

## **BEACH FILL SEDIMENT QA/QC PLAN**

### **Brevard County Shore Protection Project – North Reach**

Brevard County, Florida

Permit No: 0134869-002-JC

Permittee: Brevard County (Natural Resource Management Office)

April 18, 2013

#### ***A. Project Description***

The project will place beach-compatible sand fill along up to 9.8 miles of Atlantic Ocean shoreline along Brevard County, Florida, located between Florida Dept. of Environmental Protection (FDEP) reference monument locations R1 and R54.5. This shoreline comprises the North Reach segment of the Brevard County Federal Shore Protection Project.

The source of sand for the project renourishment shall be one or both of the Canaveral Shoals I and Canaveral Shoals II offshore borrow areas (to be determined at the time of construction), located in State and Federal waters, respectively.

The North Reach project segment was initially constructed between November 2000 and May 2001, during which approximately 3.1 million cubic yards were placed from the Canaveral Shoals II (CS-II) offshore borrow area via a nearshore rehandling area. The project was renourished in March-May 2005 with approximately 754,600 cubic yards placed from the Canaveral Shoals II offshore borrow area via direct hopper dredge pump-out. Both project construction events were contracted by the U S Army Corps of Engineers, Jacksonville District.

#### ***B. Background – Sediment Borrow Sources.***

The offshore borrow sites for this project include the Canaveral Shoals I (CS-I) and Canaveral Shoals II (CS-II) borrow areas, in State and Federal O.C.S. waters, respectively. [A third source, Space Coast Shoals II (SCS-II), was utilized in 2002 for construction of the South Reach project segment, and it is no longer available.]

Both the CS-I and CS-II borrow areas are permitted for adjacent shore protection projects, including the South Reach and Mid Reach of the Brevard County Shore Protection Project, and Patrick Air Force Base. Both borrow areas were previously investigated and developed

through evaluation of Vibracore and sediment grain size data. The CS-II borrow area has been previously utilized on at least six occasions, from 2000 through 2010, for initial construction and subsequent renourishment of the South Reach, North Reach, and Patrick AFB beach fill projects. Material from this borrow area has proven to be consistent in quality and beach compatibility, as demonstrated by previous physical and environmental monitoring since 2001. The material dredged from the borrow area conformed very closely to that indicated by the original Vibracore and geotechnical data.

The median grain size of the CS-II borrow area ranges from about 0.3 to 0.4 mm (about 0.34 mm on composite-average). The mean grain size typically ranges from about 0.34 to 0.48 mm (three-point mean), but may locally vary between about 0.3 and 0.60 mm. Fine sediment content is low, typically less than 2% finer than the #200 and #230 sieves. As of the most recent survey in May 2010, there are approximately 21.9 million cubic yards of sand available within the permitted limits of the CS-II borrow area.

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). The mean grain size is about 0.33 mm (three-point average). Fine sediment content is typically less than 3% finer than the #200 and #230 sieves. There are at least 16 million cubic yards of sand available within the permitted limits of the CS-I borrow area.

Upland borrow sources have been used for limited-scale dune restoration along the Mid-Reach and South Beaches shorelines in Brevard County, in 2005 through 2009. Standards for establishing and assuring the quality of material from upland sources, for the purposes of small-scale truck-haul beach fill, have been successfully developed by the Permittee (Brevard County, Natural Resource Management Office) through these prior dune-restoration works. The use of sand from upland borrow sources is not currently anticipated along the North Reach project area.

Specifications, operations and monitoring required for the project, as outlined below, are in accordance with State of Florida requirements and reflect prior investigations and experience associated with the native beach sediment, offshore and upland borrow areas, and material previously placed to the beach from the borrow areas.

### ***C. Native Beach Characteristics***

The native beach material of the North Reach project area is a fine to medium grain sand with variable carbonate and coarse shell content:

- The median grain size of the native beach ranges between 0.18 and 0.6 mm (sub-tidal to berm, respectively); with a typical composite-profile median grain size of about 0.3 to 0.35 mm, more or less, and mean composite-profile grain size of about 0.24 mm.
- The median grain size of the native beach berm is about 0.45 mm ( $\pm 0.1$  mm standard deviation). Grain size and coarse shell content can vary significantly along the beach, with some areas of the berm frequently dominated by all sand or all shell lag.
- Samples of the native beach exhibit carbonate fractions ranging from 16% to 54%, with a typical (average) value on the order of about 40%.
- The native sand color varies with shell content, but generally ranges from about 10YR 6.5/1 to 7.5/1 (wet), and from about 10YR 7/1 to 8/1 (dry). This ranges from medium to light gray (wet), or light to very light gray (dry).

### ***D. Beach Fill Sediment Specifications***

1. Beach fill material shall be beach compatible and meet the specifications required by Florida Administrative Codes 62B-41.007 (j), 62B-33.002 (8) and 62B-33.0015. In addition the fill shall meet the following requirements.
2. Beach fill material shall be clean sand/ from a permitted source, free of construction debris, asphalt, gravel, rocks, clay balls, branches, leaves and other organics, oil, pollutants and any other non-beach-compatible materials. The sand shall be similar to the existing beach sediments in color and texture.
3. The grain size of the fill material shall conform to the following, by weight measure (all sieve sizes refer to U.S. Std. sieves):
  - (a) not more than 5% finer than the No. 230 sieve
  - (b) not more than 5% coarser than the No. 4 sieve, and
  - (c) not more than 0.5% coarser than 3/4-inch sieve.
4. The mean grain size shall be between 0.25 and 0.55 mm.
5. Maximum carbonate content shall be 50%.
6. Sand color, based upon the Munsell Scale and when graded on the 7.5YR or 10YR Hues, shall have a Value of at least 6.0 or higher and a Chroma of 2.0 or less in moist sample conditions.

<b>TABLE A</b>	
<b>Sediment Parameter</b>	<b>Compliance Value</b>
Maximum Allowable Silt Content	≤ 5% (wt. passing #230 sieve)
Carbonate content	≤50%
Large whole shell & lag content	≤0.5% (wt. retained on ¾" sieve)
Allowable shell content	≤5% (wt. retained on #4 sieve)
Munsell color (moist) 7.5 YR or 10 YR Hue	≥ 6.0 Value ≤ 2.0 Chroma
Allowable mean grain size	0.25 to 0.55 mm

7. The compliance values described above refer to the average values assessed over 10,000 square feet area of the placed fill material. Owing to the natural variability of the fill material, it is recognized that individual samples may deviate from the specified compliance values.

***E. Dredge Location Control***

The project contract documents shall require the following in regard to tracking and controlling dredge and disposal locations. Throughout the following, the terms Contracting Officer, Government or Engineer refer to the Corps of Engineers entity responsible for construction management and contracting. The term Contractor refers to the dredge contractor responsible for construction.

1. The Contractor is required to have and operate electronic positioning equipment that will locate the dredge when operating on the project, including all aspects of excavation, disposal and pump-out. This equipment shall include real-time measurement of the water (tide) level and dredge intake depths, where the latter is corrected for water level.
2. The Contractor is required to calibrate the equipment as required by the manufacturer or as required by the Contracting Officer. Proof of calibration shall be submitted to the Contracting Officer.
3. Continuous locations of the dredge shall be made at all times during dredging, dumping, and transporting operations. The reason the dredge is outside the borrow area limits shall be annotated on the position chart and on the Contractor's Quality Control Report for each occurrence. The location of the dredge is to be by computed coordinates with a probable range error not to exceed ±3 feet and furnished daily as part of the dredge reports, along with a real-time drawing of the track of the dredge in relation to the borrow area.
4. The Contractor's method of location of the dredge shall be approved by the Contracting Officer. A Differential Global Positioning System (DGPS) or equivalent shall be used; LORAN-C shall not be permitted for location control.

5. The Contractor is also required to have a depth of dredging indicator for each dragarm and/or intake accurate to within one foot. The instrument used shall indicate the depth of dredging at all times and draghead depth when the dredge is outside the borrow area limits within 1-foot accuracy. For hopper dredges, the instrument may be a graph type paper or electronic recorder or an indicator which uses a pointer and scale.
6. The reported elevation of dragarm and/or dredging shall be adjusted by the measured water level elevation and shall be reported relative to the datum indicated on the drawings (NAVD 88) and shall have a probable range error not to exceed  $\pm 0.1$  feet vertical. The paper or depth record produced by this instrument shall be submitted daily with the daily dredge report.
7. The Contractor shall not dredge outside of the borrow area limits (horizontal and vertical) as shown on the permit drawings and construction plans, whichever is most restrictive. The Contractor shall be responsible for establishing such controls as may be necessary to ensure that excavation in the borrow area shall not extend below the allowable depths or beyond the spatial limits indicated in the project permits and drawings.

#### ***F. Project Monitoring and Quality Assurance***

1. The project contract documents shall require the following regarding dredging:
  - a. All excavation for beach fill from the borrow area shall be performed by a hopper dredge equipped with dragarms within the limits and depths of the borrow area shown on the drawings.
  - b. The Contractor shall monitor the nature of the material filled to the hopper dredge and shall continuously monitor the sediment discharged to the fill area. If rock, clay, or excessive turbidity/shell content/dark-colored material is encountered in the borrow area, the Contractor shall raise the intake(s) and *the location of the dredging shall be immediately changed* by the Contractor. The location of unsuitable material shall be noted on the Contractor's Quality Control Report. If the Contracting Officer determines the quality of beach fill is being adversely affected, that location shall be avoided in future passes of the dredge. Should undesirable sediments continue to be encountered, the Contractor shall cease excavation, move the dredge to another location within the permitted borrow area, and the Contracting Officer shall be notified immediately.
  - c. A hopper-barge load with material judged to be non-beach compatible material shall be replaced to the borrow area at the area from which it was removed, and subsequently avoided; or, shall be replaced to the borrow area at an area that will be unaffected by future dredging; or, shall be placed to the existing ODMDS site subject to federal requirements for disposal to that site; as directed by the Contracting Officer.

2. During-construction Quality Control will consist of the following:

- a. The Contractor shall perform construction observation to reasonably assure that the work will be in conformance with the required contract and permit conditions. Construction observation shall be performed 7 days a week, 24 hours a day. Daily reports will describe the sediment placed from each hopper dredge load.
- b. The Contractor shall provide onsite observation by an individual with training or experience in beach nourishment and construction inspection and testing and knowledgeable of the project design and permit conditions. The project Quality Control Plan to be implemented by the Contractor [which shall include those measures to be taken to assure compliance with Sediment Quality Control & Assurance] shall be discussed as a matter of importance at the pre-construction meeting. The Contractor shall be required to acknowledge the goals and intent of the Quality Control Plan in writing.
- c. The Contractor's daily reports shall characterize the nature of the sediments encountered at the borrow area and placed along the project shoreline with specific reference to moist sand color and the occurrence of rock, rubble, shell, silt or debris that exceeds acceptable limits. The daily reports must characterize the sediment placed from each hopper dredge load.
- d. To assure that the fill material placed on the beach is in compliance with the permit, the Contractor shall conduct assessments of the sediment as follows:
  - (i). The Contractor shall collect a 300 to 500-g grab sediment sample with each hopper dredge load (or volumetric equivalent) of dredged material placed on the beach to visually assess grain size, shell content, and silt content. Each sample will be archived with the date, time, and location of the sample. The Contractor's on-site personnel (site supervisor and equipment operators) shall continually visually monitor the material being placed on the beach for unacceptable material. The Government will make frequent daily visual inspections of the material being placed on the beach during periods of active construction.
  - (ii). The material will be visually compared to the acceptable sand criteria described herein. If determined necessary by the Government [i.e., for placed material that visually appears to differ in texture, color or content from the specifications herein], quantitative assessments of the sand samples will be promptly conducted for grain size, shell content, and moist Munsell color. A record of each sand evaluation will be provided within the daily reports and categorized as PASS or FAIL with regard to the sand specifications. All samples will be stored until project completion.
  - (iii). If three consecutive samples do not meet the material specifications as described herein, the Contractor shall cease material excavation operations and take whatever actions necessary to avoid further discharge of unsuitable material. In

this event, the Contracting Officer will use the dredge positioning records, plans, and vibracore descriptions to determine the area containing unacceptable materials and will instruct the Contractor to adjust his or her construction operation to avoid the unacceptable material.

- (iv).The Contracting Officer, in conjunction with FDEP and Brevard County, will determine if remediation is necessary. Remediation efforts may include beach tilling or blending of unacceptable beach fill material with adjacent material or moving the unacceptable material seaward of the mean high water line. Post-sediment testing shall be conducted following any remediation effort. The Contractor shall notify the Contracting Officer, Brevard County and FDEP (Compliance Officer) of any remediation efforts and report the sediment inspection results.
  - e. Materials which differ from the specifications described herein will be considered unacceptable materials. Unacceptable materials also include debris, trash, and rocks or rubble larger than three-fourths (3/4) inch in diameter. If one or more of the consecutive samples do not meet the specifications, the Contractor may be required by the Contracting Officer to increase the frequency of sampling. If multiple samples indicate that the fill material does not meet the specifications, the Contractor shall modify his dredging operations to achieve placement of acceptable quality material or shall take other actions as described above.
  - f. The Contracting Officer, and his duly authorized representative, shall be continuously on call during the period of construction for purposes of making decisions regarding issues which involve QC Plan compliance.
3. Post-Construction sand sampling, evaluation and actions will be conducted as follows:
- a. Two sand samples shall be obtained immediately following completion of construction at a reference monument line approximately every 2,000 feet along and within the beach fill project area. Each sample shall be tested for grain size distribution, color and shell content. Samples shall be collected from approximately 1 ft below the surface of the dry construction berm at (1) approximately 20 feet from the landward toe of the dune and (2) midway across the top of the berm width; (or, near the landward and seaward edges of the berm fill where the berm width is narrow). This shall amount to up to 52 samples taken throughout the filled area within the 51,800 ft project limits. If patches of inconsistent material are observed between profiles while taking these samples, a visual description of the sediment irregularities, including the location, magnitude, and general characterization should be provided to the Department; and additional samples may be taken as required or appropriate. [This sampling is per Permit 0134869-002-JC, Hydrographic Monitoring, par 2c.]
  - b. Samples will be processed to determine grain size distribution between U.S. Standard Sieve sizes 4 (4.76 mm) and 230 (0.625 mm) in addition to the weight fraction

retained on the ¾” sieve and categorized as PASS or FAIL with regard to the sand specification. The analysis shall utilize standard sieve sizes at half-phi intervals between U.S. Std. No. 4 and No. 230 (inclusive), and including the ¾” sieve and pan. Assessment shall be likewise made of shell content and color; and up to one-third of the samples shall be quantitatively assessed for carbonate content. Should non-compliant material be detected after placement, additional testing will be conducted to determine its extent, and non-compliant fill will be removed and may be subsequently replaced with compliant fill.

- c. A summary report of the sediment sample data shall be prepared and submitted to FDEP within 60 days after project construction. The summary report shall also indicate the volume, areal extent and location of any beach areas found to contain sand that does not meet the specifications, and remediated areas or areas determined to be subject to remediation.
- d. Should rocks or excessive amounts of large shell or other non-beach compatible material be identified in excess of 50% of background in any 10,000 square ft area, then the non-compatible material shall be removed from the beach fill or remediated to the satisfaction of the Contracting Officer in conjunction with the County. This assessment shall take into account the potential occurrence of non-compatible materials below the surface. Additional acceptable fill may be placed, as required, to meet the construction template requirements.
- e. Methods of remediation in the event of non-beach-compatible material placed to beach are subject to approval by the County, Engineer and FDEP. Remediation may include, but not limited to,
  - 1) Excavating the non-beach compatible material and mixing it with compatible material to achieve a sand mixture that acceptably complies with the project sand requirements,
  - 2) Excavating the non-beach compatible material, transporting the material to a permitted upland location, and replacing the material with sand that complies with the project sand requirements,
  - 3) Screening the non-beach compatible material from the fill, on-site, and removing the non-compatible material for placement to a permitted upland location.
  - 4) Notwithstanding the above, burial of non-conforming fill within the existing beach or beach fill is not permitted.
- f. Addenda or change orders to the construction Contractor shall consider whether or not the change in scope will potentially affect the Sediment QA/QC Plan.