

**U.S. Army Corps of Engineers Jacksonville District**

**Sediment Quality Control/Quality Assurance Plan  
For Maintenance Dredging with Beach Placement**

**Name of Project: Bakers Haulover Inlet and AIWW Maintenance Dredging**

**DEP Permit Number: 0173188-003-JC, Dade County**

**Date: March 29, 2010**

**A. Project Description**

The project is to maintenance dredge a portion of the Intracoastal Waterway (IWW) in the vicinity of Bakers Haulover Inlet (Cut DA-9), and place the beach-quality material south of the jetty, along Bal Harbor beach (DEP reference monuments R-28 to R-32). The estimate of material to be dredged is 40,000 cubic yards. The required project depth is 10 feet MLLW + 2 foot allowable overdepth including all advance maintenance.

Beach placement of this material in the Bal Harbor Beach area has been recommended by DEP to meet the requirements of Chapter 161, Florida Statutes through the Bakers Haulover Inlet Management Study dated September 5, 1997. The U.S. Coast Guard has also issued a Notice to Mariners regarding shoaling in the dredge area. This activity represents the best use of dredged material from the channel.

**B. Plan Purpose and Objectives**

The purpose of the Sediment Quality Control (QC) and Quality Assurance (QA) Plan, required by paragraph 62B-41.008 (1) (k) (4b) F.A.C., is to ensure that sediment placed on the beach meets the standards of the Sand Rule, shown in Appendix A. Geotechnical investigations and/or historical data for the project have indicated that the sediment located within the spatial limits of the permitted channel cut(s) meets the State requirements shown in Appendix A.

The QC provisions of the Plan reiterate the contract requirements placed on the selected contractor to perform all work within the construction tolerances of the authorized channel cut(s), to promptly modify dredging activity should sediments unsuitable for beach placement be encountered, and to take remedial actions should unsuitable material be placed on the beach. Sediment quality specifications are provided for the dredged material within a range of acceptable sand quality values which must be met for final acceptance. The sediment quality specifications take into account the variability of material within the channel and represent values which may reasonably be attained given what is known about the dredged material.

The QA provisions of the Plan outline the steps taken by the USACE Contracting Officer's Representative to observe, sample, and test the placed sediments to ensure compliance. In addition, reporting requirements are provided.

## 1. Existing Beach Material

Beach samples were collected on January 22, 2009 along R-Monuments R-28 through R-32 at Bal Harbor Beach. The samples were analyzed in January 2009 and the duplicate samples were split and reanalyzed in September 2009 to meet the DEP standards. The grain size analysis indicates that the sediments of the existing beach consist of poorly graded, fine to medium grained sand with little to some coarse to medium grained sand sized shell fragments. Trace of shell retained in the #4 sieve is also present.

It shall be noted, the beach sampling was conducted prior to the DERM truck hauling of material from an upland source to fill the portion of the critical eroded beach in May through July 2009.

In the event additional geotechnical information is required, the character of sand within the South Beach placement area will be verified using the following sampling regime and laboratory analyses prior to placement commencement:

**a. Pre-Dredge Sampling Methodology** - Surface samples will be collected by the USACE (EN-GG Section) along shore-normal transects of the project's prospective placement area within the beach placement area. Transects will be located at approximately 500 foot intervals within the prospective placement area. Along each transect, two duplicate jars of sample material will be obtained from a depth of no less than 6 inches below the surface and at the following cross-shore locations: (1) toe of dune, (2) mid-berm, (3) approximate mean high water, and (4) approximately 4 feet below surface water level. Each sample should be labeled with the following information: (a) date, (b) time, (c) sample location or monument number, and (d) cross-shore location (i.e., toe of dune).

**b. Laboratory Analyses** - The existing beach sediments will be characterized as to sand-type, moist color (Munsell), grain size distribution (sand grain frequency, median grain size, mean grain size, sorting coefficient), % visual shell, % fines (retained on #230 sieve), % fine gravel (retained on the #4 sieve), % coarse gravel, cobbles or material (retained on the 3/4 inch sieve). Sample granularmetrics shall be quantified by performing a gradation analysis using nested sieves based upon ASTM D 422. U.S. Standard sieve sizes shall include 3/4", 3/8", 4, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, and 230.

**c. Recording and Reporting of Results** - The results of each sample analysis shall be submitted as follows: (a) a tabular summary of % visual shell, % fines, % fine gravel, % coarse gravel, % cobbles or other material (retained on the 3/4 inch sieve), Munsell color (moist sample), and presence of construction debris or other foreign matter; (b) grain-size cumulative frequency distribution curve (a.k.a. gradation curve), and (c) tabular summary of nested sieve sample granularmetrics including mean grain size, median grain size, and sorting expressed as a numeric and verbal value. The sample submittal date to the laboratory shall be recorded by the laboratory on all reporting documents. The final data set of sampling information and analytical results from the

pre-construction placement area survey and the dredge area survey shall be provided to DEP for review prior to commencement of placement activity (time permitting).

**d. Outcome and Action** - If an examination by the Corps of the pre-construction sediment analytical data or historical geotechnical data reveals the likelihood of non-compliant material being placed on the beach, other disposal or beach remediation alternatives may be pursued by the Corps after consultation with DEP.

## 2. Navigation Maintenance Dredged Material

Based on vibracores collected in 2006 and 2008 from the project channel, the materials within the dredging depth consist of poorly graded fine to medium grained sand, trace to little silt, and little to some sand to gravel sized shell up to ¼". No rock was encountered within the project dredging design depth.

Some gravel to cobble-sized pieces of loose rock may be encountered throughout the dredging limits. The loose rock is predominately broken rock material left from previous excavations, and also from rock erosion from the side slopes.

## 3. Risk Management

This section outlines the responsibilities of Contractor and the USACE as they relate to the placement of dredged material on the beach. These responsibilities are in response to the acknowledged minimal risk that non-beach compatible sediments above 10% silt fraction may exist in lenses within the channel and could be unintentionally placed on the beach.

The USACE has performed geotechnical investigations to the standard of care in the industry and has relied on the linear nature of sedimentary deposits, and a limited number of samples to design the channel cuts. The USACE has the personnel and access to testing facilities to sample and test sediment that has been placed on the beach.

The USACE will be directing that the work be done and has relied on its findings, which are based on limited borings as well as previous experience, in authorizing the project to go to construction. The USACE has experience with these types of projects, and has the authority to modify the project (within the constraints of the permits and available funding) in the event that non-beach compatible sediments are inadvertently placed on the beach.

The Contractor will be undertaking the work and will be relying on the USACE's findings in constructing the project. The Contractor will have on-site personnel who can identify obvious changes in sediment quality at the active placement location. The Contractor has or can acquire the equipment and personnel to remediate the beach if so directed or required by the USACE. Based on the above discussion the Corps believes this project is low risk.

### C. Beach Placement Sediment Quality Specifications

The sediment specifications and guidelines for the channel area material are provided in Table 1. The composite values for the placed material should approach the mean values presented for the channel area. Individual material samples will likely vary from these values. The values provided in Table 1 represent the acceptable range of values for placed material.

These specifications take into account the natural variability observed within the channel areas as determined using the existing core boring data. In Table 1, silt is defined as any material passing the #230 sieve. Materials which fall outside of the compliance ranges will be considered unacceptable. Unacceptable material also includes debris, trash, and rocks or rubble larger than three-fourths (3/4) inch in diameter, which exceed the size of the natural occurrence of rock or shell on the beach.

Deviations from the specifications are acceptable provided that the spatial extent of the deviations does not exceed 10,000 continuous square feet.

**Table 1- Sediment Quality Specifications for Channel Area Material**

| Sediment Parameter                  | Project Compliance Value |
|-------------------------------------|--------------------------|
| Mean grain size range               | 0.2 mm to 0.7 mm         |
| Allowable shell content < 3/4 sieve | 1% - 40%                 |

#### Special Dredge Areas

Material dredged in Cut DA-9 between stations 48+00 and 51+00 and ranges 0.0 to 62.5 shall have special handling requirements. The dredged slurry shall be contained and dewatered above the mean high water line toward the landward edge of the design berm. It will then be re-worked and utilized to slope (fade) the existing planted shoreline vegetation into the design berm by building a low profile dune on top of the 75 ft wide design berm. The dune is to be no more than 3 ft higher than the 75 ft design berm and no more than 25 feet in width immediately adjacent to the existing dune vegetation.

### D. Quality Control

The contract documents should incorporate the following technical requirements, or equivalent language, that address the dredging location, sediment quality monitoring and reporting, modification of dredging activity, and remedial actions if necessary. The USACE will seek to enforce these contract requirements during the execution of work.

#### 1. Contingency Plan.

The Contractor will be responsible for establishing such control as may be necessary to ensure that the construction tolerances are not exceeded. If the Contractor encounters unacceptable materials during dredging, the Contractor will immediately notify the USACE verbally,

providing the time, location, and source of the unsatisfactory material and proceed in accordance with the contract. If the notification procedures are not specified in the contract, the Contractor shall adhere to the following procedures:

a. Should any beach sample not comply with the project-specific beach placement criteria, the COR shall be notified at the first available normal business hours.

b. Should three consecutive samples not comply with the beach placement criteria, the Contractor shall immediately notify the COR.

The Contractor will also report any encounters with unacceptable material in the daily QC reports. The Contractor will report the approximate elevation and horizontal position (in project reference datum) as to where the materials were encountered, as well as the location where material was placed in the beach disposal area. The excavation location of unacceptable material will be provided with the DEP notification required in Section E. 9. below.

The following engineering manuals provide guidance for surveying procedures and positioning accuracy on dredging projects along with their associated best management practices.

<http://140.194.76.129/publications/eng-manuals/>

EM 1110-1-1003 Engineering and Design - NAVSTAR Global Positioning System Surveying, 01 July 2003.

EM 1110-2-1003 Engineering and Design - Hydrographic Surveying, 01 April 2004.

EM 1110-2-5025 Engineering and Design – Dredging and Dredge Material Management, 31 March 2008.

EM 1110-1-2909 Engineering and Design - Geospatial Data and Systems, 30 September 2005.

The manuals listed above are the guidance documents utilized for this type of operation. The specifications for this project now include requirements for dredge plant positioning. Dredge plants will be equipped with horizontal and vertical control systems that provide the operator with the position of the excavation device (e.g. cutterhead, etc.). The dredge positioning equipment will have a horizontal accuracy equal to or better than a standard Differential Global Positioning System (DGPS), equal to or better than plus/minus 5 feet. Vertical data shall have an accuracy of plus/minus 0.5 foot with continuous tidal corrections, if applicable. This information will be logged at 1-minute intervals and will be transmitted to the Contracting Officer weekly. If a known permit violation occurs, the dredge positioning data will be made available for review at the USACE Jacksonville office.

As discussed in Section E., Quality Assurance, the USACE may use the contractor's daily reports, plans, and sample descriptions to determine where the Contractor may dredge to avoid placement of unacceptable materials. The USACE will adjust the construction operation to avoid placement of the unacceptable material on the beach to the greatest extent practicable. The USACE will determine where non-beach compatible material will be disposed of if encountered. Remediation actions are discussed in Section F below.

## 2. Beach Observation.

The Contractor will continuously visually monitor the material being placed on the beach for unacceptable material. The material can be deemed unacceptable based on the content of rock, debris, shell, and silty materials. If occasional debris, trash, rocks, or silty materials appear on the beach during dredging operations and appear to exceed background or existing levels, the Contractor will remediate. The Contractor will notify the USACE of any observed non-beach compatible sediment.

A representative sample of placed material will be collected, handled, and visually inspected every four hours during placement operations during daylight hours only. If a hopper dredge is used, a representative sample of material from each hopper load will be taken instead. Material placed at night shall be sampled and visually inspected at the beginning of the following day to an extent equivalent to the sampling that would have occurred during daylight hours. The result of the visual inspection will be recorded in the contractor's daily report regardless of sediment quality. If potentially non-compliant material is observed, the Contractor will verbally notify the USACE (per the Contingency Plan above). The location of the dredge at the time the unacceptable material was excavated will be recorded in the contractor's daily report.

At the discretion of the COR, a sample of material will be saved. Each saved sample will be archived with the date, time, and location of the sample. Additional information regarding dredge operations (approximate time of fill placement, approximate dredge area location, hopper load number, etc.) will also be recorded. The samples will be visually compared to the sand criteria. At the discretion of the COR, these samples may be analyzed and reported according to the procedures listed previously in Sections B.1.b. and c. A record of these sand evaluations will be provided in the USACE's daily inspection reports.

If any samples have been saved for the duration of the project (at the discretion of the COR), all final samples will be turned over to the Corps by the end of construction (not contract closeout). All samples will be stored by the USACE for 60 days after project completion of construction.

### 3. Geotechnical Data.

The Contractor will be provided with all available descriptions of sediment samples collected within the channel and will acknowledge at the preconstruction conference that he is aware of the quality of the sediment as described in the geotechnical data. This data will be presented in the construction specifications.

### 4. Debris Provision.

A screen of appropriate size (approximately 2") shall be kept on-site readily available to be used or installed on the project as needed. Should any debris be pumped on the beach at any time during the project, the screen shall be immediately installed to prevent any further debris from being placed on the beach, until no further debris is being pumped. Any debris placed on the beach shall be handled under the guidelines set forth in Section F below.

## **E. Quality Assurance**

The USACE will enforce the construction contract and FDEP permits related to sediment quality. In order to do so, the following steps will followed:

1. The USACE will conduct the level of construction observation believed to be required to determine that the Contractor's work will be in conformance with the contract and permit conditions based on the risk associated with the project. Normally, observations will be during daylight hours.
2. The USACE Quality Assurance Representative (QAR) will provide oversight. The QAR shall be an individual with training or experience in beach placement, construction inspection, and testing; and is knowledgeable of the project design and permit conditions.
3. The project QC provisions to be implemented by the Contractor will be discussed as a matter of importance at the pre-construction meeting. The Contractor will be required to acknowledge the goals and intent of the above described QC Plan at the preconstruction conference.
4. The USACE will review the Contractor's daily reports which characterize the nature of the sediments encountered at the channel area and placed on the beach with attention to the presence of rock, rubble, shell, silt, or debris that exceeds acceptable limits.
5. The USACE will be continuously on call during the period of construction for the purpose of making decisions regarding issues that involve QA/QC Plan compliance.
6. Any modification to the Contract between the USACE and the Contractor will be evaluated by USACE to determine whether or not the change in scope will potentially adversely affect the above described QC Plan.
7. To assure that the fill material placed on the beach is in compliance with the permit, the USACE will conduct assessments of the sediment based on risk. If deemed necessary by the USACE, quantitative assessments of the sand will be conducted for grain size and silt content.
8. The COR may direct the Contractor to cease operations, relocate the dredge, or take other appropriate action in order to ensure compliance. The USACE will use the contractor's daily reports, plans, and core boring descriptions to determine the dredge area containing unacceptable materials and will instruct the Contractor to adjust their construction operation to avoid the unacceptable material.
9. The USACE will have the authority to determine whether the material placed on the beach is acceptable or unacceptable. If placement of unacceptable material occurs, the contractor will be directed by the USACE on the necessary corrective actions.

In the event that the USACE determines that a section of beach contains material that is not in compliance with the permit, then the FDEP will be notified. Notification will indicate the volume, aerial extent, location of any unacceptable beach areas and any planned remediation.

Additional testing may be required to delineate the area of unacceptable material at the discretion of the COR.

10. In order to determine if an area greater than 10,000 square feet of beach fill is noncompliant, the following procedure may be performed by the USACE duly authorized representative.

- a. Upon determination that the first random surface grab sample (a minimum of one will be taken) is noncompliant, a minimum of five additional random surface grab samples will be taken and analyzed. If the additional samples are noncompliant, then additional samples can be taken at appropriate spacing in all directions.
- b. Additional samples will be archived and evaluated according to Section D.2. (above).
- c. A site map will be prepared depicting the location of all samples and the boundaries of all areas of non-compliant fill.
- d. The total square footage will be determined.
- e. The site map and analysis will be included in the USACE's daily observation report.

The USACE's sediment inspection results will be reported to the FDEP by the USACE. Remediation efforts are discussed in Section F below. Should a situation arise that can not be corrected by methods described within this QA/QC document during construction, the FDEP will be notified by the USACE.

11. Upon completion of beach construction, the USACE will collect a representative subsurface sand sample in the vicinity of FDEP beach profile lines at 500 ft intervals to quantitatively assess the grain size distribution, shell content, and silt content for compliance (at least one sand sample will be taken). The subsurface sample will be taken 8-12 inches below the surface within the limits of the constructed berm. One replicate sample (a minimum of 200 grams) will be collected at sample location. One of the sediment samples collected at each sample location will be sent for laboratory analysis while the other sample will be archived. All samples and laboratory test results will be labeled with the Project name, FDEP Monument Profile Line designation, sample location, date of obtaining the sample, and a "Berm" designation.

All laboratory testing will be performed by a Certified testing Laboratory. All samples will be evaluated for visual attributes (shell content) and 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). The samples will be sieved using the following U.S. Standard Sieve Numbers: ¾", 5/8", 3.5, 4, 5, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, and 230. The results will be tabulated and each parameter averaged to keep a running total average. The sample results will state whether the sample MET or FAILED the project specific gradation requirement. The USACE will submit sediment testing results to the FDEP within 90 days of final dredged material placement on the beach.



## **F. Remediation Actions**

1. Remediation actions for material not meeting sediment QA/QC plan specifications may include but are not limited to:

a. mixing of material that achieves a composition that complies with sediment criteria.

b. transporting the material to an alternate location, and, if practicable, replacing the material with material that complies with the sediment criteria. (Note: the transporting of non-compliant material to the submerged portion of the profile is no longer considered an acceptable method of remediation).

2. The results of any remediation will be reported to FDEP by USACE following the completion of the remediation action.

## **APPENDIX A- Florida DEP Rules on Beach Fill “the Sand Rule”**

### **62B-41.007 (2) (j), F.A.C.**

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. Such material shall be predominately of carbonate, quartz or similar material with a particle size distribution ranging between 0.062mm (4.0 $\phi$ ) and 4.76mm (-2.25 $\phi$ ) (classified as sand by either the Unified Soils or the Wentworth classification), shall be similar in color and grain size distribution (sand grain frequency, mean and median grain size and sorting coefficient) to the material in the existing coastal system at the disposal site and shall not contain:

1. Greater than 5 percent, by weight, silt, clay or colloids passing the #230 sieve (4.0 $\phi$ );
2. Greater than 5 percent, by weight, fine gravel retained on the #4 sieve (-2.25 $\phi$ );
3. Coarse gravel, cobbles or material retained on the 3/4 inch sieve in a percentage or size greater than found on the native beach;
4. Construction debris, toxic material or other foreign matter; and
5. Not result in cementation of the beach.

If rocks or other non-specified materials appear on the surface of the filled beach in excess of 50% of background in any 10,000 square foot area, then surface rock should be removed from those areas. These areas shall also be tested for subsurface rock percentage and remediated as required. If the natural beach exceeds any of the limiting parameters listed above, then the fill material shall not exceed the naturally occurring level for that parameter.

### **62B-41.007 (2) (k), F.A.C.**

Pursuant to subsection 62B-41.005(15), F.A.C., sandy sediment derived from the maintenance of coastal navigation channels shall be deemed suitable for beach placement with up to 10% fine material passing the #230 sieve, provided that it meets the criteria contained in subparagraphs (j)2. through 5. above and water quality standards. If this material contains between 10% and 20% fine material passing the #230 sieve by weight, and it meets all other sediment and water quality standards, it shall be considered suitable for placement in the nearshore portion of the beach.