CONSTRUCTION CHALLENGES AND SOLUTIONS – INTERTIDAL SEDIMENT REMEDIATION, MIDDLE WATERWAY AREA C, TACOMA, WASHINGTON

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ABSTRACT

Between July and October 2004, the Washington State Department of Natural Resources (DNR) completed removal and capping of contaminated intertidal marine sediments near the head of the Middle Waterway in Tacoma, Washington. The intertidal sediments of Area C were contaminated with metals and heavy-end organic constituents from decades of historical waste disposal and industrial activities. Sediment remediation efforts in Middle Waterway Area C were conducted as part of on-going cleanup actions for Commencement Bay Nearshore/Tideflats Superfund Site. Area C remediation also enhanced intertidal and upland habitat to restore one of the last original tideflats in Commencement Bay. Soft sediment conditions and daily tidal swings in the upper intertidal zone of Area C complicated the work and required innovative engineering and construction technologies to address scheduling and logistical challenges of the project. Working closely with DNR, EPA, the Washington State Department of Ecology, the City of Tacoma, and local landowners and stakeholders, several key design concepts were developed and further refined during construction as field conditions required.

Limited tidal work windows and shallow water conditions made traditional barge-based dredging and capping difficult and expensive. As a result, sediment excavation was accomplished using land-based equipment to access the exposed tideflats during low tide periods; however, this created several challenges to efficiently remove the sediment and prevent cross contamination. A successful construction strategy was developed to isolate individual cells for sediment removal and backfilling using steel divider sheets. Contaminated sediments within each cell were removed to a depth of about 4 feet below the tideflat surface using a medium-sized tracked excavator. To prevent cross contamination, individual cells were then backfilled within clean import, sandy fill ahead of the incoming tide. Moving in stepwise fashion, the excavation cells progressed outward from the shoreline edge across the tideflats to provide a stable platform for vehicle and equipment access. Approximately 3,200 cubic yards (CY) of sediment were removed over an area of 0.6 acre, requiring more than 50 separate cells completed over a 6-week period.

A second objective of cleanup was to place a thin-layer cap of fine sand and silt over Area C for promoting natural recovery of benthic habitat. Placing the thin layer cap on top of the backfilled excavation cells while limiting disturbance to the tideflat posed a significant challenge. The construction contractor's team successfully pilot tested and adapted a pneumatic blower system known as Air Resource Technology (ART) to deliver and gently spread capping material to the required 0.5- to 1.0-foot thicknesses over the tideflat. Capping material was fed through a hopper into a jetstream delivery system and 8-inch-diameter hose strung across the tideflat to various capping locations. The hose was manually controlled during placement and was easily moved to different areas, eliminating the need for barge support and greatly reducing the areas where heavy equipment was needed to place the cap.

Use of the construction methodologies described was instrumental for achieving project objectives for contaminated sediment excavation and capping. Crafting of workable performance-based contract specifications, and further refinement of construction methodologies by the contractor led to completion of the project within schedule and budget, and with no contract change orders. The work also established the feasibility of the ART pneumatic system for thin-layer capping.

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