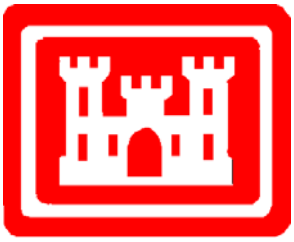
BREVARD COUNTY, FLORIDA
BEACH EROSION CONTROL PROJECT

MID REACH
SHORE PROTECTION
GRR
APPENDIX E

GEOTECHNICAL REPORT



US Army Corps of Engineers
Jacksonville District

June 2006

BREVARD COUNTY SHORE PROTECTION STUDY
MID REACH GRR

APPENDIX E

GEOTECHNICAL REPORT

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1.0 GEOLOGY AND GEOGRAPHIC SETTING

1.1 Regional Geology and Geography

Peninsular Florida occupies a portion of the much larger geographic unit, the Florida Plateau. Deep water in the Gulf of Mexico is separated from deep water of the Atlantic Ocean by this partially submerged platform nearly 500 miles long and 250 to 450 miles wide. Since the Mesozoic Era, approximately 200 million years B.P. (before present), the plateau has been alternately dry land or covered by shallow seas. During that time approximately 4,000 feet to greater than 20,000 feet of carbonate and marine sediments were deposited at the north-central and the southernmost Florida, respectively. Either following or concurrent with one of the later periods of emergence, there appears to have been a tilting of the plateau about its longitudinal axis. The west coast was partially submerged, as indicated by the wide estuaries and offshore channels, while the east coast was correspondingly elevated.

Brevard County is located on Florida's central east coast bordering the Atlantic Ocean and lies within the Coastal Lowlands physiographic region characterized by terraced level plains. The topography is largely controlled by a series of marine terraced deposits. The deposits were formed during Pleistocene time when sea level rose and fell in response to the advance and retreat of the continental ice sheets. When sea level is relatively stationary for long periods, shoreline features and marine plains develop. Shorelines above present sea level, not submerged by another transgression of the sea, are generally preserved.

The geology in the central east coast area is typified by mixed lithology, quartz-carbonate sand and barrier islands. All indurated surficial sediments in the region are generically assigned to the Anastasia Formation. It is likely that, while the Anastasia is generally regarded as Pleistocene in age, it also includes recently cemented (Holocene) beach rock. The Anastasia underlies all modern beach sediments in the central east coast area. Underlying the unconsolidated surficial sediments and the indurated Anastasia sediment are siliclastic Plio-Pleistocene sediments, which in turn overlie the Neogene Hawthorn Group. The lithology of the Hawthorn group is extremely diverse, including clay, sand, limestone, silt-sized dolomite and phosphorites (Hoenstine, R., et al., 2002).

1.2 Local Geology and Geography

Coastal features characterizing the Brevard County include Cape Canaveral to the north and Sebastian Inlet to the south with a barrier island connecting the two (Fig. 1). The shoreline of approximately 72 miles is relatively straight trending north-northwest to south-southeast, with the exception of the curvature created by the cape feature. The barrier island ranges in width from approximately 10 miles at the Cape to a few hundred feet just north of Patrick A.F.B. The upland base elevations and dune heights along the island range from 9 to 25 feet NGVD.

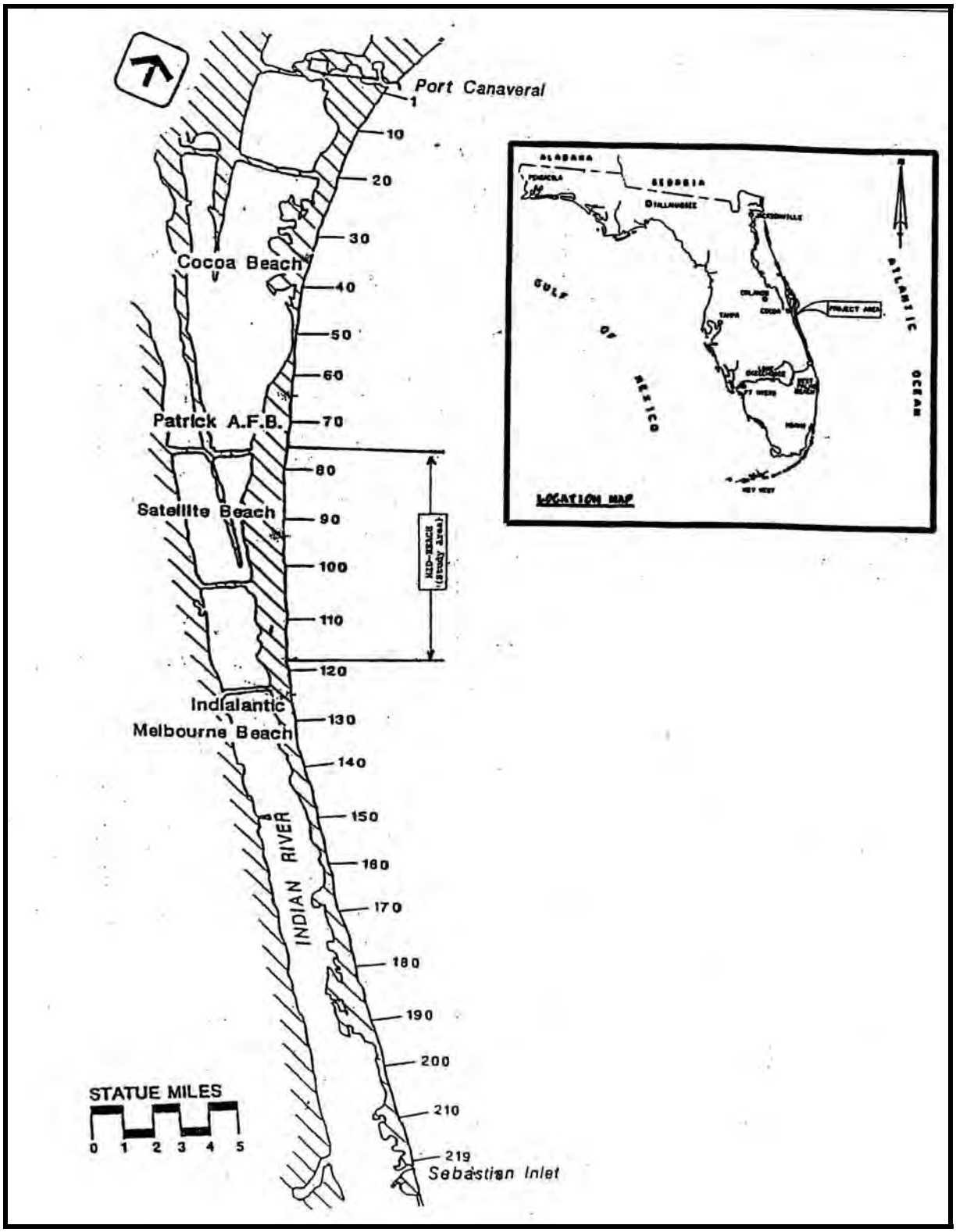

Figure 1. Mid-Reach Project Location Map
(the numbers along the shoreline denote the DEP monuments)

The barrier island is separated from the mainland by the Mosquito Lagoon and Banana River to the north and the Indian River Lagoon that runs the length of the county.

The sediments of the barrier beach along Brevard County consist primarily of fine to medium grained quartz sand with varying percentages of silt and shell content. The sand is Holocene in age and is perched on the lithified coquina rocks of Anastasia Formation of Pleistocene age. These older coquina rocks, as well as Sabellarild worm rock, can be observed in the surf zone along the central portion of the county between Indialantic Beach and Patrick A.F.B. In general, dune height, foreshore slope, shell content and mean grain sizes increase from north to south along the county (Olsen, 1989).

The nearshore rock outcrops along the Mid-Reach are principally composed of tabular lithified coquina (limestone) ledges. The rock is exposed as both singular, isolated outcrops and large tabular ledges. The vertical relief typically varies from 0 (flush with the sand seabed) to 18 inches, with some instances of up to 30 inches relief. There is significant temporal variation in the exposure/burial of the rock, particularly the lower-relief rock and the rock located near and above the low tide line. The abundance of rock decreases significantly from north to south along the Mid Reach. The highest concentration of rock occurs along the northern 1.1-miles of the Mid-Reach that includes about 45% of the total 60.8-acre estimate. The northern 4.1-miles of the Mid Reach comprise about 75% of the total rock acreage (Olsen, 2003).

2.0 PROJECT BACKGROUND

The Brevard County Mid-Reach Shore Protection Project is located on the east coast of Florida just south of Cape Canaveral. The Mid-Reach consists of approximately 7.8 miles of the Brevard County shoreline, from the south end of Patrick Air Force Base to just north of the city of Indialantic, coinciding with the survey monuments of the Department of Environmental Protection (DEP) from R75.4 to R119, as shown on Figure 1. Due to environmental concerns, the Mid-Reach was excluded from the 1996 Feasibility Report with Final Environmental Impact Statement for Brevard County. No prior beach nourishment along the Mid-Reach has been done, except for localized dune fill activities conducted by individual property owners. Shoreline erosion caused by both long-term erosion and storm-induced recession remains as the greatest problem facing upland development in the Mid-Reach segment, and threatens commercial and residential structures. The goal of the project is to provide protection from storm damage for coastal structures along the Mid-Reach.

3.0 OFFSHORE SAND SOURCES

3.1 Investigation History

Investigations for sand sources began in 1965, and several offshore borrow areas have been identified. The most promising borrow areas are situated within the extensive shoal system located a few miles southeast of the tip of Cape Canaveral, including Borrow Area I and Borrow

Area II (see Figure 2). The Canaveral Shoals Borrow Area I (CS-I) contains an estimated volume of 16 million cubic yards (mcy) of beach quality sand, however because the water depth of the borrow area only ranges from 18 feet on the western side to 6 feet on the eastern side, small-capacity hopper dredges will be required. In 1995, the Army Corps of Engineers conducted a Shore Protection Reconnaissance Study and drilled 25 vibracores in the vicinity of CS-I to delineate the borrow area.

Canaveral Shoals Borrow Area II (CS-II) is located along the eastern edge of Canaveral Shoals, in federal waters of Atlantic Ocean. Its water depths of -25 to -49 ft below mean low water (MLW) can accommodate large-capacity hopper. Geotechnical investigations in the CS-II area were conducted by Army Corps of Engineers in 1972, and by Scientific Environmental Applications, Inc, a subcontractor of Olsen Associates in 1998. In 1972, 11 vibracores were drilled in the vicinity of the CS-II to a depth 16 ft to 20 ft below sea-floor. Three of those vibracores (CB-5, CB-6 and CB-9) are located within the boundary of the borrow area. In 1998, 30 vibracores (CB98-1 thru CB98-30) were drilled in the CS-II area to a depth 16 ft to 20 ft below sea-floor. Soil samples were collected from all of those 30 vibracores for laboratory tests. Locations of those vibracore borings are depicted on Figure 3. Boring logs, gradation curves and statistics analysis data are presented in Sub-appendix A. No additional investigation was conducted at the source area for the project of the Mid-Reach segment. Although both CS-I and CS-II contain beach quality sand, CS-II is the preferred borrow area due to the anticipated increased cost of using small capacity hopper dredges at CS-I.

3.2 Characteristics of Borrow Materials

The mean composite grain size of the sediments within borrow area CS-I was 0.30 mm (1.75 phi) with a standard deviation of 1.03 phi. Percent fines was reported to be 5.5% and percent shell was reported to be 9.0%. Sediments were typically described as poorly graded, gray, fine to medium quartz sand with some small shell fragments.

The sediments encountered within borrow area CS-II consist of light grey or light brown, fine to medium, poorly graded quartz sand with varying amounts of whole and broken shell. The median grain diameter (D_{50}) of the composite sample for the entire borrow area is 0.34 mm. The composite statistics for each boring and the entire borrow area are presented in Table 1. The mean composite grain-size ranges from 0.26 mm to 0.55 mm, with an average mean of 0.39 mm (1.36 phi) and standard deviation of 1.0 phi that indicates moderately sorted sand. The silt contents (passing #230 sieve) is very low ranging from 0 to 0.14 percent. The gravel contents vary from 0 to 3.3 percent, with an average of 1.5 percent. The thickness of beach-quality sand in the CS-II area ranges from 8 to 19 ft. based on borings and sediment analyses.

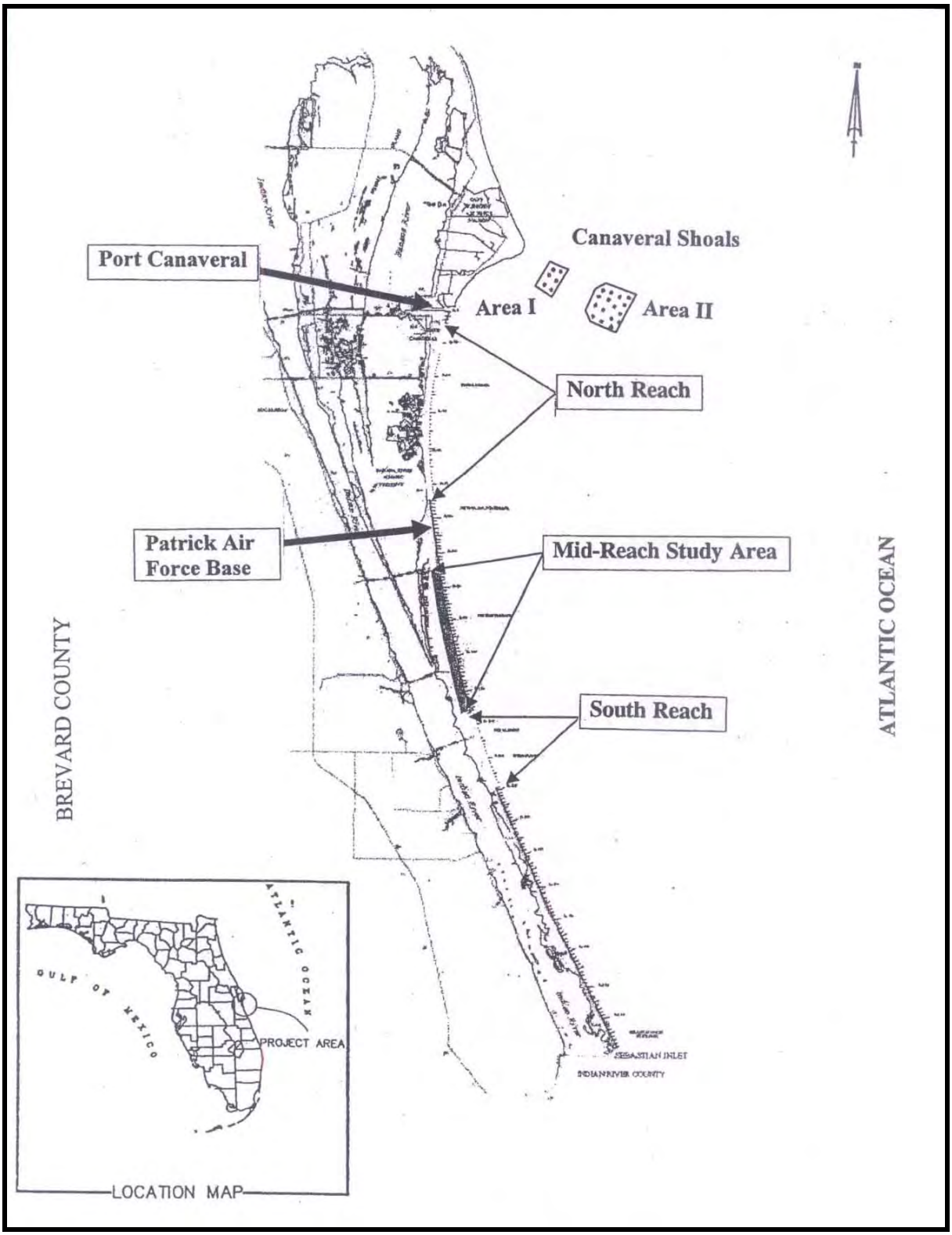

Figure 2. Location Map of Canaveral Shoal Borrow Areas

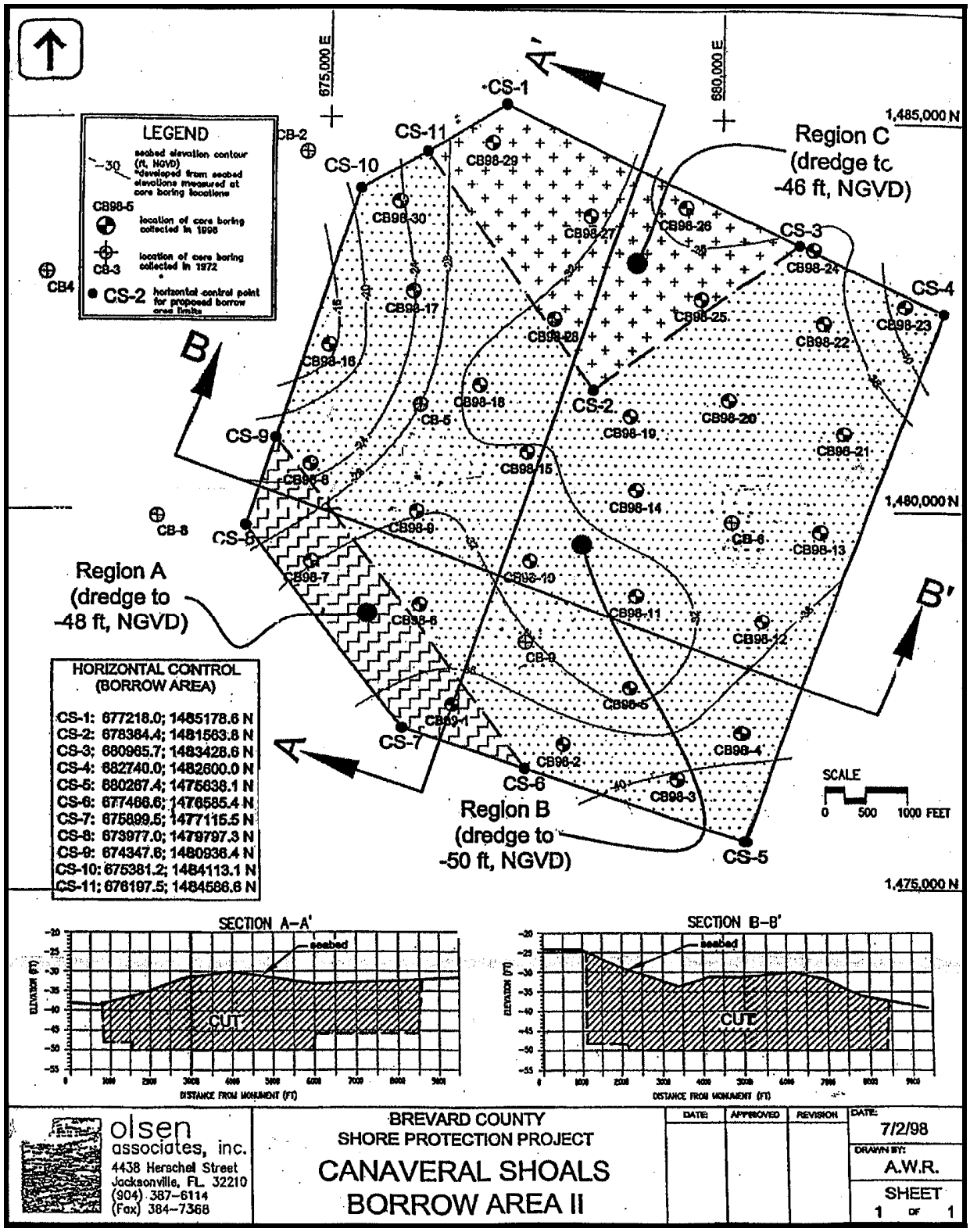

Figure 3. Boring Locations and Cross-Sections

Table 1.

Sediment character and Statistical Analysis for Canaveral Shoal Borrow Area II

SAMPLES	GRAIN SIZE Mean (mm)	SILT (#230 sieve) %	SAND %	GRAVEL (#4 sieve *) %	ST. DEV (Sorting) (Phi)	COLOR**
CSII Area A						
CB-98-2	0.26	0.01	99.99	0	0.66	Lt. grey / grey
CB-98-3	0.30	0.0	99.3	0.7	0.93	Grey / tan
CB-98-4	0.33	0.04	98.76	1.2	0.91	Grey
CB-98-5	0.30	0.01	99.79	0.2	0.79	Tan / Lt. grey
CB-98-6	0.36	0.02	96.88	3.1	1.06	Lt. grey
CB-98-9	0.32	0.0	99.4	0.6	0.93	Lt. grey / tan
CB-98-10	0.35	0.0	99.0	1.0	0.88	Lt. tan / grey
CB-98-11	0.31	0.0	100	0	0.74	Lt. tan / grey
CB-98-12	0.31	0.0	99.5	0.5	0.92	Lt. grey
CB-98-14	0.37	0.0	97.8	2.2	1.06	Tan / lt. grey
CB-98-15	0.34	0.2	97.4	2.4	1.03	Lt. grey
CB-98-18	0.39	0.03	96.97	3.0	1.07	Lt. grey
CSII Area B						
CB-98-13	0.30	0.2	99.8	0	0.89	Lt. grey / tan
CB-98-19	0.38	0.03	98.47	1.5	1.02	Grey
CB-98-20	0.34	0.14	97.86	2.0	1.09	Grey
CB-98-21	0.35	0.01	99.09	0.9	0.88	Lt. grey / tan
CB-98-22	0.26	0.05	99.15	0.8	0.91	Lt. grey
CB-98-23	0.26	0.1	99.9	0	0.84	Lt. grey
CB-98-24	0.32	0.0	100	0	0.84	Tan / lt. grey
CSII Area C						
CB-98-17	0.39	0.03	96.67	3.3	1.17	Grey / brown
CB-98-25	0.29	0.01	98.99	1.0	0.92	Lt. grey
CB-98-26	0.36	0.07	97.93	2.0	1.02	Lt. brown
CB-98-27	0.47	0.0	100	0	0.83	Lt. grey
CB-98-28	0.39	0.0	99.0	1.0	0.98	Lt. grey
CB-98-29	0.32	0.06	99.14	0.8	0.85	Lt. brown
CB-98-30	0.55	0.0	98.8	1.2	0.82	Lt. grey / brown
CSII Area D						
CB-98-1	0.31	0.09	99.91	0	0.86	Brown
CB-98-7	0.31	0.07	99.83	0.1	0.91	Lt. grey
CSII Area E						
CB-98-8	0.35	0.0	100	0	0.70	Lt. grey
CB-98-16	0.41	0.01	99.99	0	0.79	Grey / tan
Composite of CSII Borrow Area						
Composite	**0.39**	**0.0**	**98.5**	**1.5**	**1.0**	

(Data source: Scientific Environmental Applications 1998. CSII composite data are based on Olsen Associates, 2004)

3.3 Volume Available of Source Materials

Based on dredging depth limits, the CS-II borrow area is divided into 5 sub-areas: Area A, Area B, Area C, Area D and Area E (see Figure 4). Originally, the 1200-acres borrow area contained an estimated volume of 34 mcy of beach-quality sand. The borrow material has been used several times since the year of 2000 in support of beach renourishment projects along the Brevard County shoreline, including the North Reach and the South Reach. Between September 2000 and May 2003, approximately 5.15 mcy of sand had been dredged from the CS-II borrow area. A study conducted by Olsen Associates on comparison of post-construction surveys for the source area indicated that during the period of 16 months (from May 2, 2003 through August 31, 2004) there was an apparent 1,204,500 cy increase and a 28,300 cy decrease in volume of sand, yielding an approximate 1.18 mcy net increase in volume within the borrow area. As a result, the sand remaining above the permitted cut limits within the borrow area was approximately 24.6 mcy, based on the survey of August 2004. The bathymetric contours derived from the survey are presented in Figure 4. In May 2005, the borrow material was dredged again, and approximately 2.4 mcy of sand had been removed from the CS-II area for post-storm beach renourishment on beaches of the North, South reaches and Patrick Air Force Base.

The most recent survey for the borrow area was conducted on May 2005, after the latest dredging. Based on the latest survey, the estimated sand remaining above the permitted cut limits within the CS-II borrow area is approximately 21.3 mcy, after subtracting the cultural-resource exclusion areas, which are buffer zones set-up to protect the antiquities that were detected by magnetic anomalies and may have scientific or historical values. The estimated volumes of sand available for each sub-area are summarized in Table 2.

Table 2.

Estimated Volumes of Sand Available in CS-II (Based on the survey of May 2005)

Sub-Area	Dredge depth (ft. MLW)	Volumes (cy)	Volume in Buffer Zone (cy)	Volume excluded Buffer Zones (cy)	(mcy)
Area A	-48.1	5135338	74430	5060908	5.1
Area B	-46.1	6584582	74430	6510152	6.5
Area C	-44.1	7425992	60474	7365518	7.4
Area D	-42.1	1452199	97689	1354510	1.4
Area E	-28.1	1055991	55822	1000169	1.0
Total		21654102		21291257	**21.3**

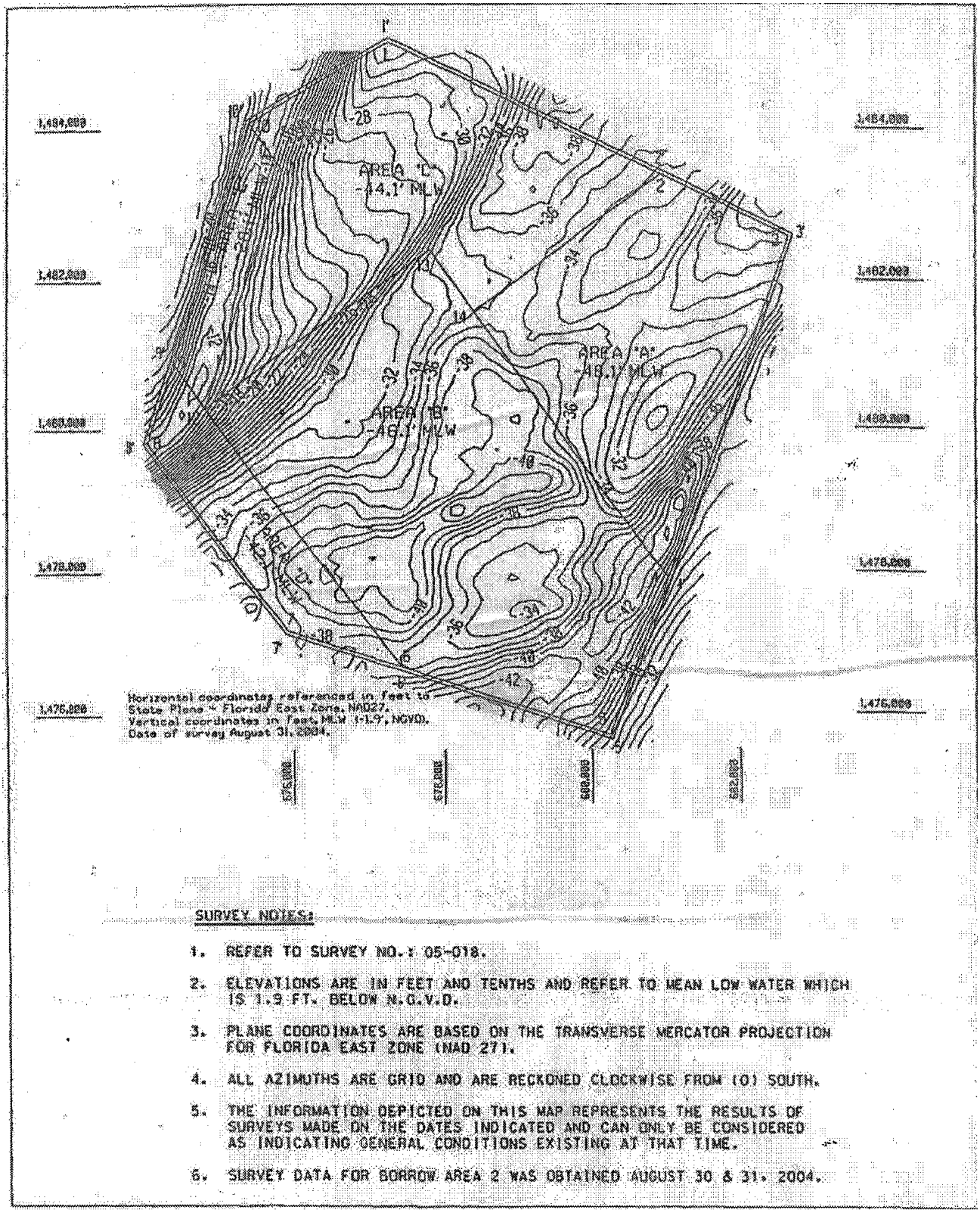

Figure 4. Canaveral Shoals Borrow Area II Bathymetry (2004 Survey)

4.0 NATIVE BEACH MATERIALS

4.1 Previous Investigation

A previous investigation for the native beach along Brevard County shoreline was performed by Olsen Associates, Inc. in 1989. During that investigation, surface beach samples were collected throughout the shoreline along 4 sampling profiles. At each of those profiles, 6 sediment samples were collected between the backshore berm or dune and the -12 ft. NGVD contour line. One profile (R-93) was located within the Mid-Reach segment.

4.2 Recent Investigation

In November 2005, an investigation on the Mid-Reach native beach was performed by USACE. During the investigation, surface beach samples were collected throughout the project domain along 5 cross-shore transects that were located at the DEP survey monuments R-83, R-93, R-99, R-105 and R-109, as shown in Figure 5. At each of these transects, 7 sediment samples were collected between backshore dune face and 20 ft below mean low water line (MLW), with exception of R-99 where one sample (#1) was unable to be collected due to lack of sediment.

All of the beach samples and the composite samples of each cross-shore transect were laboratory analyzed to characterize the sediments of the native beach. This analysis defined the initial criteria for compatibility assessment of the sand from the borrow source. The grain size statistics for the composite samples of cross-shore transects and along-shore profiles were developed by using the moment method provided by the US Corps of Engineer, Coastal Engineering Manual (EM 1110-2-1100), and the results are summarized in Table 3. The laboratory data and grain size curves are presented in Sub-appendix A.

4.3 Sediment Characteristics of the Native Beach

The native beach sediments at the Mid-Reach shore consist predominately of greenish or light grey colored, fine to medium grained quartz and carbonate sand with variable amount of shell fragments. The median grain diameter (D_{50}) of its composite sample is 0.26 mm.

The grain size statistics in Table 3 show that the mean grain sizes of composite samples of cross-shore transects (R-83, R-93, R-99, R-105 and R-109) range from 0.24 to 0.36 mm with an average of 0.31 mm (1.75 phi). The standard deviations, which represent sorting values, of the composites range between 1.10 to 1.85 phi, with an average of 1.51 phi that represents poorly sorted sediments. The silt contents (passing #230 sieve) in composite samples range from 1.8 percent to 3.6 percent with an average of 2.6 percent. The gravel contents vary from 0 to 4.7 percent with an average of 1.9 percent.

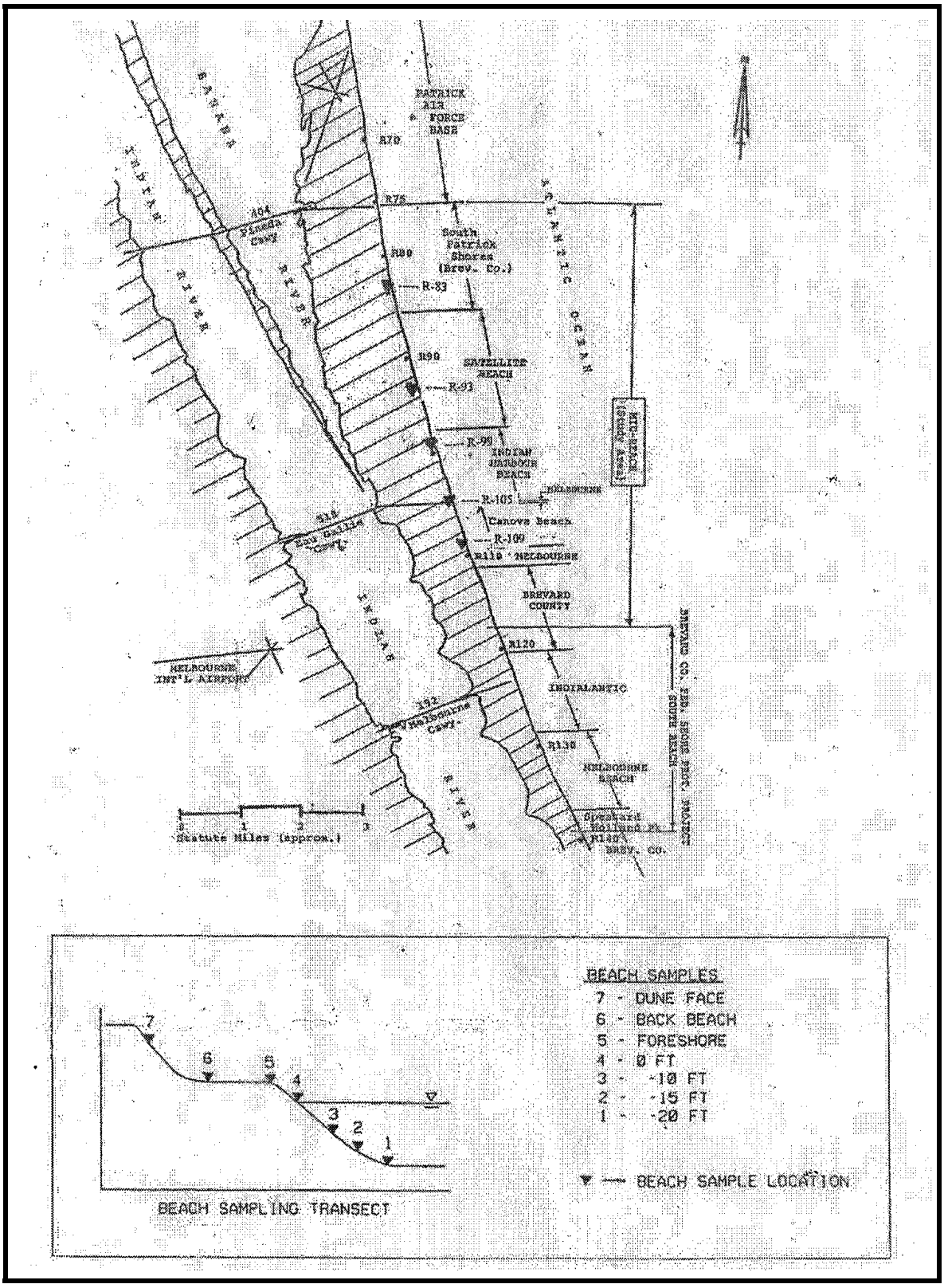

Figure 5. Sampling Locations at Mid-Reach Native Beach

Grain size statistics for the composite samples along-shore direction throughout the project domain were also developed. Three composite groups including berm/upper-beach, near-water and nearshore were created mathematically. The berm/upper-beach composite sample is combined with samples of #5, #6 and #7 from each sampling transect, and the nearshore composite sample is combined by samples of #1, #2 and #3 from each sampling transect. The near-water sample is combined by samples of #4 located along the waterline (elevation 0.0). The grain size characteristics of the along-shore composites in Table 3 show that the berm/upper-beach sample contains 0.4 percent of silt and 0.3 percent of gravel, with a mean grain size of 0.45 mm (1.16 phi), and standard deviation of 0.91 phi that represents moderately sorted sand. More fine and coarse sediments were found in nearshore composite that contains 4.6 percent of silt and 1.4 percent of gravel, with a mean grain size of 0.17 mm (2.66 phi), and standard deviation of 1.22 phi that indicates poorly sorted sediment. The coarsest sediments were found in near-water composite that contains 7.7 percent of gravel and 0.9 percent of silt, with a mean grain size of 1.16 mm (-0.22 phi), and standard deviation of 1.34 phi indicating poorly sorted sediment.

The overall character of the native beach sediments along-shore direction is fairly uniform. The berm/upper beach sediments consist of moderately sorted sand with small percentages of silt and gravel. The nearshore sediments (below water level) consist of higher percentages of silt and fine sized sand. The sediments near waterline consist predominately of medium to coarse sand-sized shell fragments or carbonate sand with some gravel-sized shell fragments or whole shells, demonstrating the most noticeable variances in grain size.

Table 3.

Sediment Character and Statistical Analyses of the Native Beach and Borrow Area II

SAMPLES	GRAIN SIZE MEAN (mm)	(phi)	SILT (#230 sieve) %	SAND %	GRAVEL* (#4 sieve) %	ST. DEV (Sorting) (Phi)	COLOR
CSII Borrow Area Composite							
Composite	**0.39**	**1.36**	**0.0**	**98.5**	**1.5**	**1.0**	
Mid-Reach Native Beach							
R-83	0.24	2.17	3.6	95.9	0.5	1.10	Greenish grey
R-93	0.31	1.74	1.8	94.4	3.8	1.72	Greenish grey
R-99	0.35	1.57	2.5	97.1	0.4	1.48	Lt. grey
R-105	0.36	1.52	2.7	92.6	4.7	1.85	Lt. greenish grey
R-109	0.31	1.73	2.6	97.4	0	1.19	grey
Composite	**0.31**	**1.75**	**2.6**	**95.5**	**1.9**	**1.51**	
Upper beach	0.45	1.16	0.4	99.3	0.3	0.91	
Near-water	1.16	-0.22	0.9	91.4	7.7	1.34	
Nearshore	0.17	2.66	4.6	94.0	1.4	1.22	

Notes: * Based on the data availability, #5 sieve is used for CSII materials, while #4 sieve is used for native beach. CSII composite data are based on Olsen Associates, 2004.

5.0 SUITABILITY ANALYSIS

In view of the different sediment characteristics between the borrow material and native beach material, a comparative analysis on the suitability of the borrow materials has been conducted. Based on comparative analysis of suitability and compatibility between the CS-I borrow area and the native beach, at the time of the Army Corps of Engineers Shore Protection Study in 1995, the material is suitable and compatible with the native beach materials. The mean composite grain size of the sediments within borrow area CS-I was 0.30 mm (1.75 phi) with a standard deviation of 1.03 phi. The overfill factor of the borrow material from CS-I is 1.0, when compared to the native beach at the time of Shore Protection Study.

The textural parameters and the results of grain size statistics for both of the native beach and the CSII borrow sources are summarized in Table 3. Comparing with the composite borrow materials, the composite native beach is finer and contains more silt (2.6 percent) than the borrow materials, which contain no silt. Figure 6 shows the composite grain size distribution for both the native beach (denoted composite) and the borrow materials (denoted BA-CSII). The composite median grain diameters (D_{50}) for the borrow material and the native beach are 0.34 mm and 0.26 mm, respectively, indicating that the median grain size of the borrow material exceeds that of the native beach by 0.08 mm. The borrow material is considered suitable for the Mid-Reach beach, because it is better sorted and contains less gravel and silt than the native beach does. An advantage of using coarser materials for beach nourishment is that the coarser materials could provide an improved resistance to storm-induced erosion. It shall expect, however, that fills with coarse materials may produce a noticeable steeper beach, which may become a design issue.

Comparing the frequency weight percent curves of the composite native beach and the borrow material as depicted in Figure 7, there is a difference in grain size characteristics between the borrow material and the native beach. The grain size of composite borrow material demonstrates a near Gaussian (normal) distribution; while the composite native beach shows a non-normal distribution due to a high percentage of silt and fine sand. On Figure 8, the frequency weight percent curves of the composite borrow material and the native beach composites along-shore direction demonstrates a different picture. The borrow material is mush coarser than the nearshore composite that demonstrates a highly skewed distribution toward fine size; while the borrow materials are fairly similar with the characteristics of the berm/upper beach composite that also has a near Gaussian distribution.

An analysis of compatibility of the borrow material with the native beach has also been conducted. An overfill factor has been estimated by using the method provided by the Coastal Engineering Manual (EM 1110-2-1100). The overfill factor reflects the portion of borrow material that does not match the native sediment grain size distribution and fines are assumed to be lost to the offshore. Conceptually, the overfill factor is the volume of borrow material required to produce a stable unit of usable fill material with the same grain size characteristics as the native beach sand. The estimated overfill factor of the borrow material in the CS-II borrow area is 1.05, when compared to the project beach. The overfill factor of 1.05 suggests that the

borrow material is compatible with the native beach sediments, and it will require approximately 5 percent overfill materials from the CS-II borrow area for the beach nourishment project at the Mid-Reach segment.

As the borrow area material will be dredged and placed into an upland holding area prior to truck haul and placement on the beach, the borrow material will require QA/QC. This is to make certain that any segregation of material from placement in the stockpile site is monitored so that the material meets minimum criteria for beach compatible material before being placed on the beach. Mixing or exclusion of material may be required.

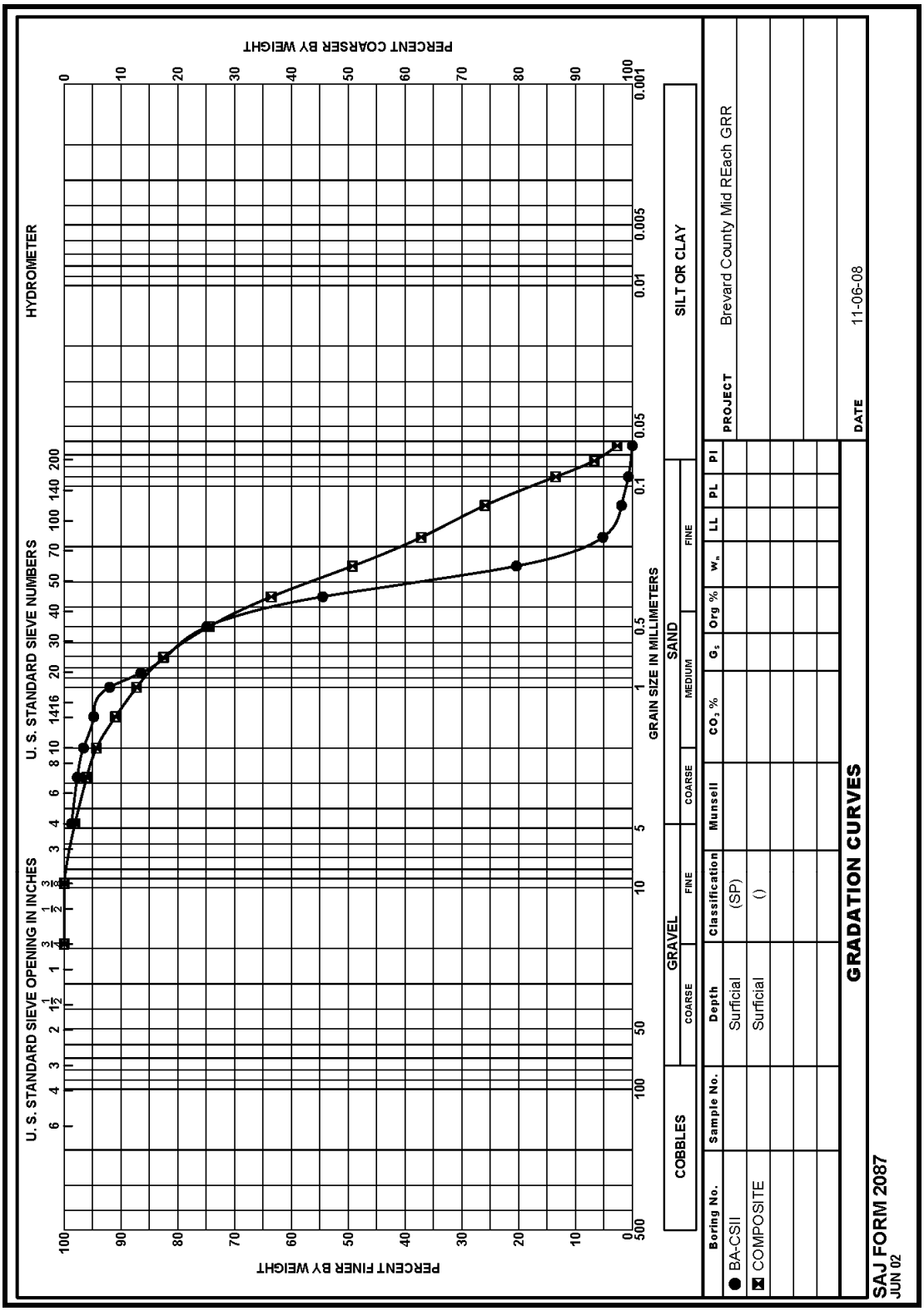

Figure 6. Composite cumulative weight percent curve of the native beach and the borrow materials

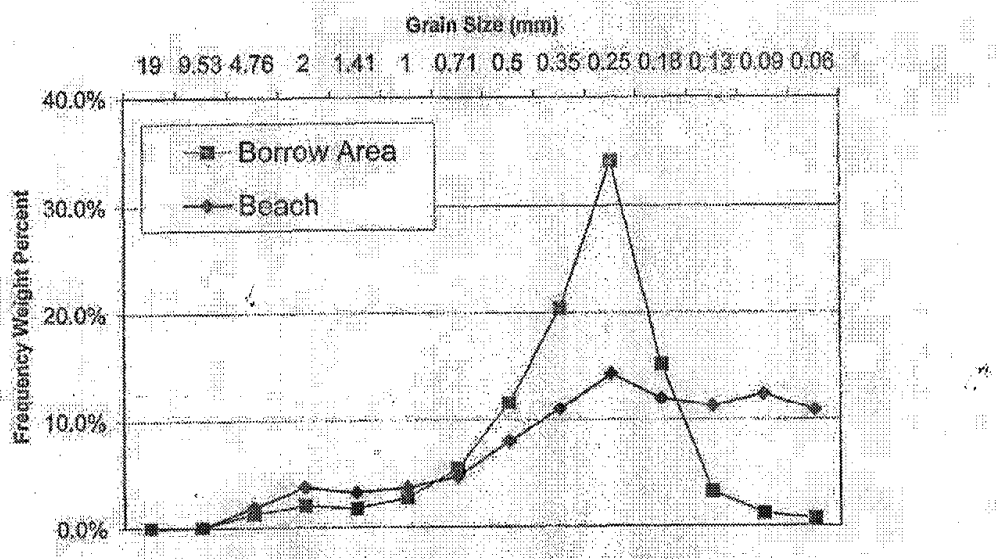

Figure 7. Composite frequency weight percent curves for the native beach and the borrow materials

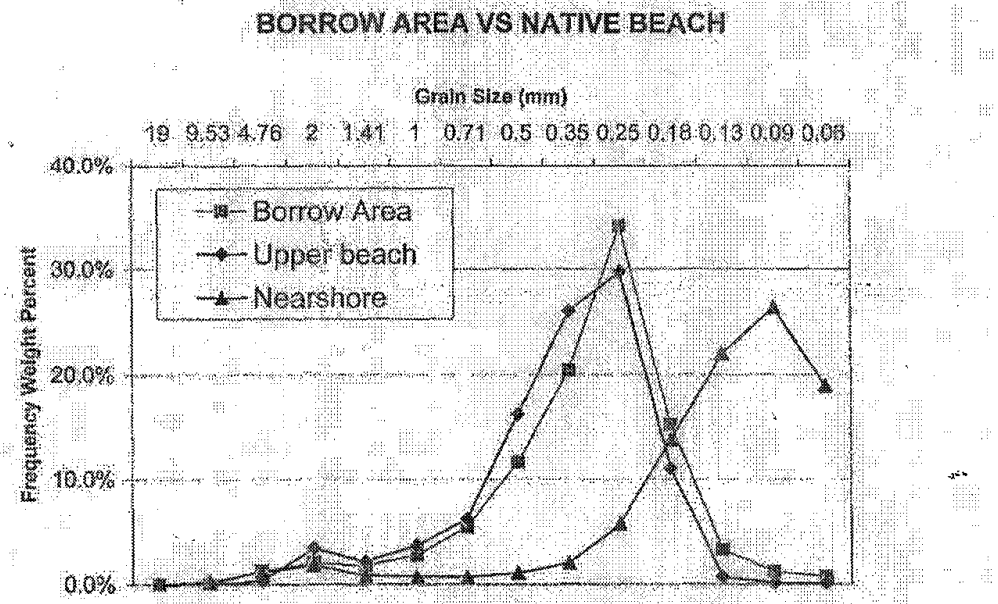

Figure 8. Composite frequency weight percent curves for the upper beach, nearshore and the borrow materials

6.0 CONCLUSIONS

The Canaveral Shoals Borrow Areas, CS-I and CS-II were both found to contain beach quality sand. Borrow area CS-I is estimated to contain 16 mcy of beach quality sand and has not yet been dredged. Borrow area CS-II has been dredged several times since September 2000 in support of beach re-nourishment projects along the Brevard County shoreline. The remaining volume of the sand in the borrow area is approximately 21.3 mcy (cultural exclusion areas being deducted), based on the most recent survey of 2005.

During the recent investigation, Mid-Reach native beach samples were collected along 5 cross-shore transects located at five DEP Monuments: R83, R93, R99, R105 and R109. The native beach sediments consist predominately of greenish or light grey colored, fine to medium grained quartz and carbonate sand with variable amount of shell fragments. The composite sample is poorly sorted consisting of 2.6 percent silt and 1.9 percent gravel with a mean size of 0.31 mm. The median grain diameter (D_{50}) of the composite sample is 0.26 mm. The overall character of the native beach sediments along-shore direction is fairly uniform. The berm/upper beach sediments consist of moderately sorted sand with small percentages of silt and gravel. The nearshore sediments (below water level) consist of higher percentages of silt and fine sized sand. The sediments near waterline consist predominately of medium to coarse sand-sized shell fragments or carbonate sand with some gravel-sized shell fragments or whole shells, demonstrating the most noticeable variances in grain size.

Based on the comparative analyses of suitability and compatibility between the CS-II borrow material and the native beach, the material is suitable and is compatible with the native beach materials. The overfill factor of the borrow material from CS-II is 1.05 when compared to the native beach. The value of the overfill factor suggests that it will require approximately 5 percent overfill materials for the Mid-Reach beach nourishment when using the borrow materials from the CS-II borrow area. Although CS-I and CS-II both contain beach quality sand, borrow area CS-II is the preferred borrow area due to the anticipated increased cost of using small hopper dredges at borrow area CS-I

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SECTION 404(B) EVALUATION

SECTION 404(b) EVALUATION
ENVIRONMENTAL IMPACT STATEMENT
ON
BREVARD COUNTY MID REACH SHORE PROTECTION PROJECT
BREVARD COUNTY, FLORIDA

I. Project Description

a. Location. The proposed work will be performed along the Atlantic Ocean shoreline of Brevard County, Florida. The proposed activity includes sand borrow areas offshore of Cape Canaveral, temporary stockpiling of sand in an upland disposal area at Canaveral Harbor/Cape Canaveral Air Station, and placement of beach fill and nearshore reef structures along 7.8 miles of shoreline between Patrick Air Force Base and Indialantic, between FDEP reference monument locations R75.4 and R119. See Figure 2-1 in the main text.

b. General Description. The project includes the following principal activities. Beach-quality sand will be excavated by hopper dredge from the Canaveral Shoals I or II offshore borrow areas (located in State and Federal waters, respectively). The excavated sand will be hydraulically discharged to, and temporarily stockpiled within, the Poseidon Dredged Material Management Area (DMMA) near the north bank of the Canaveral Harbor basin at Cape Canaveral Air Station. Initial maintenance activities of the DMMA will be undertaken to rehabilitate the banks and water control structures of the DMMA. Sand stockpiled within the DMMA will be mechanically excavated and transported by truck-haul to the Mid Reach project area shoreline and placed as dune and/or beach-face fill. Approximately 4.8 acres of artificial reef structures will be placed in various locations along the project area shoreline, about 1000-ft from shore along the -15 ft MLW depth contour, more or less. The reef structures will consist of articulated concrete mats with coquina rock surface. The surface of the placed reef structures shall be at depths of between approximately 12.4 and 14.6 feet, MLW. The project activity includes monitoring of the borrow, beach fill, nearshore hardbottom and mitigation reef areas. The anticipated renourishment requirement for the fill placement is in approximately three year intervals after initial construction. Dredging of the offshore borrow area for upland stockpiling is anticipated to be in approximately six year cycles after initial construction. Placement of sand fill will be in the form of dune restoration and maintenance along the northern 1.4 miles of the Mid Reach shoreline (“Reach 6”) and dune- and beach-face fill along the southern 6.2 miles of Mid Reach shoreline (“Reaches 1 through 5”). The latter will widen the beach by between 10 and 30 feet, depending upon location.

c. Authority. A general re-evaluation report for Brevard County, Florida was authorized by the Water Resources Development Act of 2000, which stated

"The Secretary shall prepare a general reevaluation report on the project for shoreline protection, Brevard County, Florida, authorized by section 101(b)(7) of the Water Resources Development Act of 1996 (110 Stat. 3667), to determine, if the project were modified to direct the Secretary to incorporate in the project any or all of the 7.1 mile reach of the project that was deleted from the south reach of the project, as described in paragraph (5) of the Report of the Chief of Engineers, dated December 23, 1996, whether the project as modified would be technically sound, environmentally acceptable, and economically justified."

Additional language concerning the Mid-Reach was included in the Water Resources Development Act of 2007, as follows.

SEC. 3045. BREVARD COUNTY, FLORIDA.
"(a) SHORELINE.—The project for shoreline protection, Brevard County, Florida, authorized by section 101(b)(7) of the Water Resources Development Act of 1996 (110 Stat. 3667), is modified to authorize the Secretary to include the mid-reach as an element of the project from the Florida department of environmental protection monuments R-75.4 to R-118.3, a distance of approximately 7.6 miles. The restoration work shall only be undertaken upon a determination by the Secretary, following completion of the general reevaluation report authorized by section 418 of the Water Resources Development Act of 2000 (114 Stat. 2637), that the shoreline protection is feasible.''

d. General Description of Dredged or Fill Material.

(1) General Characteristics of Material. The median grain size of the CS-I borrow area ranges from about 0.18 to 0.3 mm (about 0.27 mm on composite average), with fine sediment content typically less than 3% finer than #200 and #230. The median grain size of the CS-II borrow area ranges from approximately 0.3 to 0.4 mm (about 0.34 mm on composite average), with average carbonate fraction of about 39%. The fine sediment content of the material is less than 2% to 3% by core-boring and less than 0.5% (finer than #200 sieve) measured in-place on the beach.

(2) Quantity of Material. The total project requirement for the proposed beach fill activity along the Mid Reach is estimated to be about 3.2 million cubic yards, of which up to about 580,000 cubic yards is to be placed for initial construction. The total project requirement for the remainder of the 50-year life of the Brevard County Shore Protection (North and South Reaches), including the proposed project, is estimated to be about 12 million cubic yards.

(3) Source of Material. The two borrow areas proposed as the beach fill source, Canaveral Shoals I and II, are located from about 5 nautical miles east-northeast and about 7.8 nautical miles east of the entrance to Canaveral Harbor, in State and Federal (Outer Continental Shelf) waters, respectively, in water depths of about 20 feet to 45 feet (MLW). The Canaveral Shoals II offshore borrow area has been previously dredged for purposes of beach fill

placement along the Brevard County Shore Protection Project (North and South Reaches) and Patrick Air Force Base from 2000 through 2005. In the event that insufficient quantities of offshore sand are available in the upland stockpile, then interim use of upland borrow sources may be used. Sand from these sources shall be compatible with the native beach and conform to State of Florida standards for use as beach fill.

e. Description of the Proposed Discharge Site.

(1) Location. Dredged sand from the offshore borrow areas shall be initially discharged to the existing Poseidon DMMA near the north bank of the Canaveral Harbor basin at the Cape Canaveral Air Station (CCAS) and Naval Ordinance Testing Unit (NOTU). After dewatering, the sand will be periodically removed from the DMMA site, by truck-haul, and placed as dune and/or beach-face fill along the 7.8-mile Atlantic Ocean shoreline of the Mid Reach, between FDEP reference monuments R75.4 (south end of Patrick AFB) and R119 (north end of existing Brevard County Shore Protection Project, South Reach). The mitigation reef structures shall be placed in various locations along the 7.8-mile Mid Reach shoreline, approximately 1000 feet seaward of the shoreline, in existing water depths of about 15 feet (mean low water).

(2) Size. The Poseidon DMMA covers approximately 69 acres. The total project beach fill area comprises 7.8 miles of shoreline. The constructed mitigation reefs shall comprise about 4.8 acres of seabed, in aggregate total.

(3) Type of Site. The Poseidon DMMA is a confined upland dredged material disposal area that has been previously utilized for the purpose of stockpiling hydraulically dredged sediment. The sites for disposal (truck-haul placement) of the sand fill material are segments of eroded, sandy, recreational beach with naturally occurring rock hardgrounds that are variously exposed along and seaward of the low water shoreline. The seabed sites at which the submerged mitigation reef structures shall be placed consists of fine, barren sand with no known subsurface rock (within at least 10 feet below the seabed) or adjacent hardgrounds.

(4) Type of Habitat. The Poseidon DMMA is a confined, disturbed upland habitat. The beach fill disposal site is a supratidal dry beach and high energy intertidal environment. The placement site for the

mitigation structures is a submerged, normally turbid, energetic sand seabed habitat.

(5) Timing and Duration of Discharge. The exact timing of initial construction is not known at the time of submittal of the Draft Supplemental Environmental Impact Statement. It is anticipated that construction will begin in 2010 or 2011 and will take approximately 12 to 24 months to complete, including construction of the mitigation reef. Discharge (placement) of sand to the beach project area will be limited to November 1 through April 30, with special conditions for environmental protection implemented for construction from March 1 through April 30, and from November 1 through 30 (early and late marine turtle nesting season, respectively). No calendar restrictions are proposed for offshore dredging and discharge to the Poseidon DMMA or construction of the mitigation reef structures.

f. Description of Disposal Method. Sediment from the offshore borrow areas will be obtained using a hopper dredge with pumpout capability for subsequent hydraulic discharge to the Poseidon DMMA. Sediment will be removed from the DMMA, transported to, and placed and graded along the beach project area by truck-haul and other mechanical grading equipment.

II. Factual Determinations

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope. Details will available with the final design.

(2) Sediment Type. Sand from the borrow areas is fine to coarse grained quartz sand with varying amounts of small broken shell fragments. See also I.d(1) above.

(3) Dredge/Fill Material Movement. The fill material will be subject to cross-shore erosion by waves with alongshore movement to both the north and south, and with principal net movement of fill material to the south.

(4) Physical Effects on Benthos. The placement of sand on the beach face will result in the burial and loss of most of the beach infauna. Key components of these assemblages are surf clam and mole crab. With adequate recruitment, surf zone infauna including surf clams and mole crabs should recover within one year after completion of construction if the sedimentary characteristics of the

restored beach are adequate and as described above and indicated by prior analogous use of the proposed borrow area sediments.

b. Water Circulation, Fluctuation and Salinity Determination.

(1) Water Column Effects. Fill placement will not have long-term or significant impacts, if any, on salinity, water chemistry, clarity, color, odor, taste, dissolved gas levels, nutrients or eutrophication.

(2) Current Patterns and Circulation. Currents in the project area are both tidal and longshore. Net movement of water due to the longshore current is typically from the north to the south.

(3) Normal Water Level Fluctuations and Salinity Gradients. Tides in the project area are semi-diurnal. Elevations of mean high water and mean low water tidal datum in Brevard County are approximately 2 feet above and 1.9 feet below the NGVD'29 vertical datum.

c. Suspended Particulate/Turbidity Determinations.

(1) Expected Changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Disposal Site. There will be a temporary increase in turbidity levels in the waters adjacent to the Poseidon DMMA during hydraulic discharge and a potential temporary increase in turbidity levels in the waters adjacent to the Mid Reach project area shoreline during mechanical placement of the sediment to the beach face. Turbidity will be short-term and localized and no significant adverse impacts are expected. State standards for turbidity should not be exceeded during construction. Prior analogous use of the proposed borrow area sediment has not resulted in exceedence of stipulated State turbidity or water quality standards.

(2) Effects on the Chemical and Physical Properties of the Water Column.

(a) Light Penetration. The placement and spread of fill on the beach will increase turbidity in the nearshore area during construction. Because the immediate nearshore area is a high wave energy system and subject to naturally occurring elevated turbidity and sediment, increases due to project construction should not be significant. A nearshore turbidity monitoring program with a plume mixing zone of 150 meters from the hydraulic dredge and discharge sites will be implemented during construction. Turbidity will be monitored

during construction, and State standards for turbidity should not be exceeded. A nearshore monitoring program will be implemented to assess the potential secondary impacts of sedimentation and turbidity to nearshore hardbottom communities adjacent to the equilibrium toe of fill.

(b) Dissolved Oxygen. Dissolved oxygen levels will not be altered by this project.

(c) Toxic Metals, Organics, and Pathogens. No toxic metals, organics, or pathogens will be released by the project.

(d) Aesthetics. Aesthetic quality will be reduced during that period when work is occurring. There will be a long term increase in aesthetic quality of the beach once the work is completed.

(3) Effects on Biota.

(a) Primary Productivity and Photosynthesis. The level of suspended particles will temporarily increase in the surf zone during construction. Suspended material will prevent light from reaching existing algae temporarily restricting photosynthesis and primary productivity in local areas. Potential secondary impacts of chronic turbidity and sedimentation will be assessed for the nearshore hardbottom communities during the post-construction monitoring.

(b) Suspension/Filter Feeders. Suspension feeders will experience short-term impacts during construction, but no long-term adverse impact.

(c) Sight Feeders. Visual feeders will experience short term impacts, but no long-term adverse impact.

(d) Contaminant Determinations. Deposited fill material will not introduce, relocate, or increase contaminants.

(e) Aquatic Ecosystem and Organism Determinations. The grain size characteristics and composition exhibited by the proposed fill material are similar to those of the existing beach sediments. Therefore, no sediment related impacts are expected. The proposed fill material meets the exclusion criteria, therefore, no additional chemical-biological testing will be required.

(1) Effects on Plankton. Although short term effects (e.g., clogging of feeding appendages) on plankton are likely, no adverse long-term impacts to planktonic organisms are anticipated.

(2) Effects on Benthos. Adverse long-term impacts to non-motile or motile benthic invertebrates on nearshore hardbottom habitat and soft bottom habitat are anticipated. Impacts to hardshore habitat will be offset by the installation of suitable mitigative (replacement) reef habitat.

(3) Effects on Nekton. No adverse long-term impacts to nektonic species are anticipated.

(4) Effects on the Aquatic Food Web. No adverse long-term impacts to any trophic group in the food web are anticipated.

(5) Effects on Special Aquatic Sites.

(a) Coral Reefs. There are no coral reefs located within the proposed dredge and disposal areas.

(b) Sanctuaries and Refuges. There are no sanctuaries or wildlife refuges located within the proposed dredge and disposal areas.

(c) Wetlands. There are no wetlands located within the proposed dredge and disposal areas.

(d) Mud Flats. There are no mud flats located within the proposed dredge and disposal areas.

(e) Vegetated Shallows. There are no seagrass beds located within or adjacent to the dredge, Poseidon DMMA stockpile, beach fill or mitigation reef sites.

(6) Endangered and Threatened Species. There will be no significant impacts on any threatened or endangered species from the proposed project. No designated Critical Habitat of any threatened or endangered species is located within the project area. Sea turtle nesting may occur in the project area during the time that dredging and beach disposal takes place. If construction occurs during the nesting season, a nest monitoring and relocation program will be implemented as recommended by the USFWS. Protection measures for manatees, whales, shorebirds, gopher

tortoise, southeastern beach mice and indigo snake will be followed to minimize the potential for harm to these species.

(7) Other Wildlife. No significant adverse impacts to small foraging mammals, reptiles, wading birds, or wildlife in general are expected.

(8) Actions to Minimize Impacts. All practical safeguards will be taken during construction to preserve and enhance environmental, aesthetic, recreational, and economic values in the project area. Specific precautions that will be implemented in conjunction with the proposed project are discussed elsewhere in this 404(b) evaluation and in the Draft Supplemental Environmental Impact Statement for the project.

f. Proposed Disposal Site Determinations.

(1) Mixing Zone Determination. The fill material will not cause unacceptable changes in the mixing zone specified in the Water Quality Certification in relation to: depth, current velocity, direction and variability, degree of turbulence, stratification, or ambient concentrations of constituents.

(2) Determination of Compliance with Applicable Water Quality Standards. Because of the inert nature of the fill material, State water quality standards will not be violated. Turbidity monitoring will be implemented as stipulated by State permits

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supplies. No municipal or private water supplies will be impacted by the implementation of the project.

(b) Recreational and Commercial Fisheries. Recreational and commercial fisheries will not be permanently impacted by the disposal of dredged material on the beach. Minor or temporary adverse impacts to recreational fishing along the beach fill area may result from impacts to the nearshore hardbottom immediately along the shoreline; however, this may be evident as a seaward translocation of the fishing resource coincident with the addition of beach fill. There may be minor increased, or new, opportunity for recreational fishing associated with the mitigation reef structures constructed along the shoreline.

(c) Water Related Recreation. Beach recreation will be enhanced by the nourishment of the beach. Nearshore snorkeling and fishing may be temporarily affected by increased turbidity in the vicinity of fill sites. The presence of construction-related equipment will create public safety risks at the beach sites. The creation of 4.8 acres of nearshore mitigative reef should provide alternate snorkeling/SCUBA habitat accessible from the beach. Adverse impacts to swimming and surfing are not anticipated because of the narrow scale of beach fill to be placed immediately along the beach face, landward of locations where swimming and surfing occur. The presence of the mitigation reefs may result in a minor, but not significant, effect to surfing conditions associated with the structures' slight elevation of the seabed well seaward of the normal zone of wave breaking.

(d) Aesthetics. The stabilization of an eroding beach will improve aesthetics of the beach.

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. There are numerous non-federal beach recreation areas, including parks and facilities, located along the beach fill project area. The proposed activity is anticipated to maintain or improve beach recreation opportunities associated with these parks. There are no other national and historic monuments, national seashores, wilderness areas, research sites and similar preserves located within the project areas.

(f). Determination of Cumulative Effects on the Aquatic Ecosystem. As long as the characteristics (low proportion of fines) of fill material remain consistent with previous projects, there will be no significant cumulative impacts that result in a major impairment of water quality of the existing aquatic ecosystem as a result of placement of fill at the project site. The construction of 4.8 acres of mitigation reef will compensate for anticipated impacts to 3.0 acres of existing nearshore hardbottom along the project area shoreline. Previous monitoring has indicated no net cumulative, adverse effect to the exposure of existing nearshore hardbottom along or adjacent to prior beach nourishment activities conducted since at least 2005. No cumulative impacts to turtles, fish or wildlife have been documented.

(g). Determination of Secondary Effects on the Aquatic Ecosystem. No adverse secondary effects of the placement of the fill material are anticipated. Long-term monitoring will document potential secondary impacts of turbidity and sedimentation upon adjacent hardbottom habitats.

III. Findings of Compliance or Non-compliance with the Restrictions on Discharge.

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. No practicable alternative exists which meets the study objectives that does not involve discharge of fill into waters of the State of Florida and/or United States.

c. After consideration of disposal site dilution and dispersion, the discharge of fill materials will not cause or contribute to, violations of any applicable State

water quality standards for Class III waters. The discharge operation will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

d. The Brevard County (Mid Reach) Shore Protection Project will not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973, as amended.

e. The placement of fill material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic species and other wildlife will not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values will not occur.

f. On the basis of the guidelines, the proposed disposal site for the discharge of dredged material is specified as complying with the requirements of these guidelines.

APPENDIX G

COASTAL ZONE MANAGEMENT CONSISTENCY

FLORIDA COASTAL ZONE MANAGEMENT PROGRAM
FEDERAL CONSISTENCY EVALUATION PROCEDURES

BREVARD COUNTY MID REACH SHORE PROTECTION PROJECT
BREVARD COUNTY, FLORIDA

1. Chapter 161, Beach and Shore Preservation. The intent of the coastal construction permit program established by this chapter is to regulate construction projects located seaward of the line of mean high water and which might have an effect on natural shoreline processes.

Response: The proposed plans and information will be submitted to the state in compliance with this chapter.

2. Chapters 186 and 187, State and Regional Planning. These chapters establish the State Comprehensive Plan which sets goals that articulate a strategic vision of the State's future. It's purpose is to define in a broad sense, goals, and policies that provide decision-makers directions for the future and provide long-range guidance for an orderly social, economic and physical growth.

Response: The proposed project has been coordinated with various Federal, State and local agencies during the planning process. The project meets the primary goal of the State Comprehensive Plan through preservation and protection of the shorefront development and infrastructure.

3. Chapter 252, Disaster Preparation, Response and Mitigation. This chapter creates a state emergency management agency, with the authority to provide for the common defense; to protect the public peace, health and safety; and to preserve the lives and property of the people of Florida.

Response: The proposed project involves the placement of beach compatible material onto an eroding beach as a protective means for residents, development, and infrastructure located along the Atlantic shoreline within Brevard County. Therefore, this project would be consistent with the efforts of Division of Emergency Management. Appropriate mitigation for unavoidable impacts to nearshore hardbottom habitat has been proposed.

4. Chapter 253, State Lands. This chapter governs the management of submerged state lands and resources within state lands. This includes archeological and historical resources; water resources; fish and wildlife resources; beaches and dunes; submerged grass beds and other benthic communities; swamps, marshes and other wetlands; mineral resources; unique natural features; submerged lands; spoil islands; and artificial reefs.

Response: The proposed beach nourishment would create increased recreational beach and potential sea turtle nesting habitat. No seagrass beds, swamps, marshes and other wetlands; mineral resources; unique natural features; spoil islands; and artificial reefs are located within or adjacent to the areas proposed for dredging, disposal, beach fill placement, or mitigation. The proposed project would comply with the intent of this chapter.

5. Chapters 253, 259, 260, and 375, Land Acquisition. This chapter authorizes the state to acquire land to protect environmentally sensitive areas.

Response: No land acquisition is proposed in this project.

6. Chapter 258, State Parks and Aquatic Preserves. This chapter authorizes the state to manage state parks and preserves. Consistency with this statute would include consideration of projects that would directly or indirectly adversely impact park property, natural resources, park programs, management or operations.

Response: There are no state parks or preserves within or along the project area.

7. Chapter 267, Historic Preservation. This chapter establishes the procedures for implementing the Florida Historic Resources Act responsibilities.

Response: No significant impacts to historical properties are expected from construction of the proposed Brevard County Mid Reach Shore Protection Project based upon the results of site investigations and this coordination.

8. Chapter 288, Economic Development and Tourism. This chapter directs the state to provide guidance and promotion of beneficial development through encouraging economic diversification and promoting tourism.

Response: The proposed beach nourishment would provide more space for recreation and the protection of recreational facilities along the receiving beach. This would be compatible with tourism for this area and therefore, is consistent with the goals of this chapter.

9. Chapters 334 and 339, Public Transportation. This chapter authorizes the planning and development of a safe balanced and efficient transportation system.

Response: No public transportation systems would be impacted by this project.

10. Chapter 370, Saltwater Living Resources. This chapter directs the state to preserve, manage and protect the marine, crustacean, shell and anadromous fishery resources in state waters; to protect and enhance the marine and estuarine environment; to regulate fishermen and vessels of the state engaged in

the taking of such resources within or without state waters; to issue licenses for the taking and processing products of fisheries; to secure and maintain statistical records of the catch of each such species; and, to conduct scientific, economic, and other studies and research.

Response: The proposed project is expected to impact approximately 3 acres of nearshore hardground by the placement, and subsequent movement, of sand fill along the existing beach. These impacts are expected to be located along the southern 6.4 miles of the 7.6-mile long Mid Reach shoreline. The anticipated impact area (3 acres) represents approximately 7% of the total area of exposed hardgrounds measured in June 2004, comprising about 31.3 acres along the Mid-Reach and an additional, adjacent 11.2 acres along the southern mile of the Patrick Air Force Base shoreline. Adverse impacts to saltwater living resources shall result along that portion of the existing hardgrounds that are impacted (i.e., by burial or sedimentation) by the project. The habitat and biota along the existing nearshore hardgrounds are characterized by an area of naturally high turbidity, sedimentation, and large temporal variations in rock exposure and burial. The impacts from the proposed project are anticipated to occur mainly along the inshore (landward) portion of the hardgrounds which typically features the greatest natural degree of sedimentation. Impacts from the project are anticipated to be temporal; i.e., decreasing from about 3 acres to less than 2 acres between beach renourishment events, anticipated to occur in approximately 3-year cycles.

The project formulation has sought to avoid, minimize and mitigate impacts to the nearshore hardbottom and associated saltwater living resources. To compensate for the estimated 3-acres of impacts to the nearshore rock hard grounds, the project will construct approximately 4.8 acres of mitigation reef along the project area. The mitigation reef will consist of articulated concrete mats with coquina-rock surface, intended to emulate the physical relief and surface of the naturally occurring rock hardgrounds. The reef structures will be constructed in approximately 15 ft water depth, about 1000-feet from the Mid Reach shoreline. The placement depth of the reef was established as far landward (in shallow water) as concluded to be possible in view of practical, physical limitations. (See Appendix SEIS-F). Observations and measurements on pilot-project reef structures, placed in the same water depths and locations proposed for the mitigation structures, indicate that the mitigation reef is reasonably expected to foster recruitment and coverage of algae, worm-rock and other epifauna that is similar to that of the impacted nearshore rock. (See Appendix SEIS-D and SEIS-E.) Overall, it is estimated that the mitigation reefs should restore about 75% of the lost ecological functions across that portion of the hard grounds that will be impacted. (See Appendix SEIS-G.) Multi-year biological and physical monitoring shall be conducted to assess impacts to hard ground and performance of the mitigation reef relative to project expectations. (See Appendix SEIS-J.)

The beach fill material (sediment) proposed for the project is beach compatible and features very low fine-sediment content (<2%). The Canaveral Shoals I (CS-I) borrow area is located in State of Florida waters, and the Canaveral Shoals II (CS-II) borrow area is in Federal waters of the Outer Continental Shelf. Both contain large quantities of beach compatible material (over 50 million cubic yards in total), and neither are located in the vicinity of seagrasses, hardgrounds or similarly sensitive environmental resources. The CS-II borrow area has been utilized as an offshore source of beach fill sediment along Brevard County on numerous occasions from 2000 through 2005. Material placed to the beach from this borrow area has demonstrated suitability for marine turtle nesting and hatching success. Prior dredging and disposal of this material has not resulted in turbidity levels that approach or exceed State water quality standards. Placement of the fill material to the beach project area shall be by mechanical (truck-haul) means after the material has previously been hydraulically discharged and settled within an upland disposal area. There are no pipelines, anchors or other physical structures to be placed along the nearshore hardgrounds during construction. This shall further minimize the effects of turbidity and/or direct mechanical impacts to the existing nearshore hardgrounds and associated saltwater living resources.

11. Chapter 372, Living Land and Freshwater Resources. This chapter establishes the Game and Freshwater Fish Commission and directs it to manage freshwater aquatic life and wild animal life and their habitat to perpetuate a diversity of species with densities and distributions which provide sustained ecological, recreational, scientific, educational, aesthetic, and economic benefits.

Response: The project will have no significant effect on freshwater aquatic life or wild animal life.

12. Chapter 373, Water Resources. This chapter provides the authority to regulate the withdrawal, diversion, storage, and consumption of water.

Response: This project does not involve water resources as described by this chapter.

13. Chapter 376, Pollutant Spill Prevention and Control. This chapter regulates the transfer, storage, and transportation of pollutants and the cleanup of pollutant discharges.

Response: The contract specifications will prohibit the contractor from dumping oil, fuel, or hazardous wastes in the work area and will require that the contractor adopt safe and sanitary measures for the disposal of solid wastes. A spill prevention plan will be required.

14. Chapter 377, Oil and Gas Exploration and Production. This chapter authorizes the regulation of all phases of exploration, drilling, and production of oil, gas, and other petroleum products.

Response: This project does not involve the exploration, drilling or production of gas, oil or petroleum product and therefore, this chapter does not apply.

15. Chapter 380, Environmental Land and Water Management. This chapter establishes criteria and procedures to assure that local land development decisions consider the regional impact nature of proposed large-scale development.

Response: The proposed renourishment project will not have any regional impact on resources in the area. Therefore, the project is consistent with the goals of this chapter.

16. Chapter 388, Arthropod Control. This chapter provides for a comprehensive approach for abatement or suppression of mosquitoes and other pest arthropods within the state.

Response: The project will not further the propagation of mosquitoes or other pest arthropods.

17. Chapter 403, Environmental Control. This chapter authorizes the regulation of pollution of the air and waters of the state by the Florida Department of Environmental Regulation (now a part of the Florida Department of Environmental Protection).

Response: A Draft Environmental Impact Statement addressing project impacts has been prepared and is under review by the appropriate resource agencies including the Florida Department of Environmental Protection. Environmental protection measures will be implemented to ensure that no lasting adverse effects on water quality, air quality, or other environmental resources will occur. Water Quality Certification will be sought from the State prior to construction. The project complies with the intent of this chapter.

18. Chapter 582, Soil and Water Conservation. This chapter establishes policy for the conservation of the state soil and water through the Department of Agriculture. Land use policies will be evaluated in terms of their tendency to cause or contribute to soil erosion or to conserve, develop, and utilize soil and water resources both onsite or in adjoining properties affected by the project. Particular attention will be given to projects on or near agricultural lands.

Response: The proposed project is not located near or on agricultural lands; therefore, this chapter does not apply.