

Chris Carstens

From: David Swigler
Sent: Thursday, July 22, 2021 10:46 PM
To: Andy Studt; Tracy Logue
Subject: South Lake Worth Inlet - LGFR Item #10 (increased bypassing and cost-effectiveness)

Hi, Andy and Tracy.

Palm Beach County (PBC) is developing a local government funding request (LGFR) inlet project application to be submitted through FDEP's Beach Management Funding Assistance Program. The application is being submitted for management of South Lake Worth Inlet.

Item #10 (increased bypassing and cost-effectiveness) of the LGFR application requires an analysis of cost-effectiveness if construction phase funds are being requested for a major inlet management project component. Below is a summary of the analysis to support the LGFR.

- Major inlet management project component = sand trap expansion. The bottom elevation of the sand trap is constrained by an existing rock layer. The proposed trap expansion project seeks to excavate rock lowering the rock elevation and increasing the capacity of the trap thereby improving its ability to retain sand that would otherwise be transported to other portions of the inlet's flood shoal as the trap nears its "trapping" capacity between maintenance dredging event.
- Increased annual bypassing of sand = 3,000 cubic yards/year. The latest inlet management study (APTIM, 2021) for the inlet includes a sediment budget for the period between 2012 and 2018. The sediment budget identified that 6,000 CY/year enters the inlet from the littoral system and interior maintenance dredging performed by PBC bypassed approximately 3,000 CY/year to the beach. The proposed trap expansion project seeks to increase sand bypassing by capturing the remaining 3,000 CY/year within the trap making the sand accessible during maintenance dredging events.
- Project life = 94 years. The proposed trap expansion is expected to entail an initial construction event to remove rock and maintenance to dredge the incremental increase of impounded sand during its project life. The trap expansion will continue to benefit the inlet as long as the inlet is maintained. The inlet was initially constructed in 1927 and has been maintained to date (94 years). Therefore, the project life of the proposed trap expansion was assumed to be equivalent to this demonstrated commitment to managing and maintaining the inlet.
- Annualized construction costs = \$117,700/year. The total annualized construction costs is equal to initial construction (\$57,700/year) plus maintenance costs (\$60,000/year).
 - PBC correspondence (dated November 18, 2020) with its consulting coastal engineer (Coastal Protection & Engineering) identified a unit cost of \$30/CY to excavate 128,000 CY of rock, a mobilization cost of \$500,000, and a 25% contingency. This equates to an estimated initial construction cost of \$5,425,000. The annualized initial construction cost is \$57,700/year assuming a project life of 94 years.
 - Maintenance entails dredging the incremental volume of sand impounded due to the proposed trap expansion, which is assumed to be equal to the increased annual bypassing (3,000 CY/year). The consulting coastal engineer estimated the dredging cost of \$20/CY for sand. Assuming that mobilization is a cost incurred with the ongoing sand trap dredging, the average annual maintenance cost is estimated at \$60,000/year.
- Cost per unit volume of sand = \$39.23/CY. The unit cost is estimated as the annualized construction costs divided by the increased annual bypassing of sand.

- Alternative sand sources
 - Upland sand = \$52.44/CY. This considers truck hauling sand from upland mines to the adjacent beach south of the inlet at 7-year nourishment intervals. The unit cost is estimated based on PBC's 2021 annual construction contract to place sand along its beaches on an as needed basis.
 - Offshore sand = \$200.00/CY. This considers hydraulically dredging sand from borrow areas located offshore of the inlet. Mobilization of an ocean-going hydraulic dredge requires large upfront costs which becomes cost effective for projects with large fill volumes (e.g. 100,000's of cubic yards). These costs make the unit cost of offshore sand an order of magnitude higher when considering the volume of the incremental increased annual bypassing attributed to the proposed trap expansion.
- Cost-effectiveness...relative to upland sand = 3.8. [= (1 - \$39.23/\$52.44) x 15]

Please let me know if you have any question or need additional information. Thanks.

Dave Swigler, P.E.

Senior Engineer
 Palm Beach County
 Environmental Resources Management
 2300 North Jog Road, 4th Floor
 West Palm Beach, FL 33411-2743
dswigler@pbcgov.org
 (561) 233-2456

