

The Hayden Bridge Water Treatment Plant- A Decade of Improvement or Frustration, Depends on Who You Ask



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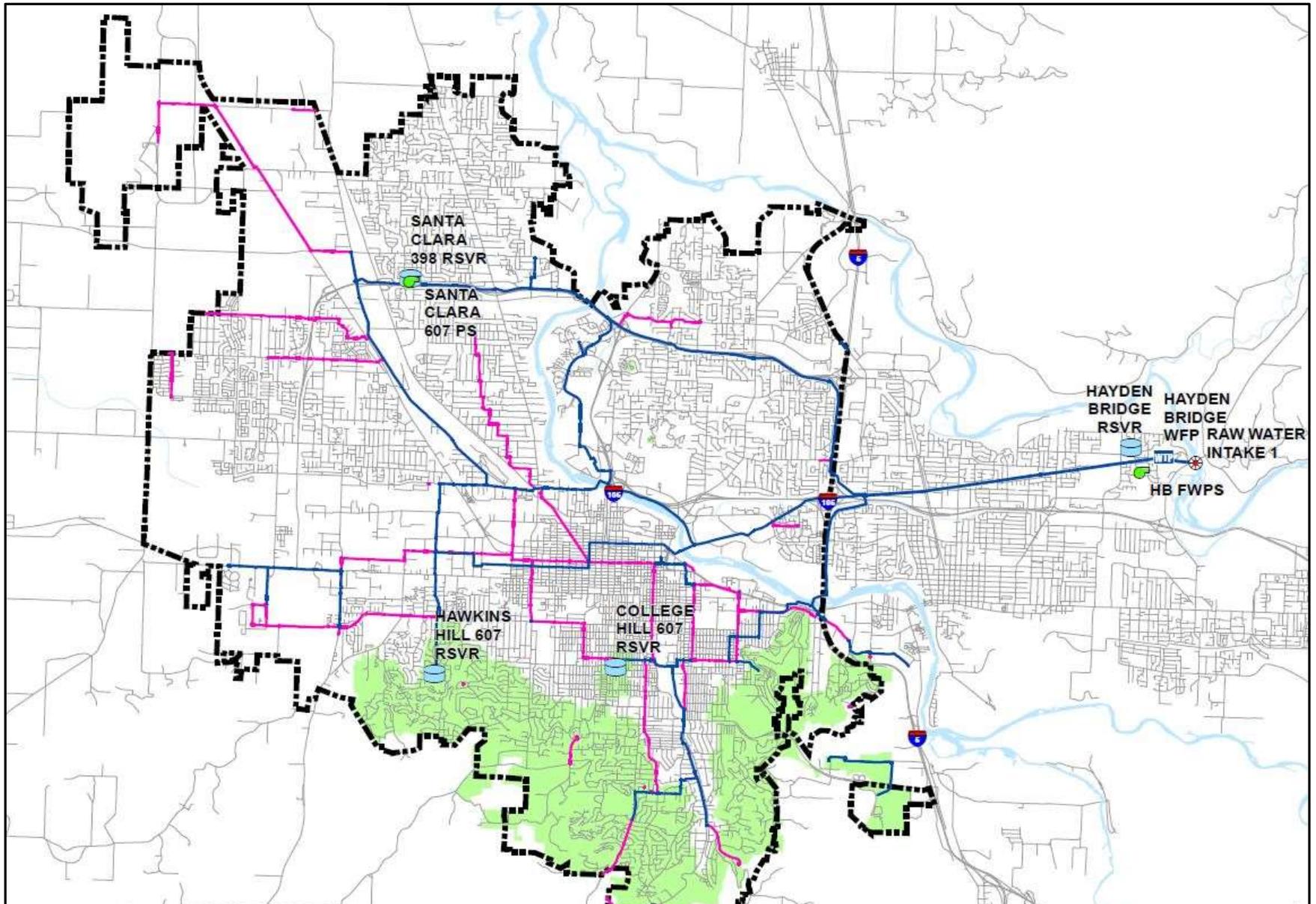
Presentation Outline

- EWEB Water System
- Hayden Bridge Water Treatment Plant
- Plant Upgrades
- Changes in Construction Process
- Future Focus
- Questions



Hayden Bridge Headhouse

EWEB's Water System

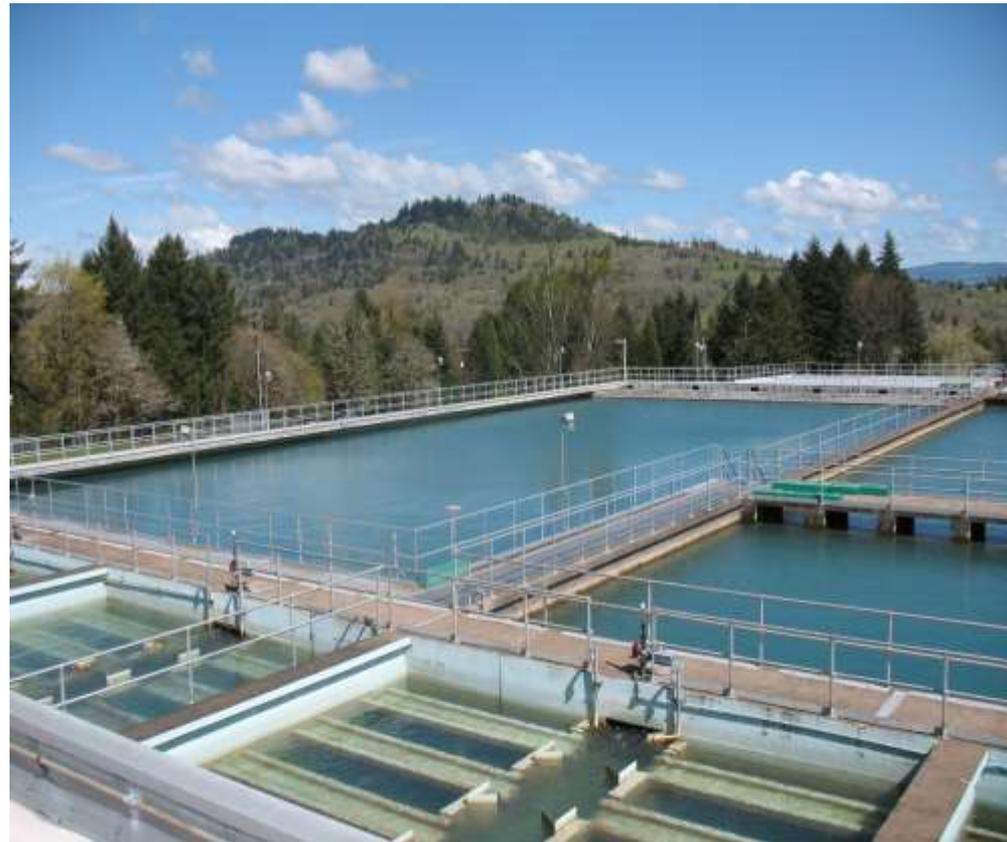


EWEB's Water System

- Founded in 1911
- Serves a population of ~185,000.
- Two Raw Water Intakes
- One Treatment Plant and Finished Water Pump Station
- One large base level with 5 smaller higher service levels
- 19 storage reservoirs, 1MG to 20MG
- 34 pump stations
- ~800 miles of distribution pipelines
 - 50% Cast iron
 - 32% Ductile
 - 4% Asbestos cement
 - 9% PVC
 - 5% Other

Hayden Bridge Water Treatment Plant

- Two Raw Water Intakes on the McKenzie River:
 - Capacity 100 MGD
- Hayden Bridge Plant:
 - Rated Plant Capacity: 80 MGD
 - Mixed Media Filtration Plant
 - Conventional Plant Below 36 MGD and Direct Filtration at Higher Flows



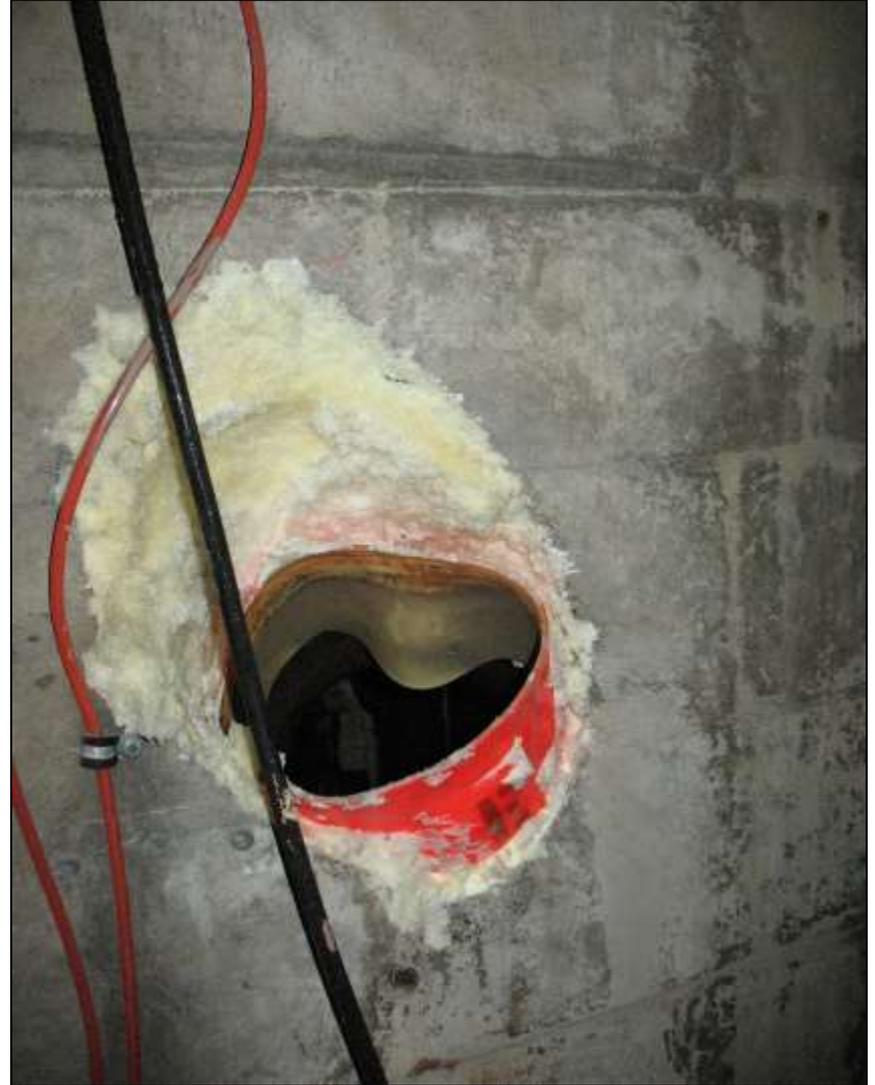
Hayden Bridge Water Treatment Plant – Filters and Sedimentation Basins

'Previous' Facility Upgrades

- Raw Water Intakes:
 - Intake 1 – Constructed in late 1940s
 - Intake 2 – Constructed in late 1950s
 - Electrical Building Constructed – Early 1990s
 - Four of 8 pumps replaced in 1990s
- Hayden Bridge
 - Original Plant constructed in the late 1940s/early 1950s
 - Three filters added 1970s
 - Carbon Feed Building 1990
 - 2001 Finished Water Pump Station and 15 MG Reservoir
 - 2002 Caustic Building
 - 2004 Filter Underdrain Rebuild

No improvements were ever made to original plant

History of Neglect



History of Neglect



History of Neglect



Stuck in the Past



2009 - Time to Stop the Neglect and Move Into the Future



Plant Upgrades

- 2004 Master Plan:
 - Raw Water Intake
 - Identified screen deficiencies
 - Identified pumping issues
 - Capacity Deficits
 - Hayden Bridge:
 - Identified capacity deficits based on the demand projections.
 - Recommended implementing improvements from a 1999 study.
- Improvements started at the Plant in full swing in 2009



2009 Expansion Piping Improvements

2009 Plant Expansion



2009 Plant Expansion – Raw Water Supply Manifold Improvements



2009 Expansion – New Contact Basin



2009 Expansion – New Filters



2009 Expansion – New Backwash Pumps



2009 Expansion - New Chemical Feed Systems



2009 Plant Expansion – Filter to Waste Flow Separation and Recovery



Post 2009 Expansion



And We Kept Going

Completed 30+ Projects Between \$10,000 and \$300,000

- House water pump replacements,
- New chemical injection vaults,
- Numerous electrical upgrades,
- New pilot filters,



And We Kept Going

Completed 30+ Projects Between \$10,000 and \$300,000

- Complete plant plumbing upgrades,
- New sample pumps,
- Numerous instrumentation upgrades,
- Building remodels



New Pilot Filter Plumbing

Concurrently - We Upgraded Filters N1 – N6 Filters (bare concrete rebuild)



The Plant Had to Keep Operating - Frustrations Abound

- Operators began to have *construction fatigue syndrome*.
- Felt left out of the construction process.
- Increasing anger and disappointment towards project managers and engineers.

So we changed things



The Old Process

- Engineer/PM scopes project working with Ops define schedule/constraints and begins predesign work.
- Engineer leads design and facilitates review with operations input.
- Engineer/PM acts as sole construction liaison.
- Operations staff continue to operate the plant.



Post Filter Chemical System

The New Process



*New Raw Water Pump being installed
on nice Oregon day.*

- Design process stayed the same except more formal documentation :
 - Project requirements,
 - What constitutes success,
 - Roles and Responsibilities.
- Added Operations staff as an additional construction liaison.
- Team dynamics shifted to be more operator focused than engineering focused.

*Multiple construction liaisons goes
against everything we are taught.*

Raw Water Intake Improvements

- Completed in two phases.
 - Phase 1 - designed by a consultant.
 - Phase 2 - designed in house.
- Phase 1 Upgrades Included:
 - New Intake Tee Screens
 - Two new pumps
 - New electrical system
 - Air burst cleaning system
 - New yard piping
 - Dedicated Operations Point Person at All Meetings



Raw Water Intake Improvements

- Phase 2 Upgrades Included:
 - New drum screens
 - Airburst cleaning system
 - New mechanical piping
 - Rotation of pumps and new discharge piping and valves
 - New 54-inch Raw Water Line
 - Dedicated operations person at design meetings, construction meetings, main point of contact for operational issues, and daily onsite presence.



Intake Drum Screen Installation 2014

South 1-7 Filter Upgrades

- Filter gallery upgrades completed.
 - New filter gallery piping
 - New sweeps, influent/effluent gates in filters.
 - Seismic improvements
 - Instrumentation
- Dedicated Operations Point of Contact at All Meetings
- Heavily Involved in Construction Management and Inspections



South Filter Pipe Gallery

Subjectively – Does New Process Work?



Seismic Improvements Raw Water Intake

- Engineer's Perspective
 - Leads to scope creep
 - Can allow too many points of contact, hard to keep track of changes.
 - Diminishes value of a PE. Feeling that Ops trumps Engineering knowledge for everything.
 - Really helps with planning work and construction issues.
 - Creates a stronger team mentality.

Subjectively – Does New Process Work?

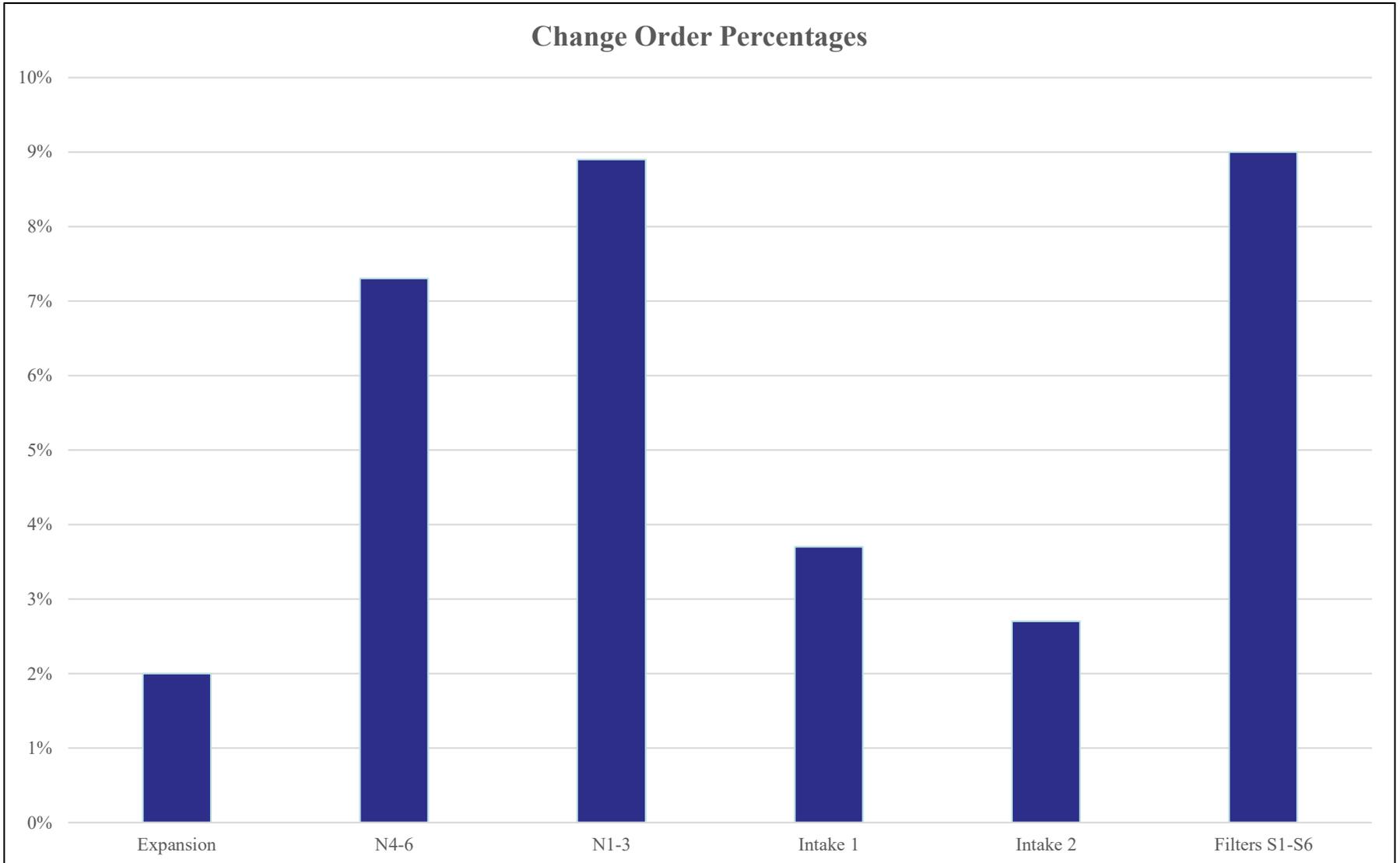
- Operators Perspective
 - Helps mitigate the issues with “if it looks good on paper it must work – they are partly responsible.
 - Helps with operational changes and outages during construction.
 - Gives Operators more ownership of the end product
 - End product more suited to needs of plant staff



South Basin Seismic Improvements

Just the Facts Does it Work?

Change Order Percentages



Engineers and Operators Have Different Measures of Success

- Different Measures of Success:
 - Engineers perspective: system runs and produces as anticipated, small issues are to be expected.
 - Operations: want perfection with no issues.
- No matter how many people are involved, perfection is not affordable.



South Filter Pipe Gallery Preconstruction

\$30 Million Later – What Did We Learn



- A decade of constant construction projects is taxing on everyone.
- More operator involvement seems to add additional scope items during construction.
- We need to work together to get the job done.
- Administering construction contracts in-house with a strong team leads to a better product.

South Filter Media Installation

\$30 Million Later – What Did We Learn

- Operations should continue to be involved in design and construction process.
- Managing feelings is more difficult than managing the construction work.
- Success is only possible if there is trust in the team.
- Direct communication is better than email or texts.
- Onsite Engineering presence makes a world of difference.



Backwash Drain Improvements 2017

We Aren't Done Yet



- New Disinfection System
 - In final design to install a new OSG system.
- Standby Power Upgrades
 - Design is complete for a new 1 MW generator
- New Water Quality Lab

Sedimentation Basin Hand Railing

We Aren't Done Yet – Future Focus



- Increased onsite engineering presence during construction.
- Minimize the number of people involved from operations.
- Clearly define the definition of success prior to construction starting.

Micro-Piling Installed for Seismic Upgrade

