Port of Portland
Terminal 4 Removal Action
Phase I Construction Summary

PORT OF PORTLAND
Possibility. In every direction.

ANCHOR ENVIRONMENTAL, L.L.C.

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Port of Portland

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Presentation Outline

- Introduction
- Bank Stabilization
  - Design Summary
  - Construction report
- Dredging
  - Design Summary
  - Construction report
- Capping
  - Design Summary
  - Construction report
- Interim Monitoring Requirements

Port of Portland Terminal 4

EPA Selected Clean up Action

Phase I Components

1. Bank Stabilization

   Wheeler Bay (*~850 linear feet*)

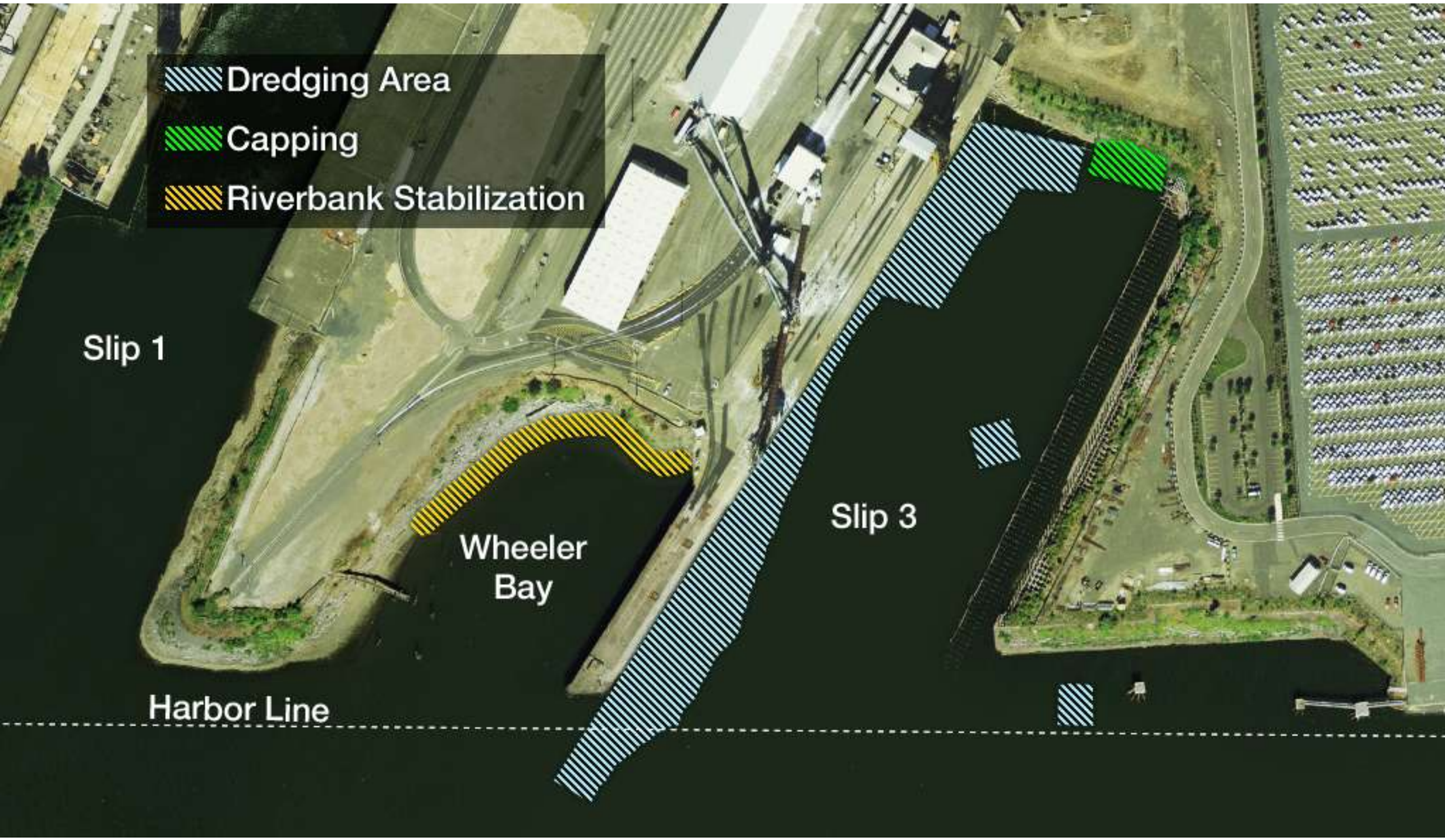
2. Dredging and off-site disposal

   Slip 3 *(~12,800 cubic yards)*

3. Construction of near-shore cap

   Head of Slip 3 *(~8,000 square feet)*

Phase I Components



Phase I – Main Contractors

Design & Construction Management:

- Anchor Environmental *(Seattle, WA)*

Dredging:

- Hickey Marine Enterprises *(Vancouver, WA)*
- Landfill: Waste Connections *(Wasco County, OR)*

Bank Stabilization:

- Ashcreek *(Portland, OR)*
- Sub: Envirocon (*Missoula, MT*)

Bank Stabilization

- Eliminate ongoing erosion of bank (source control)
- Re-grade bank (3H:1V slope)
- Protect bank from:
  - Propeller wash
  - Wind- and vessel-induced waves
  - Currents
- Above elev. 10 feet in Phase I
- Below elev. 10 feet in Phase II

Wheeler Bay Shoreline

Before Construction

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Wheeler Bay Shoreline

Before Construction

Wheeler Bay Shoreline

Debris Removal & Grading

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Wheeler Bay Shoreline

Installation of Rip-Rip Toe

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Wheeler Bay Shoreline

Installation of Coir Fabric and Topsoil

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Wheeler Bay Shoreline

Hydroseeding, Plantings & Anchored habitat logs

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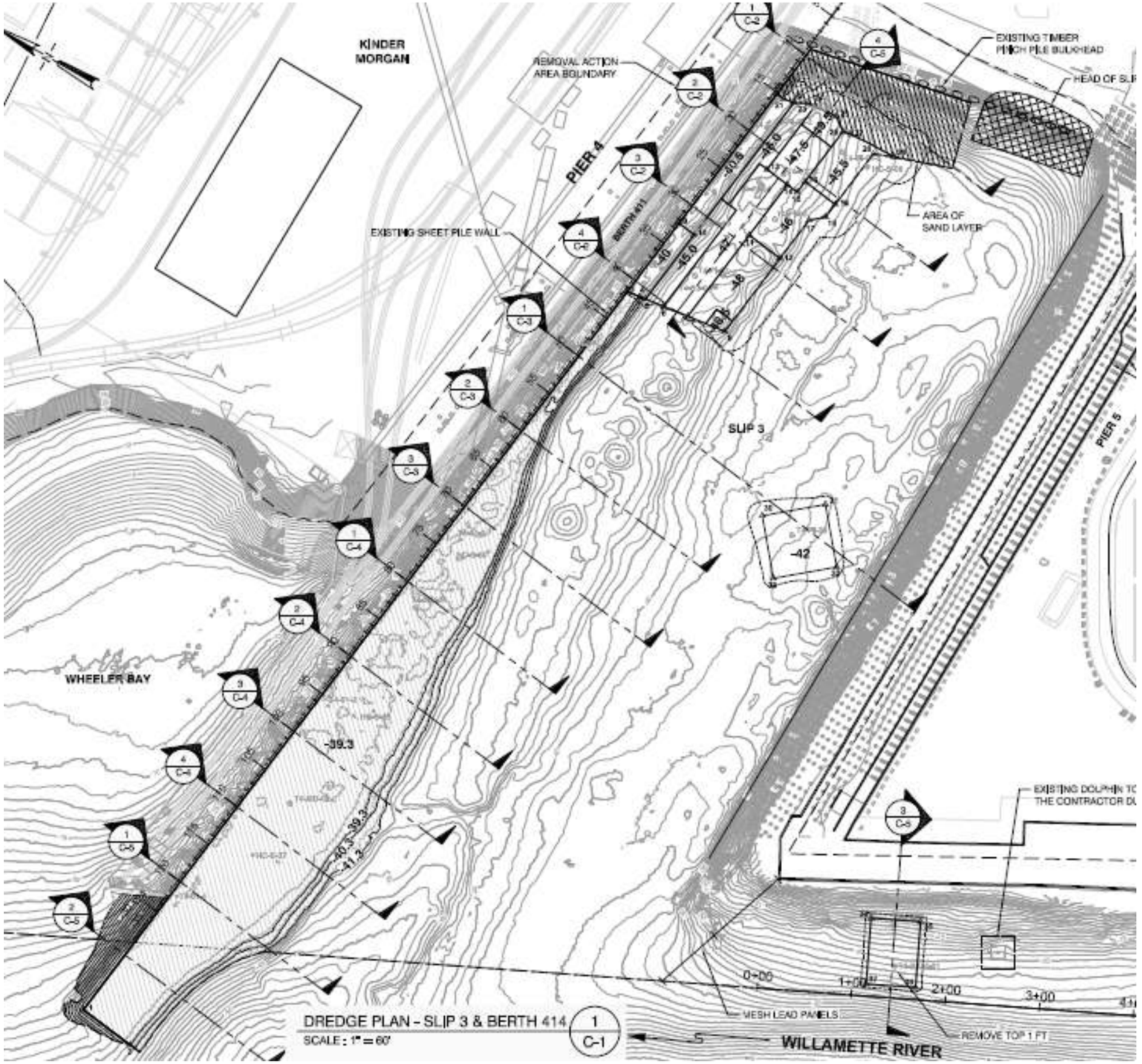
Slip 3 Dredge Plan

Dredge Design

- Target elevations ~ -41 to -51 feet CRD
- Cut depths ~ 1 to 8.5 feet
- Berth 410 – maintenance-driven dredging
- Berth 411 – environmental-driven dredging
- Allowable paid overdepth: 1 foot
- Additional allowed non-pay overdepth: 1 foot

Dredge Prism

Dredge Design



Dredge Sequencing

Dredge Design

Berth 411

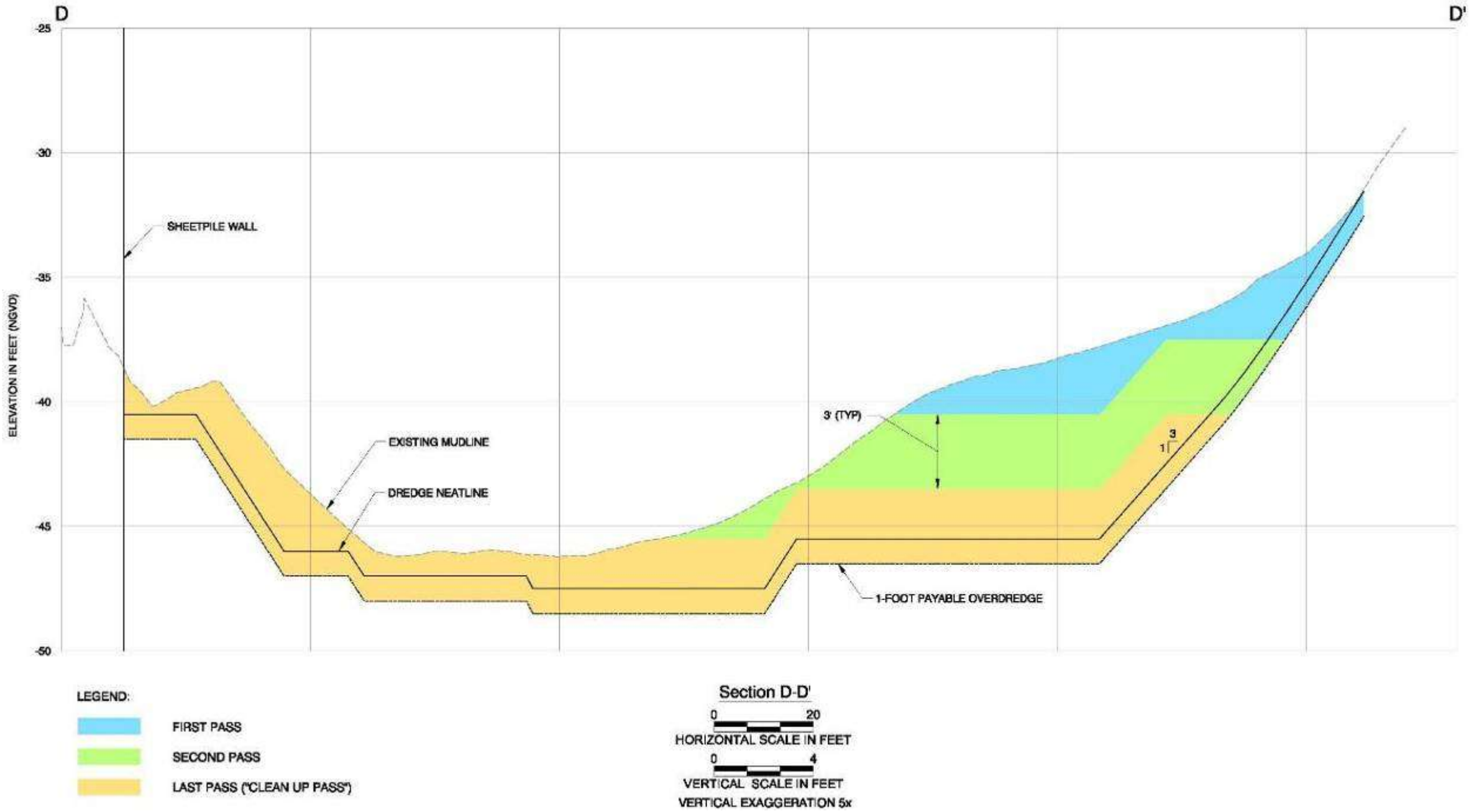
- Dredge areas with highest contamination first
- Dredge in multiple passes
- Limit pass cuts to 3 feet
- Complete one final pass over all of Berth 411

Berth 410

- Finish Berth 411 area before start of Berth 410

Dredge Pass Sequencing

Dredge Design



Dredging in Slip 3

20 cy Cable Arm bucket

Dredging in Slip 3

10 cy digging bucket

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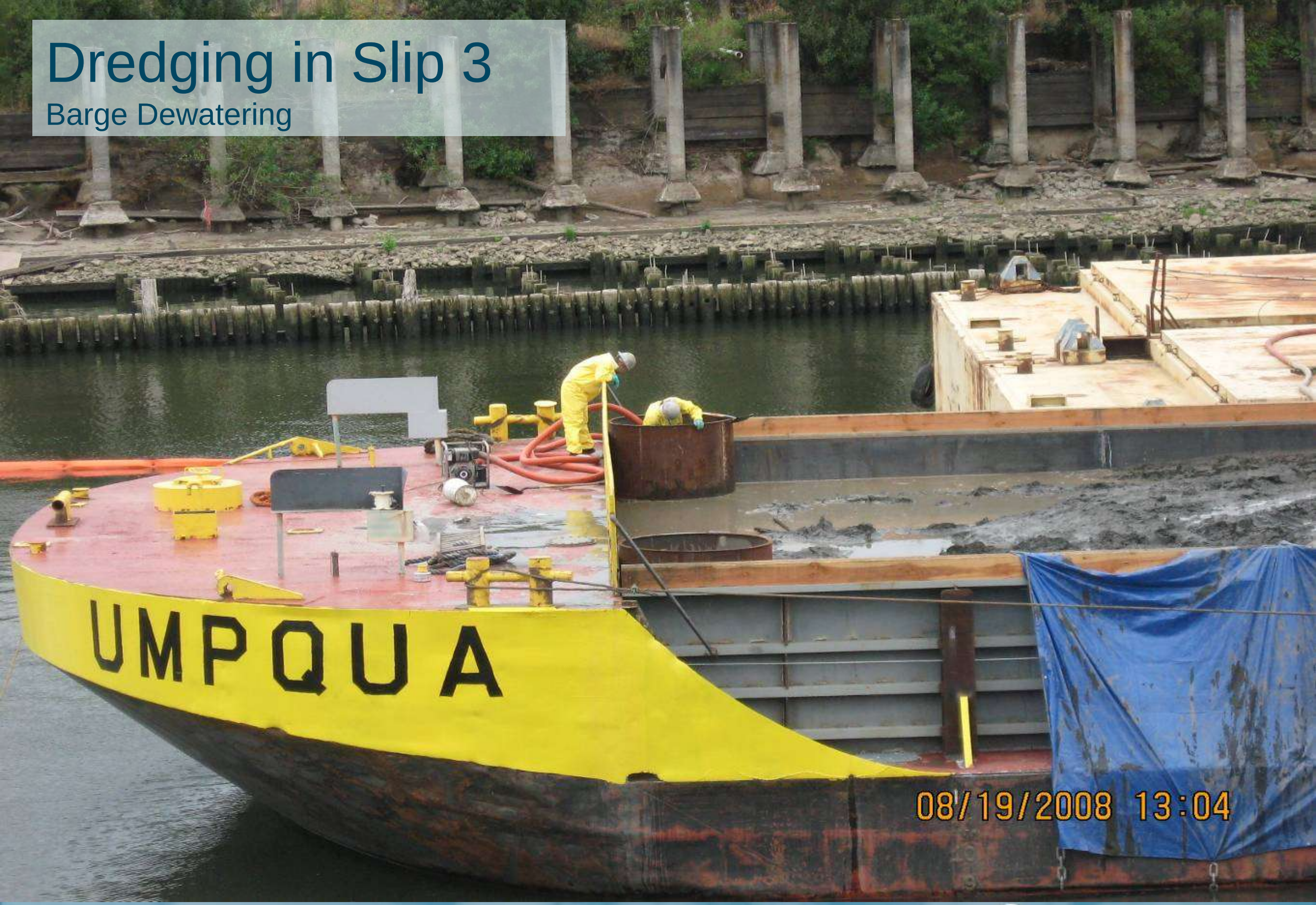
Dredging in Slip 3

Barge Dewatering



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Offloading for Landfill Disposal

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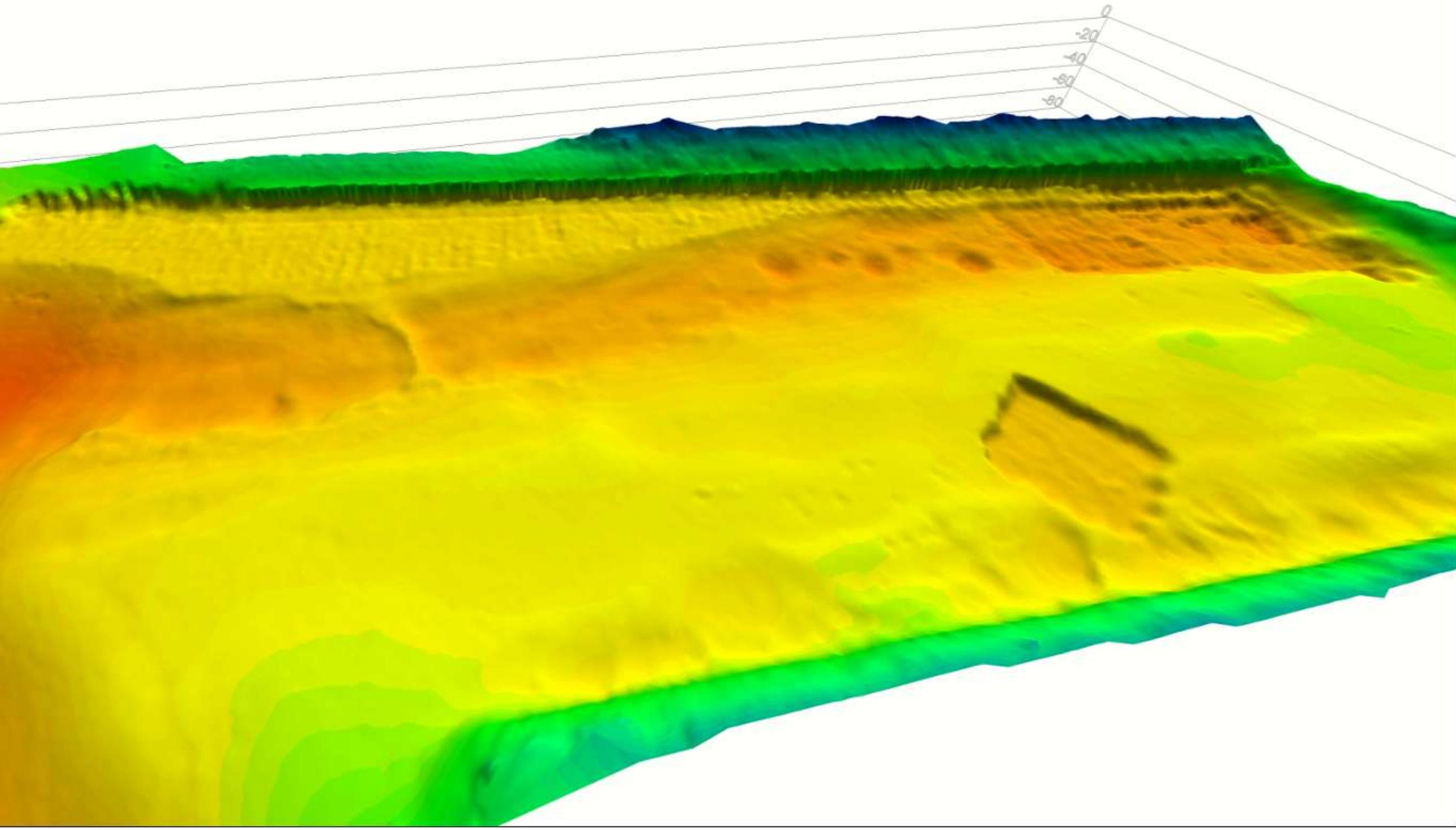
Post-Dredge Survey



Dredging and Disposal “by the numbers”

- Project Totals
  - 12,800 cy dredged
  - 18,100 tons dredged
  - 20,100 tons disposed
  - 310,000 gallons effluent
  - Three ~1,800 ton capacity barges, three trips each
- Daily Averages
  - 580 cy dredged/day (50 cy/hr)
  - 825 tons dredged/day
  - 1,000 tons offloaded/day
  - 25 gallons/cy effluent

Cap Design

In front of existing pinch-pile bulkhead:

- Isolation cap
- Alternative to dredging due to bulkhead stability
- Stability to support cap behind bulkhead

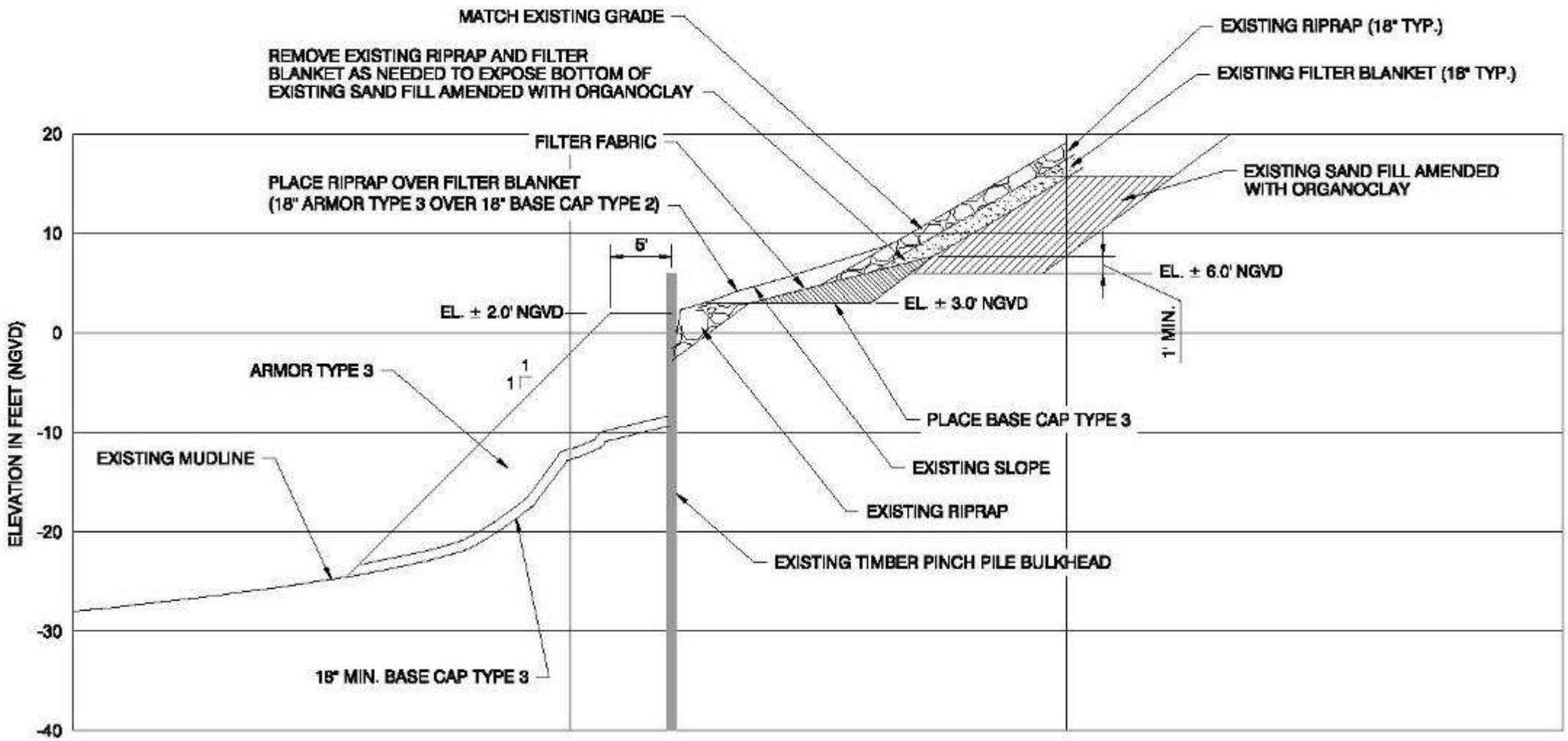
Behind existing pinch-pile bulkhead:

- Isolation cap for petroleum-impacted sediments

Cap consists of:

- Gravelly sand with Organoclay (10% by weight)
- Armor layer to resist erosion

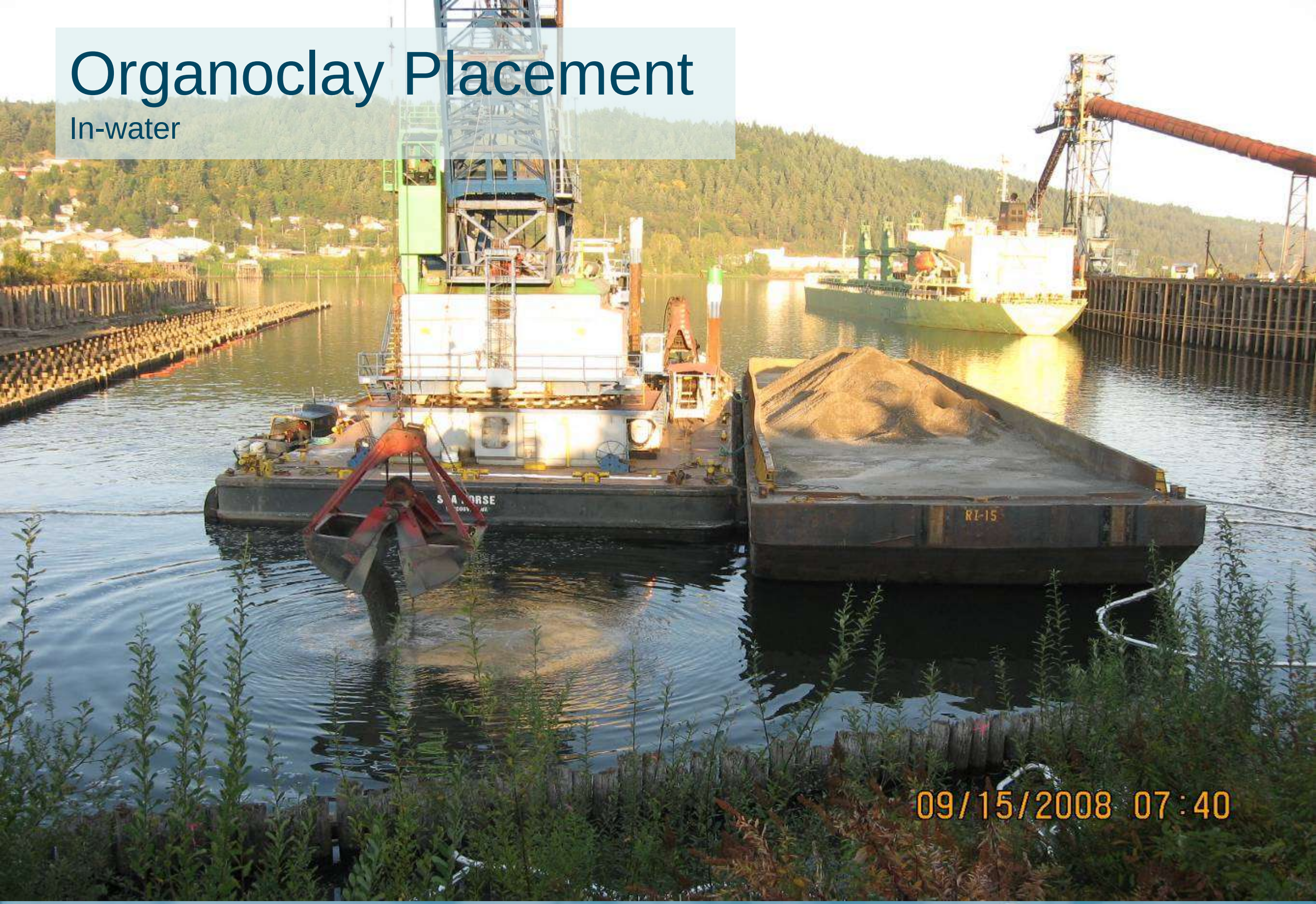
Cap Design


MATCH EXISTING GRADE
REMOVE EXISTING RIPRAP AND FILTER BLANKET AS NEEDED TO EXPOSE BOTTOM OF EXISTING SAND FILL AMENDED WITH ORGANOCLAY
EXISTING RIPRAP (18" TYP.)
EXISTING FILTER BLANKET (18" TYP.)
FILTER FABRIC
PLACE RIPRAP OVER FILTER BLANKET (18" ARMOR TYPE 3 OVER 18" BASE CAP TYPE 2)
EXISTING SAND FILL AMENDED WITH ORGANOCLAY
5'
EL. ± 6.0' NGVD
EL. ± 2.0' NGVD
EL. ± 3.0' NGVD
1' MIN.
ARMOR TYPE 3
1
1
PLACE BASE CAP TYPE 3
EXISTING SLOPE
EXISTING MUDLINE
EXISTING RIPRAP
EXISTING TIMBER PINCH PILE BULKHEAD
18" MIN. BASE CAP TYPE 3
ELEVATION IN FEET (NGVD)
20
10
0
-10
-20
-30
-40

Cap Areas in Slip 3

Organoclay Placement

In-water



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Armor Placement

In-water

Armor Placement

In-water

Clearing

Upland

Organoclay Placement

Upland

Armor Placement

Upland

Capping “by the numbers”

Total Quantities

- 850 tons of organoclay/sand base cap
- 2,700 tons of armor material
- 10 days of construction

Interim Monitoring Program

Wheeler Bay Shoreline Stabilization

- Vegetation
- Visual observations of slope and armor stability

Head of Slip 3

- Monitoring of pinch pile bulkhead wall
- Visual observations of upland slope
- Monitoring for sheen

Questions?