Innovative Stormwater Management at a Waterfront Log Handling Facility

Ben Fuentes, Project Manager, PE
Kennedy/Jenks Consultants
Agenda

• West Hylebos Log Yard
• Stormwater Characteristics
• Preliminary Evaluation and Design
• Construction
• System Performance
• Lessons Learned
West Hylebos Pier Log Yard

• 25-acre log yard
Stormwater Characteristics and the ISGP

- Log yard operations
- Runoff high in solids, metals, COD, turbidity
- Bark flour
- Sweeping is difficult
- Per the ISGP, a Level 3 Corrective Action was triggered
Preliminary Evaluation and Design

- Treatment Alternatives Analysis
- In-field Biofiltration Pilot Study
- Engineering Report
- Agency Approval
Final Design

• Finalize conveyance, pretreatment method, biofiltration mix, aggregate, plantings, etc.
• Bench-scale testing adsorptive media
• In-field Pilot Study (Round 2)
• Tiered Treatment (Series/Parallel)
How It Works
Construction Kickoff (September 2013)

- Contractor awarded
- Once you start digging...
Concrete – Rebar and Formwork

• Large Footprints
• Favorable Weather
Internals – Underdrain and Drain Rock

- Well draining system
- Pipes sized for flow capacity & maintenance
Internals – Distribution Piping and Media Placement

- Main line with branches
- Conveyor belt to install media
Internals – Media, Plants, and Valves

- Install to grade
- Valves for maintenance
Pump Stations and Tiered Treatment Valves

- Low Flows / High Flows
  - Variable Speed Pumps
  - Actuated Valves
Looks ready...
Let’s turn it on! (December 2013)

Pretreatment

Biofiltration
Initial System Performance

- Immediately met benchmarks for 5 out of 6 ISGP parameters:
  - pH
  - Zinc
  - Copper
  - Turbidity
  - TSS
- After some fine tuning 6 out of 6:
  - COD!

Up to 80% - 90% reduction in concentrations for all ISGP parameters
2010 – 2014 Quarterly Sampling (Turbidity)
2010 – 2014 Quarterly Sampling (COD)

Chemical Oxygen Demand (mg/L)
Lessons Learned

- Challenges with Flow Distribution
- Use of Conveyer Belt (Slinger Truck) Limited Media Settlement
- Pretreatment Stages Provide Storage and Detention
- Most Effective Plants Still To Be Determined
- Continued Operational and Structural BMPs Go a Long Way
- Meeting Benchmarks

Influent & Effluent Samples - February 5, 2015

- Turbidity (NTU)
- TSS (mg/L)
- COD (mg/L)
Questions?