



Sediment Cap Design and Placement: Site 19, Former Derecktor Shipyard Marine Sediment (Operable Unit 5), Newport, RI

Tenth International Conference on the Remediation and Management of
Contaminated Sediments

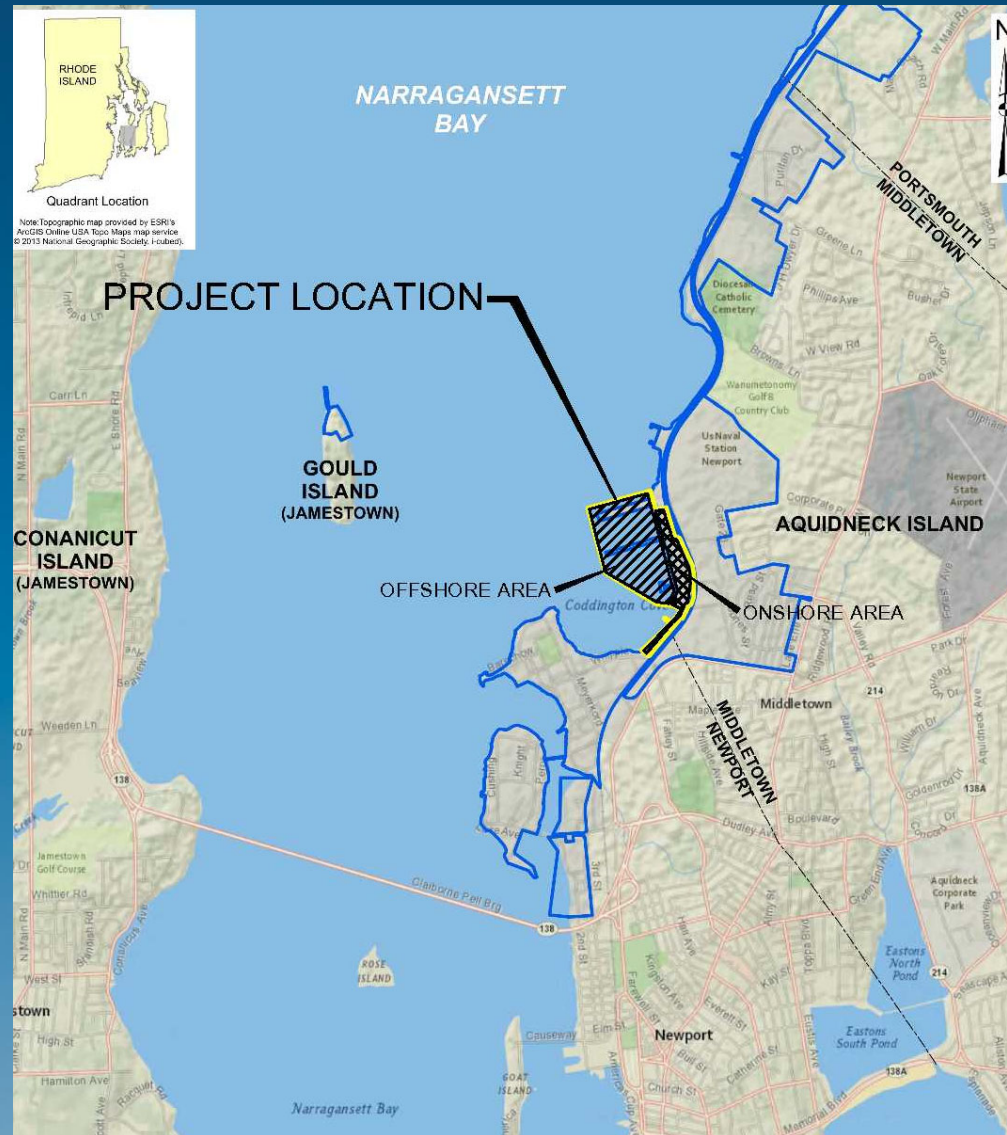


Road Map

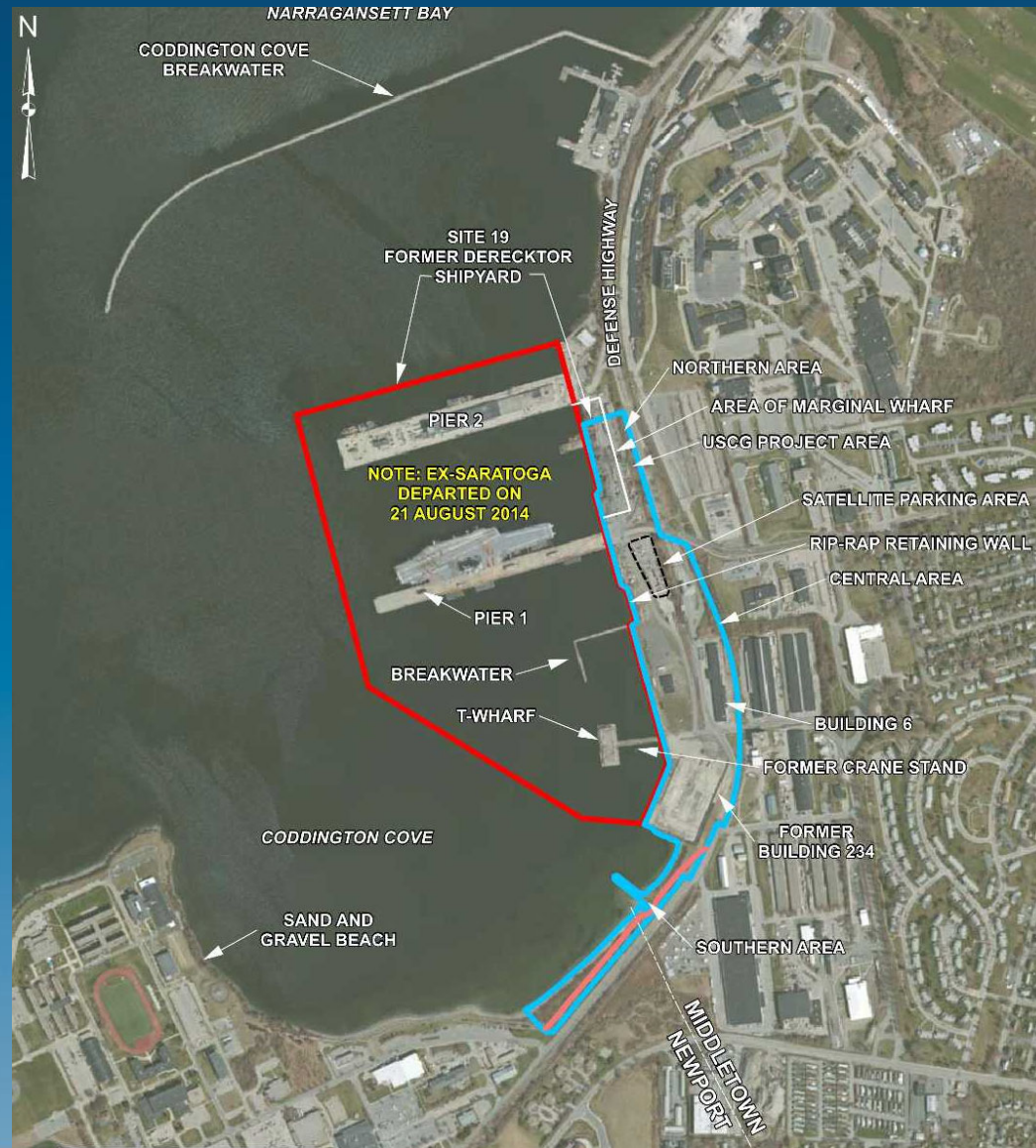
- Location, Background, and Description
- Setting
- Considerations
- Summary
- Contact & Questions



Regional Location – Site 19



Site-Specific Location – Pier 2

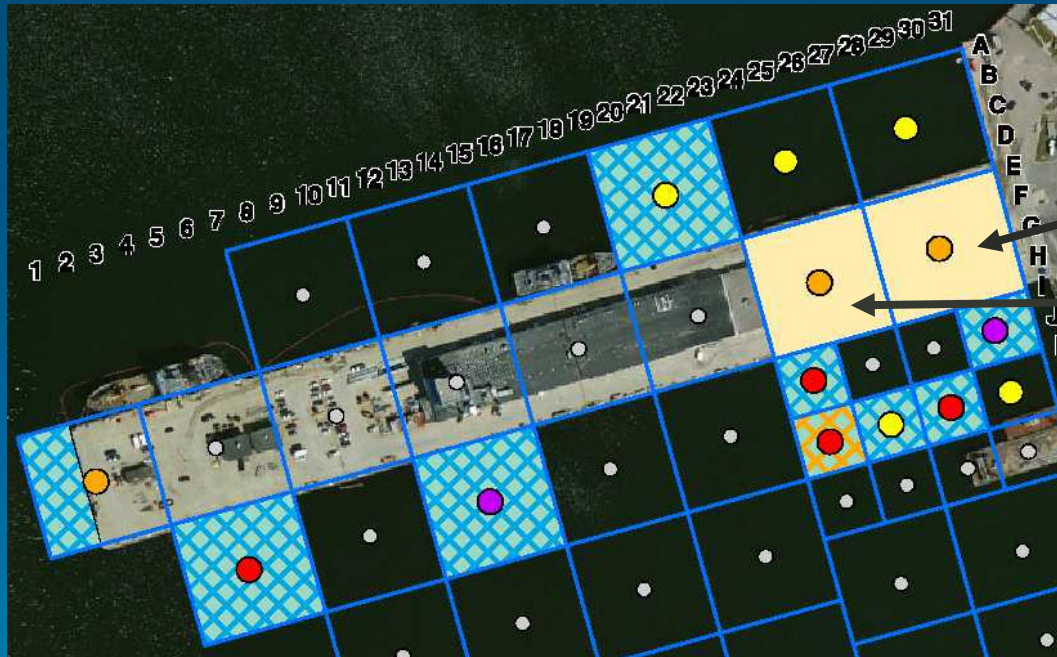


Background – Use

- Area leased to Robert E. Derecktor Shipyards of Rhode Island, Inc. (1979 – 1992)
- Former operations included sandblasting, painting, welding, and assembly of ships
- Current primary activities include research, development, and training



Background – Pier 2 Contamination



Cell G29

Cell G25

Contaminant	Cell 25	Cell 29	ROD Cleanup Levels
Benzo(a)pyrene ($\mu\text{g}/\text{kg}$)	2,200	1,600	539 (ingestion of shellfish)
Heavy molecular weight PAHs	26,800	17,300	13,903 (toxic to aquatic organisms)
Lead (mg/kg)	212	98	168 (toxic to aquatic organisms)

Background – Selected Remedy

- The Selected Remedy addressed low levels of PAHs and lead in sediments under the pier
- Dredging under pier was not feasible
 - Pilings in way of traditional equipment
 - Very limited clearance beneath pier at both high and low tides
 - Diver-assisted dredge raised safety concerns
- September 2014 ROD required:
 - Two-foot thick cap
 - Controls to prevent disturbance of the cap
 - Monitoring and Five-year Reviews



Setting – Pier 2 Details

- **Constructed in 1950s (1,600 x 200 ft wide) with three functional berths**
- **Concrete decking with concrete pilings (10 ft spacing)**
- **30+ feet of water with 3 to 4 ft of clearance below pier at high tide**



View of Pier 2

Setting – Pier 2 Use

- Home port to four USCG cutters, one NOAA research ship, and two Naval Undersea Warfare Center research craft
- Hosts the Bi-Annual International Seapower Symposium and numerous non-home ported US & foreign vessels
- Topside buildings provide maintenance and administration support



Considerations – Capping Material

- Cap required to withstand erosion from currents, 100-year storm, and ship movements (e.g., thrusters)
- Modeling indicated aggregate size of 38 mm met scour concerns for currents, 100-year storm, and all types of ships except Expeditionary Fast Transport (EFT) vessels like the USS Carson City.
- EFT vessels require aggregate size was 85 mm. Selected use of 38 mm aggregate since EFT vessels not likely docked in slips adjacent to cap location



USS Carson City



Considerations – Borrow Source

- Once material size was selected, project team needed a source that was regular in size
- Material had to be screened at source to ensure average size in thickness in two dimensions meets requirements. If not, equipment to deploy material would clog.



Cap material measurement



Considerations – Turbidity Control

- Turbidity curtain enclosed project area
- Did not extend to sediment surface to account for tidal range and prevent it from contacting/disturbing sediment
- Flotation devices, weights, anchors, and reefing lines
- Routinely inspected, and repaired immediately

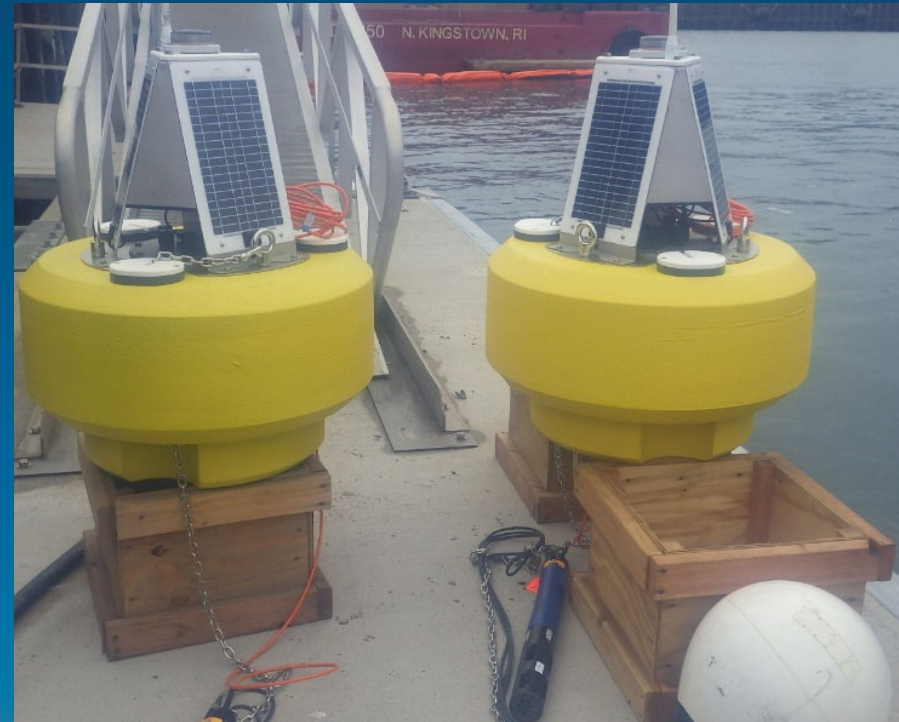


Capping material barge within turbidity curtain



Considerations – Turbidity Monitoring

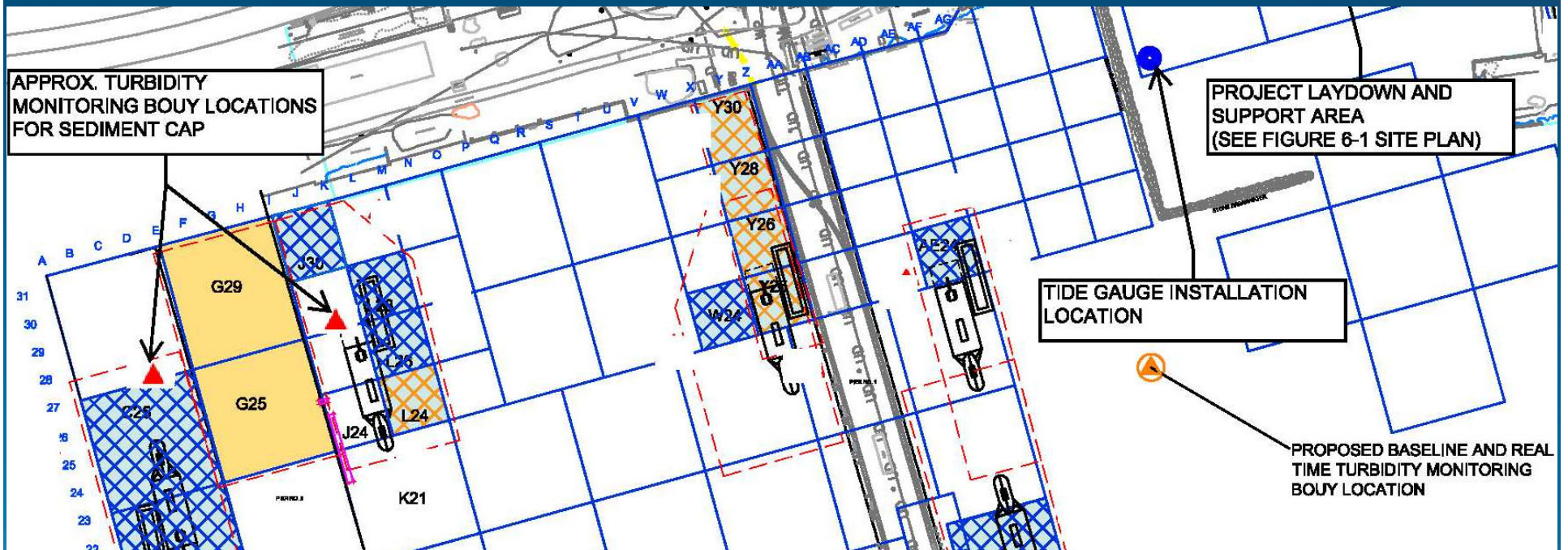
- Negotiated action level requiring stop work (background plus 10 NTUs) with EPA
- Placed buoy-mounted turbidity monitors outside of curtained work area
- Used telemetry system to send real-time data to laptop/cell phone so adjustments could be made immediately



Buoy-mounted turbidity monitors



Considerations – Turbidity Monitoring



Buoy-mounted turbidity monitor and turbidity curtain array (triangles represent monitors, red dashed line represents turbidity curtain)

Considerations – Capping Sequence

- Conducted a pre-cap bathymetric survey
- Installed cap material using diver-assisted hoses
- Installed berms along outside edge of area to be capped
- Capped material placed starting at berm and working inward in two lifts (6-in. followed by 18-in.)



Cap material stockpile on barge



Considerations – Confirming Complete

- Diver-assisted confirmation
- Confirmed cap extended to pre-marked piles (lateral and vertical)
- Test pitted to verify two-foot thickness
- Single-beam bathymetry to confirm cap placement and document final



Cap material being placed with an excavator to construct the northern berm adjacent to Pier 2



Considerations – Long Term Monitoring

- **Bathymetry to be performed 3 times per year**
 - After planned ISS (November)
 - After winter storm season (March)
 - During summer (August)
- **Conduct qualitative evaluation of habitat recovery by diver inspection approximately 3 years after installation, summarize findings in the Five-Year Review report**
- **Issue report annually, including evaluation of ship traffic logs**



Considerations – Long Term Monitoring

- Review LTM program at each five-year review cycle
- Bathymetry may be reduced if cap is performing as expected, no loss of thickness, and no weather or ship-related impacts
- Sampling and coring is not always possible or needed, and should not be a default



Key Take Home Messages

- Safety is a priority, especially when work is diver-assisted
- Sizing of material should be based on knowledge of currents and ship movements
- Borrow source should confirm material provided is uniform in size and not irregular
- Turbidity monitoring is a must
- Utilize berms and multiple lifts to place the material
- Bathymetry is main component to confirm surface area coverage complete, however test pits are needed to confirm required thickness is achieved.

