SLUDGE CHAMBER PUMP PROJECT

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Presented by:

Sonja Svihla, Ph.D.
Project Manager, Pittsburgh Water

Robert Dengler, P.E.
Sr. Project Manager, Gannett Fleming, Inc.

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Agenda

- Project Background
- Project Goals
- Unique Design Challenges
- Evaluation of Alternatives
- Construction & Commissioning

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Project Background

- Pittsburgh Water's Aspinwall Water Treatment Plant
  - Maximum Allocated Capacity = 100 MGD
  - Average Daily Water Production = 70 MGD
  - Clarification Process occurs in 4 basins in Clarifier Building

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Project Driver/Regulatory Requirement

- On January 15, 2021, Pittsburgh Water and the U.S. DOJ filed a Plea Agreement with the District Court as a results of a CWA violation involving clarifier residual discharge from Outfall 012 to the Allegheny River and a violation of Industrial User Permit that enabled Pittsburgh Water to send up to one million gallons per day of clarifier sludge to ALCOSAN.
- As a Remedial Measure and Enhancement under the Administrative Agreement with the U.S. EPA, Pittsburgh Water was required to complete an improvement project to the Clarifier Residuals Distribution Structure (Sludge Chamber Pump Project):
  - prevent accidental discharges to the Allegheny River by permanently eliminating the gate which was then bolted shut
  - improve solids handling and metering in the chamber through upgrades to pumping, electrical, and instrumentation system,
  - provide other structural improvements.
- Reports of the progress of the project was submitted quarterly to the EPA Suspension and Debarment Officer.

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Project Background

- Existing Clarifier Residuals Distribution Structure (CRDS)
  - Constructed in 1993 to direct sludge blowdown to ALCOSAN sewer.
  - Submersible pumps installed in 2010 in West Chamber to pump clarifier drain water to ALCOSAN sewer.
  - Submersible pump operating issues necessitated a temporary pump required to pump clarifier drain water to ALCOSAN sewer.
  - The gate in the West Chamber to Outfall 012 is bolted shut

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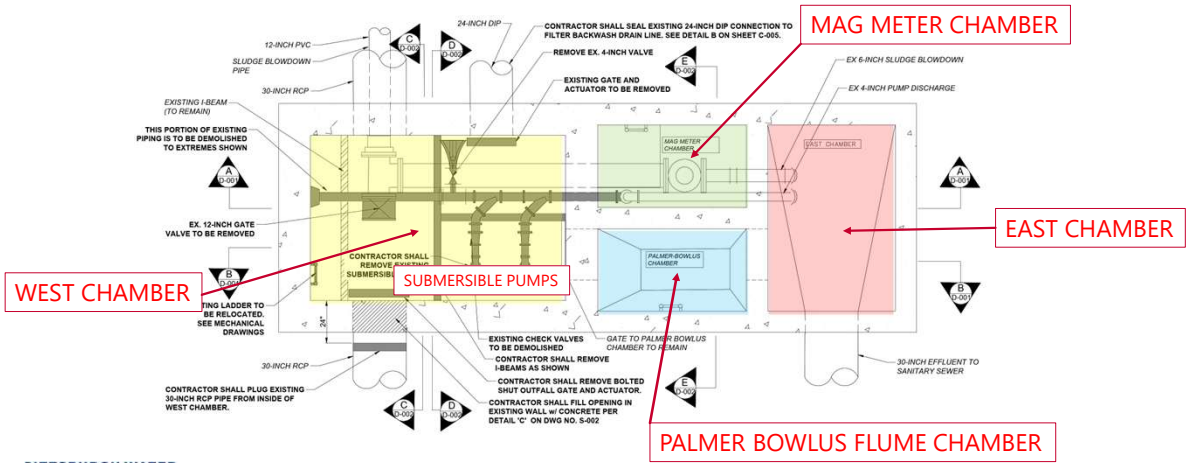
Project Background



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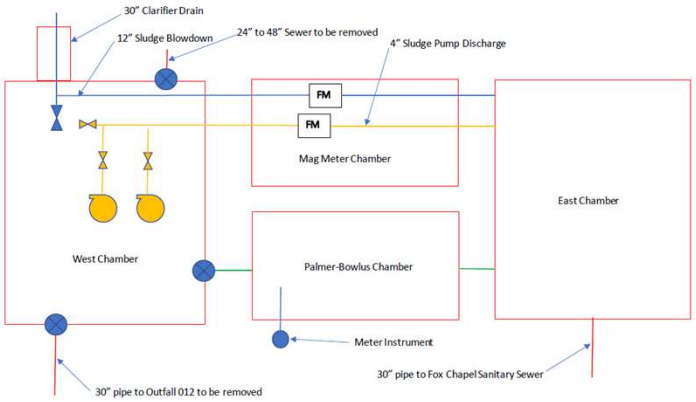
Project Background



CRDS FLOW DIAGRAM

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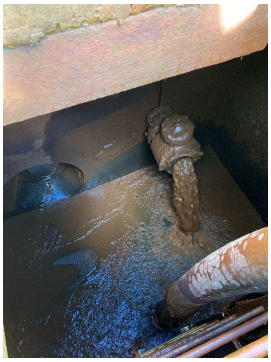

Sludge Blowdown Discharge into the East Chamber

Submersible Pumps in West Chamber

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Project Goals

- Replace submersible pumps with reliable pumping/mixing system to convey sludge to ALCOSAN and associated piping, valves, magnetic flow meters, and other appurtenances
- Permanently seal Outfall 012 from CRDS to River
- Install a slide gate downstream of the Palmer-Bowlus flume to prevent backflow
- Disconnect the west chamber to the 48-in Filter Backwash Drain and permanently seal Outfall 010 – stormwater outfall from manhole near Ross Pumping Station
- Other improvements include adding the pumps retrieval system

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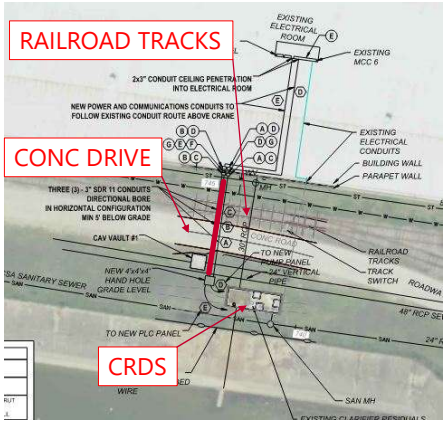
Unique Design Challenges

- Selection of a reliable pumping and mixing system
- River water intrusion while permanently sealing Outfall 012 from CRDS to River
- Installation of new conduit under concrete driveway & railroad tracks
- Keeping system in operation during construction
  - Shut-downs needed to be scheduled around quarterly clarifier draining
  - Sludge blow down outage 48 hours maximum



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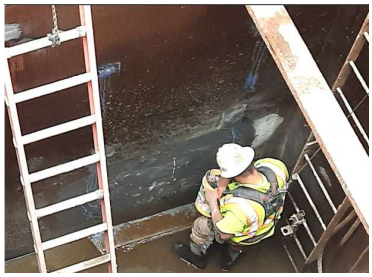
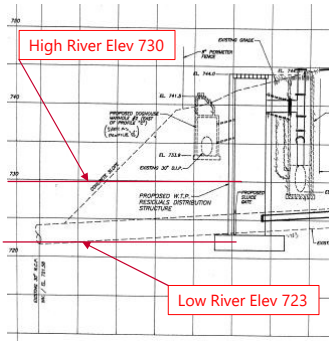
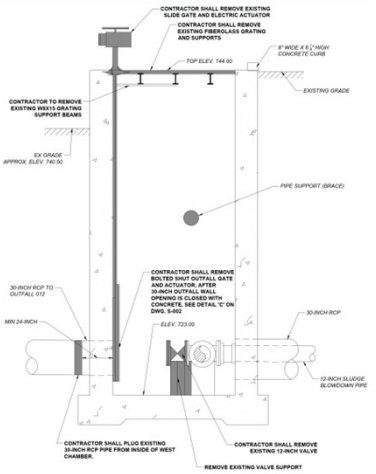
Abandon & Seal Outfall 012

- Objective – Permanently Seal Outfall 012
- Plug 30-inch Pipe inside the Chamber
- Fill Pipe with Flowable Fill to Abandon & Seal
- Remove Gate & Actuator







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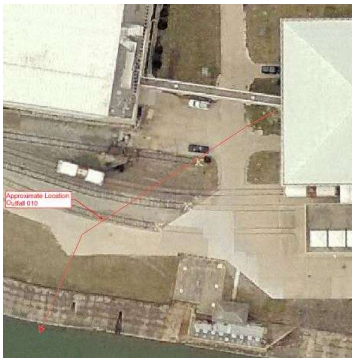
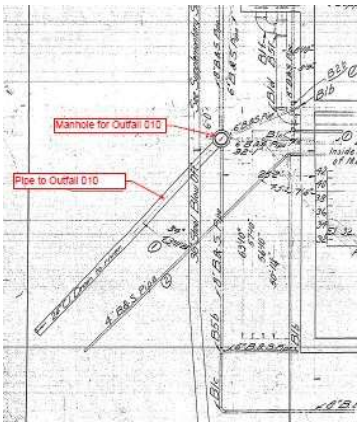
Abandon & Seal Outfall 010

- Objective – Permanently Seal Outfall 010
- No flow observed in upstream manhole
- Plug effluent 24-inch Pipe from MH
- Abandon and seal Manhole





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Pumping and Mixing Options

- Samples of Sludge taken to Determine Concentration
- Following Table Presents the Results of the Analysis

SAMPLE IDENTIFICATION	RESULT (% SOLIDS)
Sludge Blowdown Sample #1	0.3%
Sludge Blowdown Sample #2	0.3%
West Chamber Sample #1	0.5%
West Chamber Sample #2	1.1%

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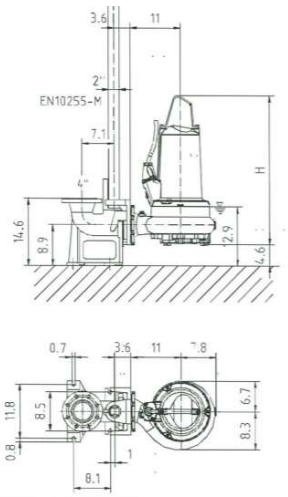
Pumping and Mixing Options

- Non-Clog Submersible Pump
- Similar to Existing Pumps
- Capable of Handling "Packed In" Sludge?



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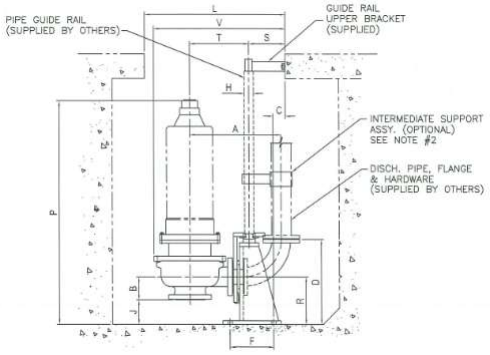
Pumping and Mixing Options

- Vortex Centrifugal Pump
- Equipped with Recessed Impeller
- Capable of Handling Thicker and Grittier Sludge than Non-Clog Submersible Pumps



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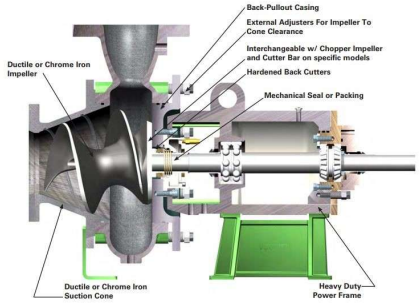
Pumping and Mixing Options

- Submersible Screw Centrifugal Pump
- Deep Cone Shaped Screw Impeller
- Capable of Pumping:
  - Thick Sludges
  - Heavy Rags
  - Stringy Materials
  - Abrasive Materials



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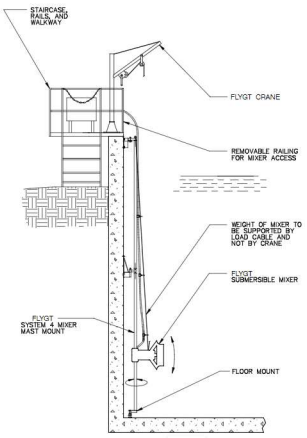
Pumping and Mixing Options

- Recirculation Mixing System
- Air Mixing System
- Submersible Mixers
- Utilization of Plant Water for Dilution



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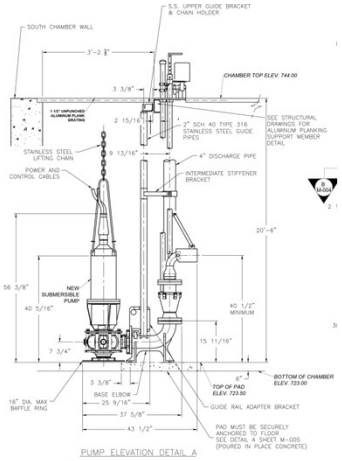
Chosen Alternative

- Integral Submersible Pump & Recirculation Mixing System
  - Screw Impeller Pump – Ability to reliably pump sludge
  - Pumps able to pump down chamber completely with CIA motor
  - Integral Mixing System – to keep sludge in circulation
  - Utilization of Plant Water for Dilution – operating procedure



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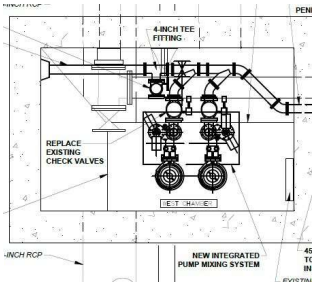
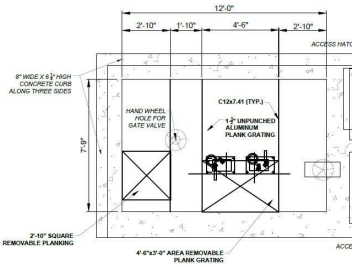
Clarifier Residuals Distribution Structure Improvements

- New Submersible Pump & Mixing System
- Modifications to 4-inch Pump Discharge Piping
- Replace Leaking Link Seal with Grout
- Replace Fiberglass Grating with Aluminum Planks over West Chamber





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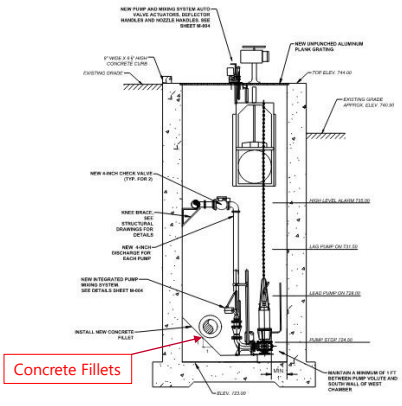
Clarifier Residuals Distribution Structure Improvements

- Concrete fillets installed in the bottom of the West Chamber to facilitate sludge flow to pumps
- Installation of New Slide Gate Downstream of Palmer-Bowlus Flume
  - Prevent sewer surcharging back into chamber
  - Work around existing concrete planks



SECTION D-D

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Bid & Construction Phases

- Project advertised for bidding on October 1 and 5, 2023
- Two Contracts – General and Electrical
- Bids opened on October 31, 2023
- Construction commenced on January 29, 2024
- Construction substantially completed, December 2024

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Construction

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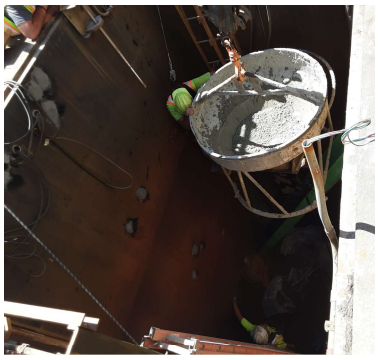

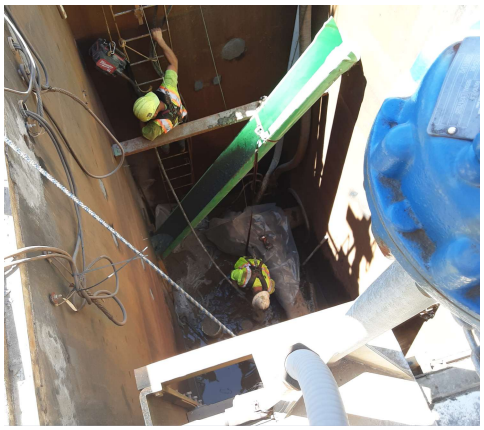

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Construction

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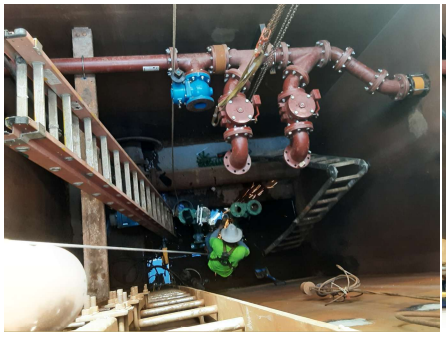

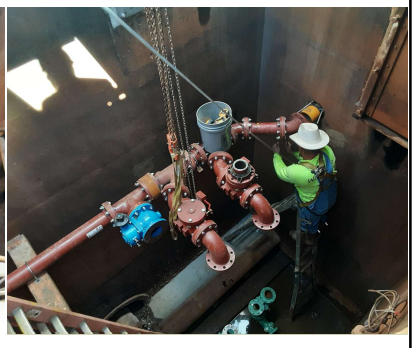

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Start Up and Commissiong

- Pumping and Mixing System tied into SCADA and started up
- Pumping system demonstrated ability to pump clarifier drain water to ALCOSAN
- Discharge to ALCOSAN metered to comply with Pittsburgh Water's discharge permit.
  - Volume limit of 1,000,000 Gallons Per Day in Discharge Permit

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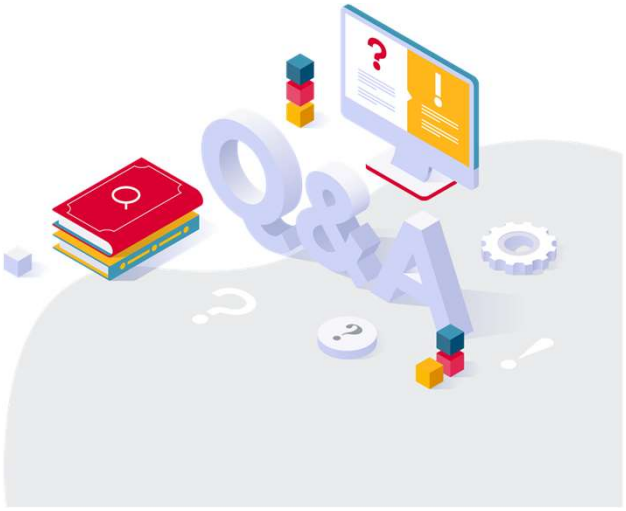
Questions & Answers



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THANK YOU!

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