

Appendix A

Post-Construction Sediment Sampling Report



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 SAN MARCO BLVD.
JACKSONVILLE, FLORIDA 32207

Engineering Division
Geosystems Branch

April 27, 2021

JCP Compliance Officer
Division of Water Resource Management
Department of Environmental Protection
Bob Martinez Building
2600 Blair Stone Road - MS3566
Tallahassee, FL 32399

Dear JCP Compliance Officers:

In compliance with the permit requirements for beach placement of dredged material on South Ponte Vedra Beach and Vilano Beach, as part of the St. Johns County Coastal Storm Risk Management Project, St. Johns County, FL (FDEP Permit File No. 0377120-001-JC), please find the enclosed post-fill sampling report.

The report concludes that the dredged material placed on the beach at South Ponte Vedra Beach and Vilano Beach, St. Johns County, Florida meets the requirements of FDEP's "Sand Rule" guidelines (Florida Administration Code 62B-41.007(2)(j)) and is in compliance with the permit requirements.

If there are questions on the technical scope, please contact Jennifer Coor, 904-232-1054, email jennifer.l.coor@usace.army.mil.

Sincerely,

Laureen A. Borocharner, P.E.
Chief, Engineering Division

Enclosures

MEMORANDUM FOR RECORD

SUBJECT: St. Johns County Coastal Storm Risk Management Project, St. Johns County, FL, FDEP Permit File No. 0377120-001-JC, Post-fill Sampling Report

1. Scope

This report summarizes the geotechnical data for post-construction beach sampling following beach placement of material from the St. Augustine Inlet Flood Shoal Borrow Area on South Ponte Vedra Beach and Vilano Beach in St. Johns County, FL. The information provided in this report encompasses laboratory index testing and analysis as described in the FDEP approved Sediment QC/QA plan. The investigations consist of surficial sampling along the post construction beach from R-103 to R-117.

2. Project Description

The St Johns CSRM project placed approximately 1,297,862 cubic yards (cy) of material from the St. Augustine Inlet Flood Shoal Borrow Area along the South Ponte Vedra Beach and Vilano Beach shoreline between FDEP R-Monuments R-103 and R-117. Dredging operations commenced on 8 October 2020 and ceased 5 January 2021. Tilling operations were completed on 5 February 2021.

3. Pre-Construction (Existing) Beach

The project area has historically received sand from the beneficial use of sediments dredged through routine maintenance dredging for the adjacent federal navigation channels. Sediment samples of the existing beach were collected by USACE in 2010 throughout the beach length of approximately 3 miles. Sediment samples were collected along four (4) representative cross-shore transects that were located approximately at the DEP survey monuments R-105, R-109, R-113, and R-117, separated by an interval of 4,000 feet. Along each transect, six (6) sediment samples were collected between the berm and 15 feet below mean sea level at the following locations: mid-berm, mid-tide, -3 feet, -5 feet, -10 feet and -15 feet. Each sample was collected from 6 to 12 inches below the ground surface.

Table 1: Grain size analysis results for Vilano Beach, St. Johns County (2010)

FDEP R-Monument	Sample Location	Mean (mm)	Mean (phi)	Sorting / St. Dev (phi)	Percent Fine Gravel* (%)	Percent Silt** (%)	Percent Carbonate (%)	Visual Shell (%)	Munsell Color
R-105	D/B	0.69	0.53	1.21	2.07	0.04	43.8	50	10YR 5/3
	MT	0.35	1.51	0.6	0.00	1.03	15.5	16.4	10YR 5/3

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FDEP R-Monument	Sample Location	Mean (mm)	Mean (phi)	Sorting / St. Dev (phi)	Percent Fine Gravel* (%)	Percent Silt** (%)	Percent Carbonate (%)	Visual Shell (%)	Munsell Color
R-105	-3 Ft	0.50	0.99	1.55	1.51	0.73	43.5	42.8	10YR 5/3
	-5 Ft	0.17	2.53	1.03	1.33	1.40	7.8	6.5	10YR 6/1
	-10 Ft	0.15	2.73	0.95	1.27	1.35	5.6	5	10YR 6/1
	-15 Ft	0.26	1.94	2.02	4.89	3.65	26.4	23.9	10YR 5/1
R-109	D/B	1.32	-0.4	1.04	3.08	0.21	78.5	83.7	10YR 6/4
	MT	0.81	0.3	1.1	0.75	0.51	53.3	56.5	10YR 6/3
	-3 Ft	0.29	1.81	1.46	0.83	0.82	23	21.1	10YR 7/1
	-5 Ft	0.18	2.46	1.18	1.6	1.33	10.1	8.9	10YR 6/1
	-10 Ft	0.13	2.98	0.77	0.39	2.06	5.6	3.8	5Y 5/1
	-15 Ft	0.18	2.48	1.5	1.94	2.39	14.7	13	5Y 5/1
R-113	D/B	0.7	0.52	1.19	0.54	0.27	49.8	48.1	10YR 7/3
	MT	1.42	-0.51	1.67	17.95	0.62	70.4	67	10YR 6/4
	-3 Ft	0.2	2.29	0.88	0.04	1.02	10.2	10.3	10YR 7/1
	-5 Ft	0.18	2.44	1.03	0.92	1.09	8.4	7.6	10YR 6/1
	-10 Ft	0.15	2.78	1.06	1.31	1.44	7.8	5.9	5Y 5/1
	-15 Ft	0.19	2.41	1.52	2	2.42	16.1	14.1	5Y 5/1
R-117	D/B	0.87	0.21	1.5	2.08	0.07	61.3	61.3	2.5Y 7/3
	MT	0.55	0.87	1.47	3.01	0.44	43.3	38.3	2.5Y 7/4
	-3 Ft	0.16	2.63	0.57	0	1.53	4.2	2.9	2.5Y 7/1
	-5 Ft	0.16	2.67	1.17	2.58	1.48	7.2	6.1	2.5Y 6/1
	-10 Ft	0.15	2.74	1.25	1.49	3.2	10.1	7.9	2.5Y 5/1
	-15 Ft	0.16	2.64	1.43	1.61	4.38	14.1	10.4	2.5Y 5/1
Beach Composite		0.32	1.66	1.70	2.31	1.33	27.73	27.27	10YR 6/1
*Retained in the #4 Sieve, **Passing the #230 Sieve									

All of the beach samples were analyzed in a laboratory with tests including sieve analysis, visual shell content, carbonate content, and Munsell color to characterize the sediments of the existing beach and a summary is provided in **Table 1. A**

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representative arithmetic composite sample was created using all samples. The beach composite sample was classified as well-graded, medium-grained sand composed of quartz and shell fragments with an average visual shell of 27.7 %, ranging from 2.9 % to 83.7 %. The average grain size was 0.32 mm (1.66 phi), and the average standard deviation (sorting) was 1.70 phi. The percent fines passing the #230 sieve averaged 1.33 %. The amount of fine gravel retained on the #4 sieve averaged 2.31%. The typical dry Munsell color of the sand was 10YR 6/1, or gray.

4. Post-Construction Beach

Fifteen (15) post-fill beach samples from South Ponte Vedra Beach and Vilano Beach were collected on 2 March 2021 from R-103 to R-117. The samples were collected within the fill berm template, taken at approximately 1,000-foot increments, adjacent to the FDEP R-monuments (**Enclosure 1**). The sediment samples were collected from a depth of approximately 12 to 18 inches below the surface.

The post-placement beach samples were tested at a USACE certified laboratory for grain size distribution, visual shell content, carbonate content, and Munsell color. The associated gradation curves and granulometric reports are enclosed (**Enclosure 2**).

A representative arithmetic composite sample was created using all samples. The granulometric results using the method of moments for each sample and for the composite sample for the St Johns CSRM are summarized in **Table 2**. The post-construction composite sample was classified as a poorly graded sand (SP), mostly fine to medium-grained sand-sized quartz, with some fine sand-sized to fine gravel-sized shell, and trace silt. The composite sample had a mean grain size of 1.86 phi or 0.28 mm and a standard deviation of 1.16 phi. The percent of fines passing the #230 sieve was 0.22%. The percent of coarse gravel, or shell material, retained on the #4 sieve was 1.67%; the visual shell content is 15.4%; the percent carbonate is 16.69%. The Munsell color of the samples is 10Y 7/1, or light gray.

Table 2. Index Testing Results of Post-fill Samples at South Ponte Vedra and Vilano Beach, St Johns County, FL

Sample Designation	USCS	Mean (mm)	Mean (phi)	Sorting (phi)	%Fines Passing #230	Visual Shell %	Percent Carbonate	Shell % Retained #4	Munsell Color	Met or Failed
R-103	SP	0.17	2.56	0.41	0.08	0.1	0.01	0.00	10YR 7/1	Met
R-104	SP	0.25	2.01	1.35	0.07	16.1	17	1.82	10YR 7/1	Met
R-105	SP	0.58	0.78	1.8	0.27	45.7	43.91	6.53	10YR 7/1	Failed
R-106	SP	0.23	2.14	0.97	0.06	12	11.62	0.74	2.5Y 7/1	Met

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Sample Designation	USCS	Mean (mm)	Mean (phi)	Sorting (phi)	%Fines Passing #230	Visual Shell %	Percent Carbonate	Shell % Retained #4	Munsell Color	Met or Failed
R-107	SP	0.16	2.64	0.51	0.27	1.6	2.8	0.17	5Y 7/1	Met
R-108	SP	0.29	1.79	1.35	0.09	13.9	15.8	1.96	10YR 7/1	Met
R-109	SP	0.18	2.45	0.55	0.06	2.1	3.83	0.00	N 8/	Met
R-110	SP	0.33	1.58	1.42	0.14	24.4	24.88	1.31	10YR 7/1	Met
R-111	SP	0.26	1.97	1.24	0.50	13.9	15.98	1.74	5Y 7/1	Met
R-112	SP	0.21	2.22	0.93	0.00	8.1	10.71	0.35	10YR 7/1	Met
R-113	SP	0.22	2.17	1.14	0.42	7.4	10.76	2.26	10YR 7/1	Met
R-114	SP	0.30	1.75	1.53	0.18	21.7	22.51	2.36	10YR 7/1	Met
R-115	SP	0.31	1.67	1.43	0.63	21.8	23.09	2.10	10YR 7/1	Met
R-116	SP	0.26	1.96	1.34	0.27	16.8	18.25	0.90	2.5Y 7/1	Met
R-117	SP	0.38	1.40	1.5	0.29	25.8	29.2	2.77	5Y 7/1	Met
Beach Composite:		0.28	1.86	1.16	0.22	15.4	16.69	1.67	10YR 7/1	Met

5. Conclusions

Compliance values based on FDEP's "Sand Rule" guidelines and the Project Sediment Quality Control/Quality Assurance Plan are shown in **Table 3**.

One (1) individual sample was above the compliance criteria for the amount of shell retained on the #4 sieve; however, the composite value for percent shell was below the compliance criteria of 5%. This exceedance is due to the natural variability of shell material within both the sand source and existing beach, as the coastal sands typically contain high amounts of small shell due to the local erosion of outcropped Anastasia formation. All other post-fill sample values are below the compliance values. The compliance violations, in the opinion of the USACE, are minor and do not warrant the remediation activities outlined in the QA/QC plan.

In conclusion, the dredged material placed at the beach along South Ponte Vedra Beach and Vilano Beach, St. Johns County, Florida meets the requirements of FDEP's "Sand Rule" guidelines (Florida Administration Code 62B-41.007(2)(j)) and is in compliance with the permit requirements.

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Table 3. Compliance Values

Sediment Parameter	Compliance Value	Post-Construction Composite Sample Value
	QA/QC Plan	SPV and Vilano Beach
Percent Silt Content passing #230 sieve	5%	0.22%
Max. Shell content retained in #4 Sieve	5%	1.67%
Munsell Color Value (Chroma $\leq$ 2)	6 or Lighter	7

6. Point of contact for this evaluation is Jennifer Coor, (904) 232-1054, email jennifer.l.coor@usace.army.mil.

2 Encls

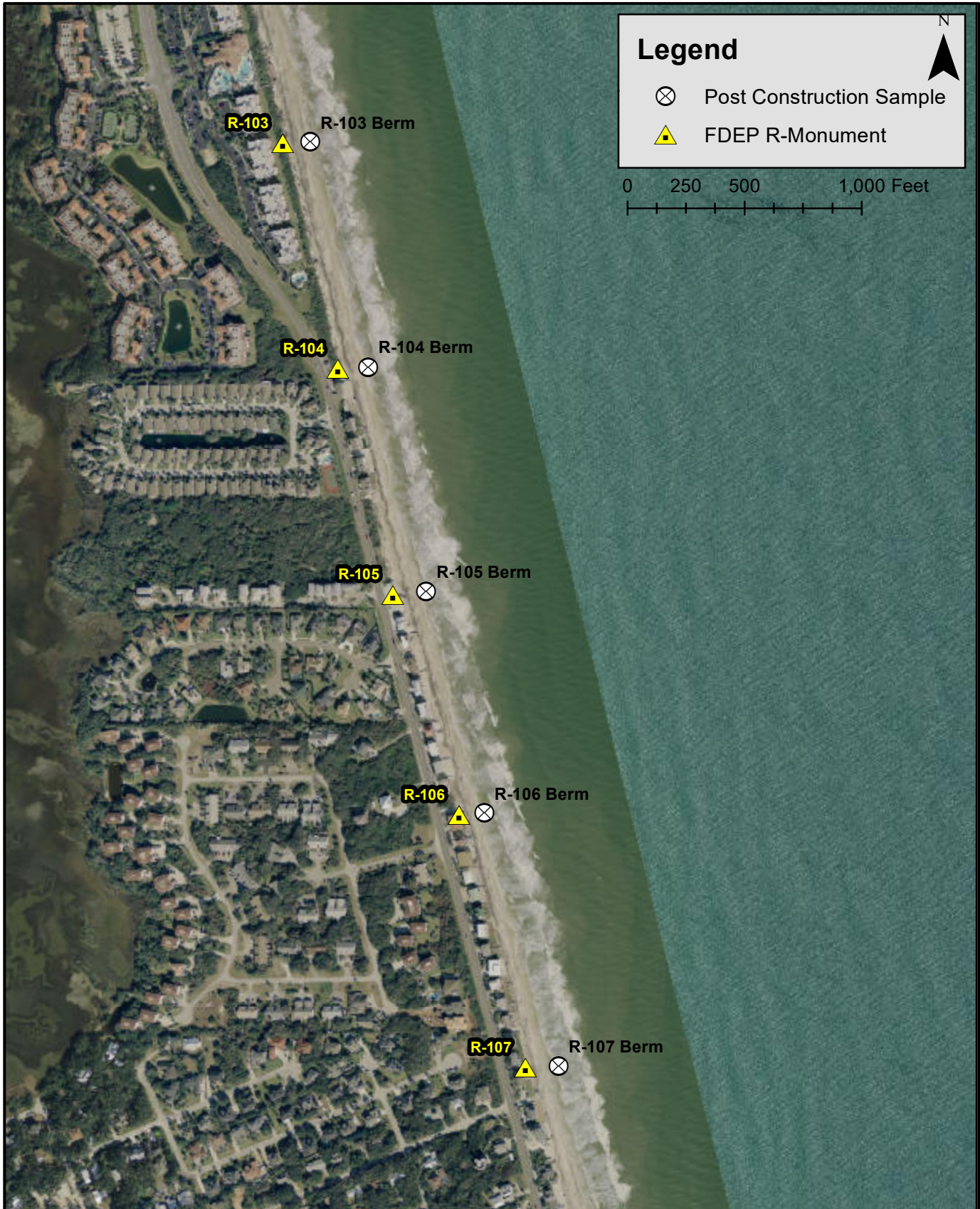
DENNIS J. ZEVENEY, P.E.
Chief, Geosystems Branch

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FDEP Permit File No. 0377120-001-JC, Post-fill Sampling Report

Enclosure 1

Sampling Location Maps



**US Army Corps
of Engineers®**
Jacksonville District

GEOTECHNICAL DRAWINGS
NOT FOR CONSTRUCTION

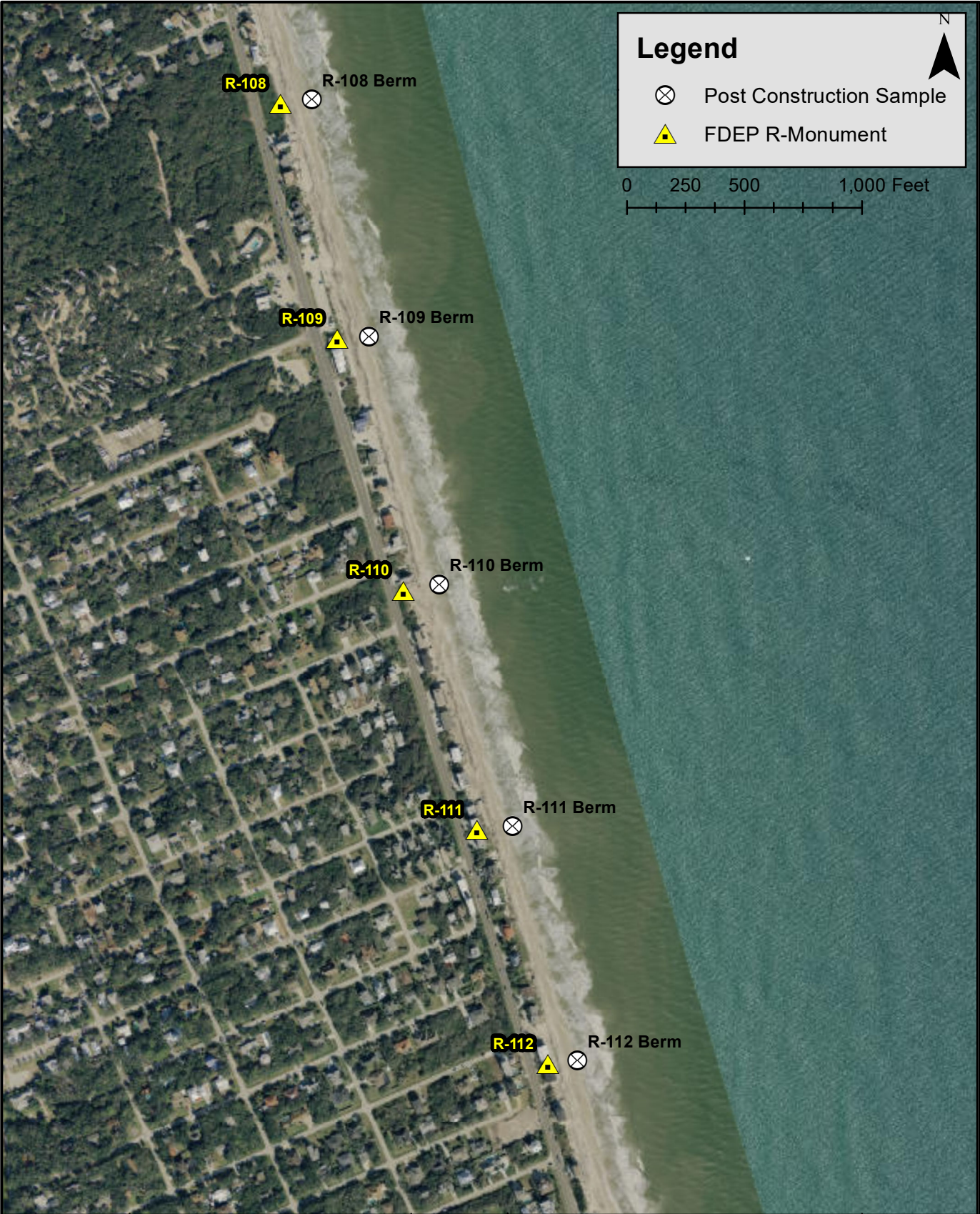
ST. JOHNS CO CSRM
Post Construction Samples

Dsn by:	JLC
Dwn by:	JLC
Ckd by:	TAM
Dated:	4 April 21

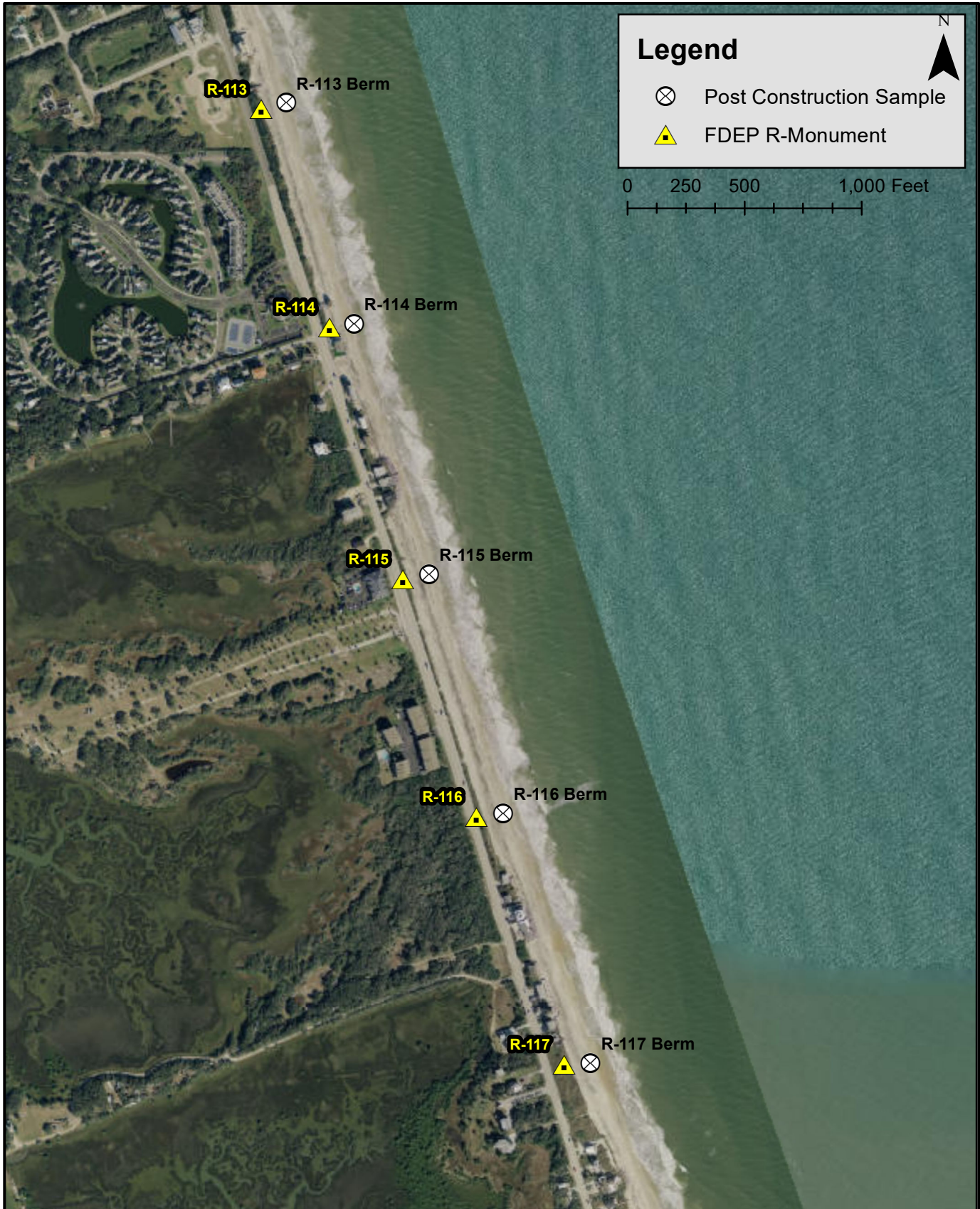
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

PLATE NO.

1



 US Army Corps of Engineers Jacksonville District	GEOTECHNICAL DRAWINGS	Dsn by: JLC	DEPARTMENT OF THE ARMY JACKSONVILLE DISTRICT, CORPS OF ENGINEERS JACKSONVILLE, FLORIDA	PLATE NO. 2
	NOT FOR CONSTRUCTION	Dwn by: JLC		
	ST. JOHNS CO CSRM	Ckd by: TAM		
	Post Construction Samples	Dated: 4 April 21		



 US Army Corps of Engineers Jacksonville District	GEOTECHNICAL DRAWINGS	Dsn by: JLC	DEPARTMENT OF THE ARMY JACKSONVILLE DISTRICT, CORPS OF ENGINEERS JACKSONVILLE, FLORIDA	PLATE NO. 3
	NOT FOR CONSTRUCTION	Dwn by: JLC		
	ST. JOHNS CO CSRM	Ckd by: TAM		
	Post Construction Samples	Dated: 4 April 21		

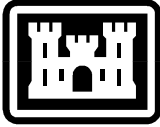
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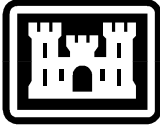
SUBJECT: St. Johns County Coastal Risk Management Project, St. Johns County, FL,
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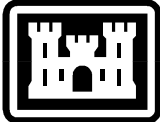
Enclosure 2

Post-Fill Gradation Curves and Granularmetric Reports

Granularmetric Report				 US Army Corps of Engineers Jacksonville District			
Project Name: Vilano and SPV CSR.M Vilano and SPV CSR.M							
Sample Name: R-103 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS: SP		Munsell: 10YR 7/1		Fines (%): #200 - 0.19 #230 - 0.08		Organics (%):	
						Carbonates (%): 0.01	
						Shells (%): 0.1	
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained		
#5	-2.00	4.00	0.00		0.00		
#7	-1.50	2.80	0.08		0.08		
#10	-1.00	2.00	0.08		0.16		
#14	-0.50	1.40	0.08		0.24		
#18	0.00	1.00	0.10		0.33		
#25	0.50	0.71	0.14		0.48		
#35	1.00	0.50	0.25		0.73		
#45	1.50	0.36	0.56		1.29		
#60	2.00	0.25	2.94		4.23		
#80	2.50	0.18	32.49		36.73		
#120	3.00	0.13	57.89		94.62		
#170	3.50	0.09	4.88		99.49		
#200	3.75	0.08	0.32		99.81		
#230	4.00	0.06	0.11		99.92		
SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace silt							
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
3.04	2.91	2.83	2.61	2.32	2.18	2.01	
Moment	Mean Phi	Mean mm	Median Phi	Median mm	Sorting	Skewness	Kurtosis
Statistics	2.56	0.17	2.61	0.16	0.41	-2.9	25.16

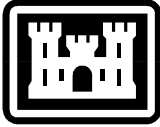
Granularmetric Report				 US Army Corps of Engineers Jacksonville District			
Project Name: Vilano and SPV CSRMR Vilano and SPV CSRMR							
Sample Name: R-104 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS: SP		Munsell: 10YR 7/1		Fines (%): #200 - 0.13 #230 - 0.07		Organics (%):	
						Carbonates (%): 17.00	
						Shells (%): 16.1	
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained		
3/8"	-3.25	9.50	0.00		0.00		
#3.5	-2.50	5.60	1.45		1.45		
#4	-2.25	4.75	0.38		1.82		
#5	-2.00	4.00	0.98		2.80		
#7	-1.50	2.80	1.11		3.91		
#10	-1.00	2.00	1.56		5.47		
#14	-0.50	1.40	2.52		7.99		
#18	0.00	1.00	2.76		10.75		
#25	0.50	0.71	3.02		13.77		
#35	1.00	0.50	3.56		17.33		
#45	1.50	0.36	4.11		21.44		
#60	2.00	0.25	5.39		26.83		
#80	2.50	0.18	18.03		44.85		
#120	3.00	0.13	46.80		91.65		
#170	3.50	0.09	7.77		99.42		
#200	3.75	0.08	0.45		99.87		
#230	4.00	0.06	0.06		99.93		
SAND, poorly-graded, mostly fine-grained sand-sized quartz, little sand to gravel-sized shell fragments, trace silt							
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
3.22	2.92	2.82	2.55	1.83	0.81	-1.15	
Moment	Mean Phi	Mean mm	Median Phi	Median mm	Sorting	Skewness	Kurtosis
Statistics	2.01	0.25	2.55	0.17	1.35	-1.86	5.86

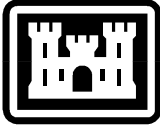
Granularmetric Report				 US Army Corps of Engineers Jacksonville District			
Project Name: Vilano and SPV CSRMR Vilano and SPV CSRMR							
Sample Name: R-105 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS: SP		Munsell: 10YR 7/1		Fines (%): #200 - 0.35 #230 - 0.27		Organics (%):	
						Carbonates (%): 43.91	
						Shells (%): 45.7	
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained		
3/4"	-4.25	19.00	0.00		0.00		
3/8"	-3.25	9.50	2.01		2.01		
#3.5	-2.50	5.60	3.06		5.07		
#4	-2.25	4.75	1.46		6.53		
#5	-2.00	4.00	2.41		8.94		
#7	-1.50	2.80	4.41		13.34		
#10	-1.00	2.00	5.18		18.53		
#14	-0.50	1.40	7.13		25.66		
#18	0.00	1.00	6.86		32.53		
#25	0.50	0.71	6.99		39.51		
#35	1.00	0.50	7.97		47.49		
#45	1.50	0.36	8.74		56.22		
#60	2.00	0.25	9.16		65.38		
#80	2.50	0.18	13.24		78.62		
#120	3.00	0.13	17.84		96.46		
#170	3.50	0.09	2.95		99.41		
#200	3.75	0.08	0.24		99.65		
#230	4.00	0.06	0.08		99.73		
SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, some sand to gravel-sized shell fragments, trace silt							
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
2.96	2.65	2.36	1.14	-0.55	-1.24	-2.52	
Moment	Mean Phi	Mean mm	Median Phi	Median mm	Sorting	Skewness	Kurtosis
Statistics	0.78	0.58	1.14	0.45	1.8	-0.61	2.41

Granularmetric Report				 US Army Corps of Engineers Jacksonville District			
Project Name: Vilano and SPV CSR/GPJ Vilano and SPV CSR/GPJ							
Sample Name: R-106 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS: SP		Munsell: 2.5Y 7/1		Fines (%): #200 - 0.11 #230 - 0.06		Organics (%):	
						Carbonates (%): 11.62	
						Shells (%): 12	
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained		
3/8"	-3.25	9.50	0.00		0.00		
#3.5	-2.50	5.60	0.60		0.60		
#4	-2.25	4.75	0.14		0.74		
#5	-2.00	4.00	0.24		0.99		
#7	-1.50	2.80	0.47		1.45		
#10	-1.00	2.00	0.75		2.21		
#14	-0.50	1.40	1.06		3.26		
#18	0.00	1.00	1.43		4.70		
#25	0.50	0.71	2.09		6.79		
#35	1.00	0.50	3.05		9.84		
#45	1.50	0.36	5.25		15.08		
#60	2.00	0.25	9.55		24.63		
#80	2.50	0.18	30.94		55.57		
#120	3.00	0.13	41.19		96.75		
#170	3.50	0.09	2.98		99.73		
#200	3.75	0.08	0.16		99.89		
#230	4.00	0.06	0.04		99.94		
SAND, poorly-graded, mostly fine-grained sand-sized quartz, few sand to gravel-sized shell fragments, trace silt							
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
2.98	2.85	2.74	2.41	2.01	1.55	0.07	
Moment	Mean Phi	Mean mm	Median Phi	Median mm	Sorting	Skewness	Kurtosis
Statistics	2.14	0.23	2.41	0.19	0.97	-2.44	10.18

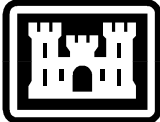
Granularmetric Report				 US Army Corps of Engineers Jacksonville District			
Project Name: Vilano and SPV CSR/GPJ Vilano and SPV CSR/GPJ							
Sample Name: R-107 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS: SP		Munsell: 5Y 7/1		Fines (%): #200 - 0.36 #230 - 0.27		Organics (%):	
						Carbonates (%): 2.80	
						Shells (%): 1.6	
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained		
3/8"	-3.25	9.50	0.00		0.00		
#3.5	-2.50	5.60	0.17		0.17		
#4	-2.25	4.75	0.00		0.17		
#5	-2.00	4.00	0.00		0.17		
#7	-1.50	2.80	0.10		0.26		
#10	-1.00	2.00	0.11		0.37		
#14	-0.50	1.40	0.15		0.52		
#18	0.00	1.00	0.11		0.63		
#25	0.50	0.71	0.21		0.84		
#35	1.00	0.50	0.39		1.23		
#45	1.50	0.36	0.70		1.93		
#60	2.00	0.25	2.27		4.21		
#80	2.50	0.18	20.80		25.01		
#120	3.00	0.13	62.69		87.70		
#170	3.50	0.09	11.17		98.87		
#200	3.75	0.08	0.78		99.64		
#230	4.00	0.06	0.08		99.73		
SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace shell fragments, trace silt							
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
3.33	2.97	2.90	2.70	2.50	2.28	2.02	
Moment	Mean Phi	Mean mm	Median Phi	Median mm	Sorting	Skewness	Kurtosis
Statistics	2.64	0.16	2.70	0.15	0.51	-4.34	38.59

GRANULARMETRIC REPORT % VILANO AND SPV CSR/GPJ CESAJ 20171021 GDT 4/1/21

Granularmetric Report				 US Army Corps of Engineers Jacksonville District			
Project Name: Vilano and SPV CSR/GPJ Vilano and SPV CSR/GPJ							
Sample Name: R-108 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS:		Munsell:		Fines (%):		Organics (%):	
SP		10YR 7/1		#200 - 0.15 #230 - 0.09		15.80	
Sieve Number		Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained	
3/8"	-3.25	9.50	0.00		0.00		
#3.5	-2.50	5.60	1.68		1.68		
#4	-2.25	4.75	0.28		1.96		
#5	-2.00	4.00	0.58		2.54		
#7	-1.50	2.80	1.16		3.70		
#10	-1.00	2.00	2.03		5.73		
#14	-0.50	1.40	2.58		8.31		
#18	0.00	1.00	3.06		11.37		
#25	0.50	0.71	3.91		15.29		
#35	1.00	0.50	6.45		21.74		
#45	1.50	0.36	8.47		30.21		
#60	2.00	0.25	8.26		38.47		
#80	2.50	0.18	19.39		57.86		
#120	3.00	0.13	37.35		95.21		
#170	3.50	0.09	4.33		99.54		
#200	3.75	0.08	0.31		99.85		
#230	4.00	0.06	0.06		99.91		
SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, little sand to gravel-sized shell fragments, trace silt							
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
3.00	2.85	2.73	2.30	1.19	0.56	-1.18	
Moment	Mean Phi	Mean mm	Median Phi	Median mm	Sorting	Skewness	Kurtosis
Statistics	1.79	0.29	2.30	0.20	1.35	-1.54	4.94

Granularmetric Report				 US Army Corps of Engineers Jacksonville District			
Project Name: Vilano and SPV CSR.M Vilano and SPV CSR.M							
Sample Name: R-109 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS:		Munsell:		Fines (%):		Organics (%):	
SP		N 8/		#200 - 0.09 #230 - 0.06		Carbonates (%): 3.83	
Shells (%): 2.1							
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained		
#4	-2.25	4.75	0.00		0.00		
#5	-2.00	4.00	0.05		0.05		
#7	-1.50	2.80	0.06		0.11		
#10	-1.00	2.00	0.04		0.14		
#14	-0.50	1.40	0.25		0.40		
#18	0.00	1.00	0.38		0.78		
#25	0.50	0.71	0.00		0.78		
#35	1.00	0.50	1.98		2.76		
#45	1.50	0.36	2.96		5.72		
#60	2.00	0.25	6.80		12.52		
#80	2.50	0.18	28.73		41.25		
#120	3.00	0.13	53.58		94.83		
#170	3.50	0.09	4.73		99.56		
#200	3.75	0.08	0.34		99.91		
#230	4.00	0.06	0.03		99.94		
SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace shell fragments, trace silt							
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
3.02	2.90	2.81	2.58	2.22	2.06	1.38	
Moment	Mean Phi	Mean mm	Median Phi	Median mm	Sorting	Skewness	Kurtosis
Statistics	2.45	0.18	2.58	0.17	0.55	-2.34	12.82

Granularmetric Report				 US Army Corps of Engineers Jacksonville District			
Project Name: Vilano and SPV CSRMR Vilano and SPV CSRMR							
Sample Name: R-110 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS: SP		Munsell: 10YR 7/1		Fines (%): #200 - 0.21 #230 - 0.14		Organics (%):	
						Carbonates (%): 24.88	
						Shells (%): 24.4	
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained		
3/8"	-3.25	9.50	0.00		0.00		
#3.5	-2.50	5.60	0.77		0.77		
#4	-2.25	4.75	0.55		1.31		
#5	-2.00	4.00	1.33		2.64		
#7	-1.50	2.80	2.18		4.83		
#10	-1.00	2.00	3.06		7.89		
#14	-0.50	1.40	4.07		11.96		
#18	0.00	1.00	4.35		16.31		
#25	0.50	0.71	4.55		20.86		
#35	1.00	0.50	5.44		26.30		
#45	1.50	0.36	8.50		34.80		
#60	2.00	0.25	10.60		45.40		
#80	2.50	0.18	21.17		66.57		
#120	3.00	0.13	29.62		96.20		
#170	3.50	0.09	3.36		99.55		
#200	3.75	0.08	0.24		99.79		
#230	4.00	0.06	0.07		99.86		
SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, little sand to gravel-sized shell fragments, trace silt							
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
2.98	2.79	2.64	2.11	0.88	-0.04	-1.47	
Moment	Mean Phi	Mean mm	Median Phi	Median mm	Sorting	Skewness	Kurtosis
Statistics	1.58	0.33	2.11	0.23	1.42	-1.18	3.51

Granularmetric Report				 US Army Corps of Engineers Jacksonville District			
Project Name: Vilano and SPV CSR/GPJ Vilano and SPV CSR/GPJ							
Sample Name: R-111 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS:		Munsell:		Fines (%):		Organics (%):	
SP		5Y 7/1		#200 - 0.58 #230 - 0.50		Carbonates (%): 15.98	
Shells (%): 13.9							
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained		
3/8"	-3.25	9.50	0.00		0.00		
#3.5	-2.50	5.60	0.41		0.41		
#4	-2.25	4.75	1.33		1.74		
#5	-2.00	4.00	0.28		2.01		
#7	-1.50	2.80	1.16		3.17		
#10	-1.00	2.00	1.85		5.02		
#14	-0.50	1.40	2.55		7.58		
#18	0.00	1.00	2.55		10.13		
#25	0.50	0.71	2.44		12.57		
#35	1.00	0.50	2.92		15.50		
#45	1.50	0.36	3.51		19.01		
#60	2.00	0.25	7.49		26.50		
#80	2.50	0.18	30.55		57.06		
#120	3.00	0.13	38.62		95.68		
#170	3.50	0.09	3.51		99.19		
#200	3.75	0.08	0.23		99.42		
#230	4.00	0.06	0.07		99.50		
SAND, poorly-graded, mostly fine-grained sand-sized quartz, little sand to gravel-sized shell fragments, trace silt							
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
2.99	2.85	2.73	2.38	1.90	1.07	-1.01	
Moment	Mean Phi	Mean mm	Median Phi	Median mm	Sorting	Skewness	Kurtosis
Statistics	1.97	0.26	2.38	0.19	1.24	-1.94	6.24

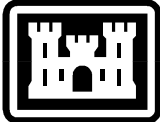
Granularmetric Report				 US Army Corps of Engineers Jacksonville District			
Project Name: Vilano and SPV CSRMR Vilano and SPV CSRMR							
Sample Name: R-112 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS: SP		Munsell: 10YR 7/1		Fines (%): #200 - 0.08 #230 - 0.00		Organics (%):	
						Carbonates (%): 10.71	
						Shells (%): 8.1	
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained		
3/8"	-3.25	9.50	0.00		0.00		
#3.5	-2.50	5.60	0.30		0.30		
#4	-2.25	4.75	0.04		0.35		
#5	-2.00	4.00	0.21		0.55		
#7	-1.50	2.80	0.41		0.96		
#10	-1.00	2.00	0.73		1.68		
#14	-0.50	1.40	1.15		2.83		
#18	0.00	1.00	1.52		4.35		
#25	0.50	0.71	2.08		6.43		
#35	1.00	0.50	3.24		9.67		
#45	1.50	0.36	4.71		14.38		
#60	2.00	0.25	7.99		22.37		
#80	2.50	0.18	26.47		48.83		
#120	3.00	0.13	45.90		94.73		
#170	3.50	0.09	4.92		99.65		
#200	3.75	0.08	0.27		99.92		
#230	4.00	0.06	0.08		100.00		
SAND, poorly-graded, mostly fine-grained sand-sized quartz, few sand to gravel-sized shell fragments							
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
3.03	2.88	2.79	2.51	2.05	1.60	0.16	
Moment	Mean Phi	Mean mm	Median Phi	Median mm	Sorting	Skewness	Kurtosis
Statistics	2.22	0.21	2.51	0.18	0.93	-2.29	9.27

Granularmetric Report				 US Army Corps of Engineers Jacksonville District			
Project Name: Vilano and SPV CSRMR Vilano and SPV CSRMR							
Sample Name: R-113 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS:		Munsell:		Fines (%):		Organics (%):	
SP		10YR 7/1		#200 - 0.50 #230 - 0.42		Carbonates (%): 10.76	
						Shells (%): 7.4	
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained		
3/8"	-3.25	9.50	0.00		0.00		
#3.5	-2.50	5.60	2.14		2.14		
#4	-2.25	4.75	0.12		2.26		
#5	-2.00	4.00	0.17		2.43		
#7	-1.50	2.80	0.48		2.90		
#10	-1.00	2.00	0.85		3.76		
#14	-0.50	1.40	1.12		4.88		
#18	0.00	1.00	1.32		6.20		
#25	0.50	0.71	1.50		7.70		
#35	1.00	0.50	2.05		9.75		
#45	1.50	0.36	2.80		12.55		
#60	2.00	0.25	6.03		18.58		
#80	2.50	0.18	30.27		48.85		
#120	3.00	0.13	45.93		94.78		
#170	3.50	0.09	4.38		99.16		
#200	3.75	0.08	0.34		99.50		
#230	4.00	0.06	0.08		99.58		
SAND, poorly-graded, mostly fine-grained sand-sized quartz, few sand to gravel-sized shell fragments, trace silt							
Phi 5		Phi 16		Phi 25		Phi 50	
3.03		2.88		2.78		2.51	
Phi 75		Phi 84		Phi 95			
2.11		1.79		-0.45			
Moment		Mean Phi		Mean mm		Median Phi	
Statistics		2.17		0.22		2.51	

Granularmetric Report				 US Army Corps of Engineers Jacksonville District			
Project Name: Vilano and SPV CSR/GPJ Vilano and SPV CSR/GPJ							
Sample Name: R-114 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS: SP		Munsell: 10YR 7/1		Fines (%): #200 - 0.26 #230 - 0.18		Organics (%):	
						Carbonates (%): 22.51	
						Shells (%): 21.7	
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained		
3/8"	-3.25	9.50	0.00		0.00		
#3.5	-2.50	5.60	1.85		1.85		
#4	-2.25	4.75	0.51		2.36		
#5	-2.00	4.00	1.19		3.55		
#7	-1.50	2.80	2.11		5.66		
#10	-1.00	2.00	3.24		8.90		
#14	-0.50	1.40	3.97		12.87		
#18	0.00	1.00	3.78		16.65		
#25	0.50	0.71	3.46		20.10		
#35	1.00	0.50	3.44		23.55		
#45	1.50	0.36	3.35		26.89		
#60	2.00	0.25	4.69		31.58		
#80	2.50	0.18	21.13		52.72		
#120	3.00	0.13	41.89		94.60		
#170	3.50	0.09	4.82		99.42		
#200	3.75	0.08	0.32		99.74		
#230	4.00	0.06	0.07		99.82		
SAND, poorly-graded, mostly fine-grained sand-sized quartz, little sand to gravel-sized shell fragments, trace silt							
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
3.04	2.87	2.77	2.44	1.22	-0.09	-1.66	
Moment	Mean Phi	Mean mm	Median Phi	Median mm	Sorting	Skewness	Kurtosis
Statistics	1.75	0.30	2.44	0.18	1.53	-1.44	3.98

Granularmetric Report				 US Army Corps of Engineers Jacksonville District			
Project Name: Vilano and SPV CSRMR Vilano and SPV CSRMR							
Sample Name: R-115 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS: SP		Munsell: 10YR 7/1		Fines (%): #200 - 0.67 #230 - 0.63		Organics (%): Carbonates (%): 23.09 Shells (%): 21.8	
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained		
3/8"	-3.25	9.50	0.00		0.00		
#3.5	-2.50	5.60	1.81		1.81		
#4	-2.25	4.75	0.29		2.10		
#5	-2.00	4.00	0.72		2.82		
#7	-1.50	2.80	2.22		5.04		
#10	-1.00	2.00	2.85		7.89		
#14	-0.50	1.40	3.73		11.62		
#18	0.00	1.00	3.56		15.18		
#25	0.50	0.71	3.63		18.81		
#35	1.00	0.50	4.26		23.06		
#45	1.50	0.36	5.22		28.29		
#60	2.00	0.25	9.13		37.42		
#80	2.50	0.18	28.37		65.79		
#120	3.00	0.13	30.56		96.35		
#170	3.50	0.09	2.72		99.07		
#200	3.75	0.08	0.27		99.33		
#230	4.00	0.06	0.04		99.37		
SAND, poorly-graded, mostly fine-grained sand-sized quartz, little sand to gravel-sized shell fragments, trace silt							
Phi 5		Phi 16		Phi 25		Phi 50	
2.98		2.80		2.65		2.22	
Phi 75		Phi 84		Phi 95			
1.19		0.11		-1.51			
Moment		Mean Phi		Mean mm		Median Phi	
Statistics		1.67		0.31		2.22	

GRANULARMETRIC REPORT % VILANO AND SPV CSRMR.GPJ CESAJ 20171021 GDT 4/1/21

Granularmetric Report						 US Army Corps of Engineers Jacksonville District	
Project Name: Vilano and SPV CSRMR Vilano and SPV CSRMR							
Sample Name: R-116 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS: SP		Munsell: 2.5Y 7/1		Fines (%): #200 - 0.35 #230 - 0.27		Organics (%): Carbonates (%): 18.25 Shells (%): 16.8	
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained		
3/8"	-3.25	9.50	0.00		0.00		
#3.5	-2.50	5.60	0.67		0.67		
#4	-2.25	4.75	0.23		0.90		
#5	-2.00	4.00	0.32		1.22		
#7	-1.50	2.80	2.43		3.65		
#10	-1.00	2.00	2.42		6.07		
#14	-0.50	1.40	3.58		9.65		
#18	0.00	1.00	2.81		12.46		
#25	0.50	0.71	2.83		15.30		
#35	1.00	0.50	3.11		18.41		
#45	1.50	0.36	3.50		21.91		
#60	2.00	0.25	3.87		25.78		
#80	2.50	0.18	21.70		47.49		
#120	3.00	0.13	47.05		94.53		
#170	3.50	0.09	4.76		99.29		
#200	3.75	0.08	0.35		99.65		
#230	4.00	0.06	0.08		99.73		
SAND, poorly-graded, mostly fine-grained sand-sized quartz, little sand to gravel-sized shell fragments, trace silt							
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
3.05	2.89	2.79	2.53	1.90	0.61	-1.22	
Moment Statistics	Mean Phi	Mean mm	Median Phi	Median mm	Sorting	Skewness	Kurtosis
	1.96	0.26	2.53	0.17	1.34	-1.7	4.94

Granularmetric Report				 US Army Corps of Engineers Jacksonville District			
Project Name: Vilano and SPV CSR/GPJ Vilano and SPV CSR/GPJ							
Sample Name: R-117 @ 0 ft							
Analysis Date: 3/19/2021							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
USCS: SP		Munsell: 5Y 7/1		Fines (%): #200 - 0.34 #230 - 0.29		Organics (%):	
						Carbonates (%): 29.20	
						Shells (%): 25.8	
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	% Weight Retained		C. % Weight Retained		
3/8"	-3.25	9.50	0.00		0.00		
#3.5	-2.50	5.60	1.88		1.88		
#4	-2.25	4.75	0.89		2.77		
#5	-2.00	4.00	1.05		3.81		
#7	-1.50	2.80	2.75		6.57		
#10	-1.00	2.00	3.54		10.10		
#14	-0.50	1.40	4.83		14.94		
#18	0.00	1.00	4.75		19.69		
#25	0.50	0.71	4.88		24.57		
#35	1.00	0.50	5.38		29.94		
#45	1.50	0.36	5.90		35.84		
#60	2.00	0.25	10.81		46.65		
#80	2.50	0.18	29.48		76.13		
#120	3.00	0.13	21.79		97.92		
#170	3.50	0.09	1.60		99.52		
#200	3.75	0.08	0.14		99.66		
#230	4.00	0.06	0.05		99.71		
SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, some sand to gravel-sized shell fragments, trace silt							
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
2.93	2.68	2.48	2.06	0.54	-0.39	-1.78	
Moment	Mean Phi	Mean mm	Median Phi	Median mm	Sorting	Skewness	Kurtosis
Statistics	1.40	0.38	2.06	0.24	1.5	-1.15	3.31

