Three Innovative Stormwater Treatment Approaches for Three Linked Industrial Sites

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Discussion Topics

- Three Industrial Sites
- WA Industrial Stormwater General Permit
- Stormwater Characteristics
- Treatment Evaluation and Selection
- Hydrologic and Hydraulic Evaluation
- Performance and Costs
Three Linked Industrial Sites

- General Peninsula Project
- Olympic Container Terminal (OCT)
- North Intermodal Yard (NIM)
- South Intermodal Yard (SIM)
- Heavy Industrial Maritime Property
- Containerized Cargo
- Difficult Meeting ISGP Benchmarks
Olympic Container Terminal (OCT)

- 56 acres
- Ship to Rail or Truck and Back
- 5 Drainage Basins
- Outfalls Under Pier
North Intermodal Yard (NIM)

- 12 acres
- Containers moved between terminals
- Efficient means of ship to inland or inland to ship transport
- 24 hour operations
- Small strip of unpaved land available
South Intermodal Yard (SIM)

- 22 acres
- Operating rail facility
- 2 drainage basins
- Long rectangular configuration
- Perforated storm drain piping underneath track ballast
Stormwater Characteristics

- Zinc – Main pollutant of concern
- Occasional turbidity exceedances Throughout
- Copper at SIM
- Larger particulate at SIM (perforated storm drains along tracks)
Treatment Alternatives Selected

- 2 up-flow type
- 1 lateral flow
Upward Flow Media Filtration

- Subsurface Manhole or Vault
- Fluidized Media Filtration Technology
- Bags of Media Inside Filter Modules
Lateral Flow Media Filtration

- At-Grade System
- Front End Settling
- Pre-Filtration Cartridges
- Media Filtration
- Perforated Collection Piping
Upward Flow Cartridge Filtration

- Subsurface Manhole
- Up-flow configuration
- Membrane Filters
- Passive Backwash
Draining by Gravity

- In-depth Hydraulic Modeling
- Tidal Influence
- Check Valves
- Bypassing Flows Greater Than Water Quality Flowrate
OCT Final Design

- 5 Subsurface Vaults
- From 8’ x 12’ to 16’ x 17’
- 15 feet deep
- Accommodates 125 Kip Wheel Loads
NIM Final Design

- 2 At-Grade Systems
- Each 10’ x 20’
- 1 Flow Splitter and Collection MH
- Located clear of container traffic, on strip of unpaved area
SIM Final Design

- 2 Subsurface 6” ID Filter Systems.
- Upstream Flow Splitter MH and Downstream Collection MH for each
- Accommodates 125 Kip Wheel Loads
SIM – Cost & Performance

- ~70% reduction of turbidity and zinc for 2 qtrs
- Below all benchmark levels through 1st qtr 2016
- Very little O&M

Project Costs:
Final Construction Cost: $418,603
Cost per acre treated: $11,674
NIM – Cost & Performance

► ~70% reduction of turbidity and zinc for 2 qtrs
► Below all benchmark levels through 1st qtr 2016
► Very little O&M

Project Costs

Final Construction Cost: $301,104
Cost per acre treated: $25,092
OCT – Cost & Performance

- Not so lucky
- Leaks
- Retrofit
- Still working on it

Project Costs:
Final Construction Cost: $1,033,614
Cost per acre treated: $18,457
Stormwater regulations are getting tougher & more expensive

You will NEVER have enough data

Retrofitting infrastructure can cost more than treatment

There is NO SILVER BULLET for stormwater treatment

Implementing BMPs and frequent O&M is key for system performance

Facility drainage design needs to change to meet future compliance at most port terminals