

PHYSICAL MONITORING PLAN

Canaveral Harbor Federal Sand Bypassing Project

Brevard County, Florida

Permit No: 0220629-002-JC

Permittee: Canaveral Port Authority

November 22, 2006

Revised: 14 December, 2006

Revised: 14 May, 2009

Revised: November 7, 2014

Project Description

The project will dredge the equivalent of approximately 156,000 cubic yards per year from the shoreline north of the Canaveral Harbor Entrance ("inlet") and place the material along the shoreline within 3.5 miles south of the inlet for the purposes of "sand bypassing" to mechanically restore the natural southerly littoral drift across the inlet. The project will be repeated approximately every six (6) years, more or less. This is a federally authorized project that is part of the Canaveral Harbor Federal Navigation Project and constructed by the U.S. Army Corps of Engineers, Jacksonville District.

The dredge (borrow) area is between the existing mean high water line and the -19.3 ft NAVD88 contour, between the inlet's north jetty and 8,150 ft north thereof (at reference monument CCAFS-38). The dredged material will be placed along the shoreline, between the Canaveral Harbor south jetty and southward for up to 18,600 feet (R1 to R20). [The Corps' presently authorized fill placement area is from R1-R14.] The fill material will be placed in a berm with landward elevation of approximately +7.2 ft NAVD88 of varying width and sloping seaward at approximately 1V:50H to approximately +6.2 ft NAVD88 elevation, thence sloping seaward to the existing seabed at average slope of approximately 1V:25H. The actual length and width of the placed fill within the designated alongshore limits will vary as a function of the volume of material that will be bypassed during each construction event, to be specified by the Corps of Engineers.

The project has been previously constructed four times: in the Spring of 1995, Spring 1998, November-December 2007, and in March/April 2010. The next construction event is anticipated in Spring of 2016. Construction activity is limited by permits to November 1 through April 30.

Predicted Performance (Design Life)

The project's design life is 6-years predicated upon a nominal 6-year bypassing interval of 936,000 cy per construction event; i.e., a bypassing rate of 156,000 cy/yr on equivalent annual average. This reflects both the minimum anticipated rate of littoral in-filling

(recovery) of the borrow area and the probable rate of littoral feeder-effect (erosion) of the fill area.

Annual physical monitoring of the previously conducted projects, from 1995 to 2013, has affirmed these original design (performance) predictions thus far.^{1,2} The measured rate of volumetric recovery of the borrow area, north of the inlet, has been about 212,000 cy/yr on annual average. The 4000-ft monitored shoreline north (updrift) of the borrow area has additionally gained about 33,000 cy/yr, on average.

Physical Monitoring Plan

1. Borrow and Fill Area Profile Surveys.

Topographic and bathymetric profile surveys of the beach and offshore will be conducted as follows (dates are approximate, \pm one month). This schedule encompasses both the previous and pending Sand Bypass Projects and would repeat for subsequent projects;

Sand Bypass IV (constructed April, 2010)

- a) Pre-Construction (December 2009; synonymous with Yr-2 survey for SB-III, above) -- Completed
- b) Post-Construction (May-June 2010) -- Completed
- c) 1-yr, 2-yr, 3-yr Post-Construction (May-June, 2011, 2012, 2013) -- Completed
- d) 5-yr Post-Construction (May-June, 2015)

Sand Bypass V (Anticipated construction January-April, 2016)

- e) Pre-Construction (November-December 2015)
- f) Post-Construction (May-June 2016)
- g) 1-yr, 2-yr, 3-yr Post-Construction (May-June, 2017, 2018, 2019)
- h) 5-yr Post-Construction (May-June, 2021)

Pre-construction survey data shall be collected not more than 90 days prior to dredging/beach fill. Post-construction survey data shall be collected not more than 60 days after completion of dredging/beach fill. Additional surveys may be conducted if/as conditions warrant. This schedule will be repeated for the following bypass construction event (nominally anticipated in 2022 per Corps' schedule).

North of the inlet, the profile surveys shall span the borrow area plus 4000-ft of adjacent shoreline to the north; viz., from the inlet's north jetty to approximately

¹ Olsen Associates, Inc., 2013. "Canaveral Harbor Sand Bypass Project, 2010 Phase IV Bypassing. 3-Year Post-Construction Physical Monitoring Report (May 2013)." Prepared for Canaveral Port Authority and Fla. Dept. of Env. Protection. Olsen Associates, Inc., 2618 Herschel Street, Jacksonville, FL 32204., September 6, 2013.

² Olsen Associates, Inc., 2014. "Port Canaveral Inlet Management Plan. Brevard County, Fl. 2013 Sediment Budget update." Olsen Associates, Inc., 2618 Herschel Street, Jacksonville, FL 32204.

12,400-ft north thereof, from monument CCAFS-29 through CCAFS-42. (There are no R-monuments north of the inlet). Profile spacing along the borrow area shall be not greater than 500 ft.

South of the inlet, the profile surveys shall span the fill area plus at least 5000-ft of the adjacent shoreline. Beach fill monitoring profiles will include, at minimum, monuments R1 through R20.

All profile surveys shall be measured along the previously established azimuths and locations of each historical monument. The profiles shall extend from the monument or at least 100-ft landward of the dune/vegetation/ seawall line, to at least 3600-ft offshore of the monument or to the -32 ft, NAVD seabed contour. All survey activities and deliverables shall be conducted in accordance with the latest update of the *BBCS Monitoring Standards for Beach Erosion Control Projects, Section 01000 – Beach Profile Topographic Surveying and Section 01100 – Offshore Profile Topographic Surveying*³.

2. Aerial Photography

Aerial photography of the beach shall be taken concurrently with the post-construction survey and the Year-Five post-construction survey, as close to the date of the beach profile surveys as possible. The limits of the photography shall include the surveyed monitoring area as described above. All work activities and deliverables shall be conducted in accordance with the latest update of the *BBCS Monitoring Standards for Beach Erosion Control Projects, Section 02000 – Aerial Photography*. It is noted that military security may prohibit or limit aerial photography along the borrow area north of the inlet.

3. Engineering Analysis and Report

All survey and aerial photography data, and an engineering report, shall be submitted to BBCS within 90 days following the completion of the post-construction and each annual or biennial monitoring survey.

The report shall summarize and discuss the data, the performance of the beach fill project, and identify erosion and accretion patterns within the monitored area. In addition, the report shall include a comparative review of project performance to performance expectations and identification of any adverse impacts attributable to the project. The report will specifically include analysis and discussion of the borrow activity's impact to the existing dune along the borrow area.

³ Note: Because of the nature of the borrow area, located directly along the beach's high water line, the profile surveys along the "Borrow Area" shall include the dune, dry beach and offshore, in accordance with Sections 01000 and 01100. Alongshore profile spacing shall be approximately 500-feet in accordance with Section 01200 (*Borrow Site, Shoal and Other Bathymetric Surveying*).

Appendices shall include plots of survey profiles and graphical representations of volumetric and shoreline position changes for the monitoring area. Results shall be analyzed for patterns, trends, or changes between annual surveys and cumulatively since project construction, including additional reference to data and results measured since the inception of the Sand Bypass project in 1995.

Coordination and Reporting

Surveys and other data acquisition and reports shall be coordinated with concurrent monitoring requirements for FDEP-permitted projects within and adjacent to the sand bypass project area. These projects include the south jetty sediment trap, Brevard County Shore Protection Project, and others.

Monitoring reports and data shall be submitted to the Bureau of Beaches & Coastal Systems (BBCS) in Tallahassee. Submittals shall be formatted and delivered in accordance with all permit requirements.