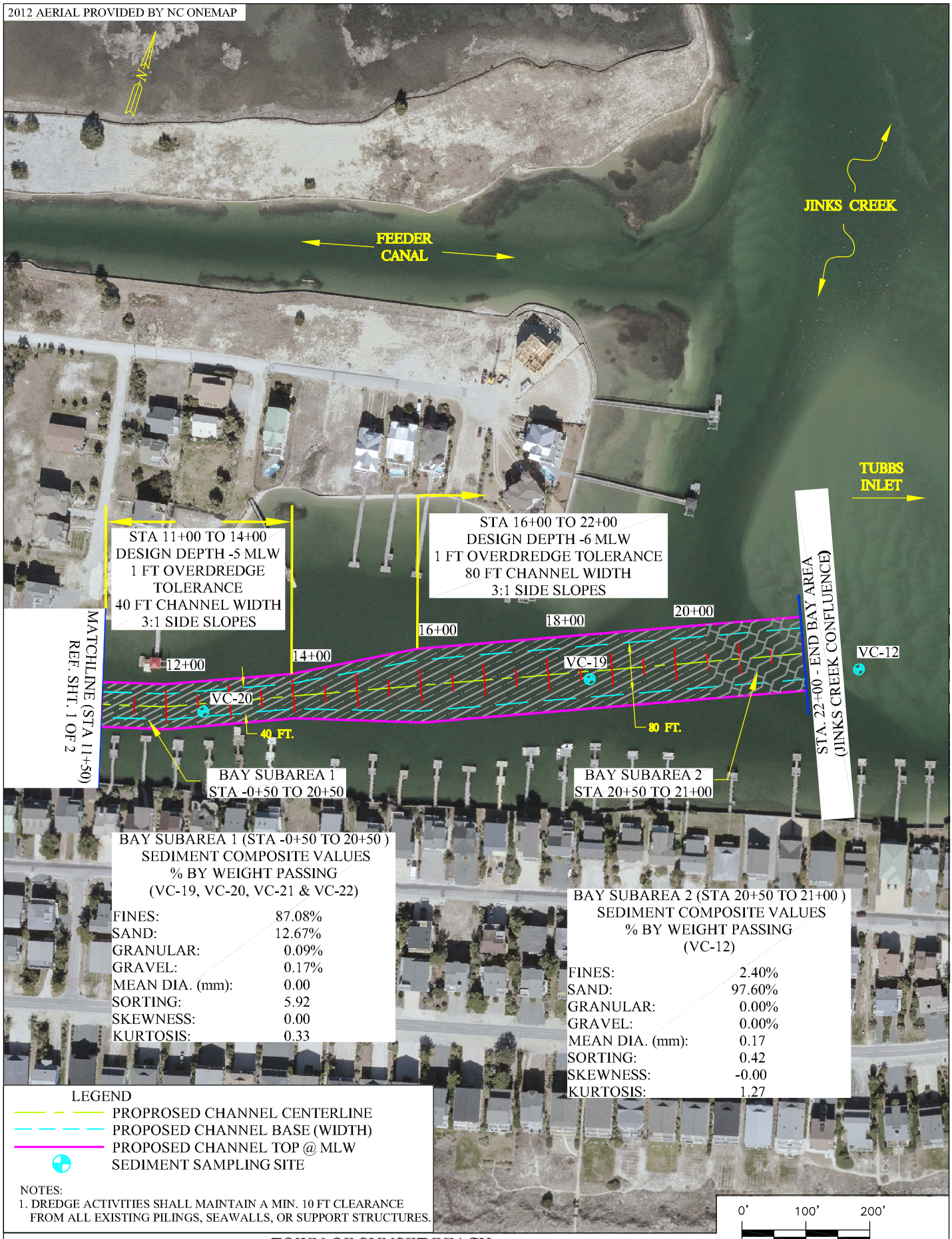

TOWN OF SUNSET BEACH
PRE-DREDGE ANALYSIS
BAY AREA SEDIMENT ANALYSIS
PLAN VIEW

C1-2

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Town of Sunset Beach
BAY AREA SUBAREA COMPOSITE SUMMARY
Summary Table

Per 15A NCAC 07H.0312
Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

	Vibracores	Representative Staions		Representative Volume (CY)	Composite Summary (% By Wt. Passing)					Mean	Sorting	Skewness	Kurtosis
SubArea		Start	Stop		Fines	Sand	Granular	Gravel	Total	(mm)	(σ)	(α)	(β)
1	VC-19, VC-20, VC-21 & VC-22	-0+50	20+50	17,555	87.08%	12.67%	0.09%	0.17%	100%	0.00	5.92	0.00	0.33
2	VC-12	20+50	21+00	645	2.40%	97.60%	0.00%	0.00%	100%	0.17	0.42	0.00	1.27

Material Type	Volume (CY)	Stations
Beach Compatible Material	645	20+50 - 21+00
Non-Compatible Materail	17,555	0+50 - 20+50
Total	18,200	0+00 - 21+00

1. Volumes Include OverDredge Tolerance.

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Sunset Beach

Pre-Dredge Analysis

Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

BAY AREA SUBAREA COMPOSITES

Design Depth --5 to -6 MLW

SubArea 1 (Vibracores VC-19, VC-20, VC-21 & VC-22)

Sieve (Phi)	SubArea 1 Sample Cumulative % by Weight Retained VC-19	VC-20	VC-21	VC-22
-4.25	0.00	0.00	0.00	0.00
-4.00	0.00	0.00	0.00	0.00
-3.00	0.20	0.00	0.00	0.20
-2.00	0.30	0.00	0.00	0.20
-1.00	0.40	0.10	0.10	0.20
0.00	0.50	0.20	0.20	0.30
1.00	0.60	0.50	0.20	0.40
2.00	1.20	1.50	0.80	2.60
3.00	5.80	4.40	4.80	25.80
3.75	12.70	5.80	5.60	29.40
4.00	13.60	6.10	5.61	29.50

SubArea 1 Sample Cumulative % by Weight Passing VC-19	VC-20	VC-21	VC-22
100.0	100.0	100.0	100.0
100.0	100.0	100.0	100.0
99.8	100.0	100.0	99.8
99.7	100.0	100.0	99.8
99.6	99.9	99.9	99.8
99.5	99.8	99.8	99.7
99.4	99.5	99.8	99.6
98.8	98.5	99.2	97.4
94.2	95.6	95.2	74.2
87.3	94.2	94.4	70.6
86.4	93.9	94.4	70.5

Weighted Composite % Retained	% Passing
0.00	100.00
0.00	100.00
0.12	99.88
0.17	99.83
0.26	99.74
0.36	99.64
0.50	99.50
1.43	98.57
8.16	91.84
12.40	87.60
12.92	87.08

SubArea 1	Station Interval (Feet)		Representative Values		
Sample	Start	Stop	Volume	Percent	USCS
VC-19	15+50	20+50	8,300	47.28%	OL/OH
VC-20	9+50	15+50	4,608	26.25%	OL/OH
VC-21	3+50	9+50	2,144	12.21%	OL/OH
VC-22	-0+50	3+50	2,503	14.26%	OL/OH
Composite	**-0+50**	**20+50**	**17,555**	**100%**	**OL/OH**

SubArea 1	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
VC-19	2.83	4.67	5.46	8.67	11.87	13.03	14.44
VC-20	3.32	8.30	12.22	23.09	33.96	37.87	42.65
VC-21	3.19	8.32	12.06	22.46	32.85	36.59	41.17
VC-22	2.10	2.58	2.97	5.52	7.38	8.05	8.87
Composite	**2.53**	**4.54**	**6.10**	**10.45**	**14.80**	**16.37**	**18.28**

SubArea 1

Composite Grain Size Distribution (% by Weight Passing)					
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
VC-19	86.40	13.20	0.10	0.30	100%
VC-20	93.90	6.00	0.10	0.00	100%
VC-21	94.39	5.51	0.10	0.00	100%
VC-22	70.50	29.30	0.00	0.20	100%
Composite	**87.08**	**12.67**	**0.09**	**0.17**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

SubArea 1					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
VC-19	8.67	0.00	8.79	0.00	4.18	0.03	0.39
VC-20	23.09	0.00	23.09	0.00	14.78	0.00	0.33
VC-21	22.46	0.00	22.46	0.00	14.14	0.00	0.34
VC-22	5.52	0.02	5.38	0.02	2.74	-0.05	0.24
Composite	**10.45**	**0.00**	**10.45**	**0.00071**	**5.92**	**0.00**	**0.33**

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Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\Phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\Phi}-\Phi_{50})/\sigma_{\Phi}]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_{5}) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\Phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

BAY AREA SUBAREA COMPOSITES
Design Depth --5 to -6 MLW

SubArea 2 (Vibracores VC-12)

Sieve (Phi)	SubArea 2 Sample Cumulative % by Weight Retained: VC-12			
-4.25	0.00			
-4.00	0.00			
-3.00	0.00			
-2.00	0.00			
-1.00	0.00			
0.00	0.10			
1.00	0.70			
2.00	7.50			
3.00	89.00			
3.75	97.50			
4.00	97.60			

SubArea 2 Sample Cumulative % by Weight Passing: VC-12			
100.0			
100.0			
100.0			
100.0			
100.0			
99.9			
99.3			
92.5			
11.0			
2.5			
2.4			

Weighted Composite	
% Retained	% Passing
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.10	99.90
0.70	99.30
7.50	92.50
89.00	11.00
97.50	2.50
97.60	2.40

SubArea 2	Station Interval (Feet)		Representative Values		
Sample	Start	Stop	Volume	Percent	USCS
VC-12	20+50	21+00	645	100.00%	SP
Composite	**20+50**	**21+00**	**645**	**100%**	**SP**

SubArea 2	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
VC-12	1.63	2.10	2.21	2.52	2.83	2.94	3.53
Composite	**1.63**	**2.10**	**2.21**	**2.52**	**2.83**	**2.94**	**3.53**

SubArea 2

Composite Grain Size Distribution (% by Weight Passing)					
Sample	**Fines**	**Sand**	**Granular**	**Gravel**	**Total**
VC-12	2.40	97.60	0.00	0.00	100%
Composite	**2.40**	**97.60**	**0.00**	**0.00**	**100%**

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) sieve.

SubArea 2					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
VC-12	2.52	0.17	2.52	0.17	0.42	0.00	1.27
Composite	**2.52**	**0.17**	**2.52**	**0.17**	**0.42**	**0.00**	**1.27**

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Town of Sunset Beach
Bay Area Sediment Composites
Summary Table

Per 15A NCAC 07H.0312

Fines: X < 0.0625 mm
Sand: 0.0625 ≤ X < 2 mm
Granular: 2 mm ≤ X < 4.76 mm
Gravel: 4.76 ≤ X < 76 mm

	Representative Staions		Representative Volume (CY)	Sample Elevation (FT-MLW)		Max. Disturbance (FT-MLW)	% Coverage of Disturbance Depth	Composite Summary (% By Wt. Passing)					Mean	Sorting	Skewness	Kurtosis
Vibracore	Start	Stop		Top	Bottom			Fines	Sand	Granular	Gravel	Total	(mm)	(σ)	(α)	(β)
VC-22	-0+50	3+50	2,503	-0.4	-6	-6	100%	70.5	29.3	0	0.2	100%	0.02	2.74	-0.05	0.24
VC-21	3+50	9+50	2,144	-3.5	-6	-6	100%	94.39	5.51	0.1	0	100%	1.7E-07	14.1	2.5E-16	0.3
VC-20	9+50	15+50	4,608	-2.2	-7	-7	100%	93.90	6.00	0.10	0.00	100%	1.1E-07	14.8	0.0E+00	0.3
VC-19	15+50	20+50	8,300	-2.2	-7	-7	100%	86.40	13.20	0.10	0.30	100%	2.3E-03	4.2	2.9E-02	0.4
VC-12	20+50	21+00	645	-0.2	-7	-7	100%	2.40	97.60	0.00	0.00	100%	0.17	0.42	0.00	1.27

Area	Volume (CY)	Stations
Beach Compatible Material	645	20+50 to 21+00
Non-Compatible Materail	17,555	-0+50 to 20+50

Total	18,200	-0+50 to 21+00

1. Max. Disturbance Depth Includes OverDredge Tolerance.
2. See Appendix A for VC-12 Composite Information.

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Sunset Beach
Pre-Dredge Analysis
Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\phi}-\Phi_{50})/\sigma_\phi]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_\phi\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Bay Area
Design Depth -5 to -6 MLW

Vibracore VC-19 Max Dredge Depth -7 MLW

VC-19	Sample Cumlative % by Weight Retained			
Sieve (Phi)	#1	#2	#3	#4
-4.25	0.00			
-4.00	0.00			
-3.00	0.20			
-2.00	0.30			
-1.00	0.40			
0.00	0.50			
1.00	0.60			
2.00	1.20			
3.00	5.80			
3.75	12.70			
4.00	13.60			

VC-19	Sample Cumlative % by Weight Passing		
#1	#2	#3	#4
100.0			
100.0			
99.8			
99.7			
99.6			
99.5			
99.4			
98.8			
94.2			
87.3			
86.4			

Composite VC-19	
Weighted Composite (% Retained)	Weighted Composite (% Passing)
0.00	100.00
0.00	100.00
0.20	99.80
0.30	99.70
0.40	99.60
0.50	99.50
0.60	99.40
1.20	98.80
5.80	94.20
12.70	87.30
13.60	86.40

VC-19	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-2.2	-7	4.8	100.00%	OL/OH
2					
3					
4					
Composite	**-2.2**	**-7**	**4.8**	**100.00%**	**OL/OH**

VC-19	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	2.83	4.67	5.46	8.67	11.87	13.03	14.44
2							
3							
4							
Composite	**2.83**	**4.67**	**5.46**	**8.67**	**11.87**	**13.03**	**14.44**

VC-19	Composite Grain Size Distribution (% by Weight Passing)				
SubSample	% Fines	% Sand	% Granular	% Gravel	Total
1.00	86.40	13.20	0.10	0.30	100%
2.00					
3.00					
4.00					
Composite	**86.40**	**13.20**	**0.10**	**0.30**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) siecve.

Per 15A NCAC 07H.0312

% Fines: X < 0.0625 mm
% Sand: 0.0625 ≤ X < 2 mm
% Granular: 2 mm ≤ X < 4.76 mm
% Gravel: 4.76 ≤ X < 76 mm

VC-19					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	8.67	0.00	8.79	0.00	4.18	0.03	0.39
2							
3							
4							
Composite	**8.67**	**0.00**	**8.79**	**0.00**	**4.18**	**0.03**	**0.39**

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Sunset Beach
Pre-Dredge Analysis
Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\phi}-\Phi_{50})/\sigma_\phi]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Bay Area
Design Depth -5 to -6 MLW

Vibracore VC-20 Max Dredge Depth -7 MLW

	VC-20			
	Sample Cumlative % by Weight Retained			
Sieve (Phi)	#1	#2	#3	#4
-4.25	0.00			
-4.00	0.00			
-3.00	0.00			
-2.00	0.00			
-1.00	0.10			
0.00	0.20			
1.00	0.50			
2.00	1.50			
3.00	4.40			
3.75	5.80			
4.00	6.10			

VC-20			
Sample Cumlative % by Weight Passing			
#1	#2	#3	#4
100.0			
100.0			
100.0			
100.0			
99.9			
99.8			
99.5			
98.5			
95.6			
94.2			
93.9			

Composite VC-20	
Weighted Composite (% Retained)	Weighted Composite (% Passing)
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.10	99.90
0.20	99.80
0.50	99.50
1.50	98.50
4.40	95.60
5.80	94.20
6.10	93.90

VC-20	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-2.2	-7	4.8	100.00%	OL/OH
2					
3					
4					
Composite	**-2.2**	**-7**	**4.8**	**100.00%**	**OL/OH**

VC-20	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1							
2	3.32	8.30	12.22	23.09	33.96	37.87	42.65
3							
4							
Composite	**3.32**	**8.30**	**12.22**	**23.09**	**33.96**	**37.87**	**42.65**

VC-20	Composite Grain Size Distribution (% by Weight Passing)				
SubSample	% Fines	% Sand	% Granular	% Gravel	Total
1.00	93.90	6.00	0.10	0.00	100%
2.00					
3.00					
4.00					
Composite	**93.90**	**6.00**	**0.10**	**0.00**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) siecve.

Per 15A NCAC 07H.0312

% Fines: X < 0.0625 mm
% Sand: 0.0625 ≤ X < 2 mm
% Granular: 2 mm ≤ X < 4.76 mm
% Gravel: 4.76 ≤ X < 76 mm

VC-20					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	23.09	0.00	23.09	0.00	14.78	0.00	0.33
2							
3							
4							
Composite	**23.09**	**0.00**	**23.09**	**0.00**	**14.78**	**0.00**	**0.33**

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Sunset Beach
Pre-Dredge Analysis
Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\phi}-\Phi_{50})/\sigma_\phi]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_{\phi}\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Bay Area
Design Depth -5 to -6 MLW

Vibracore VC-21 Max Dredge Depth -6 MLW

VC-21	Sample Cumlative % by Weight Retained			
Sieve (Phi)	#1	#2	#3	#4
-4.25	0.00			
-4.00	0.00			
-3.00	0.00			
-2.00	0.00			
-1.00	0.10			
0.00	0.20			
1.00	0.20			
2.00	0.80			
3.00	4.80			
3.75	5.60			
4.00	5.61			

VC-21	Sample Cumlative % by Weight Passing		
#1	#2	#3	#4
100.0			
100.0			
100.0			
100.0			
99.9			
99.8			
99.8			
99.2			
95.2			
94.4			
94.4			

Composite VC-21	
Weighted Composite (% Retained)	Weighted Composite (% Passing)
0.00	100.00
0.00	100.00
0.00	100.00
0.00	100.00
0.10	99.90
0.20	99.80
0.20	99.80
0.80	99.20
4.80	95.20
5.60	94.40
5.61	94.39

VC-21	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-3.5	-6	2.5	100.00%	OL/OH
2					
3					
4					
Composite	**-3.5**	**-6**	**2.5**	**100.00%**	**OL/OH**

VC-21	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	3.19	8.32	12.06	22.46	32.85	36.59	41.17
2							
3							
4							
Composite	**3.19**	**8.32**	**12.06**	**22.46**	**32.85**	**36.59**	**41.17**

VC-21	Composite Grain Size Distribution (% by Weight Passing)				
SubSample	% Fines	% Sand	% Granular	% Gravel	Total
1.00	94.4	5.51	0.10	0.00	100%
2.00					
3.00					
4.00					
Composite	**94.4**	**5.51**	**0.10**	**0.00**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) siecve.

Per 15A NCAC 07H.0312

% Fines: X < 0.0625 mm
% Sand: 0.0625 ≤ X < 2 mm
% Granular: 2 mm ≤ X < 4.76 mm
% Gravel: 4.76 ≤ X < 76 mm

VC-21					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	22.46	0.00	22.46	0.00	14.14	0.00	0.34
2							
3							
4							
Composite	**22.46**	**0.00**	**22.46**	**0.00**	**14.14**	**0.00**	**0.34**

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Sunset Beach
Pre-Dredge Analysis
Sediment Analysis

Sieve Designation Legend

Sieve #	3/4	5/8	5/16	4	5	10	18	35	60	120	200	230
Sieve Size (Φ)	-4.25	-4.00	-3.00	-2.25	-2.00	-1.00	0.00	1.00	2.00	3.00	3.75	4.00
Sieve Size (mm)	19.0	16	8	4.76	4	2	1	0.5	0.25	0.125	0.0743	0.0625

Mean grain size ($M_{d\phi}$) determined by $[(\Phi_{84}+\Phi_{50}+\Phi_{16})/3]$ (Folk & Ward,1957).
Sorting determined by $[(\Phi_{84}-\Phi_{16})/2]$ (Dean & Dalrymple, 2002).
Skewness determined by $[(M_{d\phi}-\Phi_{50})/\sigma_\phi]$ (Dean & Dalrymple, 2002).
Kurtosis determined by $\{[(\Phi_{16}-\Phi_5) + (\Phi_{95}-\Phi_{84})]/2\sigma_\phi\}$ (Dean & Dalrymple, 2002).
Moment statistics determined by linear interpretation of composite properties.

Bay Area
Design Depth -5 to -6 MLW

Vibracore VC-22 Max Dredge Depth -6 MLW

VC-22	Sample Cumlative % by Weight Retained			
Sieve (Phi)	#1	#2	#3	#4
-4.25	0.00			
-4.00	0.00			
-3.00	0.20			
-2.00	0.20			
-1.00	0.20			
0.00	0.30			
1.00	0.40			
2.00	2.60			
3.00	25.80			
3.75	29.40			
4.00	29.50			

VC-22	Sample Cumlative % by Weight Passing		
#1	#2	#3	#4
100.0			
100.0			
99.8			
99.8			
99.8			
99.7			
99.6			
97.4			
74.2			
70.6			
70.5			

Composite VC-22	
Weighted Composite (% Retained)	Weighted Composite (% Passing)
0.00	100.00
0.00	100.00
0.20	99.80
0.20	99.80
0.20	99.80
0.30	99.70
0.40	99.60
2.60	97.40
25.80	74.20
29.40	70.60
29.50	70.50

VC-22	Depth Interval (MLW)		Representative Values		
Sample	Top	Bottom	Length (ft)	Percent	USCS
1	-0.4	-6	5.6	100.00%	OL/OH
2					
3					
4					
Composite	**-0.4**	**-6**	**5.6**	**100.00%**	**OL/OH**

VC-22	Moment Statistics and Properties in Phi Units						
Sample	φ_5	φ_{16}	φ_{25}	φ_{50}	φ_{75}	φ_{84}	φ_{95}
1	2.10	2.58	2.97	5.52	7.38	8.05	8.87
2							
3							
4							
Composite	**2.10**	**2.58**	**2.97**	**5.52**	**7.38**	**8.05**	**8.87**

VC-22	Composite Grain Size Distribution (% by Weight Passing)				
SubSample	**% Fines**	**% Sand**	**% Granular**	**% Gravel**	**Total**
1.00	70.5	29.30	0.00	0.20	100%
2.00					
3.00					
4.00					
Composite	**70.5**	**29.30**	**0.00**	**0.20**	**100%**

Note: Grain size analysis did not include 4.76 mm sieve (-2.25 ϕ); therefore the divide between granular and gravel based on % passing the 4 mm (-2 ϕ) siecve.

Per 15A NCAC 07H.0312

% Fines: X < 0.0625 mm
% Sand: 0.0625 ≤ X < 2 mm
% Granular: 2 mm ≤ X < 4.76 mm
% Gravel: 4.76 ≤ X < 76 mm

VC-22					Parameters in Phi Units		
Sample	Median (ϕ)	Median (mm)	Mean (ϕ)	Mean (mm)	Sorting (σ)	Skewness (α)	Kurtosis (β)
1	5.52	0.02	5.38	0.02	2.74	-0.05	0.24
2							
3							
4							
Composite	**5.52**	**0.02**	**5.38**	**0.02**	**2.74**	**-0.05**	**0.24**

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APPENDIX D
CHEMICAL ANALYSIS RESULTS

SHEET INDEX

SHT D1 - CHEMICAL ANALYSIS SUMMARY (PLAN VIEW)

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G12 (COMPOSTIE OF G-01 & G-02)

ANALYTE	RESULT	RL	MDL	UNITS	METHOD
Benzo (a) anthracene	0.0189 J	0.063	0.016	mg/kg	SW846 8270D BY SIM
Benzo (a) pyrene	0.0286 J	0.063	0.016	mg/kg	SW846 8270D BY SIM
Benzo (b) fluoranthene	0.0473 J	0.063	0.016	mg/kg	SW846 8270D BY SIM
Benzo (g, h, i) perylene	0.0221 J	0.063	0.016	mg/kg	SW846 8270D BY SIM
Benzo (k) fluoranthene	0.0388 J	0.063	0.016	mg/kg	SW846 8270D BY SIM
Chrysene	0.0338 J	0.063	0.016	mg/kg	SW846 8270D BY SIM
Indeno (1,2,3-cd) pyrene	0.236 J	0.063	0.016	mg/kg	SW846 8270D BY SIM
Arsenic	16.5	1.6		mg/kg	SW846 6101D
Beryllium	1	0.81		mg/kg	SW846 6101D
Chromium	51.1	1.6		mg/kg	SW846 6101D
Copper	19.4	4		mg/kg	SW846 6101D
Lead	20.9	3.2		mg/kg	SW846 6101D
Nickel	11.2	6.5		mg/kg	SW846 6101D
Zinc	64.4	3.2		mg/kg	SW846 6101D
TOC	178,000	4,800		mg/kg	SW846 9060A M

V1618 (COMPOSTIE OF VC-16 & VC-18)

ANALYTE	RESULT	RL	MDL	UNITS	METHOD
Toluene	0.112 J	0.21	0.11	mg/kg	MADEP VPH REV 1.1
Arsenic	3.4	0.58		mg/kg	SW846 6101D
Beryllium	0.30	0.29		mg/kg	SW846 6101D
Chromium	17.0	0.58		mg/kg	SW846 6101D
Copper	3.7	1.4		mg/kg	SW846 6101D
Lead	6.0	1.2		mg/kg	SW846 6101D
Nickel	3.3	2.3		mg/kg	SW846 6101D
Zinc	16.3	1.2		mg/kg	SW846 6101D
TOC	33,700	1,600		mg/kg	SW846 9060A M

V2022 (COMPOSTIE OF VC-20 & VC-22)

ANALYTE	RESULT	RL	UNITS	METHOD
Arsenic	15.7	1.2	mg/kg	SW846 6101D
Beryllium	0.94	0.62	mg/kg	SW846 6101D
Chromium	48.7	1.2	mg/kg	SW846 6101D
Copper	11.6	3.1	mg/kg	SW846 6101D
Lead	23.9	2.5	mg/kg	SW846 6101D
Nickel	11.8	5	mg/kg	SW846 6101D
Zinc	51.0	2.5	mg/kg	SW846 6101D
TOC	111,000	2,800	mg/kg	SW846 9060A M

V23242526 (COMPOSITE OF VC-23, VC-24, VC-25 & VC-26)

ANALYTE	RESULT	RL	UNITS	METHOD
Arsenic	6.2	0.88	mg/kg	SW846 6101D
Chromium	24.3	0.88	mg/kg	SW846 6101D
Copper	7.5	2.2	mg/kg	SW846 6101D
Lead	7.8	1.8	mg/kg	SW846 6101D
Nickel	4.6	3.5	mg/kg	SW846 6101D
Zinc	23.8	1.8	mg/kg	SW846 6101D
TOC	65,000	2,100	mg/kg	SW846 9060A M

TOWN OF SUNSET BEACH
PRE-DREDGE ANALYSIS
CHEMICAL ANALYSIS SUMMARY

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