

Attachment B
Bathtub Beach Fill Restoration Project Summary

Introduction

Bathtub Beach — a state-designated critically eroded beach in Martin County, Florida — has recently experienced erosion that damaged Bathtub Beach Park infrastructure and threatened an adjacent public roadway. Bathtub Beach is located on a narrow stretch of barrier island on the Atlantic Ocean about one mile north of St. Lucie Inlet (Permit Application Figure B1). Martin County has developed Bathtub Beach Park between the beach and MacArthur Boulevard. A limestone outcrop at the northern end of the beach extends at an acute angle from the shoreline into the nearshore marine environment. This hardbottom (a valuable natural resource) begins at the shoreline just north of the Bathtub Beach Park property line and angles out about 300 ft beyond the shoreline at the south end of Bathtub Beach Park. The distance of the hardbottom from the shoreline varies with the shoreline location. Between the hardbottom and the shoreline lies a shallow, relatively calm area of water. This feature makes the beach an extremely popular bathing, snorkeling, and diving area. South of the beach lies the residential community of Sailfish Point, which terminates at the St. Lucie Inlet.

Martin County proposes to dredge material from the St. Lucie Inlet flood shoal and place the material from approximately 300 ft south of FDEP monument R-34 to approximately 200 ft north of FDEP monument R-36 (approximately one mile north of the inlet). The Bathtub Beach Fill Restoration Project design provides for beach fill to protect adjacent public infrastructure and natural resources. This permit request provides for beach nourishment on an as-needed basis (i.e., when erosion reaches the point of threatening to damage infrastructure). Martin County does not propose scheduled nourishment, but rather proposes a permit to allow the county to act expeditiously when the situation requires.

Beach Fill Design Basis

Sand transport into and out of the project area during storm events causes the beach width to vary dramatically (Figure 1). Infrequently, sand may cover the northern end of the wormrock reef and hardbottom areas. Likewise, the beach sometimes erodes rapidly and dramatically. Such erosion in late 2007 and in Fall 2008 damaged park infrastructure and threatened MacArthur Boulevard, the only access to the Sailfish Point residential community.

The general project design (Permit Application Figure B-4) would provide a minimum, equilibrium fill design, which is unlike a typical beach nourishment template in the following ways:

- The Bathtub Beach template does not expand the beach significantly seaward to account for a long-term beach erosion rate and a periodic renourishment schedule. The template provides for minimal protective fill.
- The Bathtub Beach template sets the seaward slope of the fill at the equilibrium slope of the beach (based on the R-35 data shown in Figure 1) so that the construction toe of fill would not move significantly seaward.
- The fill design only replaces the dune lost during recent erosion events. The design does not greatly expand the pre-erosion dune volume or footprint. Notably, the peak at the extreme left (western) edge of the May 2008 profile shows sand placed on the parking lot to protect against wave action. This peak is not a natural dune feature.

The proposed beach fill template provides for not only the minimum protective fill, but also the minimum potential risk to the adjacent hardbottom. Figures 1 and 2 clearly suggest that sand has likely periodically covered the current landward edge of the hardbottom. The proposed fill template extends to the extreme landward edge of the period of record profiles. Natural variation in the beach extent clearly presents greater potential to cover the hardbottom than the proposed project.

The St. Lucie Inlet flood shoal would provide the sand source for nourishment. The dredge template (Permit Application Figure D-1) completely avoids areas containing any seagrass and the design includes a buffer area between the edge of the dredge template and any seagrass. The flood shoal sand originates from the inlet-mediated capture and settling of sand from north of the inlet (including Bathtub Beach). Flood shoal sand is unlikely to reenter the inlet and pass to the south. By moving the sand from the flood shoal back to Bathtub Beach, this project, in effect, would return the sand to circulation. The recently constructed St. Lucie Inlet sand trap captures sand entering the inlet from the north for transfer to beaches south of the inlet. If sand placed on Bathtub Beach erodes and moves south to the inlet, the sand trap will likely capture some of that material.

Figure 1 May 2008 Beach Profile, Approximate Fill Template, and Historic FDEP Profiles at Monument R-35
 Bathtub Beach, Martin County, FL

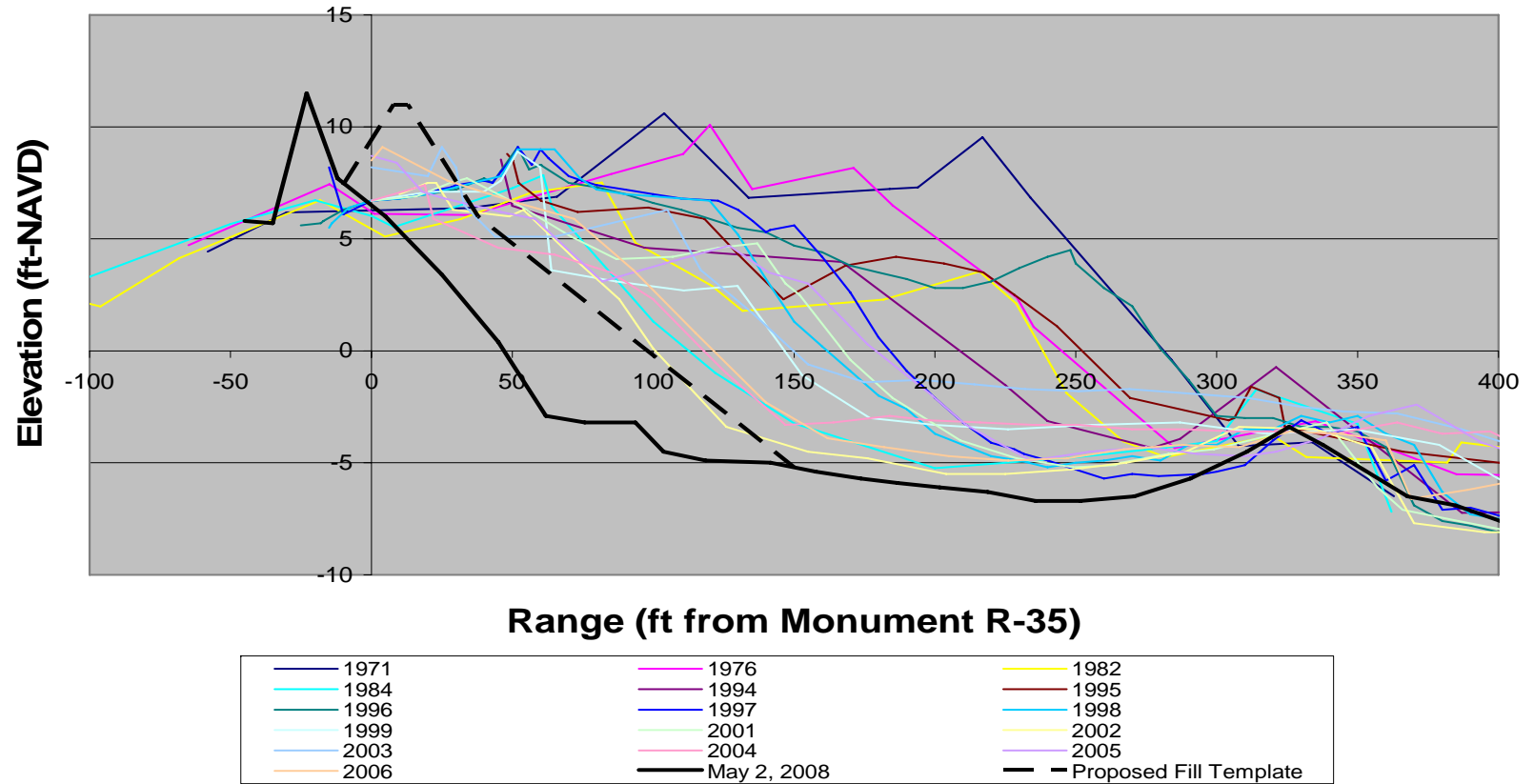
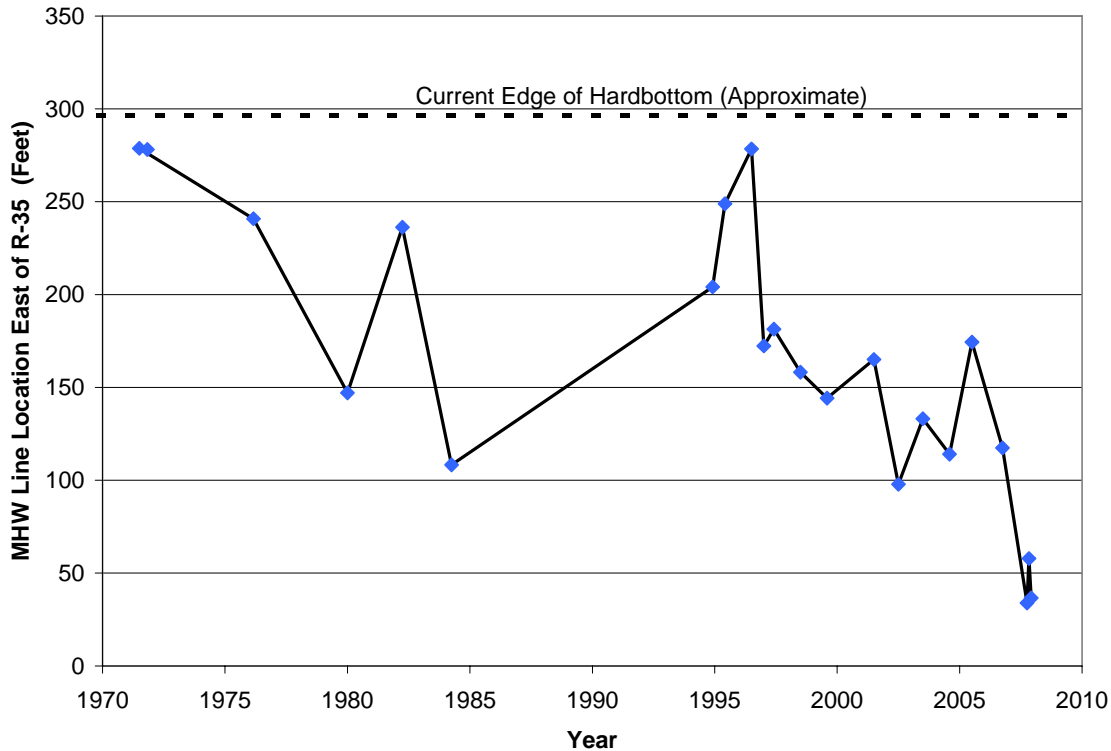


Figure 2 Changes in Mean High Water (MHW) Line Location 1971 – 2007 at FDEP Monument R-35 Bathtub Beach, Martin County, FL



Engineering Design

The proposed project's fill template varies slightly throughout the project area depending on the features of the existing beach. To prevent adverse impacts to existing hardbottom (just east of Bathtub Beach), the fill template maintains a sufficient distance landward of the hardbottom. A baseline drawn between FDEP monuments R-36 and R-35 that extends northwest to the northern extent of the project area. For the majority of the project area, the seaward toe of the template ends at a line lying 150 ft seaward of the designated baseline. Except at the northern end of the project area, the 150-ft distance seaward of the baseline provides a buffer of at least 120 ft between the toe of fill and the hardbottom.

Finally, the fill template includes a berm adjacent to a few properties in Sailfish Point just beyond the northern boundary of the county park. Owners of the first two houses north of the park have requested sand placement in front of their properties and the county has agreed to include this component in the permit application. Placement of any sand in that location would occur only if funded privately.

A topographic / bathymetric survey conducted in May 2008 by Morgan & Eklund, Inc. (Attachment F) provided the basis of the fill design. The survey comprised shore perpendicular transects at approximately 100-ft intervals from the FDEP monuments; surveyors labeled the transects alphabetically according to distance south of the monument. For example, R-35A lies 100 ft south of R-35, R-35B lies 200 ft south of R-35, and so on.

The fill template extends from R-35F at the south end of the project area to R-34C at the north end (Permit Application Figure B-4) and allows for a placement volume of just over 25,000 CY. With the exception of R-34C, R-34D, and R-34E at the northern end of the project area, the fill template includes the following design parameters:

- 1:5 (vertical: horizontal) construction slope from seaward edge of parking lot (assumed 6 ft-NAVD elevation) to fill crest
- Fill crest elevation:
 - 12 ft-NAVD (R-35E – R-35F)
 - 11 ft-NAVD (R-35A – R-35C)
 - 10 ft-NAVD (R-34G)
- Fill width: varies
- 1:5 construction slope from seaward edge of fill crest to 6 ft-NAVD elevation
- 1:10 construction slope from 6 ft-NAVD elevation to construction toe of fill located at 150 ft range from baseline. The existing beach slope and proposed construction slopes are equivalent (Figure 1). The historic profiles also follow the same general slope.

Because the survey data did not typically extend across the parking lot, Taylor Engineering estimated the parking lot edge from aerial photographs and assumed a consistent parking lot elevation of 6 ft-NAVD based on old survey data.

The exceptions to the given template occur at the northern end of the project at R-34C, R-34D, and R-34E. The template at R-34C begins at the existing 6 ft-NAVD contour and extends seaward at that elevation until it slopes down at 1:3 to the existing MHW location. The template at R-34D also begins at the existing 6 ft-NAVD contour and extends seaward at that elevation until it slopes down at 1:10 to the existing MHW location. At R-34E, the template consists of a 1:5 construction slope from the seaward

edge of the parking lot to a 6 ft-NAVD fill elevation. At the seaward crest of the fill, the template then slopes down at 1:10 to the 150 ft range from the baseline.

Construction Plans

The contractor will mechanically excavate and pump the sand from the St. Lucie Inlet flood shoal through the Sailfish Point pipeline (Permit application Figure D-4) to the Bathtub Beach shoreline. Geotubes filled with pumped sand will create a temporary shore-parallel containment area. This containment area will allow additional pumped sand to settle. After the initial placement, the contractor will cut and remove the geotubes to deposit the contained sand onto the beach. At that time, the beach should contain enough placed sand for the construction of a shore-parallel sand berm for containment of the remainder of the placement volume.