



# Development of Bulking Factors Estimates for New Work Dredging of Houston Ship Channel

## ERDC Dredging Operations Technical Support Program (DOTS)

U.S. ARMY CORPS OF ENGINEERS

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### Response Summary:

The USACE Galveston District requested assistance in estimating bulking factors for new work dredging/deepening of Segments 5 and 6 of the Houston Ship Channel to aid in designing adequate storage capacity in the CDFs. The new work sediment is composed primarily of stiff, very stiff, and hard clays that would be expected to form clay balls that will degrade as the material is pumped to two CDFs. The degraded sediment will bulk greatly during transport but will undergo compression settling during the placement operations, decreasing the bulking factor over the course of the placement duration. Sediment arriving at the CDFs as clay balls will retain their in situ density, decreasing the overall bulking factor. Estimates of clay ball generation and degradation were calculated based on sediment properties and transport distance to the CDF for both segments and CDFs. Estimates of the bulk factor for the dredged material formed by the degraded clay balls were calculated by computing the solids concentration using compression settling parameters from a settling properties database by matching Atterberg Limits and grain size distribution. Composite bulking factors for each combination of segment and CDF were then computed by weighting the component bulking factors by their weight fractions for a range in project durations. The resulting bulking factors and their sensitivity to project factors were provided in a technical memorandum documenting the methodology and results.

### Period of Performance:

Request date: 29 April 2024    Completion date: 6 June 2024

### Benefits of the Response to the USACE Dredging/Navigation Program:

The response provided critical information to the design team such that the design would provide adequate storage capacity without reducing dredge production while not requiring costly excess capacity due to uncertainty.

### Deliverable:

A technical memorandum documenting the methodology and resulting bulking factors and their sensitivity to project factors were provided to be included as an appendix to the design document.



Providing environmental and engineering technical support to the U.S. Army Corps of Engineers  
Operations and Maintenance navigation and dredging missions