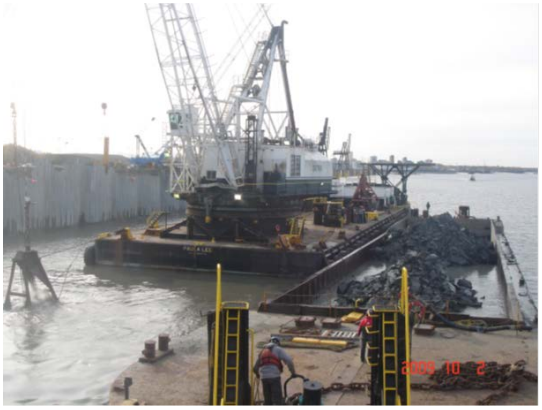
Development of an Automated Scow Load Measurement System, Contract Specifications and Engineering Guidance

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS BUILDING STRONG®

Problem



Statement of Need (SON) 2015-N-2 stated that "there is currently no reliable way to measure the volume of dredged material (cubic yards) in scows." The requirement was presented such that if dredged material could be accurately measured in the scows, payment could be made on a per yard basis, thus maintaining a production incentive and keeping costs down and that this would be similar to the bin measurement payment method that is used for hopper dredges in lieu of hydrosurvey measurement. Problem is that the only scow measurement systems currently available to the USACE consist of one of two methods. A dredging inspector can visually measure the draft markings on the scow hull forward and aft and port and starboard, average these four measurements to calculate an average draft, then refer to a displacement chart to measure the weight of the dredged material in the hopper. Then a representative volume of dredged material is retrieved from the load (usually 1 ft^3) and weighed to establish a unit weight, and then the volume of dredged material is back calculated from these two values. This is a very labor intensive method and free water weight is also included, and is counted as sediment. The automated methods are measured by the Dredging Quality Management (DQM) Center's system that either only measures displacement (weight of dredged material in monitoring mode), or the volume and tons dry solids in the hopper by only taking two ullage measurements of the dredged material surface in the hopper that doesn't take into account the heaped material from more cohesive loads.

Study Description

A technical literature search will be conducted on existing and emerging technologies to measure quantity of material in the scow. The number of districts using scows where the quantity of dredged material is measured will be determined and their subsequent methods of measurement and respective perceived accuracy and precision levels will be documented in a technical note. Using the results of existing and emerging scow measurement systems identified in the technical literature and district survey, the most promising technology (or technologies) will be selected and NWP contract specifications crafted (in coordination with NWP contract writers and dredging project personnel) to include the use of these candidates on an NWP dredging contract. These contract specifications will be written to have the equipment costs incurred by the contractor to the maximum extent possible. Any remaining equipment costs will have to be paid for by the research task. It is envisioned that the contract will also be written such that the selected dredging contractor will be required to demonstrate this system during the FY17 summer dredging interval in NWP. This demonstration will be monitored (measurement system performance, advantages and disadvantages, etc.) by ERDC and NWP personnel, and system performance recorded. The dredging contractor and possibly NWP hydrographic surveyors will conduct before and after dredging surveys to measure volume of dredged material removed and this value will be compared to the prototype measurement system derived value. The following year (FY18), the NWP contract specifications and system requirements will be refined to include lessons learned from FY17, and system performance, accuracy and precision will be monitored during the execution of using that improve system for that year's dredging contract.

Products

The products that will be delivered from this research task will include a technical note presenting the results of the literature search and district survey, a technical report will be written that includes system performance, contract specifications, and experiences gained during the preceding two contract years, and a peer-reviewed journal article will also be produced detailing these aspects.

Summary

This DOER research task will provide an improved scow measurement system to allow more accurate quantification of dredged material quantities to optimize project management and regulatory reporting requirements, and incentivize dredging contractor to maximize production.

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

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Nov 2018