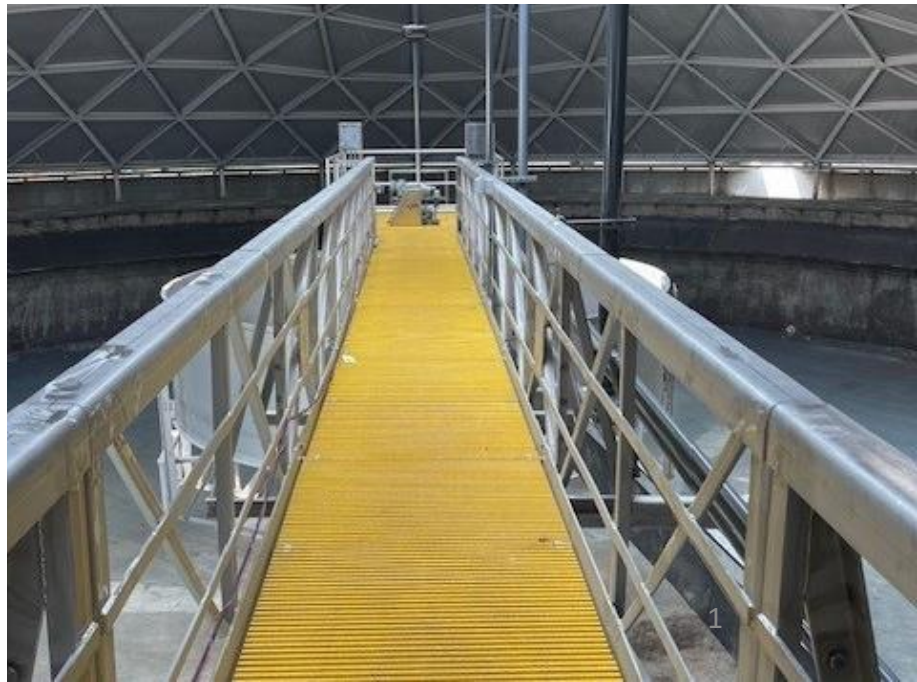
NEW ENGLAND WATER ENVIRONMENT ASSOCIATION
NEWEA
WORKING FOR WATER QUALITY

Collaborative and Innovative Efforts for Fast-Track Projects

Portland Water District
Portland, ME

KLEINFELDER
Bright People. Right Solutions.

January 29, 2025

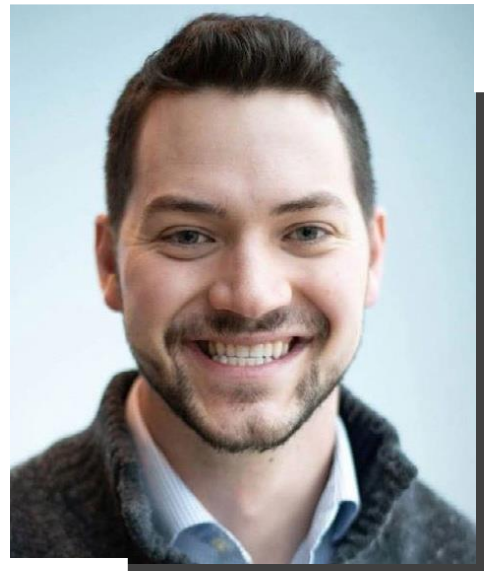


Our Speakers

Joel Jones, PE
Portland Water District
Project Manager

Stephanie Hubbard, PE
Kleinfelder
Project Manager

Jose Infante Corona, PE
Kleinfelder
Technical Design Lead



Gil Hogan, PE
Kleinfelder
Assist. Project Manager

Agenda

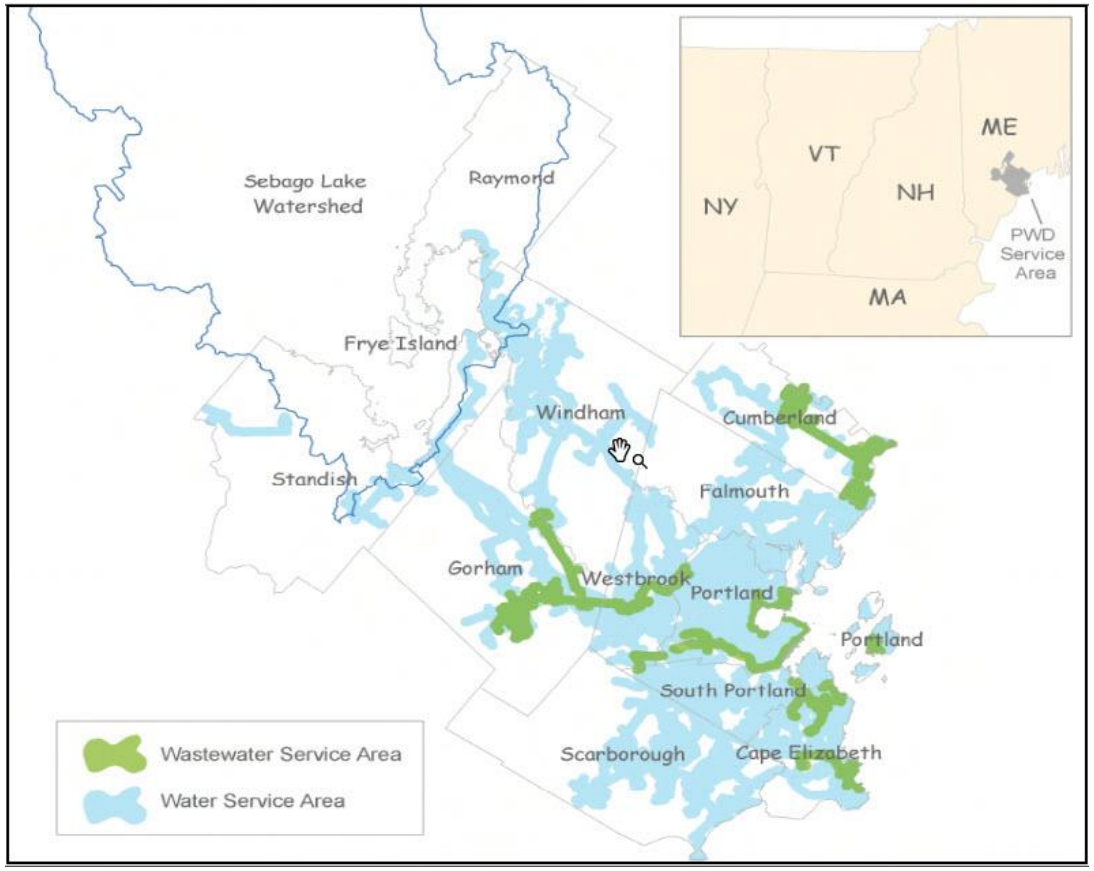
OVERVIEW OF PWD AND PROJECT

DESIGN & KEY DECISIONS

EVALUATION OF PERFORMANCE

Q&A DISCUSSION

Portland Water District



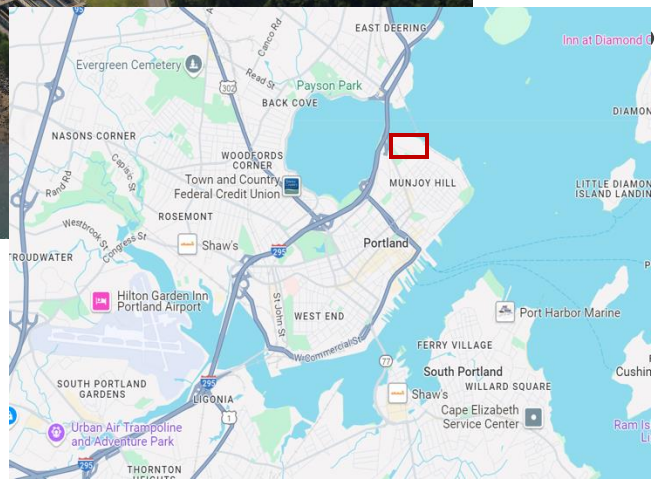
186 Employees

56,114 services with a 140 sq mile service area

21 MGD of Water Delivered
1,010 miles water mains
5,197 hydrants

115 miles wastewater pipe
76 WW Pump Stations
4 WW Treatment Plants

East End Wastewater Treatment Facility (EEWWTF)



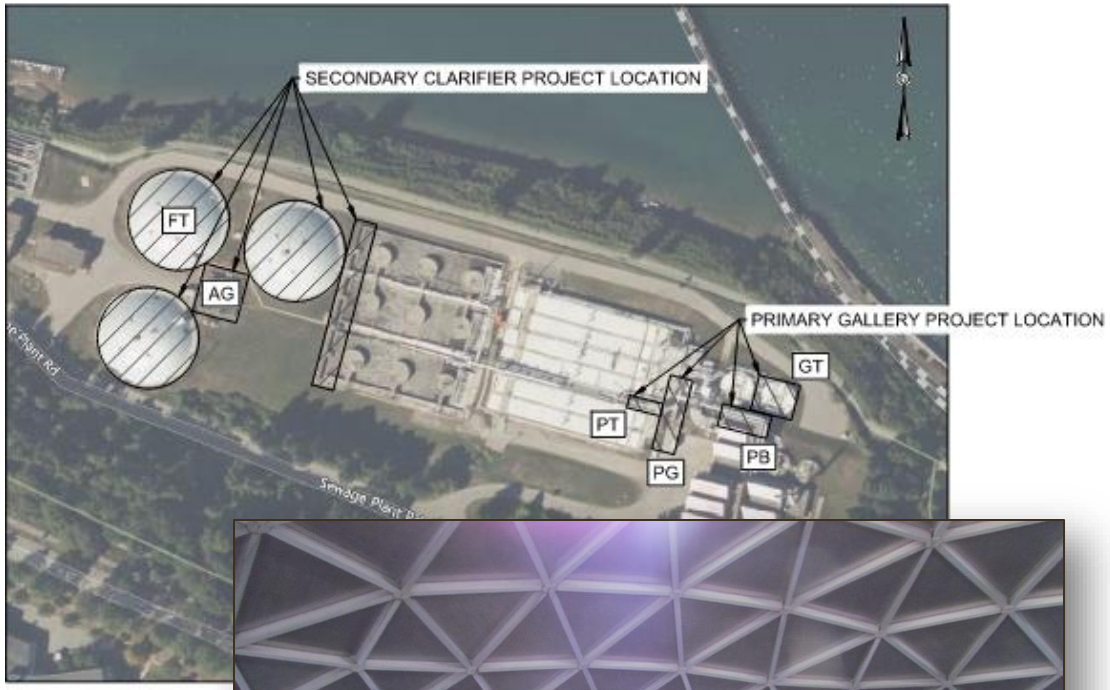
- Maine's largest treatment facility
- Constructed in 1979
- Secondary clarifiers upgraded once in 1999
- Population Served: 60,000
  Flow: (million gallons per day)
  - Average: 19.8
  - Peak Flow: 80.0

EEWWTF Upgrade Project

Primary Gallery Upgrade:

- Primary Sludge Gravity Thickener
- Primary Sludge Pumps
- Plant Water Pumps and VFDs
- Plant Water Strainer
- New SCADA Panel
- Primary Sludge Pipe Modifications
- Electrical Upgrades/new MCCs
- Upgrades to Primary Electrical Room
- Upgrade to Instrumentation and Controls

EEWWTF Upgrade Project



Secondary Clarifier Upgrade:

- Replacement of mechanism with SS 316 spiral rake
- Replacement of existing influent slide gates to secondary clarifiers with SS 316 slide gates
- Replacement of plant water suction pipe isolation valves
- Concrete Repairs to clarifiers
- Electrical Upgrades
- Instrumentation and Control Upgrades

Operational Challenges

- **Decreased allowable inventory levels**
  - Lower solids loading rate to clarifiers
  - Unable to implement nutrient optimization efforts (to resume in 2025!)
- **Decreased RAS capacity**
  - Each clarifier is dedicated to a specific pump
- **Concerns over additional failures during construction**
  - What if one of the two functioning clarifiers fails while third clarifier is under construction?

Project Schedule

Preliminary Design
February - May 2023

Key Deliverables:

- Pre-Procurement Package
- Preliminary Design Report

Final Design
May - October 2023

Key Deliverables:

- 90% Milestone and Workshop
- 100% Milestone
- Early Demo Package – SC#3
- Bidding and Award

Construction
October 2023 – April 2025

Key Milestones:

- Nov 2023 - Early Demo of SC#3
- April 2024 - SC#3 Online
- August 2024 - SC#2 Online
- December 2024 - SC#1 Online

Key-Design Decisions for Fast-Track

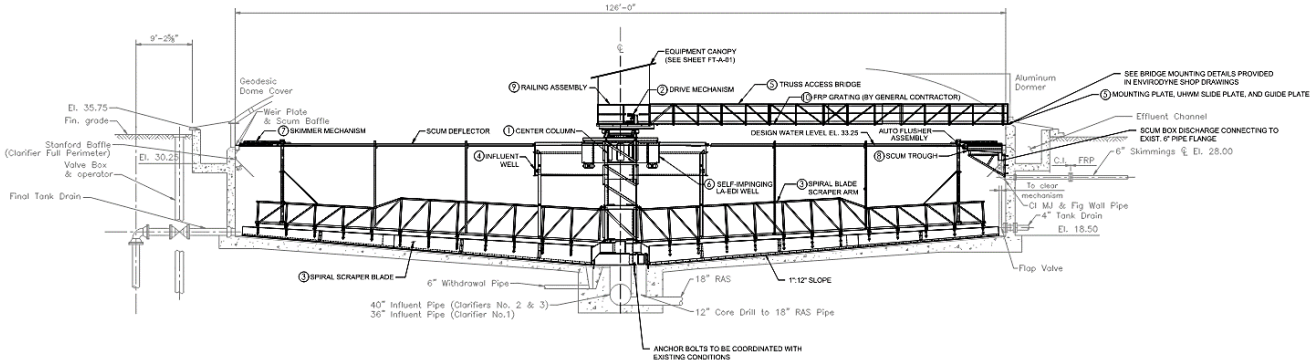
Project partnership and collaboration

- Weekly Check-In Meetings
  - Owner and OPM
  - Design Engineer and Subconsultants
- Design Milestones/Workshops

Key-Design Decisions for Fast-Track

Pre-Procurement

- Secondary Clarifier Mechanism
- Slide Gates
- SCADA Panels
- What about Electrical Equipment?

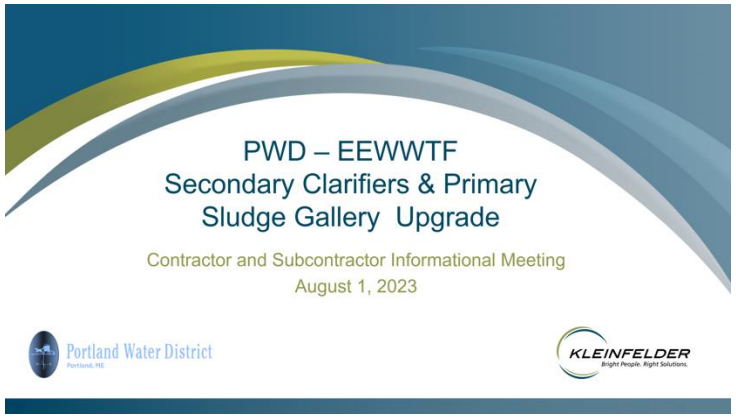


TYP. SECONDARY CLARIFIER EQUIPMENT UPGRADES PROFILE

Key-Design Decisions for Fast-Track

Contractor Coordination

- Early Demolition Package for SC#3
- Contractor and Sub-Contractor Informational Meeting
  - Early Outreach on project and schedule
- Contract “Novation” discussed



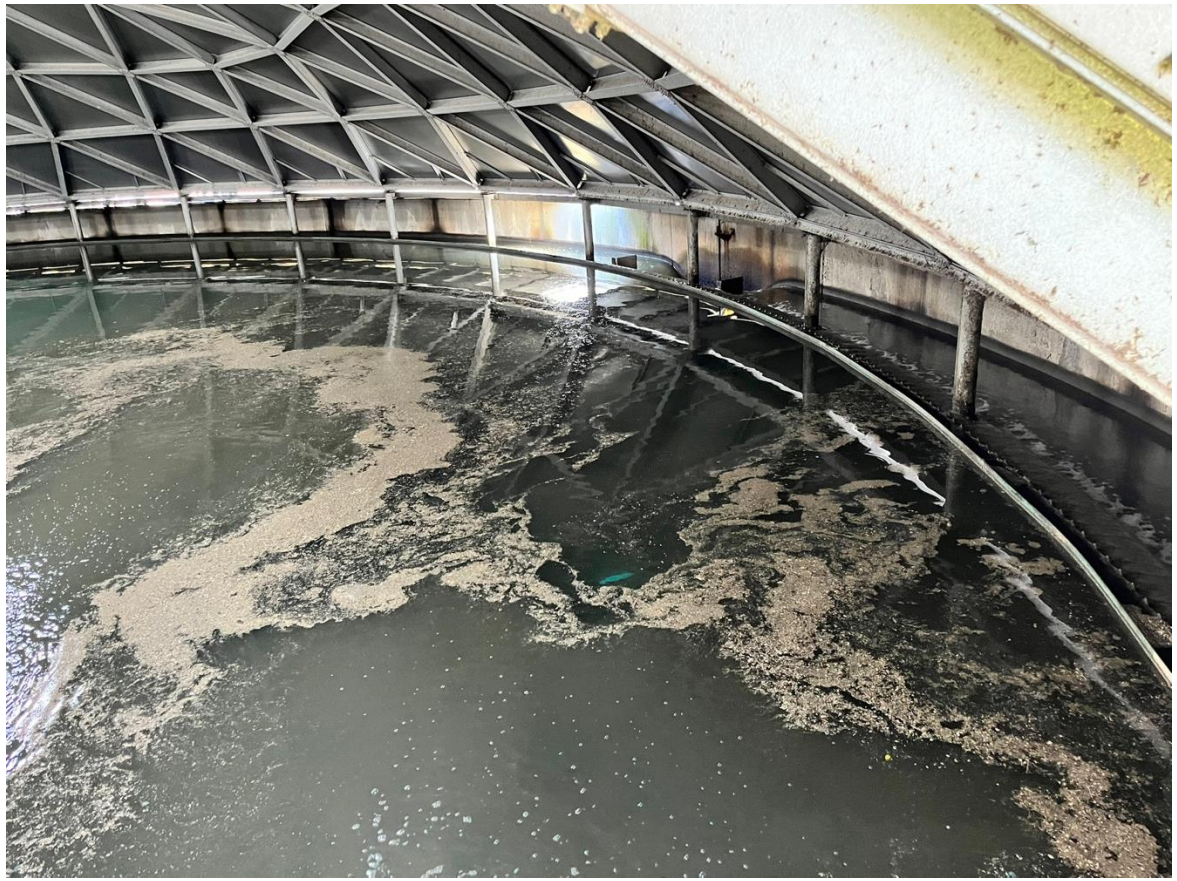
Performance:
Secondary Clarifier Mechanism
Old vs New

- The main differences are:
  - Energy Dissipation Inlet (Better inlet flow conditioning)
  - Anti-rotational Baffle (Better scum removal)
  - RAS Pipe Inlet

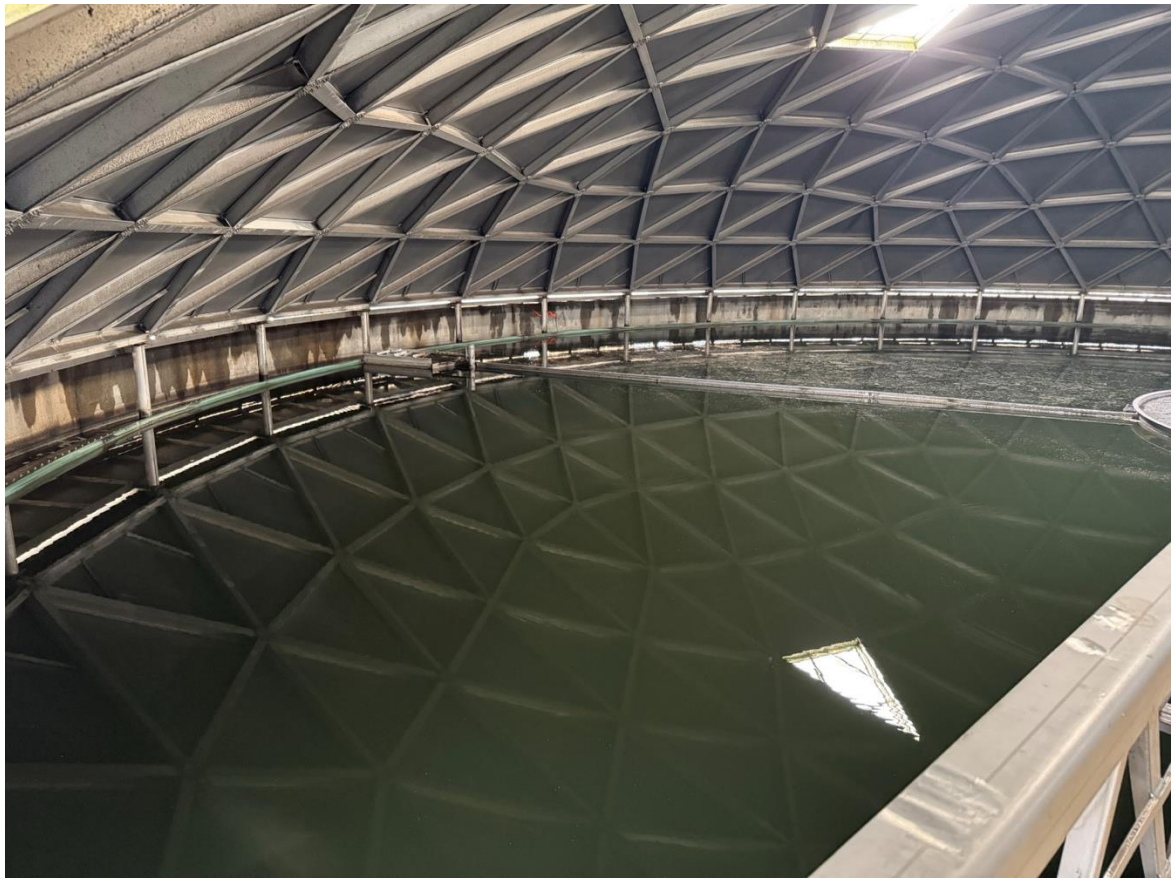
- Comparison for Two (2) clarifiers Old Mechanism Vs. Two (2) clarifiers New Mechanism

Performance:
Secondary Clarifier Mechanism
Old vs New

With Old Mechanism



With New Mechanism



Performance:
Secondary Clarifier Mechanism
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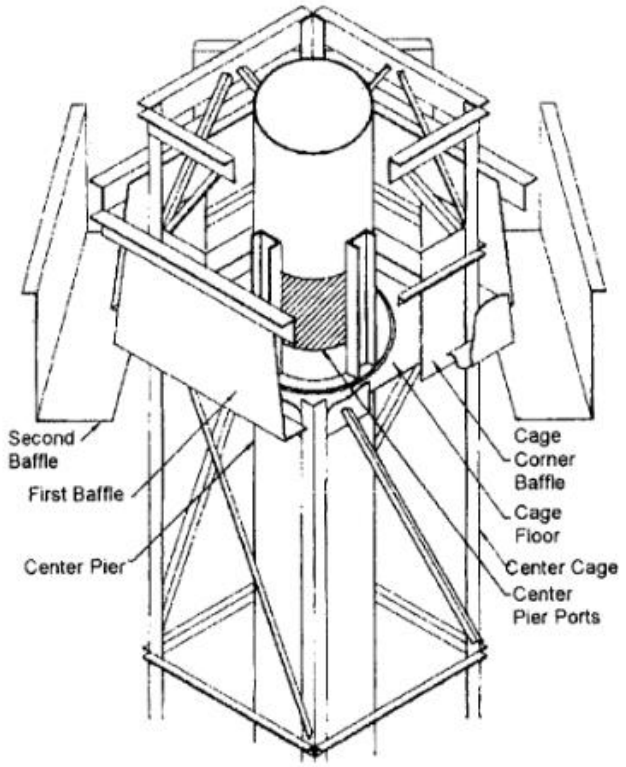
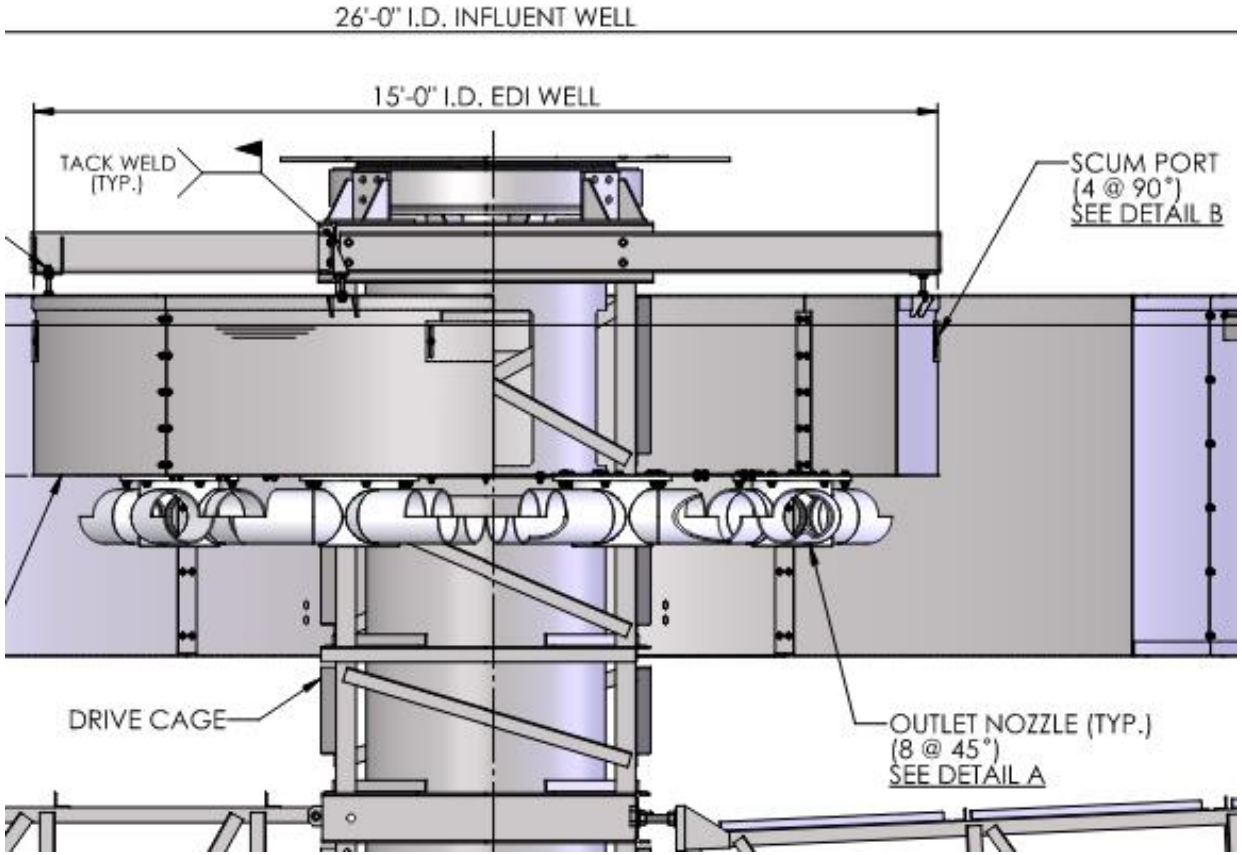


FIGURE 8.13 Flocculating energy dissipating feedwell (FEDWA).



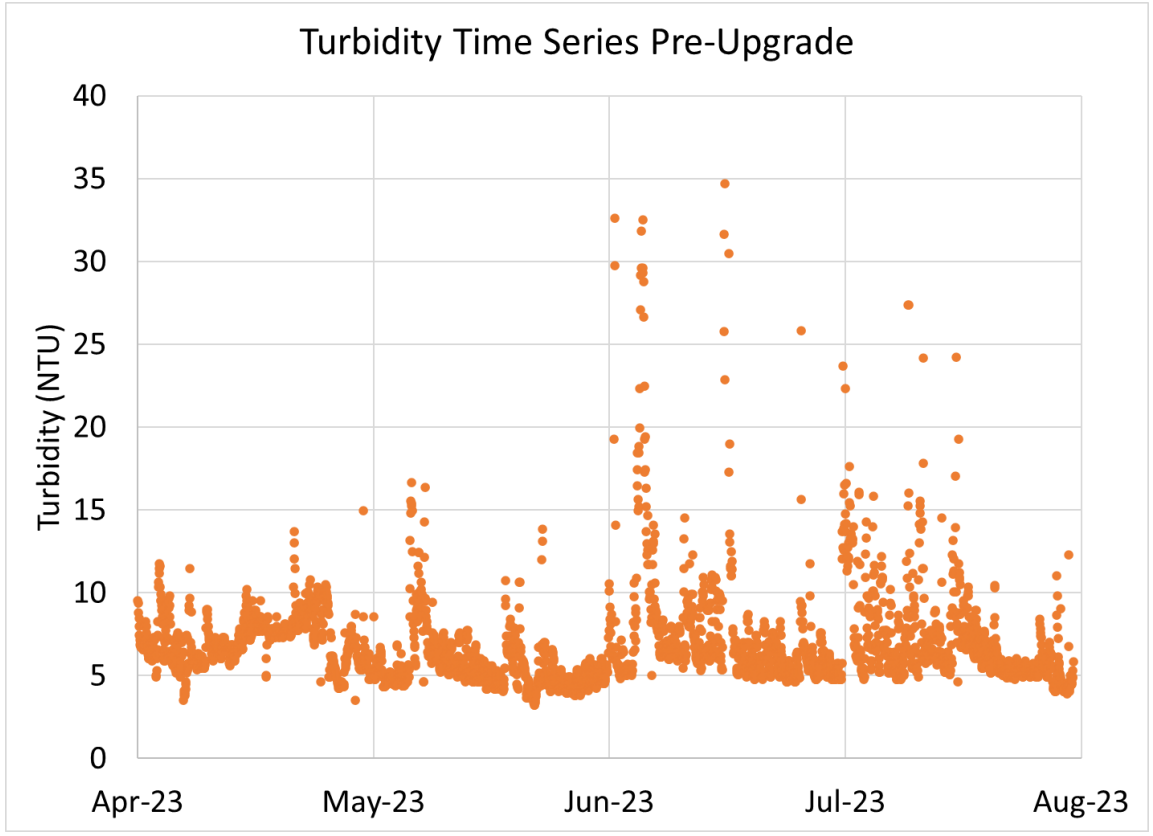
Performance: Secondary Clarifier Mechanism Old vs New

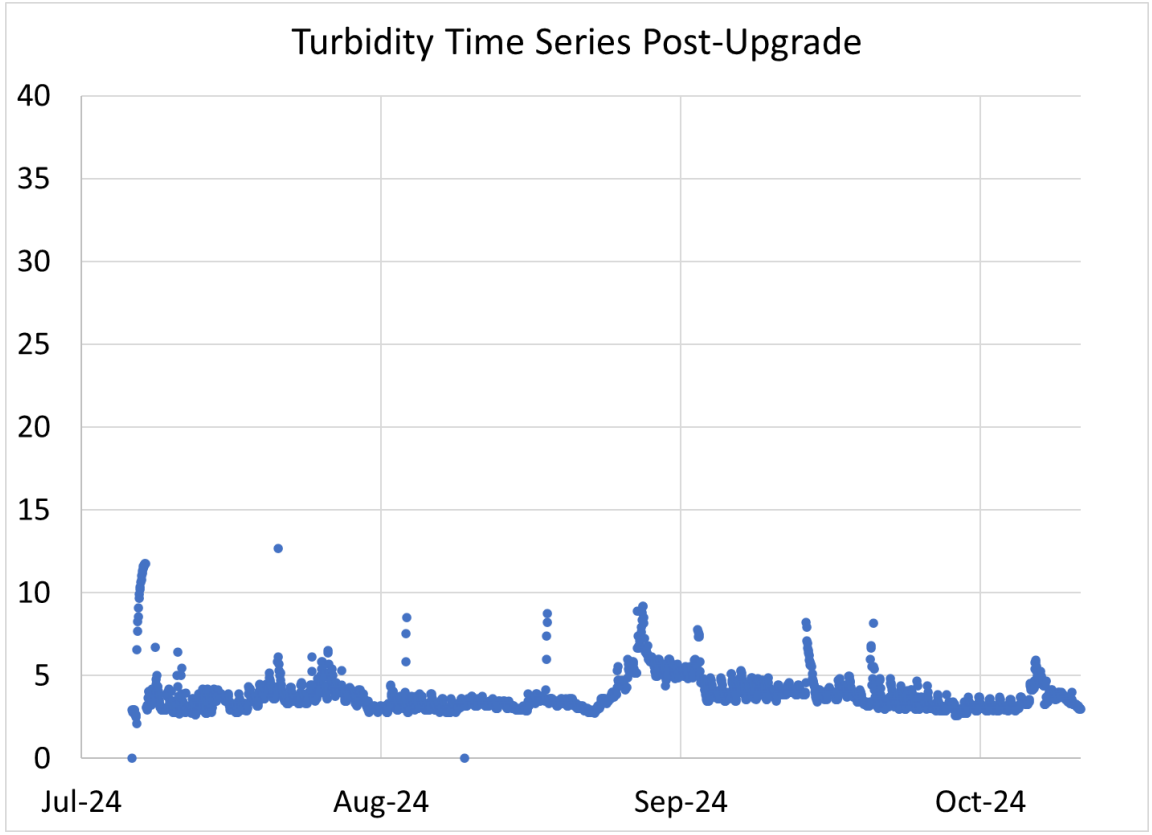
Comparison of Clarifier Performance Pre-Upgrade Vs. Post-Upgrade

Parameter	Units	Pre-Upgrade	Post-Upgrade
Time Period	Date	04/01/23 to 07/31/23	08/01/24 to 11/14/24
Avg. Flow	MGD	17.2	11.14
Max. Flow	MGD	66.1	78.3
Air Temp. Range	*C	-4 to 29	-7 to 26
Avg. Air Temperature	*C	12.2	9.9
Avg. Effluent Turbidity	**NTU**	**7.2**	**3.8**
Avg. Total Suspended Solids	**mg/L**	**17.6**	**10.3**

PERFORMANCE: SECONDARY CLARIFIER MECHANISM OLD VS NEW

Turbidity Over Time – Normal Operations

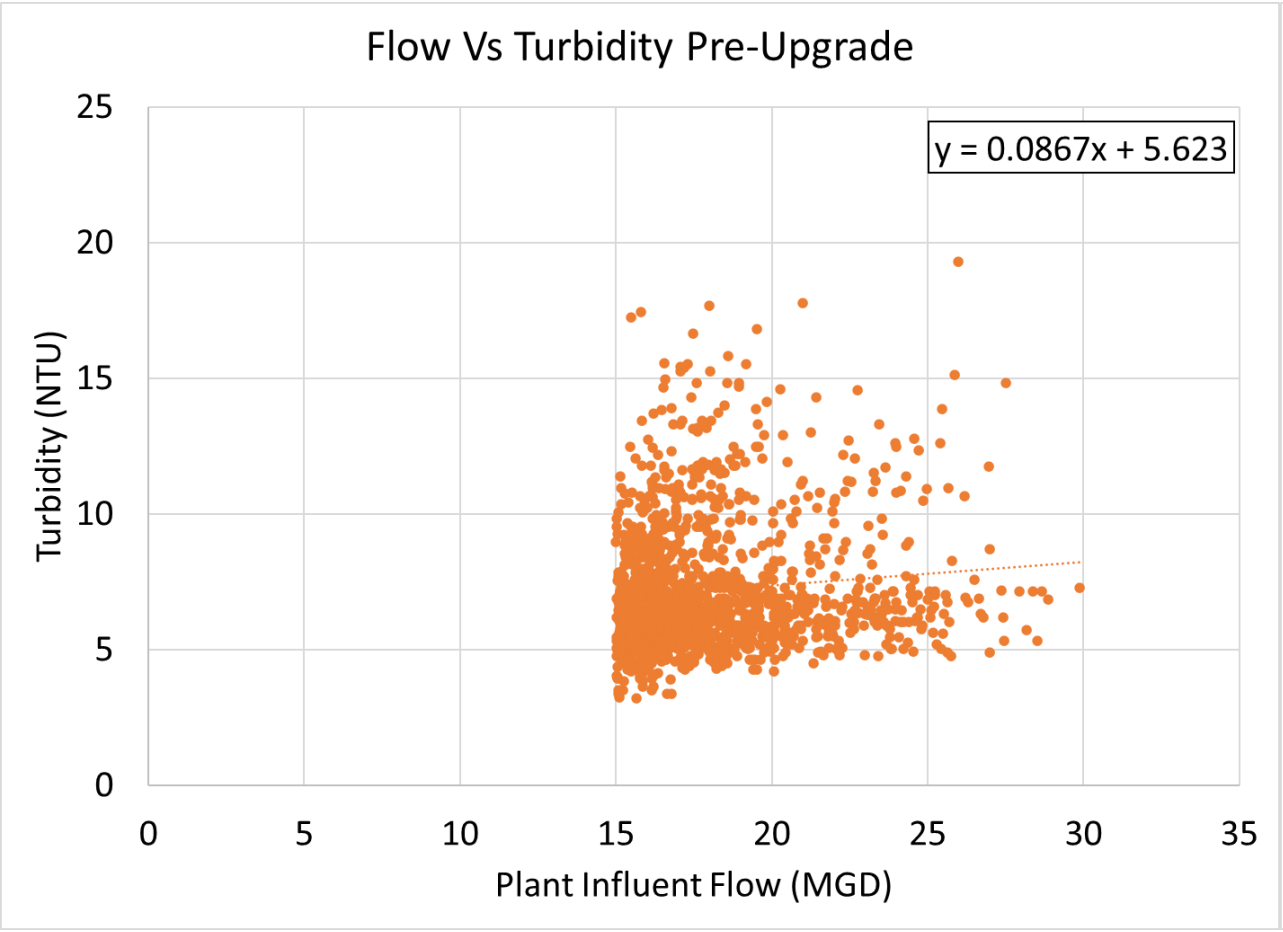


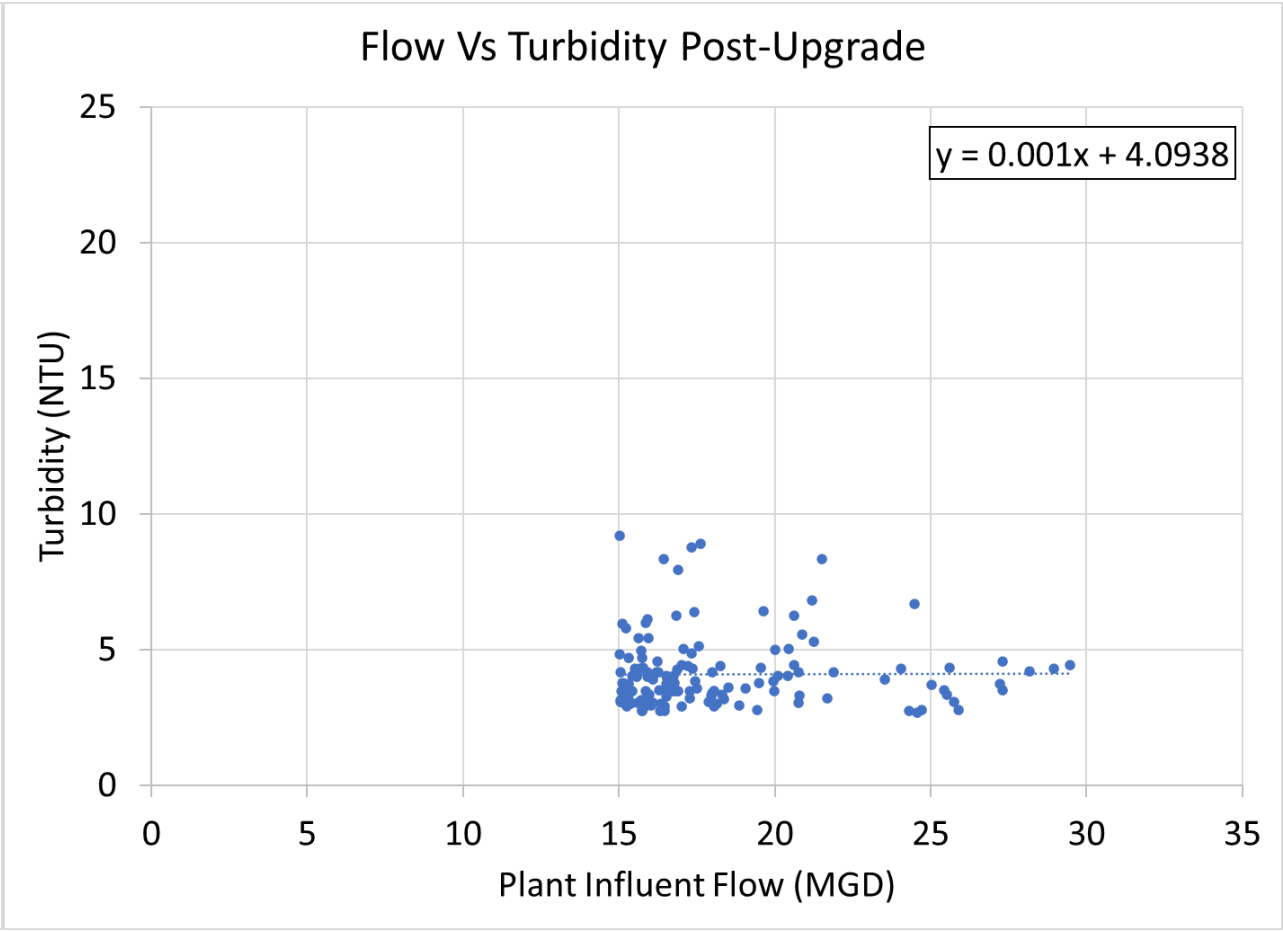


Flow Vs. Turbidity Scatter Plot

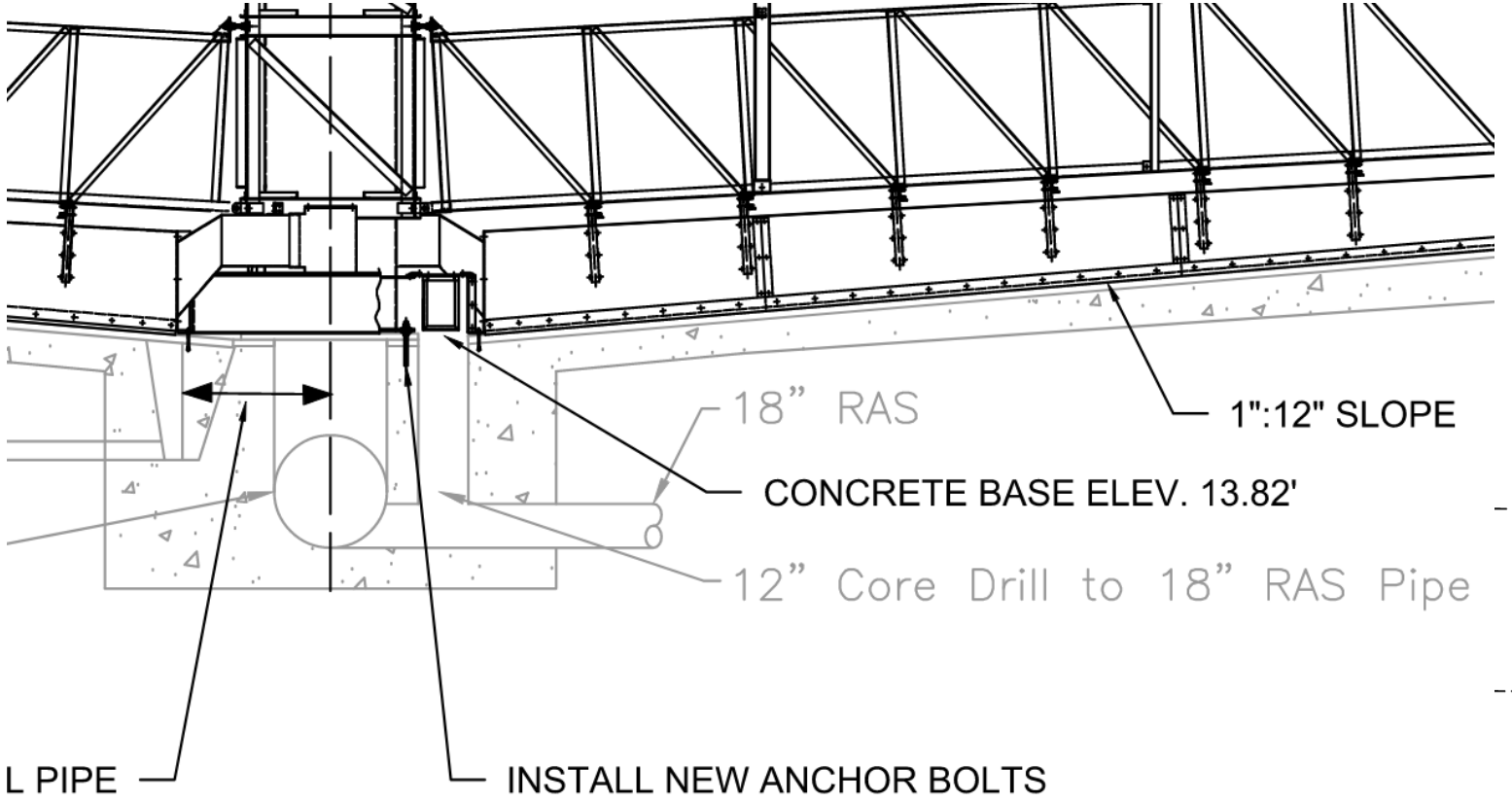
- Flows between 15 and 30-MGD
- No Polymer added, No wet weather effect.
- Comparison of Post-Upgrade and Pre-Upgrade
- Plot of Flow (MGD) Vs. Effluent Turbidity (NTU)

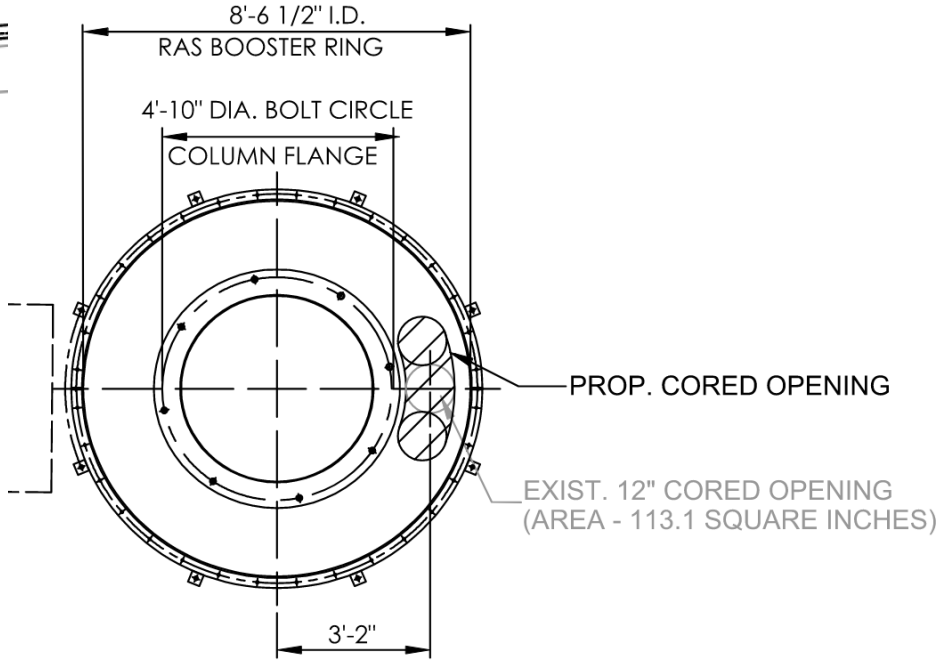
Flow Vs. Turbidity Scatter Plot



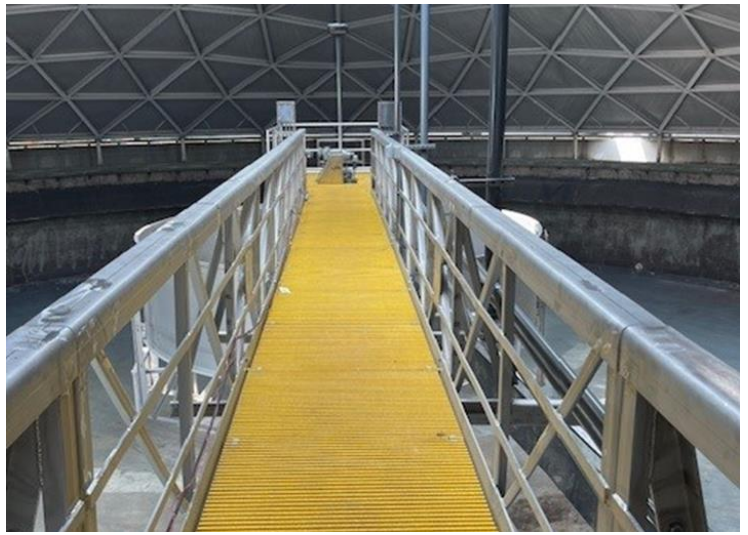


Performance: Future RAS Pumping





Construction Progress



Construction progress

Public Education

Educational Poster/Sign installed along the Eastern Promenade Trail

What Success Looks Like

Portland Water District
Portland, ME

KLEINFELDER
Bright People. Right Solutions.

AEC ENGINEERING
AUTOMATION & ELECTRONIC CONTROLS

Woodard & Curran

DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE OF MAINE

PENTA
CORPORATION

B·H·MILLIKEN
Electrical Contractors