

Recontamination and Remediation of Sediment Underlying the Murray Morgan Bridge in Tacoma, Washington

FLOYD | SNIDER
strategy ■ science ■ engineering



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Presented by

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Project Overview



Background and Site Overview

Remedial Action to address recontamination to sediments within the Commencement Bay Superfund Site

Bridge Rehabilitation and Sampling

Pre- and Post-bridge overwater construction sediment sampling identified metals contamination to underlying sediments

Dredging

USEPA directed the City of Tacoma and their bridge contractor to remediate the recontaminated sediments within the Natural Recovery Area

Dewatering and Water Quality Monitoring

Passive dewatering of dredged sediments and WQ monitoring was performed

Cap Placement

To limit the remedial action to the surface sediments impacted by overwater construction, sand was placed over the dredge area

Confirmational Sampling and OMMP

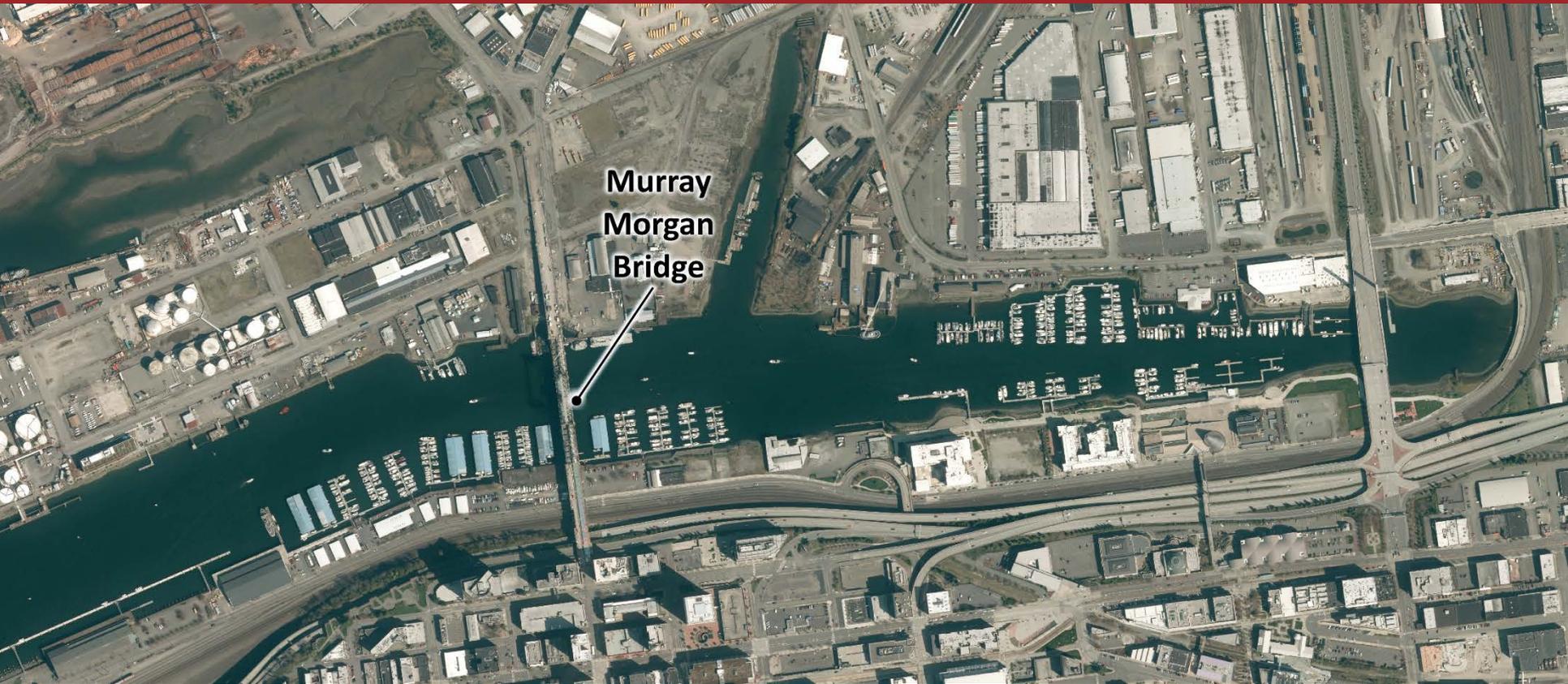
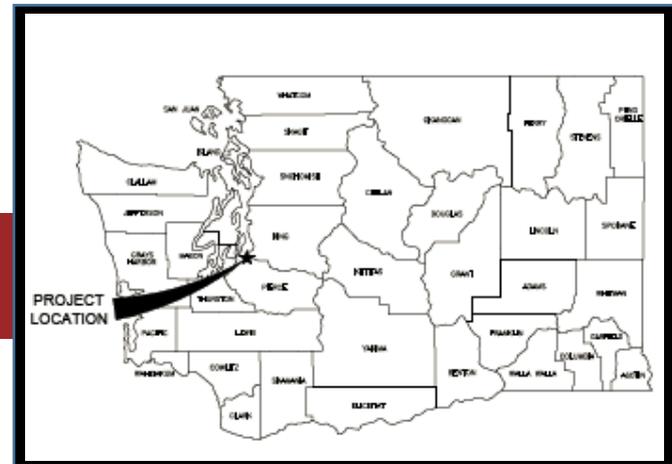
Post-remedial action sediment sampling was performed, and additional monitoring of the area will be done as part of the City's OMMP



Background and Site Overview

Thea Foss and Wheeler-Osgood Waterway

- 1 of 5 urban waterways of Commencement Bay in Tacoma
- 2006 Superfund sediment cleanup completed



Rehabilitation of the Murray Morgan Bridge

- 1913 unique vertical lift span bridge
- Bridge rehabilitation construction by City contractor: 2011–2013
- Breach of containment following sandblasting
- Over-water pressure washing and discharge to waterway
- Metals recontamination to underlying Superfund Site sediments



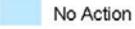
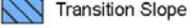
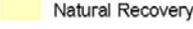
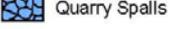
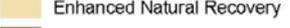
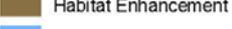
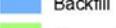
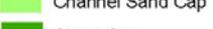
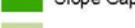
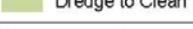
Background and Site Overview

Completed Remedial Action

Legend

⑧ Remedial Areas

Completed Remedial Actions:

 No Action	 Grout Mat Cap
 Slope Rehabilitation	 Transition Slope
 Natural Recovery	 Quarry Spalls
 Enhanced Natural Recovery	881  City of Tacoma Outfall and Designation
 Habitat Enhancement	 Private Outfall (No Designation Provided)
 Backfill	
 Channel Sand Cap	
 Slope Cap	
 Dredge to Clean	

Bridge overlying
Natural Recovery
Area



Recontaminated sediments
located within USACE
navigation channel

Adjacent
buried cable
crossing area

Project Overview and Work Activities

USEPA-Required Remedial Action and Unique Project Roles

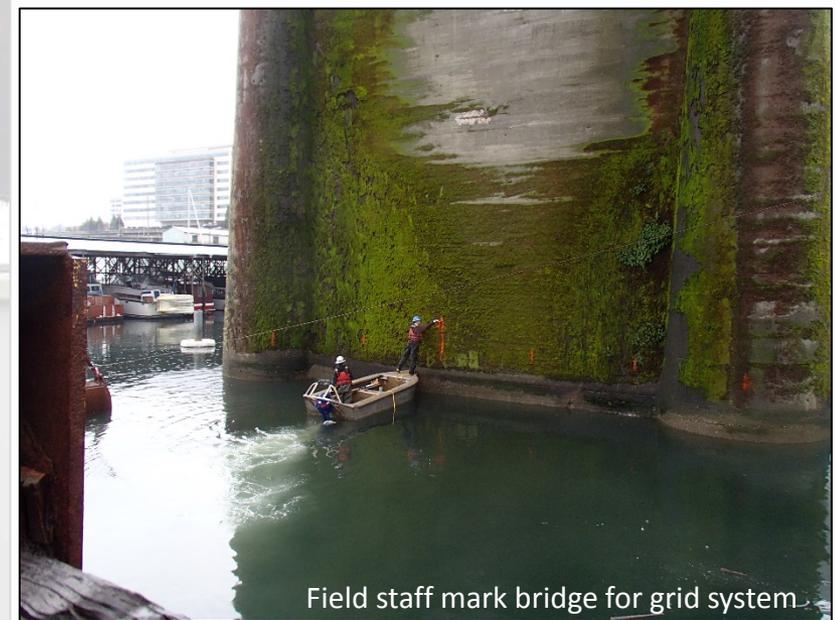


- Bridge contractor responsible for Remedial Action
- Collaboration between the City, bridge contractor, and marine contractor
- Fast pace project: USEPA and City agreement in September 2014, Remedial Action completed February 14, 2015 (~5 months)
- Closure of in-water work window February 15, 2015

- Remedial Action
 - Mechanical dredging
 - Placement of sand cap
 - Merged hydrographic survey and lead line data
 - Post-remedial action sediment sampling
 - Future long-term monitoring

Removal of Metals-Contaminated Sediments Via Mechanical Dredging

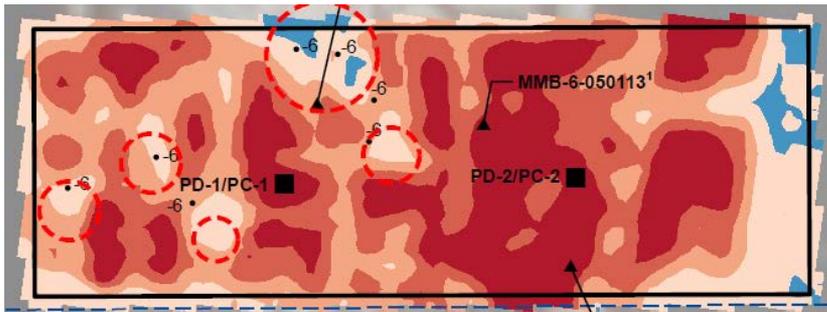
- Dredging required by USEPA
 - Could not shallow the navigation channel
- 5-CY clamshell rehandle bucket (available equipment)
- Dredge area under bridge
 - Manual grid system used due to bridge GPS interference
- Remedial action area approx. 3,000 SF
- 12-inch dredge cut, 128 CY of fine silts
- Sediment loaded into lined watertight containers on the receiving barge



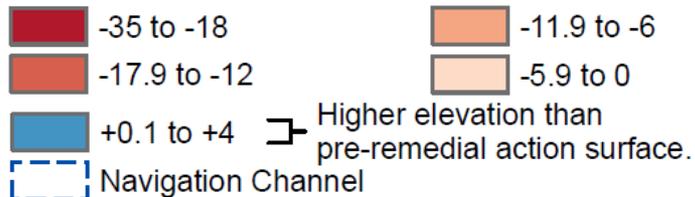
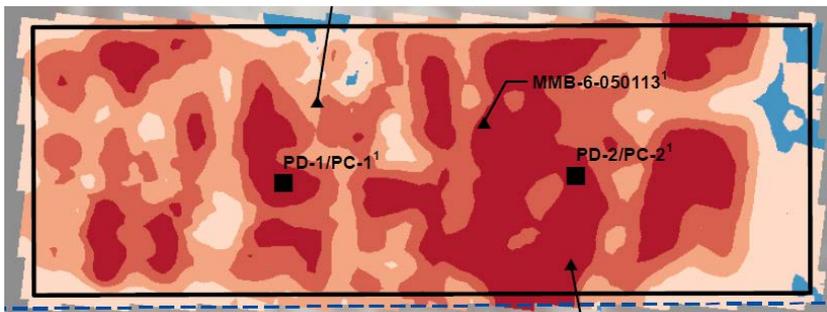
Dredge Depth Verification

Post-Dredge Hydrographic Survey and Lead Line Measurements

Interim dredge depth

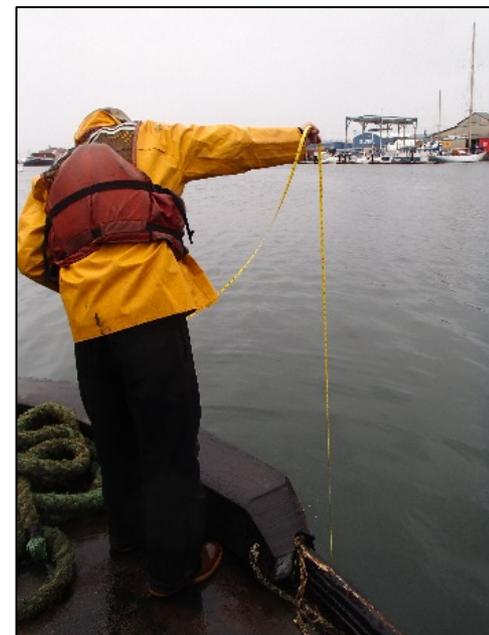


Final dredge depth



Units: Inches of variation from pre-remedial action surface mudline

- Hydrographic survey identified five high spots not dredged to the 6-inch minimum
- Re-dredging occurred 3 days before work window closure
- Merger of post-dredge hydrographic survey with post-high spot dredging lead line measurements: removed the need for additional survey and stand-by time

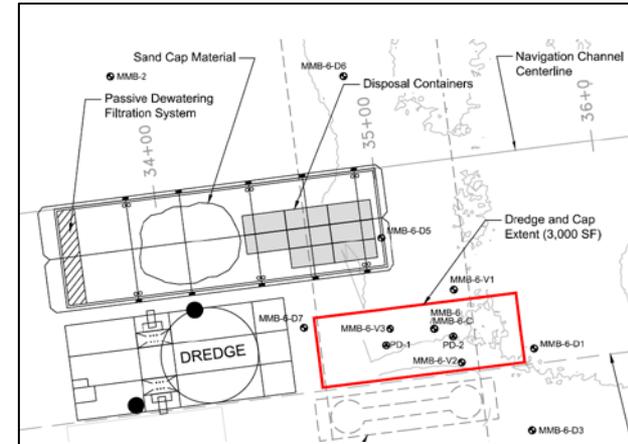




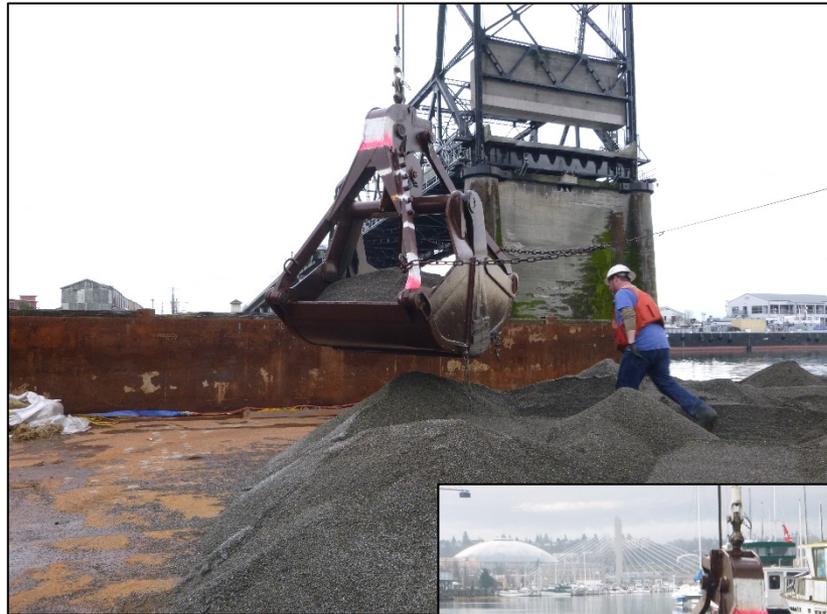
Dewatering and Water Quality Monitoring

In-Water Dewatering and Turbidity Monitoring

- Passive dewatering of ~15,000 gallons
- One brief exceedance during dredging at 150-foot point of compliance
- Turbid discharge on occasion
- Slowed pump rate and additional BMPs
- Substantial USEPA coordination about water quality concerns



Sand Cap Over Dredge Area

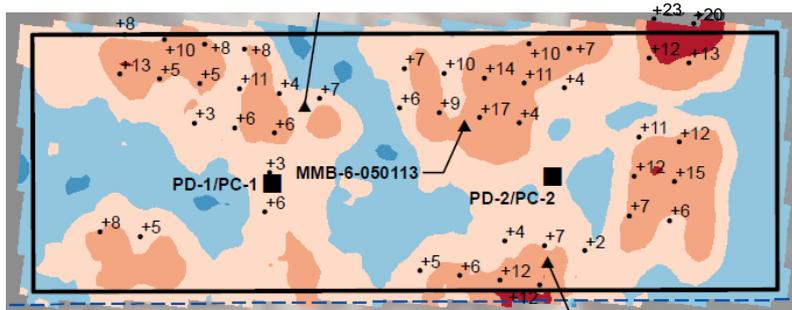


- Cap to limit dredging to surface sediments within natural recovery area and unknown subsurface sediment quality
- Manual grid system used
- Remedial action and cap material consistent with original Thea Foss Superfund Site sand cap specifications
- 170 CY of 0.1% activated carbon amended sand cap

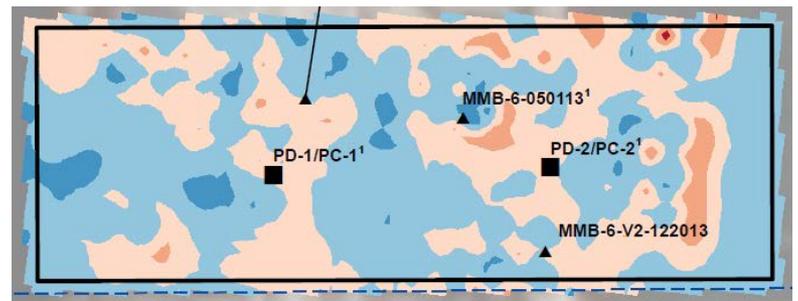
Additional Sand Placement and Lead Line Confirmation of Final Action Elevations

- 5-CY rehandle bucket constrained with chains
- Post-cap survey showed areas of less than 6 inches of sand
- Placement of additional sand to achieve pre-action mudline elevations
- Merger of post-cap survey and lead line measurements
- Confirmation of final post-remedial action elevation

Interim post-remedial action depth changes



Final post-remedial action depth changes



Units: Inches of variation from pre-remedial action surface mudline

	-23 to -12	}	Lower elevation than pre-remedial action surface.
	-11.9 to -6		
	-5.9 to 0		

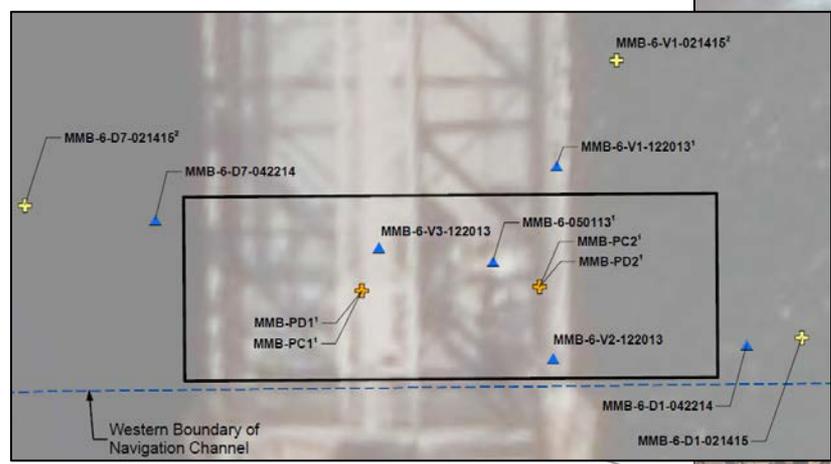
	+0.1 to +6	}	Higher elevation than pre-remedial action surface.
	+6 to +8		
	Navigation Channel		



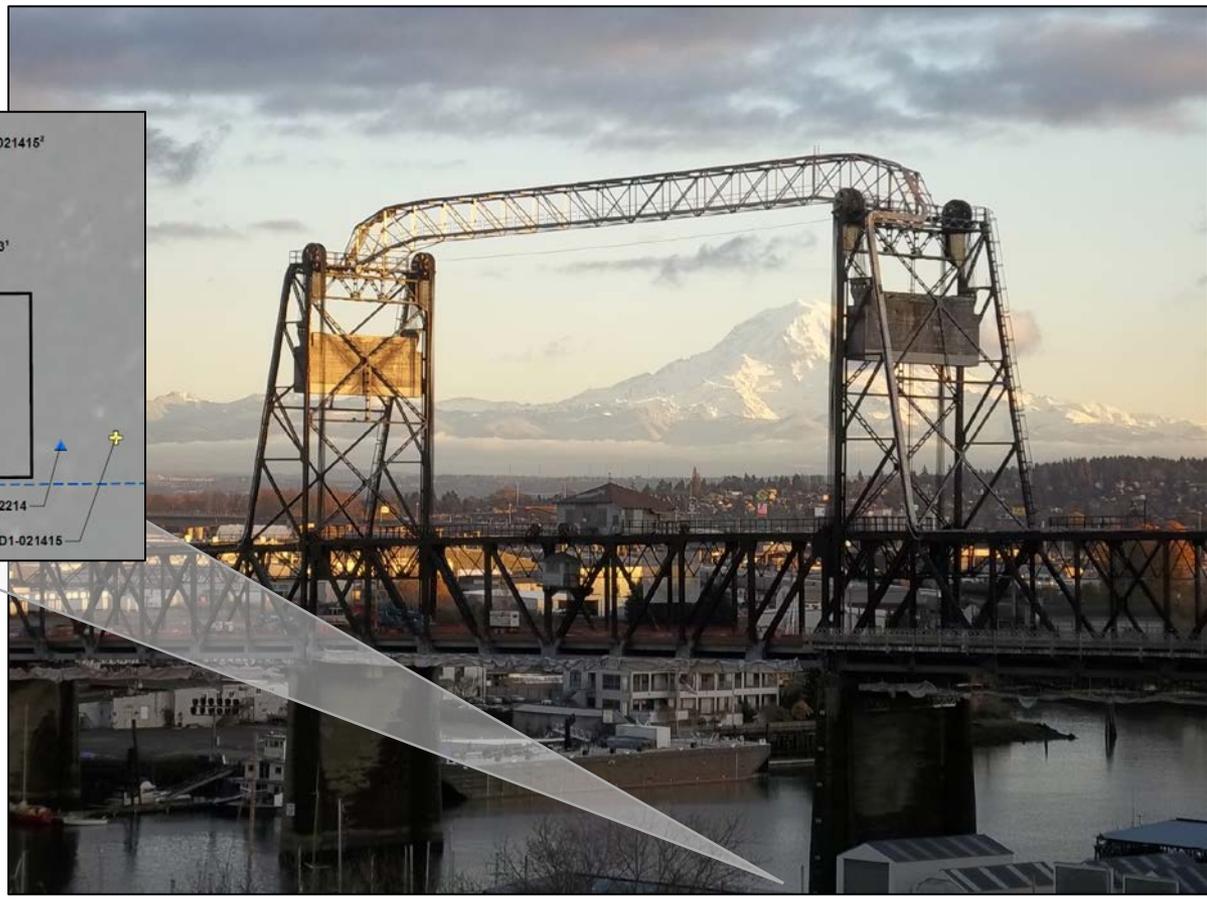
Post-Remedial Action Confirmational Sampling

Surface Sediment Grab Sampling – No Dredge Residual Issues

- Samples from within and outside remedial action area



- ▲ 2013–2014 Murray Morgan Bridge Post-Construction Surface Sediment Sample Locations
- ✚ 2015 Post-Dredge and Post-Remedial Action Surface Sediment Sample Locations
- ✚ 2015 Post-Remedial Action Surface Sediment Sample Locations
- Remedial Action Area Extent
- - - Navigation Channel





Transloading and Disposal

Subtitle D (Non-Hazardous) Landfill Disposal



3. Loaded directly to truck



2. Barged to transload facility

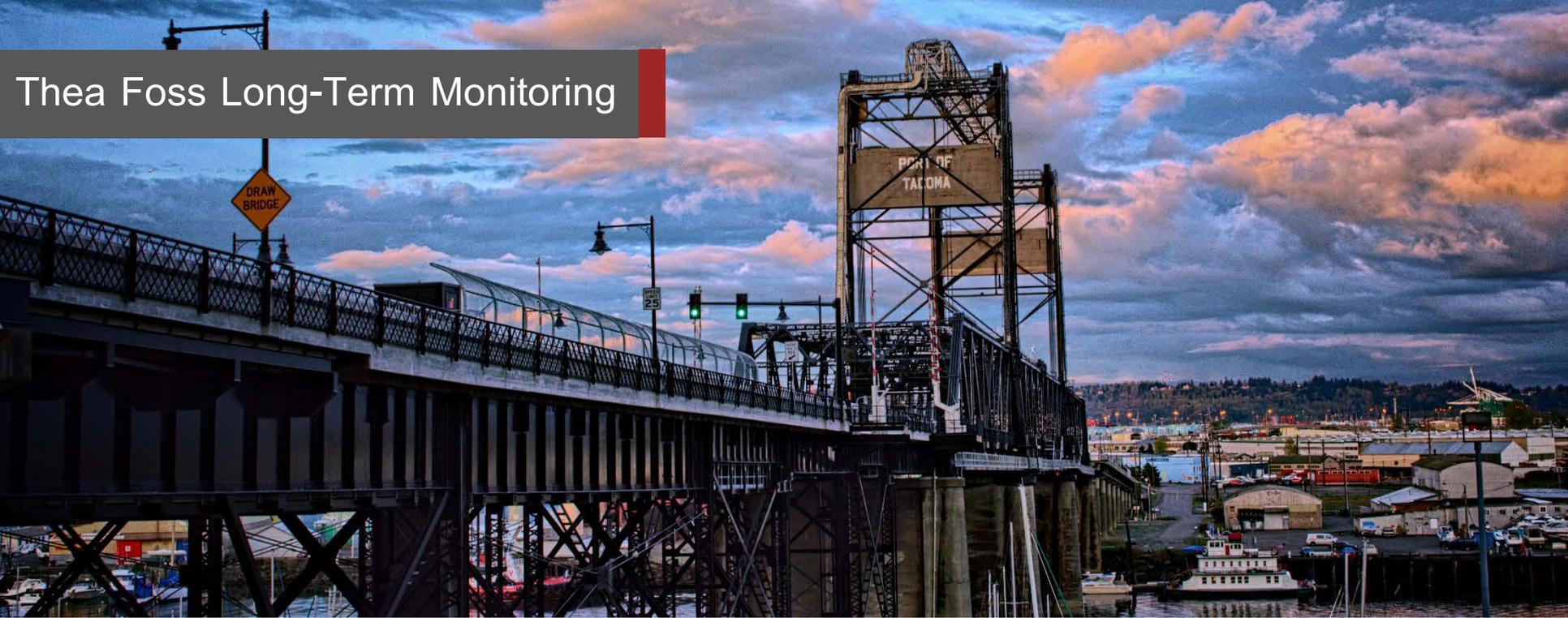


1. Removed dewatered sediment



- Water-tight shipping containers transloaded directly from barge to marine contractor's yard on the Hylebos Waterway
- No additional dewatering needed
- Containers trucked to rail facility
- Part of Superfund cleanup – no transloading permits needed

Thea Foss Long-Term Monitoring



2016: Year 10 Thea Foss Waterway Operational Maintenance and Monitoring

- One surface sediment sampling location within the remedial action area added to Year 10 monitoring
- Capped area also added to subtidal hydrographic survey areas
- It is expected that the final remedial action surface will have spread and settled and the mudline will be close to the pre-action elevations
- 2016 is Year 10 of the monitoring of the Foss remedy – will determine what response actions may be needed

Thank you



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