



Innovative Sediment Placement Technologies: Sediment Distribution Pipe

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS

BUILDING STRONG®

Focus Area

Dredged Material Management

Problem

A need exists for testing innovative methods to improve the way that dredging is executed and dredged material is placed, but opportunities to explore the efficiency of “new” things can be limited by a bunker mentality (risk), “traditionalism,” and/or lack of funding. Historical methods for levee construction using the sediment distribution pipe allowed for dredged sediment to be hydraulically sorted during placement, and allowed for increased placement area. Unfortunately, this technique has been poorly documented, and no performance metrics or design guidance exists for its implementation.



Sediment Distribution Pipe demo on Sturgeon Island March 2020

Study Description

An in-line separation methodology was used in the past to build levees by separating sand from fine-grained material by hydraulic sorting through holes in the bottom of an elevated pipeline. As the dredge pumped the partially stratified mixed sediment slurry in the discharge pipeline to the elevated section, the coarser sand dropped out through the bottom holes by force of gravity while the finer silts and clays in suspension were preferentially transported over the holes and out the end of pipe. This simple placement method from the past is being evaluated to establish not only separation performance metrics, but is also being further developed to enhance sediment distribution capabilities to optimize targeted placement while dredging, as opposed to rehandling the sediment at a later time and incurring additional costs. This RT includes proof of concept pilot projects of the sediment distribution pipe to demonstrate functionality. Scaled physical modeling will be conducted to quantify sand separation efficiency and evaluate other performance metrics. The project’s long-term goal is to provide a robust targeted-placement methodology that both: 1) separates sand from mud and, 2) distributes sediment more efficiently while dredging.

Products

Multiple peer-reviewed reports discussing the methods and results of the research will be produced as a result of this RT. Technical reports and journal papers generated by this RT will provide guidance on the use of a sediment distribution pipe and an engineering tool for predicting select hydraulic characteristics of a slurry distribution system that would allow an engineer to customize its design to achieve project objectives. Journal papers will discuss the methods and findings of this work in terms that expand beyond the specific field demonstration sites and impact the greater engineering and scientific community.

Summary

The USCAE is seeking ways to increase the beneficial use of dredged sediment across the nation. This project is developing a technique to hydraulically sort and simultaneously conduct targeted placement of dredged material. These methods could significantly reduce costs associated with rehandling sediment and make many BU projects more feasible for implementation.



Balancing operational and environmental initiatives and meeting complex challenges of dredging and dredged material placement in support of the navigation mission.