Abstract

San Luis Pass (SLP) flood shoal between the Galveston and Follet’s Island along the Gulf Coast in Texas, acts as a natural sink for sediment from adjacent Gulf shorelines. Sediment deposited in the flood shoal influences meandering of the tidal channels resulting in erosion of islands and adjacent shorelines. A sediment management concept was developed which consisted of dredging and maintaining the tidal channel(s) to capture the sediment lost from adjacent Gulf shoreline and return the sediment back to the eroding shorelines.

Geotechnical investigations have showed that the sediment deposited in the flood shoal consists of fine to medium grain sand (suitable for habitat restoration and beach nourishment) down to a depth of at least 17 ft below MSL. Dredging alternatives were developed and tested with numerical modeling. The analysis showed that by dredging new tidal channels, the existing channel migration in the flood delta could be reduced, thereby reducing shoreline erosion within the pass.

A sediment budget was developed for the reach from the Bolivar Road Jetties to the Freeport Jetties. The sediment budget showed that the general trend of sediment transport along the West Galveston Island is towards SLP. Along Follet’s Island, the transport pathways are bi-directional but in the vicinity of SLP, longshore transport is towards the pass. Hydrodynamic, morphological and salinity modeling were conducted to evaluate the influence and change resulting from proposed alternatives. Results showed that the alternatives cause minor to negligible change over existing conditions.

A range of sediment placement alternatives were developed and analyzed. The selected placement alternative consists of placing the sand as nearshore submerged berm. This concept involves placing dredged material in shallow coastal waters in the form of shore-parallel berms to act as feeder berms. These berms enhance the adjacent beaches and nearshore areas by reducing wave action and providing additional material for the littoral system.

Constraints such as access route location and depth, equipment types, dimensions, and capacities, feasible pipeline route, and placement depth restrictions were analyzed to understand
the construction limitations. Since the cost of construction of the project will vary depending on where the dredged material is placed along the Follet’s Island shoreline, cost variation was developed for placing the material adjacent to the Treasure Island revetment’s terminus to 35,000 ft west along the shoreline.

An analysis was performed to determine the optimal placement location both cross-shore and alongshore. A detailed literature review was done to develop the guidance for design of submerged berm. Conceptual level placement alternatives were developed for two options – fixed budget (assuming a fixed available budget for construction) and fixed volume (assuming a fixed available volume for construction), to develop the range of cost estimates associated with the project.

**Key Words:** San Luis Pass, Follet’s Island, Nearshore Beach Nourishment, Flood Shoal Dredging.

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**Bio**

Mr. Agarwal is a Senior Coastal Engineer and Project Manager with over 10 years of experience in coastal engineering. He interests lie in performing sophisticated analysis and numerical modeling on various costal phenomena such as wave transformation, circulation, shoreline morphology, sediment transport, and vessel hydrodynamics.

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