



# *Redeveloping a Waterfront Shipping Terminal With Stormwater in Mind*



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**Kennedy/Jenks Consultants**  
**Engineers & Scientists**

# ***Discussion Topics***

- ▶ ***Bellingham Bay Past & Present***
- ▶ ***Waterfront District Redevelopment***
- ▶ ***Bellingham Shipping Terminal***
- ▶ ***Limitations of Traditional Drainage Design***
- ▶ ***Innovative Drainage & Treatment Approaches***
- ▶ ***Design & Construction***



# Bellingham Bay Past & Present

- ▶ Port of Bellingham established 1920
- ▶ Pulp & paper arrived in the 1930s
- ▶ Georgia Pacific 1960 - 2007
- ▶ City & Port Waterfront District
- ▶ Cleanup of Bay & Upland
- ▶ Bellingham Shipping Terminal



Bellingham Waterfront Concept Sketch, Bellingham, WA, Port of Bellingham

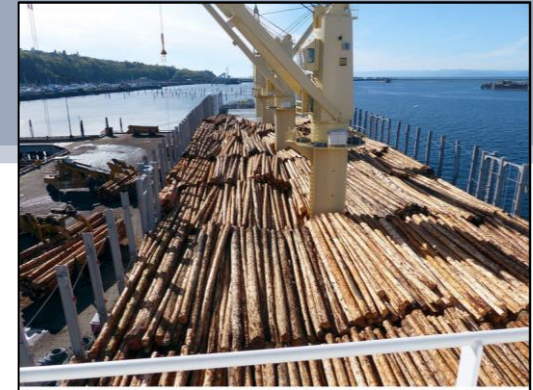
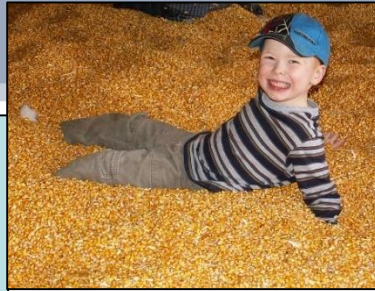


Figure 1-1  
Waterfront District Boundaries  
The Waterfront District Sub-Area Plan

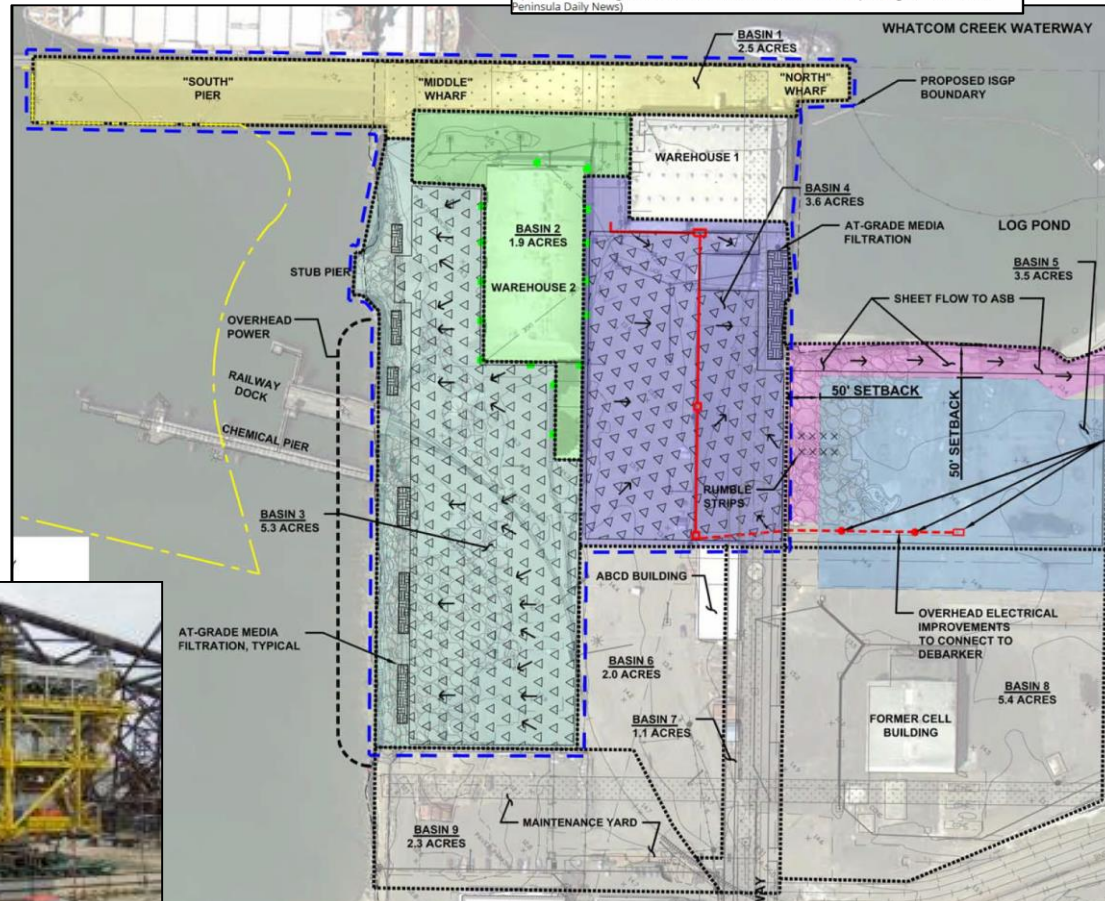


# Bellingham Shipping Terminal

- ▶ **Wanted to accommodate multiple site uses – bulk, breakbulk, modular construction**
- ▶ **Goal was to provide stormwater treatment appropriate for each specific area**
- ▶ **Basins phased in over time**
- ▶ **Traditional drainage and treatment approaches just wouldn't cut it**
- ▶ **Ecology grant required GULD treatment**

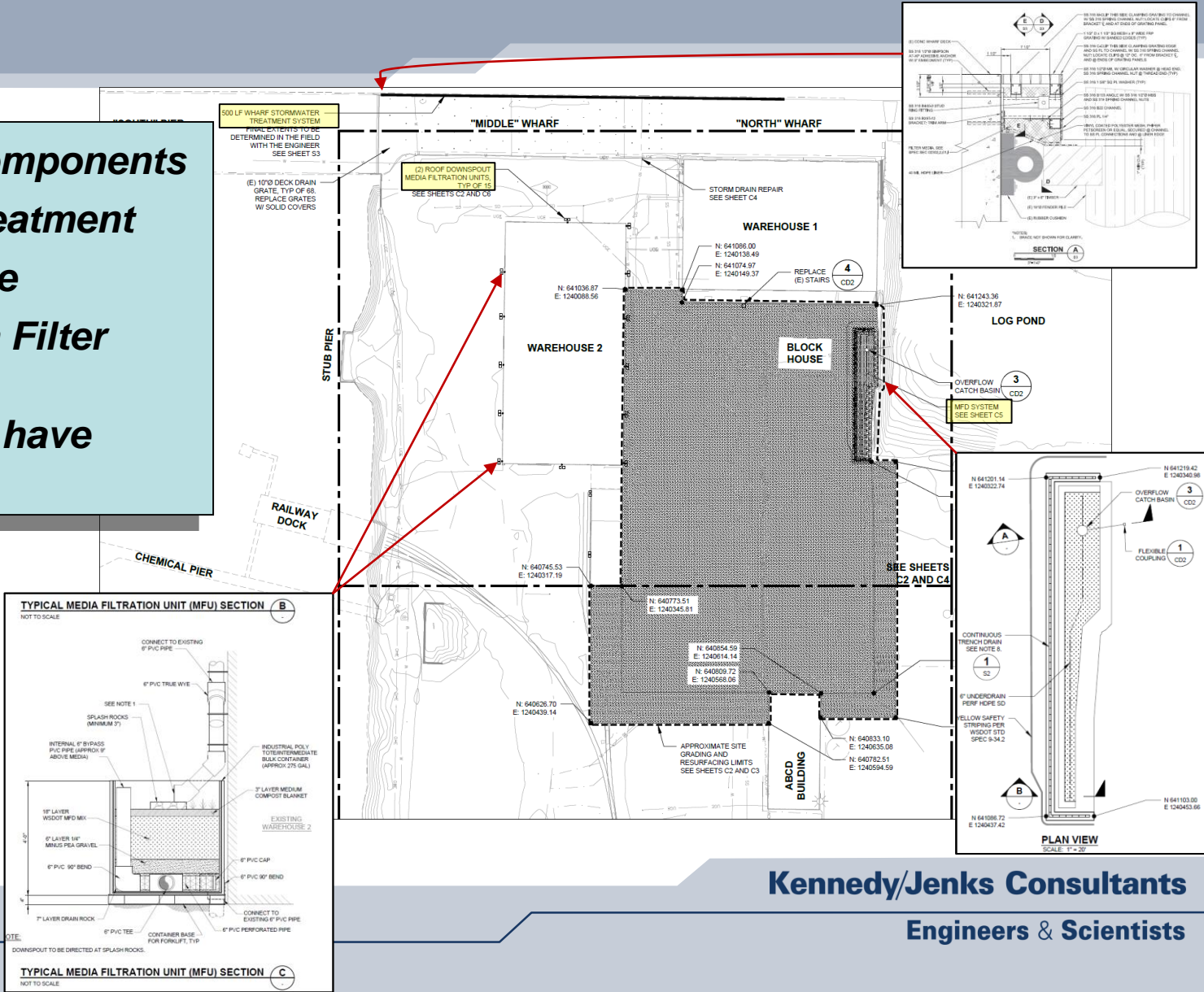


A pile of debarked logs on the deck of New Face as seen from the ship's bridge. (Dave Sellers/for Peninsula Daily News)



# Phase I – WH2 Roof, Basin 1 (Wharf), & Basin 4 (Pavement)

- ▶ 3 treatment components
- ▶ Downspout treatment
- ▶ Wharf drainage
- ▶ WSDOT Media Filter Drain (MFD)
- ▶ All basins will have treatment



# Warehouse Roof Treatment

- ▶ *Grattix-type treatment becoming standard in the NW*
- ▶ *Roofs are the only part of the facility you cant sweep*
- ▶ *Drainage blind tapped*
- ▶ *WSDOT MFD Media - crushed rock, dolomite, gypsum, and perlite*
- ▶ *Works for solids, dissolved metals, and birds*



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GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS), ENHANCED, & PHOSPHORUS TREATMENT

For

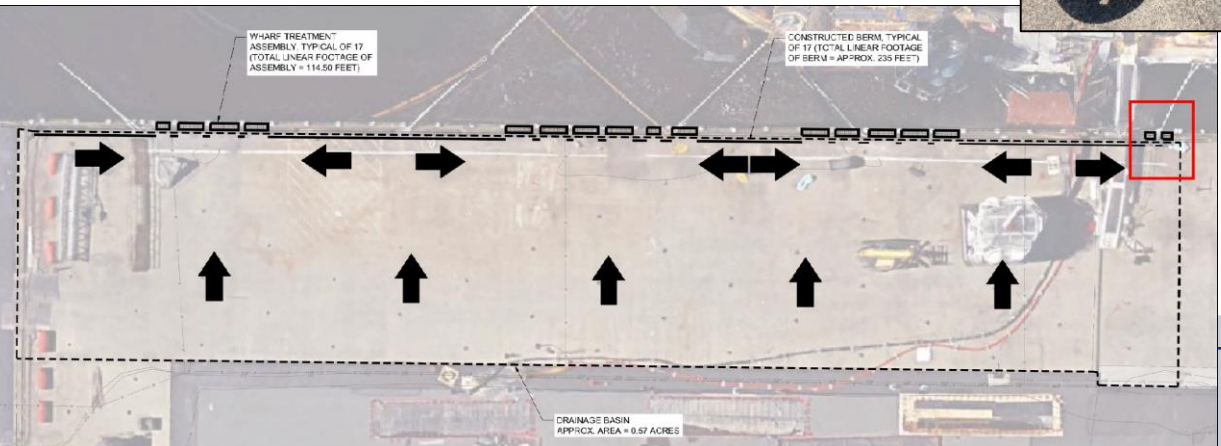
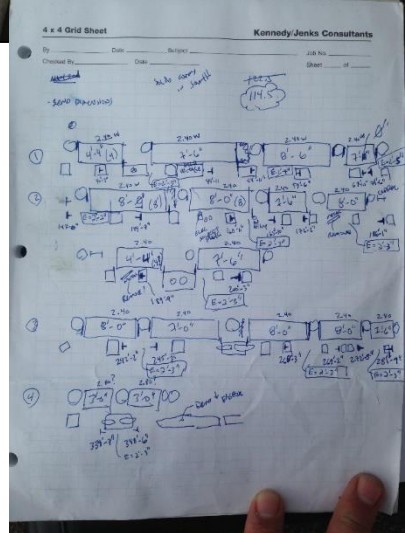
Washington State Department of Transportation's Media Filter Drain (MFD)



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# Innovative Wharf Treatment Approach

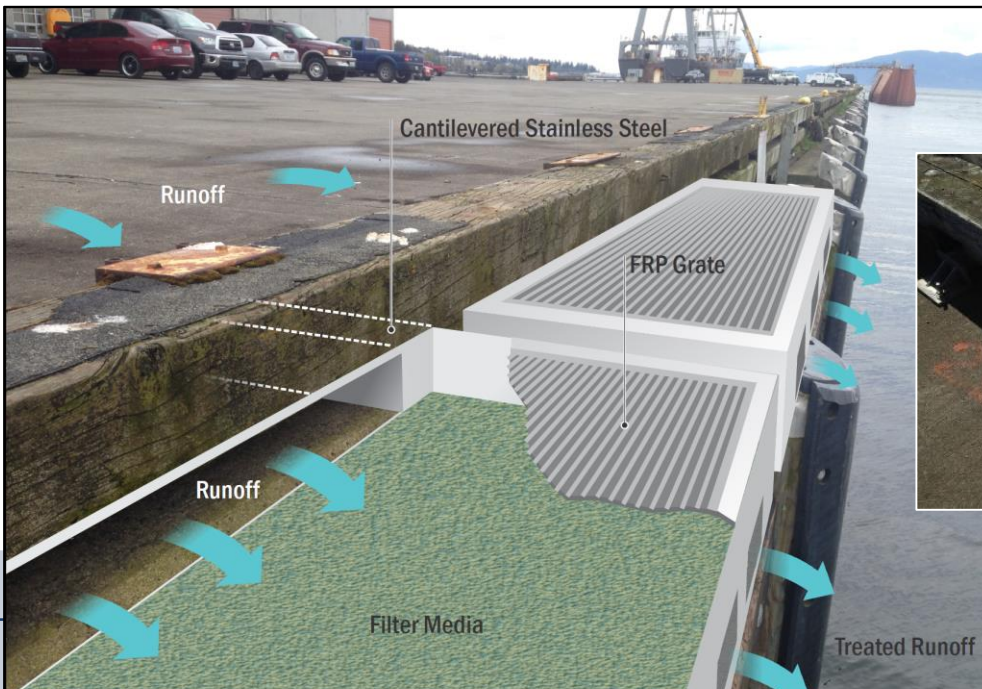
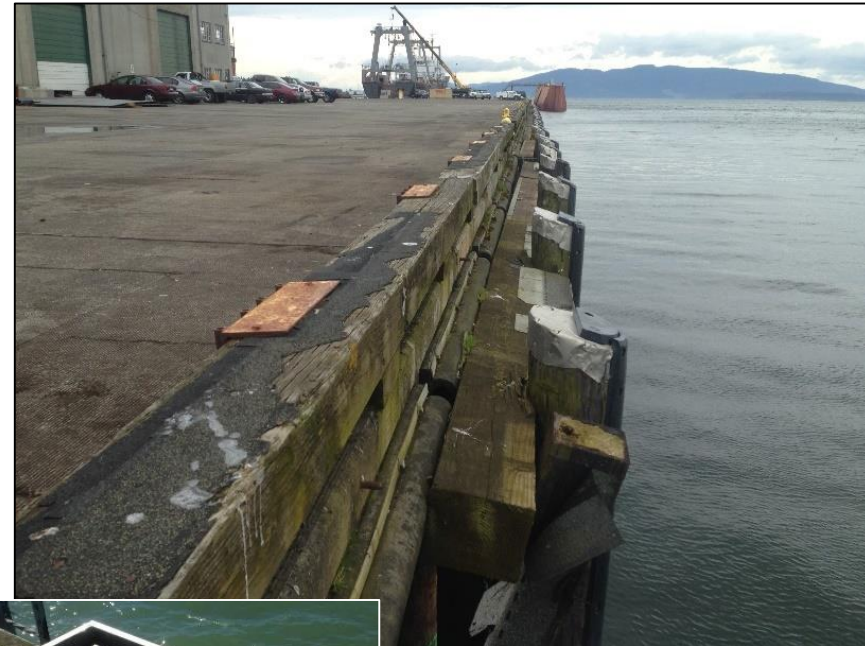
- ▶ Fairly rare wharf design draining towards the waterway prompted a sheet flow solution
- ▶ 1' drop from wharf to fender system
- ▶ Fire access ports in the deck
- ▶ Figured out that we can treat runoff from the 350' of wharf with 120' (17) wharf gutters





# ***Innovative Wharf Treatment Approach***

- ▶ ***Stainless steel gutters***
- ▶ ***Fender system & worker safety concerns drove final cantilever approach***
- ▶ ***Fiberglass reinforced plastic grating***

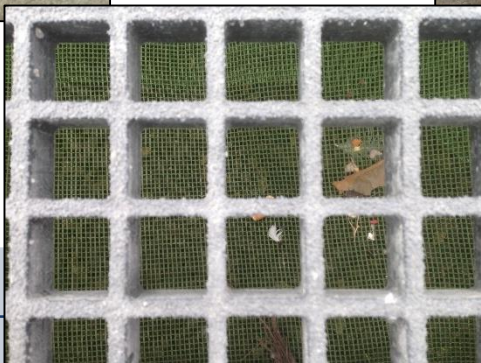
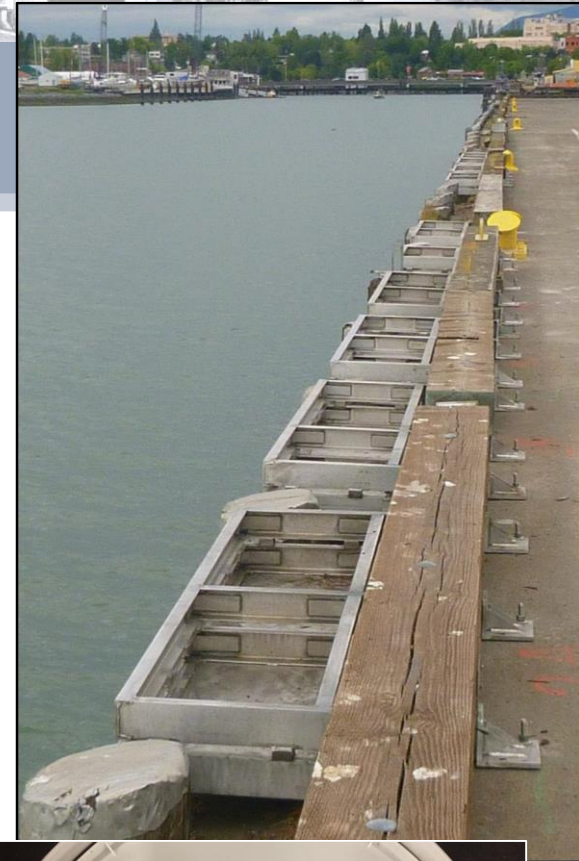
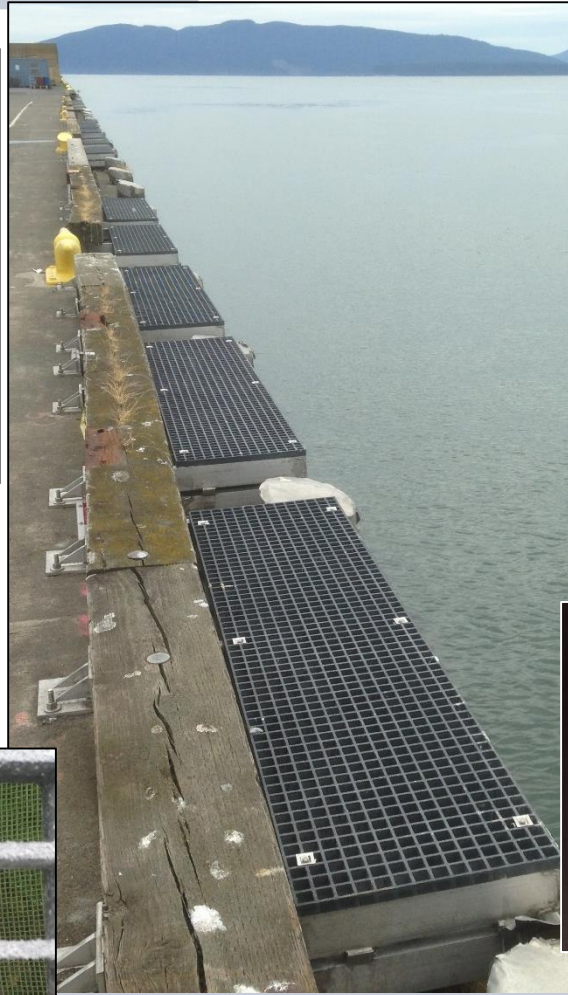


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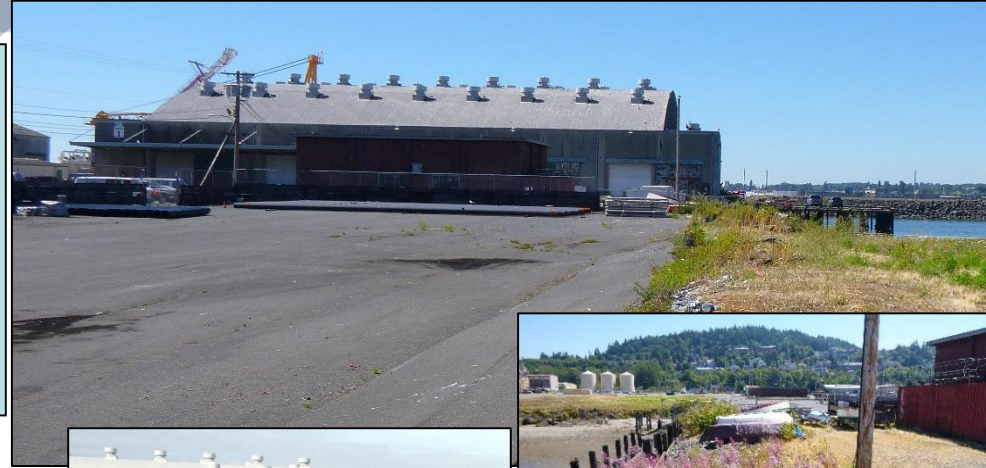
# ***Innovative Wharf Treatment Approach***

- ▶ ***New concept so it couldn't be grant funded***
- ▶ ***Gutters lined with screen and filled with MFD media***
- ▶ ***All fire holes fitted with blank covers.***



# ***Innovative Yard Drainage & Treatment Approach***

- ▶ ***Abandon existing underground drainage***
- ▶ ***Regrade site to drain by sheet flow***
- ▶ ***Precast equalization trench***
- ▶ ***Takes advantage of 0-3' of head***



# ***Innovative Yard Treatment Approach***

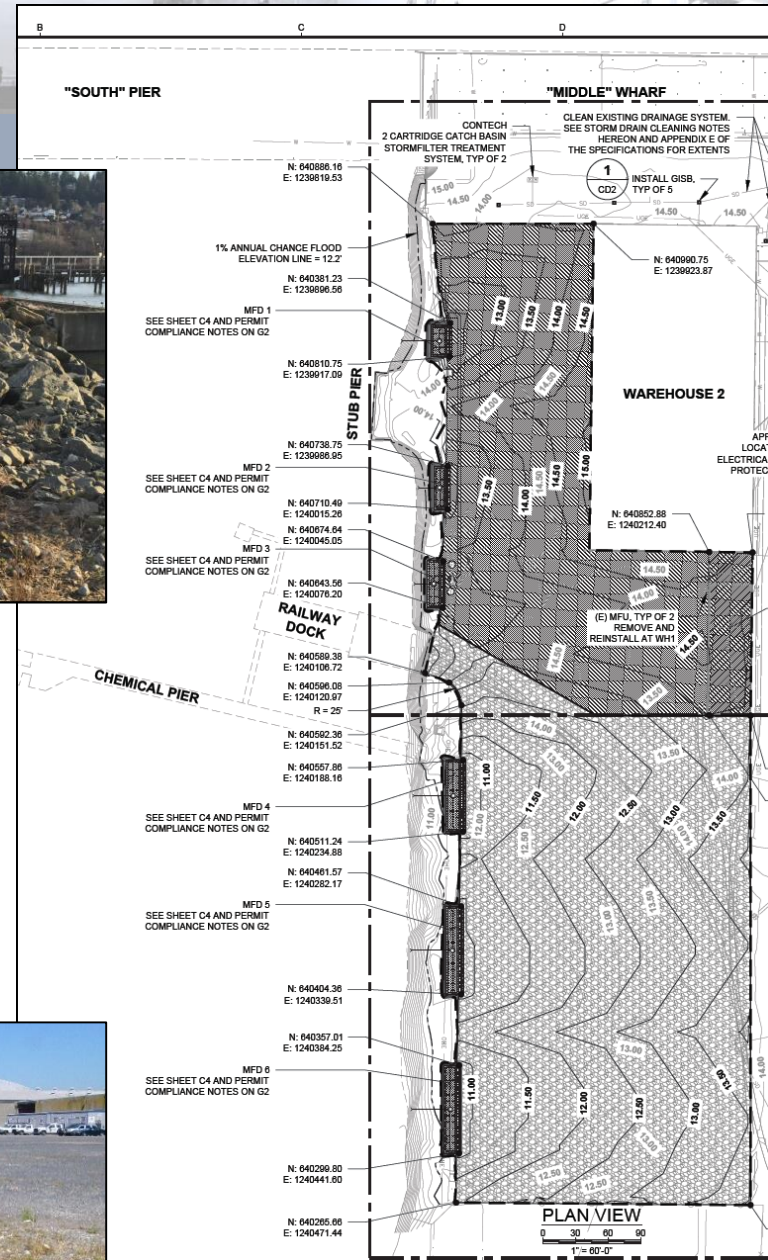
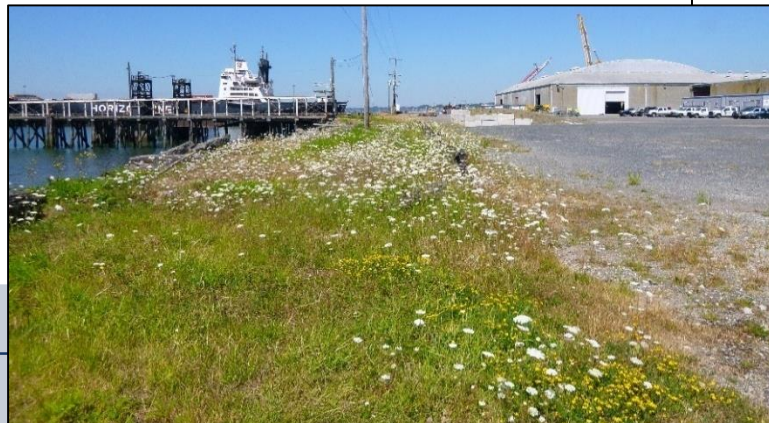
- ▶ ***Install liner, equalization trough, underdrain piping***
- ▶ ***Backfilled with MFD media and toppedressed with compost for hydroseed***
- ▶ ***Final grading, drainage, and grating***
- ▶ ***Just waiting for the rain!***



# What's Next?

## Phase II

- ▶ Basin 2, WH2 downspout treatment, CB inserts
- ▶ Basin 3, pavement & MFDs,
- ▶ Bid 08/17
- ▶ Construction starts 09/17
- ▶ Basins 5, 6, 7, 8 - TBD



**Questions??**

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