Seawall Maintenance & Repair
2016 CIWHA Annual Meeting

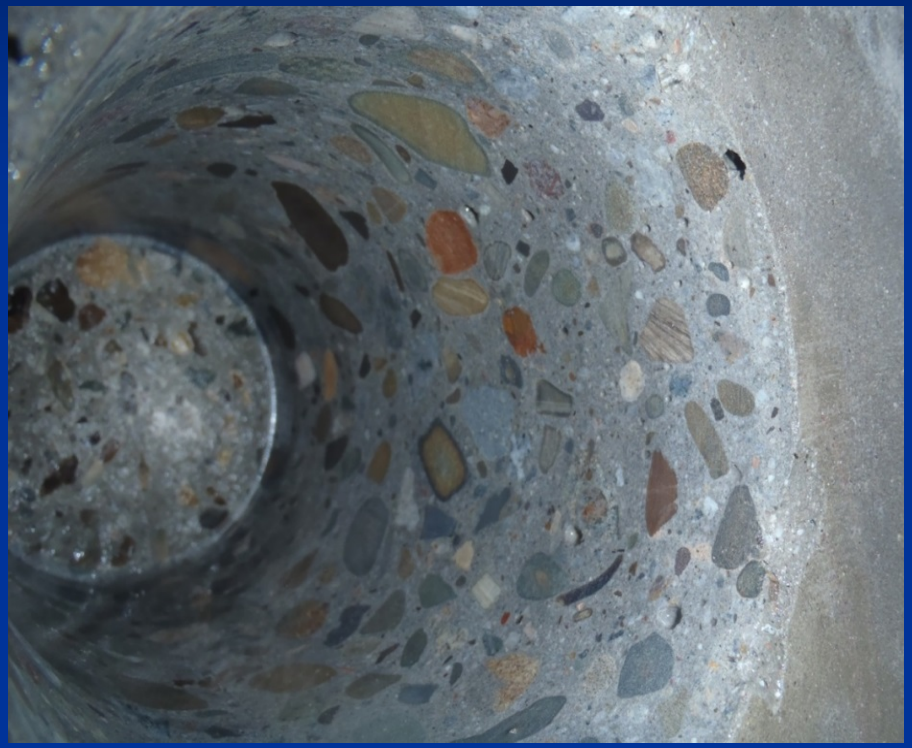

TROP

Condition Assessment

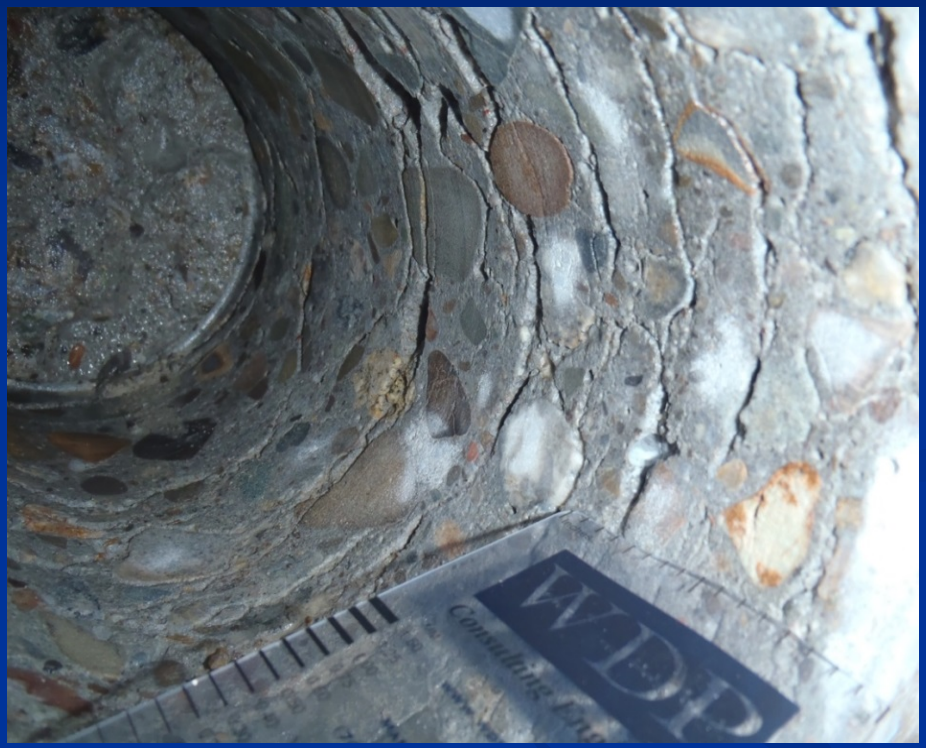
- Seawall Scaling/Erosion is due to an expansive reaction called Alkali-Silica Reactivity. The damage depth ranges from 0-4" and varies dramatically by environmental exposure/wall orientation.
- This chemical damage is worse on the Zurn walls but a concern for both wall types since the steel reinforcing is close to the surface of the Boise walls.
- Failures are anticipated to start occurring in 2 to 5 years which will quadruple the repair cost if each block is dealt with on a small scale "emergency repair" basis.
- Existing Pilaster Jacket repairs are performing well but additional jackets are needed in a timely manner to avoid high cost repairs.
- Existing underwater Vinyl Sheet Pile repairs at the wall corners are performing well to prevent further undermining

Exterior Surface Condition

Wall Interior Condition



Good Condition



Poor Condition

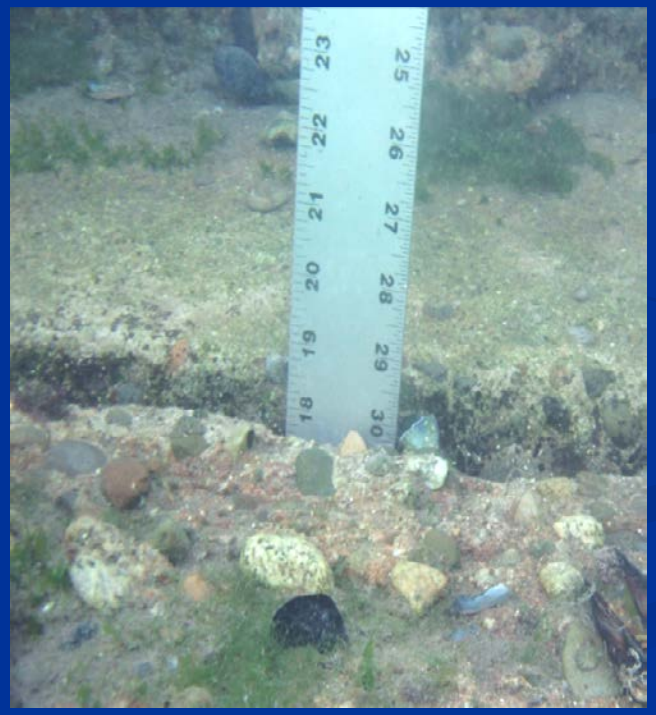
Work Completed

- Seawall Condition Assessment – Completed in 2012 (both above and below water)
- Developed repair alternatives and cost estimates for next 25 years of repairs needed to maintain the walls.
- Prioritized repairs from High Priority to Low Priority ranked on a scale of 1 Low to 5 High

- Seawall Monitoring Program – (10) seawall segments have suspected wall movement. Data points have been collected at 6-month intervals to determine if each segment is stable or movement is on-going and should be advanced to a High Priority repair.

Completed Repairs – Fill Underwater Gaps

- In 2014 underwater Vinyl Sheet Pile repairs were completed at (7) locations to protect the timber piling from Marine Borers.
- In 2014 low cost repairs completed to infill the gap on the top of the footing at (14) locations and between the slope protection (fabric and concrete mat) and the face of the footing at (5) locations.



Completed Repair -Kingsbridge Way

- 2015 Repair – New 200’ concrete wale & tieback soil anchors

2016 Repair - Pilaster Jackets

- Repair (50) of the worst condition pilasters prior to the corrosion damage destroying the tie-back rods which then require costly "shoring" to brace the wall during repairs

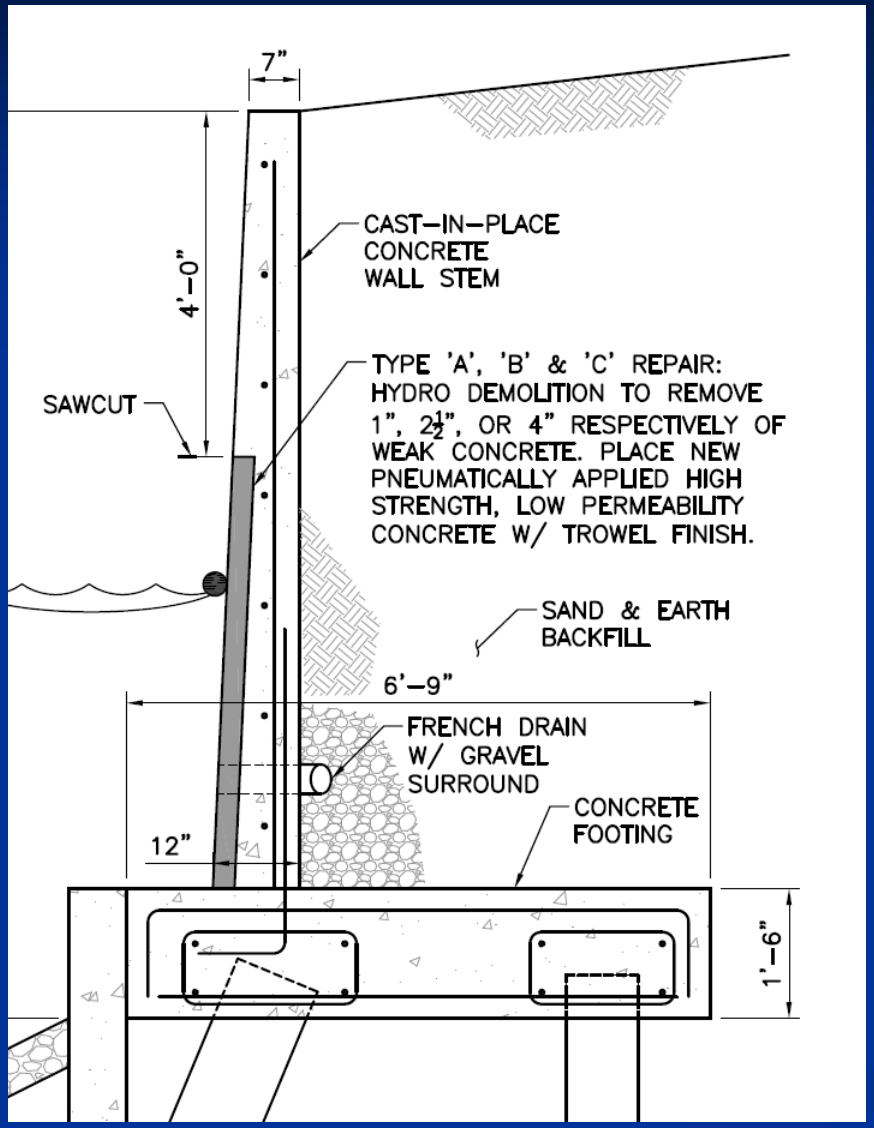
2016 Repair - West Hemlock

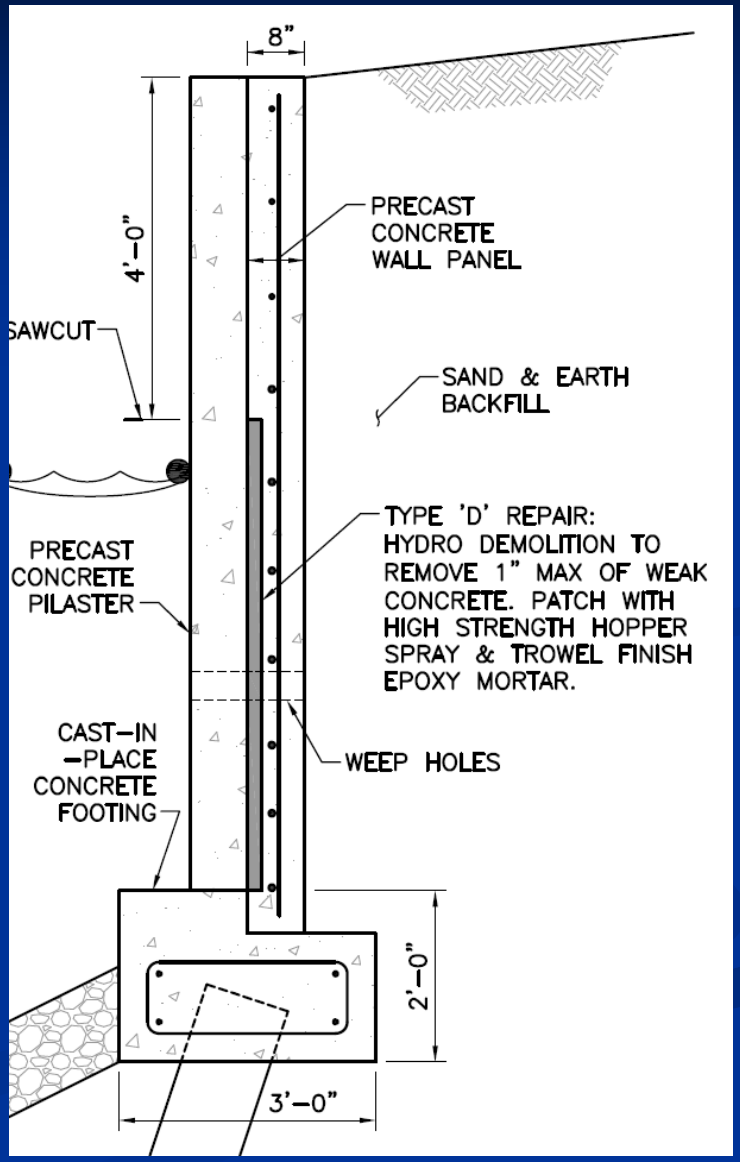
- (4) Boise Wall panels and (4) pilasters with Flexural Overstress Cracks
- These cracks provide direct access for seawater to corrode the reinforcing steel which will cause premature failures
- A Pilot Program will explore using varying repair methods to identify the "best value solution" for future use on all Boise walls.

2016 – Maintenance Dredging

- Perform a Hydrographic Survey of the seafloor for the entire community in 2016 and then identify the areas in need of dredging. Work on Design & Environmental Permits for work in 2017

Zurn "Repair Concepts" Boise





Next Steps

- Organize the membership and City representatives to press for an annual funding source capable of generating the budget necessary to support the Seawall Maintenance Program, prior to the start of failures or the challenge will quadruple.
- Wait for a moderate earthquake to fail the majority of the weakened walls and an Emergency Repair Bond Measure for repairs a few years later.
- **Seawall Repair Costs**

  $128,000,000 Replace all walls with new prior to failures

  $192,000,000 Replace walls on an Emergency Basis

  $44,000,000 Repair walls to extend their life 25-40 years