

MAINTENANCE DREDGING QUALITY ASSURANCE AND QUALITY CONTROL PLAN

Clam Pass Maintenance Dredging Project
JCP File No. 0296087-001-JC
Naples, Collier County, Florida

Purpose The purpose of the Maintenance Dredging Quality Assurance (QA) and Quality Control Plan (QC) is to provide procedures for checking the consistency of the quality of the sediment to meet the standard in paragraph 62B-41.007 (2) (j) FAC., by monitoring the placement of the fill material on the beach, testing the fill material after it is placed, and remediation if fill material does not meet the standard cited above.

Approach PBS&J has completed cores within the dredge footprint and native beach sampling from range monuments R-39 to R-44 during August, 2009. This investigation has indicated that the sediment located within the permitted dredging limits meets State requirements. The design depth of the dredging ranges from -3.5' to -4.5' NGVD (-4.8' to -5.8' NAVD 88) with a 0.5' over depth allowance as shown on the construction plans for the above referenced JCP Permit. The QA portion of the plan outlines the steps to be taken by the Permittee and its Engineer to observe, sample and test the placed sediments to determine if the sediments are on compliance. The QC portion of the plan, formulated for the project, will outline procedures that the selected contractor will perform to insure all work is within the horizontal and vertical limits of the permitted channel and the Contractor takes appropriate remedial actions for unsuitable material, if necessary. These plans are described below.

Quality Assurance The permittee will seek to enforce the relevant Terms and Conditions of both the Contract and FDEP permits related to sediment quality and quantity. In order to do so the following steps will be followed:

- a) Construction observation will be performed continuously during construction activity by the permittee, or the permittee's designated representative.
- b) The permittee shall provide onsite observation by an individual with training or experience in beach nourishment and construction observation, and that is knowledgeable of the project design and permit conditions.
- c) The project Quality Control portion of the plan to be implemented by the Contractor 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 QC portion of the Plan in writing prior to the issuance of a Notice to Proceed.
- d) The permittee will review the Contractor's daily reports which characterize the nature of the sediments encountered at the dredge cut and placed along the project shoreline with specific reference to the occurrence of rock, rubble, silt or debris that exceeds acceptable limits. The Engineer will review the dredge positions on a daily basis. Copies of the daily reports shall be provided to FDEP following the completion of the project or at any time during construction if requested.
- e) The project engineer, 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 portion of the Plan compliance.
- f) A project coastal engineer shall personally observe fill placement operations weekly. Communications will take place between the engineer and the onsite construction observer daily.
- g) Any addendum or change order to the Contract between Owner and Contractor shall determine whether or not the change in scope will potentially affect the QC portion of the Plan.
- h) The Permittee or Engineer will conduct assessments of the sediment as follows:

1. The Permittee or Engineer, will collect a representative subsurface (12"-18" inches below grade) grab sediment sample from each 500-foot long section of the constructed beach to visually assess fine gravel content, coarse gravel content, wet Munsell color, shell hash content, and silt content. Shell hash will be defined as shell material less than 4.75mm (#4 sieve) and greater than 2.8mm (#7 sieve). Fine gravel will be defined as shell or gravel larger than the #4 sieve and passing the 3/4" sieve. The sieves used for quantitative analysis include sieve numbers 3/4", 5/8", 7/16", 5/16", 3.5, 4, 5, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, and 230. Each sample will be archived with date, time, and location of the sample. The sample will be visually compared to the acceptable sand criteria. If determined necessary by the Permittee's authorized representative, quantitative assessments of sand will be conducted for Munsell color, and content of fine and gravel coarse gravel, shell hash, and silt. A record of these sand evaluations will be provided within the Permittee's authorized representative daily inspection reports. All samples will be stored by the Engineer or Permittee for 60 days after project completion.

2. Upon the placement of every 5,000 cubic yards, the Permittee or his duly authorized representative or Engineer, will collect and analyze representative sub-surface (12"-18" inches below grade) sand sample from the middle of the constructed berm. All samples and laboratory tests results shall be labeled with the Project name, FDEP Range Monument Profile Line designation, the above descriptive sample location, date of obtaining the sample. Any characteristics of the beach, such as scattered rocks, shell piles, and other debris not represented in the sand samples shall be documented and photographed or sampled.

3. All laboratory testing shall be performed by a certified Testing Laboratory. All samples shall be evaluated for visual attributes and sieved on a 1/2 phi interval to the #230 sieve in accordance with the applicable section of ASTM D422-63 (Standard Test Method for Particle Size Analysis of Soils) and ASTM D2487 (Classification of Soils for Engineering Purposes). The percent fine, defined as the percent passing #230 sieve, shall be calculated for each sample. The results shall be tabulated and each parameter averaged to keep a running total average. Each sample results shall state whether the sample MEETS or FAILED the compliance standards set forth in Table 1.

4. If continuous beach area of 10,000 square feet contains sediment that is not in compliance with the permit then the FDEP will be notified. Notification will indicate the estimated volume, aerial extent and location of any unacceptable beach areas and remediation planned. The results of any remediation will be reported to FDEP following construction.

i) Remediation will be determined by the Permittee and may include but shall not be limited to:

1. Excavating the non-specification material and replacing the material with that which complies with the sediment criteria. Additionally, material that is unacceptable may be disposed of in an approved upland disposal facility landward of the CCCL.

j) In order to determine if an area greater than 10,000 square feet of beach fill is non-compliant, the following procedure will be performed by Permittee's duly authorized representative or Engineer.

1. Upon determination that the first representative surface grab sample is non-compliant, at minimum, five (5) additional random surface grab samples will be taken and analyzed. If additional samples are non compliant, then additional samples will be taken at 25 foot spacing in all directions.

2. Additional samples will be archived and evaluated according to h.1. (above).

3. A site map shall be prepared depicting the location of all samples and boundaries of all areas of non-compliant fill.

4. The total square footage will be determined.
5. This method will also be used to test remediated areas to insure compliance.

The sediment specifications for the dredge cut are provided in Table 1. The values provided in Table 1 represent the acceptable range for maintenance dredged placed material that must be met for the material to be acceptable. Deviations from the above specifications are acceptable provided that the spatial extent of deviations does not exceed 10,000 continuous square feet. Materials which fall outside these ranges will be considered unacceptable materials.

Table 1

Sediment Compliance Specifications

<u>Sediment Parameter</u>	<u>Maintenance Dredge Cut</u>
Allowable Wet Munsell Value (referenced to the 2000 Standard)	6 or higher
Maximum Fine Gravel (Material passing 3/4" sieve and retained on the #4 sieve, assumed to be shell.)	5%
Maximum Coarse Gravel (Material greater than 3/4")	3%
Maximum Silt Content (Material passing #230 sieve)	10%

Quality Control The project documents will incorporate the following technical requirements that address the location of dredging which will be adhered to by the contractor during the prosecution of work:

1) Electronic Positioning and Dredge Depth Monitoring Equipment shall be utilized if material is dredged hydraulically. The Contractor shall continuously operate electronic positioning equipment approved by the Engineer to monitor the cutterhead location and depth or provide an alternative system acceptable to the engineer. A Differential Global Positioning System (DGPS) or equivalent shall be used to determine the horizontal position and shall be interfaced with an appropriate depth measuring device to determine the cutterhead depth. The horizontal positioning equipment shall maintain an accuracy of ±3 feet. The cutterhead depth positioning device shall maintain a vertical accuracy of ±0.5 feet with continuous applicable tidal corrections. The Contractor is required to operate the electronic positioning equipment continuously and plot the position of the dredge cutterhead. Such fixes, and the accompanying plots, shall be furnished to the Engineer daily as part of the Daily Reports. The electronic positioning equipment shall be installed on the dredge so as to monitor, as closely as possible, the actual location of the cutterhead. The location of the master antenna on the dredge and the distance and direction from the master antenna to the cutterhead shall be reported on the Daily Reports. A printout of the cutterhead location in State Plane coordinates, the cutterhead depth corrected for tide elevation and referenced to NAVD 88 and time, shall be maintained using an interval of 2 minutes for each printed fix. A printed and a digital file (in ASCII format) copy of the position data shall be provided to the Engineer as part of the daily report. The Contractor shall prepare a plot of the data that includes the State Plane Coordinate grid system and the channel limits. The format of the plot shall be subject to approval by the Engineer. No dredging shall take place outside of the channel limits (horizontal and vertical limits) as shown on the drawings.

2) If the material is dredged mechanically the Contractor shall complete layout (initial stake out) of work per the construction plans. The stake out shall include laying out the project by placing vertical stakes at every station as depicted on the construction plans, in alignment with the dredge footprint in order to present an outline of the bottom width of the dredge cut. The Contractor may elect to only stake out a portion of the job

initially to reduce potential displacement or loss of stakes. The Contractor shall furnish such stakes, equipment, tools and qualified personnel as may be necessary for maintaining such staking for completion of the work. Contractor will be responsible for documenting the placement of all stakes placed on the beach through a graduated numbering of the stakes, and to use that list to ensure all stakes are removed and accounted for upon completion of the project.

3) Contingency Plan. The Contractor shall be responsible for establishing such controls as may be necessary to determine that the contract quantity is placed on the beach. Excavation in the channel shall not extend below the allowable depths shown on the drawings or as otherwise agreed by the Owner and Permits. The Contractor shall be responsible for establishing such control as may be necessary to show that the allowable excavation depths and limits are not exceeded. If rock, clay or excessive turbidity is encountered in the channel, the dredging depth or the location of the dredging shall be immediately changed by the Contractor. **If the material is dredged hydraulically**, the first action taken by the contractor shall be to raise the cutterhead. Should undesirable sediments continue to be encountered, the contractor shall cease excavation and move the dredge to another location within the permitted borrow area and the Engineer shall be notified immediately. Any rock or clay balls deposited on the beach shall be removed from the site of the work and disposed of in areas provided by the Contractor.

4) Other. The Contractor shall excavate within the channel in a uniform and continuous manner in the directions required by the Plans and Specifications. If directed by the Engineer, the Contractor shall change the location and/or depth of excavation with the channel limits when necessary to provide the best fill material available. Although no rock is expected to be encountered, the Contractor will be prepared to screen the dredged material and remove any non-beach compatible material. Any non-beach compatible material will be hauled by dump truck to an upland disposal facility landward of the CCCL.

Order of Work

The means and methods of excavation shall be determined by the Contractor. If dredging is to be done mechanically, this may require using some of the material to be graded for the purpose of constructing a temporary access sand road between stations approximately 2+00 and 6+10. Upon completion of the access sand road, the Contractor shall begin at the eastern end excavating the material to be dredged down to grade, or as near to grade as possible so as to minimize removal of non-beach compatible material which may be encountered at lower elevations. The excavation shall proceed from east to west, with removal of the plug to connect the channel to the Gulf of Mexico being the last order of work, so that during the majority of the excavation, tidal currents will not interfere with the work or carry turbidity into interior portions of the bay or out the inlet.

The material to be dredged is distributed among three areas as designated as Sections A, B, and C, on the plans. It is the intent of the County to, at a minimum, complete the dredging as specified for Sections A and B, because these are contiguous to the beach and are the shallowest areas and the easiest to access with mechanical excavation equipment, and past experience has shown that logistically Sections A and B can be excavated mechanically.

Section C presents logistical difficulty to mechanical excavation that is somewhat different from the conditions in Sections A and B. Section C has greater water depths and distribution of the material to be dredged over a wider area. In the past Section C has always been dredged with a hydraulic dredge, with the material being pumped directly to the beach. This has been done during maintenance operations when all three sections, A, B, and C, were dredged hydraulically.

For Sections A and B only, the order of work shall be placement and grading of approximately 4,000 cubic yards of sand in the old natural channel meander, then placement of the remainder of the material, estimated to be approximately 8,000 cubic yards of sand in the designated area on the beach south of the inlet. Section C, representing a project alternative, may be dredged mechanically on a barge or hydraulically with placement of up to approximately 8,100 cubic yards of material in the South Fill Template, as shown on the plans.