



**APPROVED**

**Sediment QA/QC Plan**

**Permit #: 0314535-001-JC**

**Approval: September 17, 2012**

**Beaches, Inlets, and Ports Program**

Broward County Shore Protection Project – Segment II  
Broward County, FL

## **SEDIMENT QUALITY CONTROL/QUALITY ASSURANCE PLAN**

September 17, 2012

### **A. INTRODUCTION**

Pursuant to Fla. Admin. Code r. 62B-41.008 (1) (k) 4.b., permit applications for inlet excavation, beach restoration, or nourishment shall include a quality control/assurance plan that will ensure that the sediment from the borrow areas to be used in the project will meet the standard in Fla. Admin. Code r. 62B-41.007(2)(j). To protect the environmental functions of Florida's beaches, only beach compatible fill shall be placed on the beach or in any associated dune system. Beach compatible fill is material that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system.

The Department has received the results of geotechnical investigations that provide adequate data concerning the character of the sediment and the quantities available within the spatial limits of the upland sand sources. The Department has received an analysis of the existing or native sediment and the sediment within the permitted upland sand sources, including the methods of mining and post-mining processing, that demonstrates its compatibility with the naturally occurring beach sediment in accordance with Fla. Admin. Code r. 62B-41.007(2)(j). The sediment analysis and volume calculations were performed using established industry standards, and are certified by a Professional Engineer or Professional Geologist registered in the State of Florida.

Based upon this information, the Department of Environmental Protection (Department) has determined that use of the sediment from the upland sand sources will maintain the general character and functionality of the sediment occurring on the beach and in the adjacent dune and coastal system. Furthermore, this information provides sufficient quality control/quality assurance (QC/QA) that the mean grain size and carbonate content of the sediment from the upland sand sources will meet the requirements of Fla. Admin. Code r. 62B-41.007(2)(j); hence, additional QC/QA procedures are not required for these sediment parameters during construction.

This plan outlines the responsibilities of each stakeholder in the project as they relate to the placement of beach compatible material on the beach. These responsibilities are in response to the possibility that non-beach compatible sediments may exist within the upland sand sources and could be unintentionally placed on the beach. The QC Plan specifies the minimum construction management, inspection and reporting requirements placed on the Contractor and to be enforced by Broward County, to ensure that the sediment from the upland sand sources meet the project compliance specifications. The QA Plan specifies the minimum construction oversight, inspection and reporting requirements to be undertaken by Broward County or the County's On-Site Representative to observe, sample, and test the placed sediments to verify the sediments are in compliance.

### **B. SEDIMENT QUALITY SPECIFICATIONS**

Only processed material from the upland sand mines will qualify for use on the Segment II project. The sediment from the upland sand sources is similar in Munsell color and grain size distribution to the material in the existing coastal system at the beach placement site. The Department and Broward County acknowledge that it is possible that discrete occurrences of non-beach compatible sediments may exist within the permitted upland sand sources that do not comply with the limiting parameters of Fla. Admin. Code r. 62B-41.007(2)(j) 1. – 5., or vary in Munsell color from the composite value. Furthermore, the Department may consider more restrictive values for the sediment parameters to ensure that the sediment from the upland sand sources is similar in color and grain size distribution to the sediment in the existing coastal system at the beach placement site. Therefore, fill material compliance specifications for the sediment from the upland sand sources proposed for this project are provided in Table 1.

The compliance specifications take into account the variability of sediment on the native or existing beach, and are values which may reasonably be attained given what is known about the upland sand sources. Beach fill material which falls outside of these limits will be considered unacceptable and subject to remediation.

**Table 1- Sediment Compliance Specifications**

<b>Sediment Parameter</b>	<b>Parameter Definition</b>	<b>Compliance Value</b>
Mean Grain Size (mm)		<b>0.35 - 0.65</b>
Max. Silt Content	passing #230 sieve	<b>2%</b>
Max. Shell Content*	retained on #4 sieve	<b>2%</b>
Munsell Color Value	moist Value (chroma = 1)	<b>7 or lighter</b>
<b>The beach fill material shall not contain construction debris, toxic material, other foreign matter, coarse gravel or rocks.</b>		

\*Shell Content is used as the indicator of fine gravel content for the implementation of quality control/quality assurance procedures.

### C. QUALITY CONTROL PLAN

The Segment II Contract Documents shall incorporate the following technical requirements, or equivalent language that addresses the sediment quality monitoring on the beach, and, if necessary, remedial actions. Broward County will seek to enforce these contract requirements during the execution of work. The Contractor’s Quality Control Plan shall be submitted for review and acceptance by Broward County. This Plan shall also address sediment quality assurance by including: (1) the specific sampling frequency and testing methodology to be provided by the Contractor, (2) the name, address and point of contact for the Licensed Testing Laboratory to be used for the required collection of samples and laboratory testing, and (3) how the Contractor intends to assess compliance with the Sediments Compliance Specifications as shown in Table 1 above.

Typical characteristics of processed materials from the upland sand sources are indicated the geotechnical data. However, the Contractor should be aware that it is possible for material of differing characteristics to be present and that the mining process may correspondingly require revisions to produce beach compatible sand consistent with the Sediment Compliance Specifications in Table 1.

- 1. Assessment at Upland Sand Source.** The material shall be observed while the material is being loaded into the trucks for transport to the Construction Access/ Staging Area. Both the Contractor and Broward County shall have benchmark samples labeled with the permit number, “Benchmark Sample”, date collected, site name and information on where the sample was attained. The benchmark sample shall be material that has been deemed beach compatible in accordance with the Sediment Compliance Specifications and shall serve as the minimum requirement for the material being placed on the beach. If any material appears to be non-compliant, it shall be set aside for testing and/or further processing and not transported to the beach.

Sampling and laboratory testing of material in the processed sand stockpiles shall be conducted at the upland mines before the material is transported to the Construction Access/Staging Areas. The Contractor shall collect four (4) representative samples from approximately every 3,000 cubic yards of material in the stockpile no less than 6 inches below the surface. The samples shall be tested at a Licensed Testing Laboratory using the criteria outlined in Section D.7.b.

If a sample does not meet the Sediment Compliance Specifications in Table 1, then the 3,000 cubic yards of material represented by that sample shall not be transported to the Construction Access/Staging Area. The material may undergo further processing to meet the Sediment Compliance Specifications with additional testing to verify the additional processing produce material that meets the Sediment Compliance Specifications, or the material shall be set aside and not used.

2. **Beach Observation.** The Contractor shall continuously visually monitor the sediment being placed on the beach. An assessment shall be made during placement at a minimum of once every hour. This assessment shall consist of handling the fill material to ensure that it is predominantly sand and to note the physical characteristics, and assure the material meets the Sediment Compliance Specifications in Table 1. If noncompliant sediment is placed on the beach, the Contractor shall immediately cease placement until any stockpiled material at the beach construction staging area can be verified as beach compatible and verbally notify Broward County's On-site Representative, providing the time, location, and description of the noncompliant sediment. The Contractor shall take the appropriate remediation actions as directed by the Broward County or the Project Engineer.

#### **D. QUALITY ASSURANCE PLAN**

Broward County shall seek to enforce the construction contract and Department permits related to sediment quality. In order to do so, the following steps shall be followed:

1. **Construction Observation.** Construction observation by Broward County's On-Site Representative shall be performed daily basis during periods of active construction. Broward County's On-Site Representative shall collect a sediment sample to visually assess grain size, Munsell color, shell content, and silt content against the benchmark sample. The observation shall include handling the fill material to ensure that it is predominantly sand to note the physical characteristics and assure the material meets the sediment compliance parameter specified in this Plan. If deemed necessary, quantitative assessments of the sand shall be conducted for silt content, shell content and Munsell color using the methods outlined in section D.7.b.
2. **On-Site Representative.** Broward County shall provide on-site observation by individuals with training or experience in beach nourishment and construction inspection and testing, and who are knowledgeable of the project design and permit conditions. The Project Engineer shall actively coordinate with Broward County's On-Site Representative, who may be an employee or sub-contractor of Broward County or the Project Engineer. Communications shall take place between the Project Engineer and Broward County's On-Site Representative on a weekly basis.
3. **Pre-Construction Meeting.** The project QC/QA Plan shall be discussed as a matter of importance at the pre-construction meeting. The Contractor shall acknowledge the goals and intent of the above described QC/QA Plan, in writing, prior to commencement of construction.
4. **Contractor's Daily Reports.** Broward County's On-Site Representative shall review the Contractor's Daily Reports which shall characterize the nature of the sediments encountered at the upland sand source and placed along the project shoreline with specific reference to moist sand color and the occurrence of rock, rubble, shell, silt or debris.
5. **On Call.** The Project Engineer shall be on call continuously during the period of construction for the purpose of making decisions regarding issues that involve QC/QA Plan compliance.
6. **Addendums.** Any addendum or change order to the Contract between Broward County and the Contractor shall be evaluated to determine whether or not the change in scope will potentially affect the QC/QA Plan.
7. **Post-Construction Sampling for Laboratory Testing.** To assure that the fill material placed on the beach was adequately assessed by the borrow area investigation and design, the Project Engineer shall conduct assessments of the sediment as follows:
  - a. Post-construction sampling of each acceptance section and testing of the fill material shall be conducted to verify that the sediment placed on the beach meets the expected criteria/characteristics provided during from the upland sand source geotechnical investigation. Upon completion of an acceptance section of constructed beach, the Project Engineer shall collect two (2) duplicate sand samples at each Department reference monument profile line to quantitatively assess the grain size distribution, moist Munsell color, shell content, and silt content for compliance. The Project Engineer shall collect the sediment samples of a

minimum of 1 U.S. pint (at least 200 grams) each from the bottom of a test hole a minimum of 18 inches deep within the limits of the constructed berm. The Project Engineer shall visually assess grain size, Munsell color, shell content, and silt content of the material by handling the fill material to ensure that it is predominantly sand, and further to note the physical characteristics. The Project Engineer shall note the existence of any layering or rocks within the test hole. One sample shall be sent for laboratory analysis while the other sample will be archived by Broward County. All samples and laboratory test results shall be labeled with the Project name, FDEP Reference Monument Profile Line designation, date sample was obtained, and "Construction Berm Sample."

- b. All samples shall be evaluated for visual attributes (Munsell color and shell content), sieved in accordance with the applicable sections of ASTM D422-63 (Standard Test Method for Particle-Size Analysis of Soils), ASTM D1140 (Standard Test Method for Amount of Material in Soils Finer than No. 200 Sieve), and ASTM D2487 (Classification of Soils for Engineering Purposes), and analyzed for carbonate content. The samples shall be sieved using the following U.S. Standard Sieve Numbers: 3/4", 5/8", 3.5, 4, 5, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, and 230.
- c. A summary table of the sediment samples and test results for the sediment compliance parameters shall accompany the complete set of laboratory testing results. The column headings shall include: Sample Number; Mean Grain Size (mm); Sorting Value; Silt Content (%); Shell Content (%); Munsell Color Value; and a column stating whether each sample MET or FAILED the compliance values found in Table 1. The sediment testing results shall be certified by a Professional Engineer or Professional Geologist registered in the State of Florida. A statement of how the placed fill material compares to the sediment analysis and volume calculations from the sand search investigation shall be included in the sediment testing results report. Broward County shall submit sediment testing results and analysis report to the Department within 90 days following beach construction.
- d. In the event that a section of beach contains fill material that is not in compliance with the sediment compliance specifications, then the Department shall be notified. Notification shall indicate the volume, aerial extent and location of any unacceptable beach areas and remediation planned.

## **E. REMEDIATION**

1. **Compliance Area.** If a sample does not meet the compliance value for construction debris, toxic material, other foreign material, coarse gravel, or rock Broward County shall determine the aerial extent of the noncompliant beach fill material and remediate regardless of the extent of the noncompliant material. If a sample is noncompliant for the silt content, shell content, or Munsell color, and the aerial extent exceeds 10,000 square feet of beach berm or 100 linear feet of dune for dune-only projects, Broward County shall remediate.
2. **Notification.** If an area of newly constructed beach or dune does not meet the sediment compliance specifications, then the Department (JCPCCompliance@dep.state.fl.us) shall be notified. Notification shall indicate the aerial extent and location of any areas of noncompliant beach fill material and remediation planned. As outlined in section E.4 below, Broward County shall immediately undertake remediation actions without additional approvals from the Department. The results of any remediation shall be reported to the Department following completion of the remediation activities and shall indicate the volume of noncompliant fill material removed and replaced.
3. **Sampling to determine extent.** In order to determine if an area greater than 10,000 square feet of beach berm or 100 linear feet of dune for dune-only projects is noncompliant, the following procedure shall be performed by the Broward County's On-site Representative or the Project Engineer:
  - a. Upon determination that the first sediment sample is noncompliant, at minimum, five (5) additional sediment samples shall be collected at a maximum 25-foot spacing in all directions and assessed. If the additional samples are also noncompliant, then additional samples shall be collected at a 25-foot spacing in all directions until the aerial extent is identified.

- b. The samples shall be visually compared to the acceptable sand criteria. If deemed necessary by the Project Engineer, quantitative assessments of the sand shall be conducted for grain size, silt content, shell content, and Munsell color using the methods outlined in section D.7.b. Samples shall be archived by Broward County.
  - c. A site map shall be prepared depicting the location of all samples and the boundaries of all areas of noncompliant fill.
  - d. The total square footage shall be determined.
  - e. The site map and analysis shall be included in the Contractor's Daily Report.
4. **Actions.** Broward County and the Project Engineer will have the authority to determine whether the material placed on the beach is compliant or noncompliant. If placement of noncompliant material occurs, the Contractor shall be directed by Broward County or the Project Engineer on the necessary corrective actions. Should a situation arise during construction that cannot be corrected by the remediation methods described within this QC/QA Plan, the Department shall be notified. The remediation actions for each sediment parameter are as follows:
- a. Silt: blending the noncompliant fill material with compliant fill material within the adjacent construction berm or dune sufficiently to meet the compliance value, or removing the noncompliant fill material and replacing it with compliant fill material.
  - b. Shell: blending the noncompliant fill material with compliant fill material within the adjacent construction berm or dune sufficiently to meet the compliance value or removing the noncompliant fill material and replacing it with compliant fill material.
  - c. Munsell color: blending the noncompliant fill material with compliant fill material within the adjacent construction berm or dune sufficiently to meet the compliance value or removing the noncompliant fill material and replacing it with compliant fill material.
  - d. Coarse gravel: screening and removing the noncompliant fill material and replacing it with compliant fill material.
  - e. Construction debris, toxic material, or other foreign matter: removing the noncompliant fill material and replacing it with compliant fill material.

All noncompliant fill material removed from the beach shall be transported to an appropriate upland disposal facility located landward of the Coastal Construction Control Line or returned to the upland mine.

5. **Post-Remediation Testing.** Re-sampling shall be conducted following any remediation actions in accordance with the following protocols:
- a. Within the boundaries of the remediation actions, samples shall be taken at maximum of 25-foot spacing.
  - b. The samples shall be visually compared to the acceptable sand criteria. If deemed necessary by the Project Engineer, quantitative assessments of the sand will be conducted for grain size, silt content, and Munsell color using the methods outlined in section D.7.b. Samples shall be archived by Broward County.
  - c. A site map shall be prepared depicting the location of all samples and the boundaries of all areas of remediation actions.
6. **Reporting.** A post-remediation report containing the site map, sediment analysis, and volume of noncompliant fill material removed and replaced shall be submitted to the Department within 7 days following completion of remediation activities.

All reports or notices relating to this permit shall be emailed and sent to the Department at the following locations:

**DEP Bureau of Beaches & Coastal Systems**

JCP Compliance Officer

Mail Station 300

3900 Commonwealth Boulevard

Tallahassee, Florida 32399-3000

phone: (850) 414-7716

e-mail: [JCP Compliance@dep.state.fl.us](mailto:JCP_Compliance@dep.state.fl.us)

End of Plan