



Metropolitan Water Reclamation District of Greater Chicago

**WELCOME
TO THE OCTOBER EDITION
OF THE 2019
M&R SEMINAR SERIES**

BEFORE WE BEGIN

- **SAFETY PRECAUTIONS**
 - PLEASE FOLLOW EXIT SIGN IN CASE OF EMERGENCY EVACUATION
 - AUTOMATED EXTERNAL DEFIBRILLATOR (AED) LOCATED OUTSIDE
- **PLEASE SILENCE CELL PHONES OR SMART PHONES**
- **QUESTION AND ANSWER SESSION WILL FOLLOW PRESENTATION**
- **PLEASE FILL EVALUATION FORM**
- **SEMINAR SLIDES WILL BE POSTED ON MWRD WEBSITE**
(<https://mwrdd.org/seminars>)
- **STREAM VIDEO WILL BE AVAILABLE ON MWRD WEBSITE**
(<https://mwrdd.org/seminars> - after authorization for release is arranged)

Paul D. O'Brien, P.E.

- Mr. Paul D. O'Brien is a Principal Civil Engineer with the Metropolitan Water Reclamation District of Greater Chicago. Working in the Plant Design Management section of the Engineering Department, he is project manager for the design and construction of new sludge thickening facilities and the replacement of Imhoff tanks with primary clarifiers at the Stickney Water Reclamation Plant, a 1440 MGD facility located in suburban Chicago. Prior to these projects, he was in the Construction Division, working as a Resident Engineer at the District's three largest plants.
- Paul has been with the District for twenty-five years. He has a Bachelor of Science from Purdue University, and is a member of the Water Environment Federation, the Illinois Water Environment Association, and the American Nuclear Society. He is a licensed Professional Engineer registered in Illinois and Wisconsin.



Let the Water Flow: Startup of the New Aerated Grit Facility and Primary Settling Tanks at MWRDGC's Stickney WRP

Paul O'Brien, PE (MWRDGC)





Agenda

- Overview of Stickney Water Reclamation Plant
- Imhoff Tank Replacement Project
- Demolition and Construction
- Startup
- Startup Challenges
- Conclusion

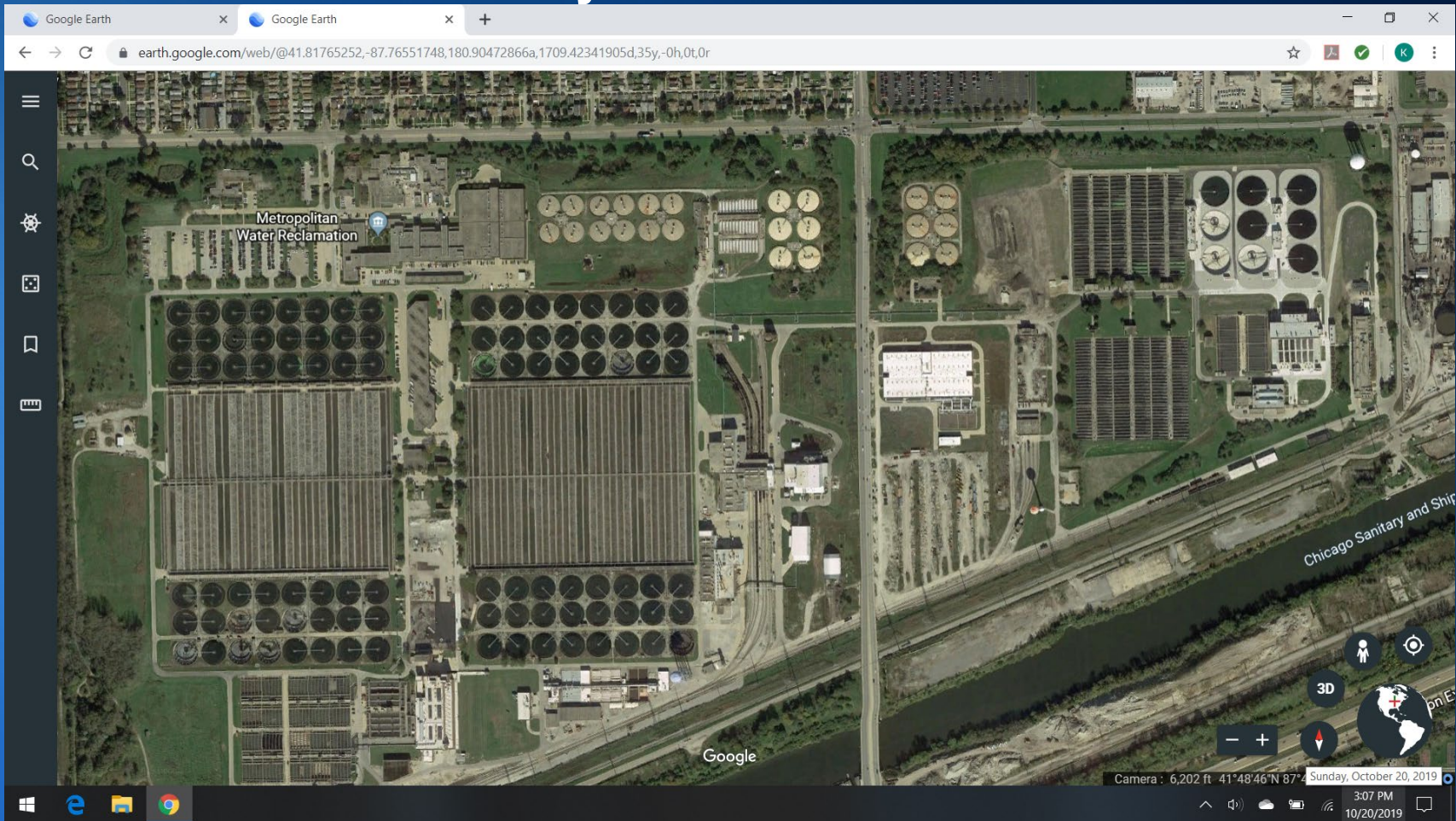


Overview of Stickney WRP

- Stickney WRP
 - 1,440 MGD
 - West Side Plant
 - *Preliminary treatment*
 - *Primary treatment*
 - *Peak capacity of 720 mgd*
 - Southwest Plant
 - *Preliminary, primary, secondary treatment*
 - *Over 1,000 mgd preliminary peak capacity*

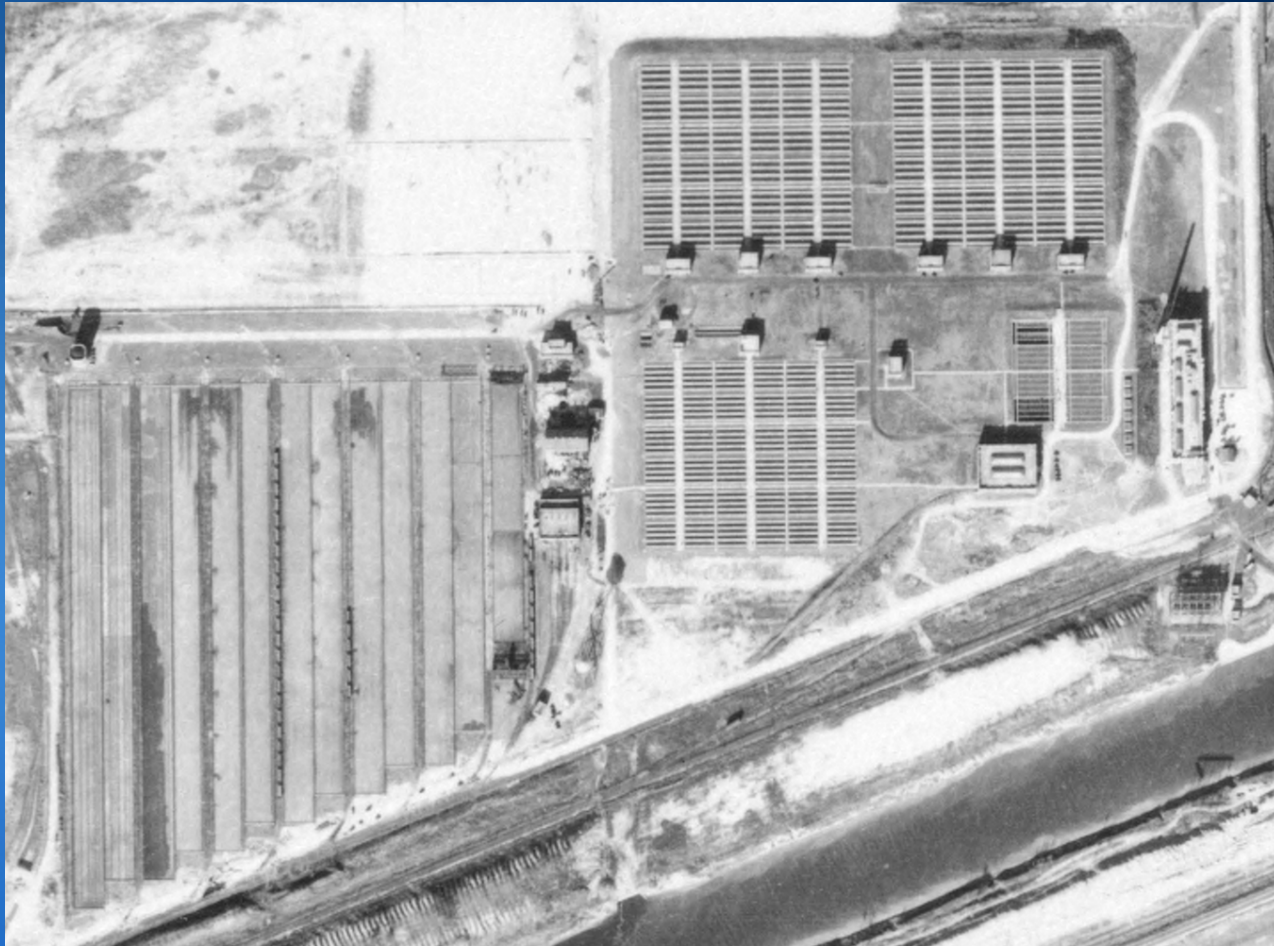


Overview of Stickney WRP





West Side Sewage Treatment Works, 1938



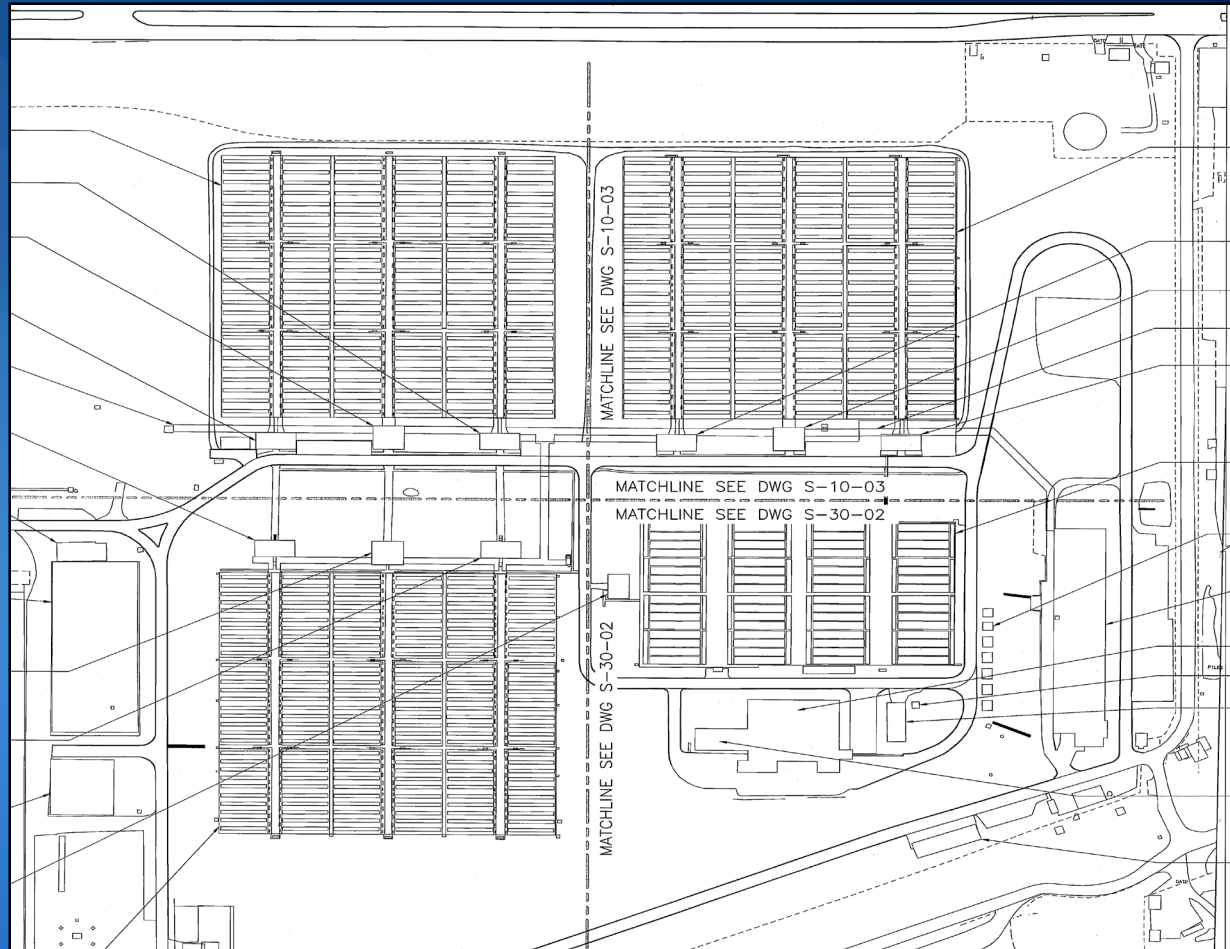


Imhoff Replacement Project

- Imhoff and Skimming Tanks are at the end of useful life
- Insufficient ability to isolate processes leading to shutdowns for normal maintenance
- Green House Gas (CH₄) Emissions from Imhoff Tanks
- Odors from Imhoff Tanks
- Solids are digested within the lower compartment of the Imhoff tanks, so sludge produces minimal methane within the digesters



Westside Plant - 2009





Original Imhoff Replacement Projects

- 4 Projects
 - Phase 1 – Contract 08-171-3P
 - *Work Performed to Isolate Risks*
 - *Demo Imhoff Tanks Battery A*
 - *Site preparation and demo of skimming tanks 1-8*
 - Phase 2 & 3 – Contract 04-128-3P
 - *New Aerated Grit Facility (AGF)*
 - *New Primary Settling Tank's (PST) 1-9*
 - *New TAPS A & B Buildings*
 - *Primary Switchgear Building*
 - Phase 4
 - *Demo Imhoff Tanks Battery B*
 - *New Primary Settling Tank's (PST) 10-18*
 - *New TAPS C Buildings*
- \$41.6M**
- \$224M**
- \$160M**



Hydraulic stress test

480 MGD was determined to be the max we could pass through 8 skimming tanks and 2 Imhoff batteries





Contract 08-171-3P

- Construction Completed 2013
- Work Included:
 - Skimming Tanks 1-8 and Imhoff Battery A demolished
 - Abatement of hazardous material
 - 145,000,000 gal of sludge removal from Battery A
 - Replace Electrical Feeds to Imhoff Batteries B and C
 - Site preparation for future contracts



Contract 08-171-3P



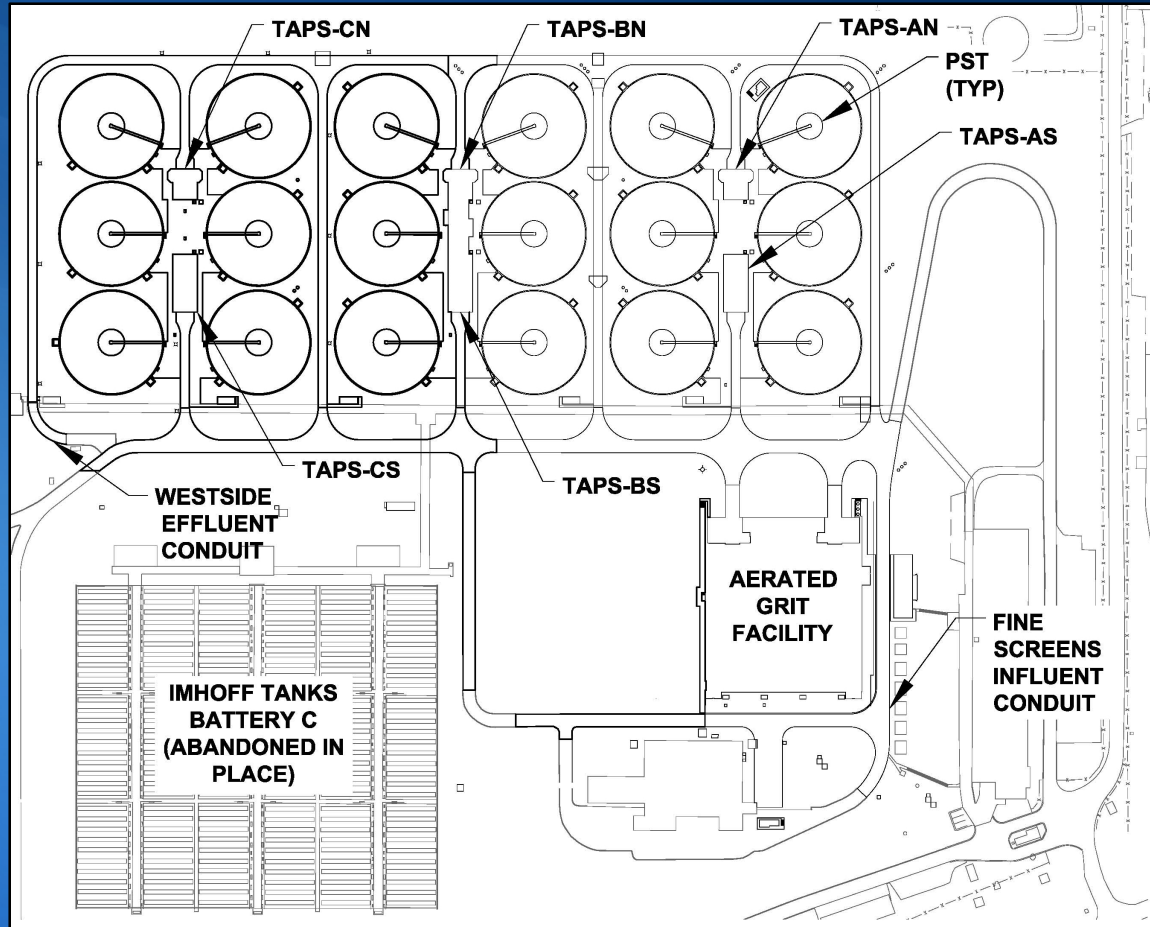


Contract 08-171-3P





WS Plant After Imhoff Replacement Project





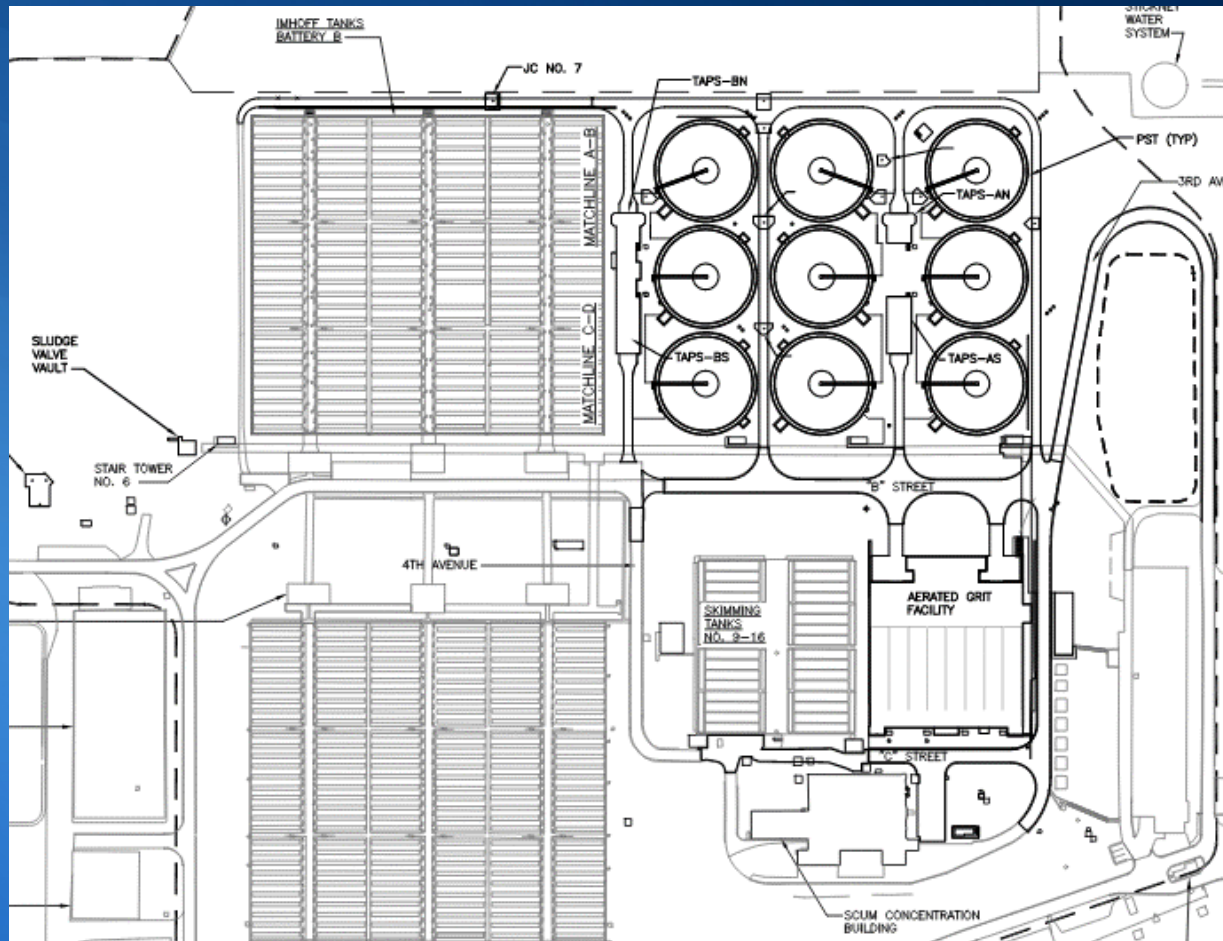
Re-evaluation and Incorporating Lessons Learned.

- Calumet PSTs were started while 08-171-3P was underway
- CWRP AGRT was larger than necessary and maintenance intensive
- Calumet PSTs proved more effective at removing solids than anticipated



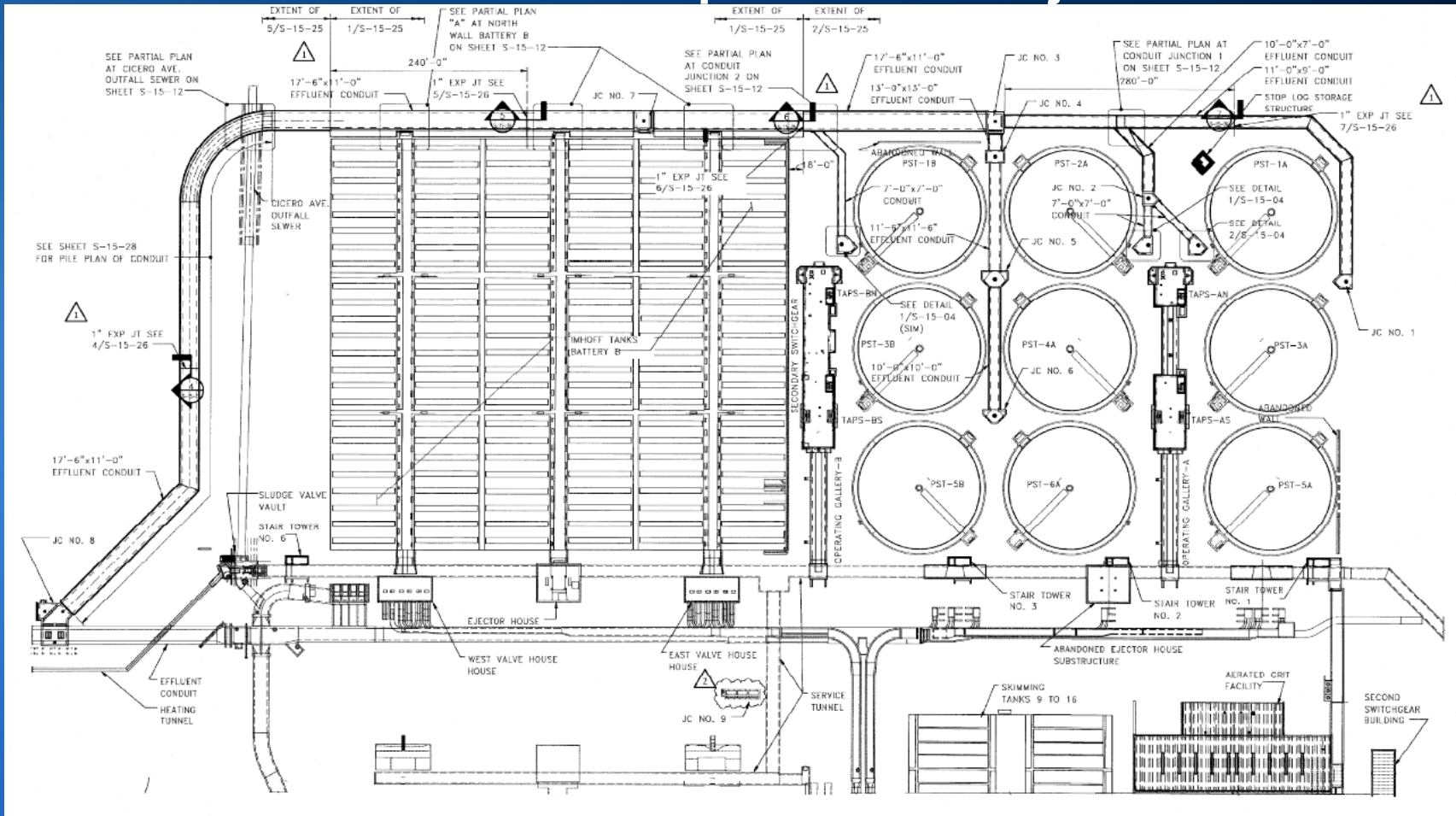


WS Plant After Imhoff Replacement Project



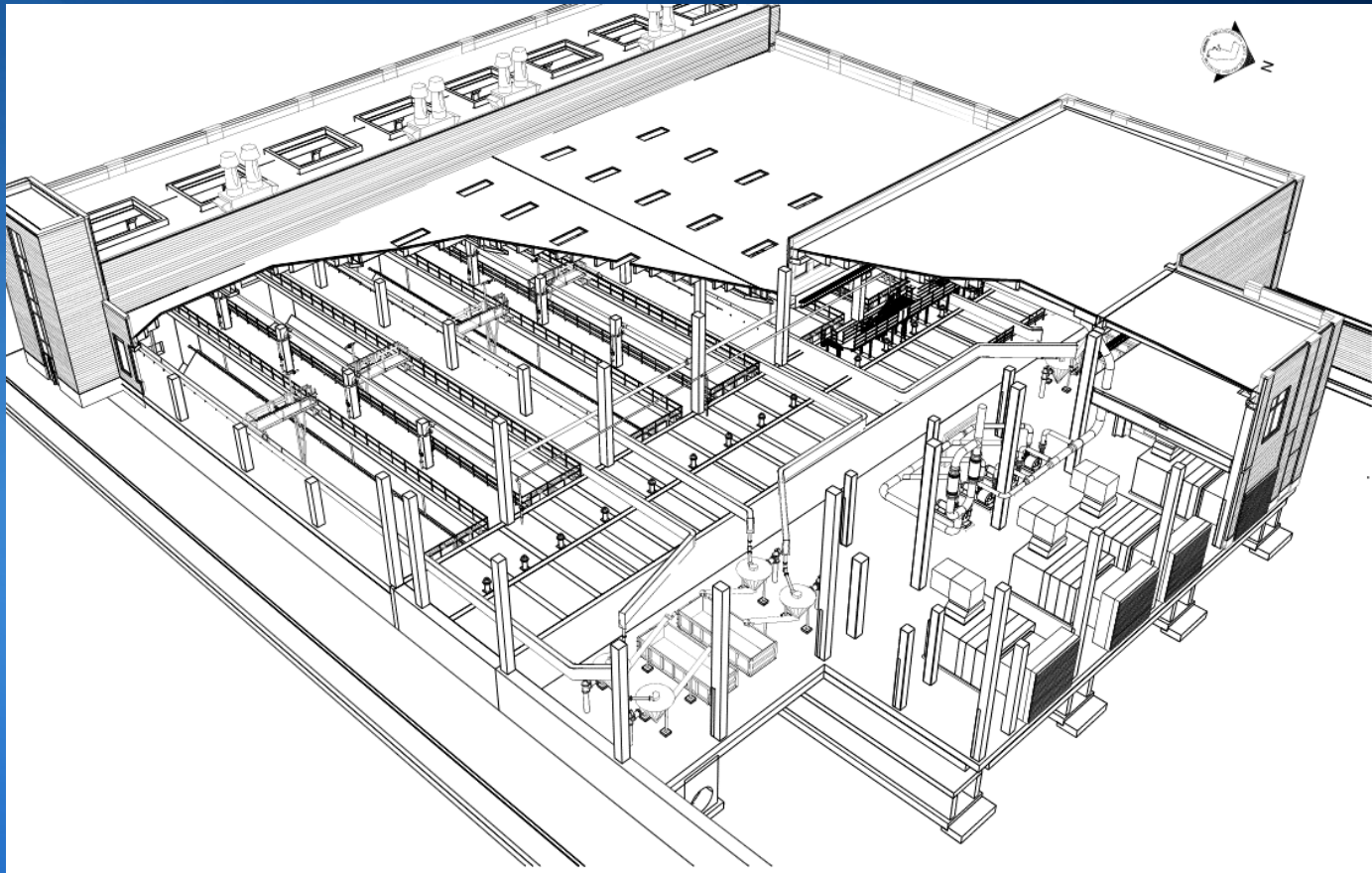


WS Plant After Imhoff Replacement Project



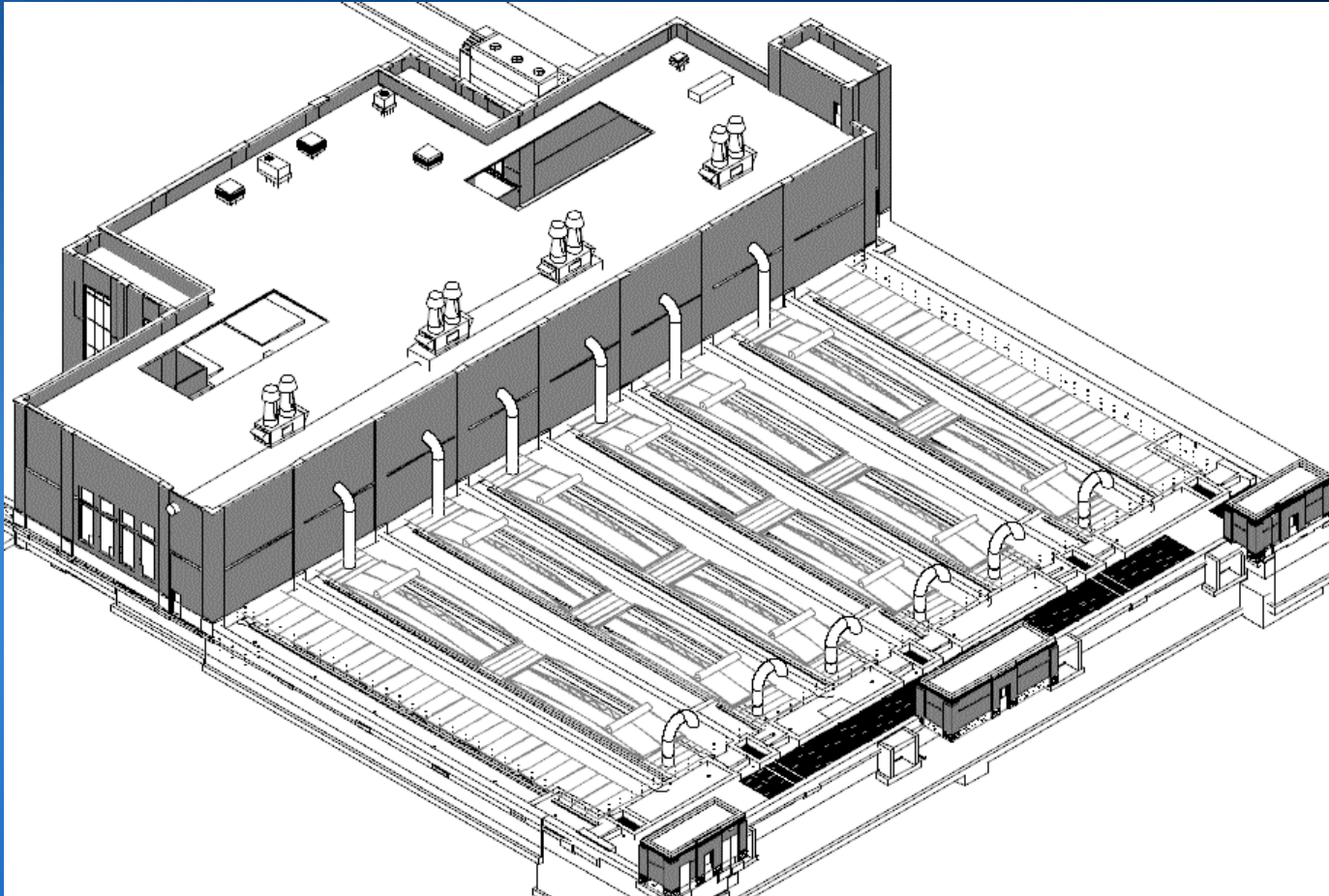


Aerated Grit Facility – Original Design





Contract 04-128-3P – Aerated Grit Facility--As-Built





Contract 04-128-3P

- Aerated Grit Facility
 - 6 Aerated Grit Tanks
- 9 160' Diameter PSTs
 - System for flow to bypass PSTs and send to secondary process
- Tunnel Access Pump Stations (TAPS) A and B
- Odor control system for AGF and PSTs



Contract 04-128-3P

- Project Bid
 - Summer 2014
 - \$224 million
 - 1200 calendar days to construct
- Construction
 - Notice to Proceed – December 2014
 - Startup – November 2018



Contract 04-128-3P Construction - AGF





Contract 04-128-3P Construction - AGF





Contract 04-128-3P Construction - PST





Contract 04-128-3P Construction - PST





Contract 04-128-3P Construction - PST





Contract 04-128-3P Construction – Effluent Conduits





Contract 04-128-3P Construction - AGF





Contract 04-128-3P Construction - AGF





Contract 04-128-3P Construction - PST





Contract 04-128-3P Construction - PST



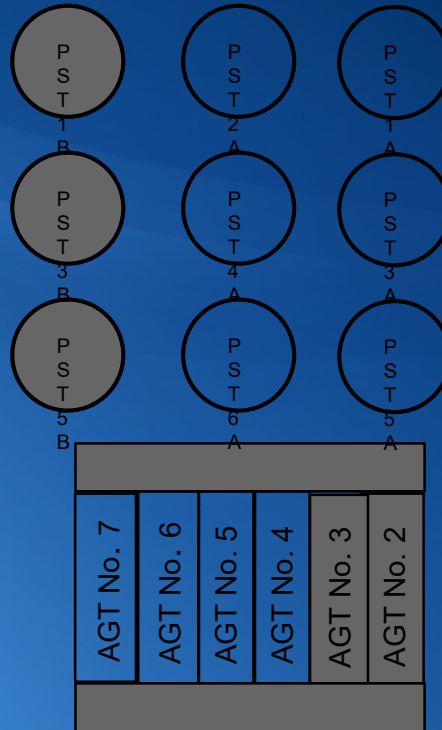


Contract 04-128-3P Startup

- Coordination and planning between departments at MWRDGC and contractor
- Start up at one third of its maximum design capacity
- Limit the flow to give MWRDGC staff time to:
 - Adapt and gain experience to new facilities and equipment
 - Make necessary adjustments prior to full flow going through the new Project
 - Allow sufficient time for the other processes at Stickney to adjust, specifically anaerobic digesters

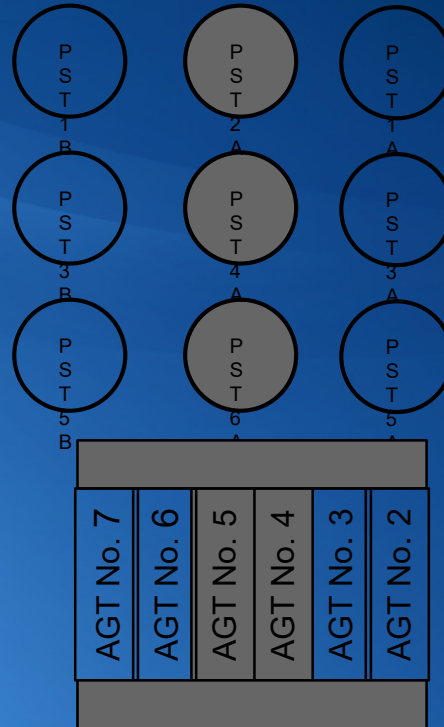


Contract 04-128-3P Startup



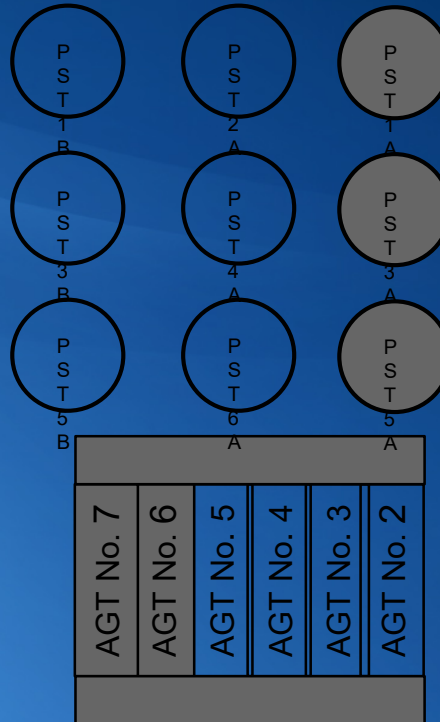


Contract 04-128-3P Startup





Contract 04-128-3P Startup





Contract 04-128-3P Startup





Contract 04-128-3P Startup



Start of 7-day startup test and 60-day performance test

Official Startup - November 27, 2018



Contract 04-128-3P Startup Challenges





Sludge Vent Containment Structure



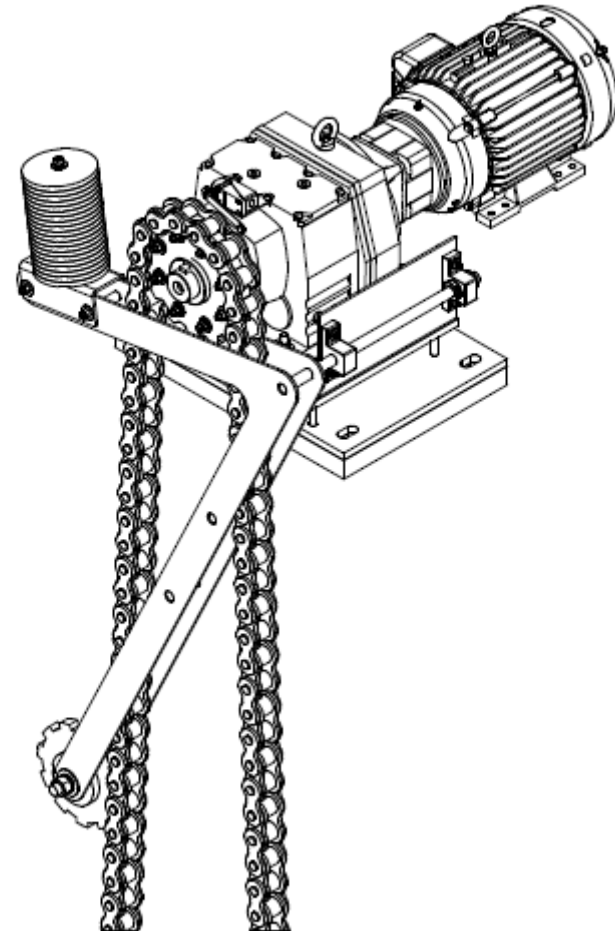


Contract 04-128-3P Startup Challenges



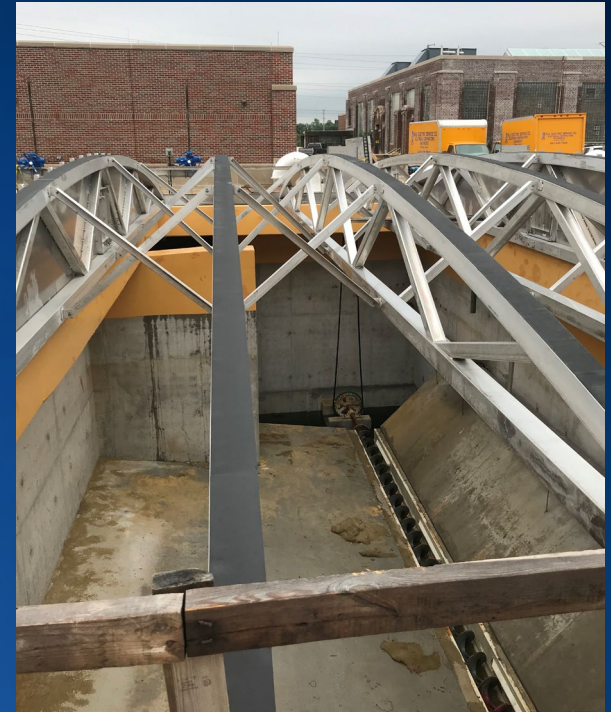


Chain must be kept in tension



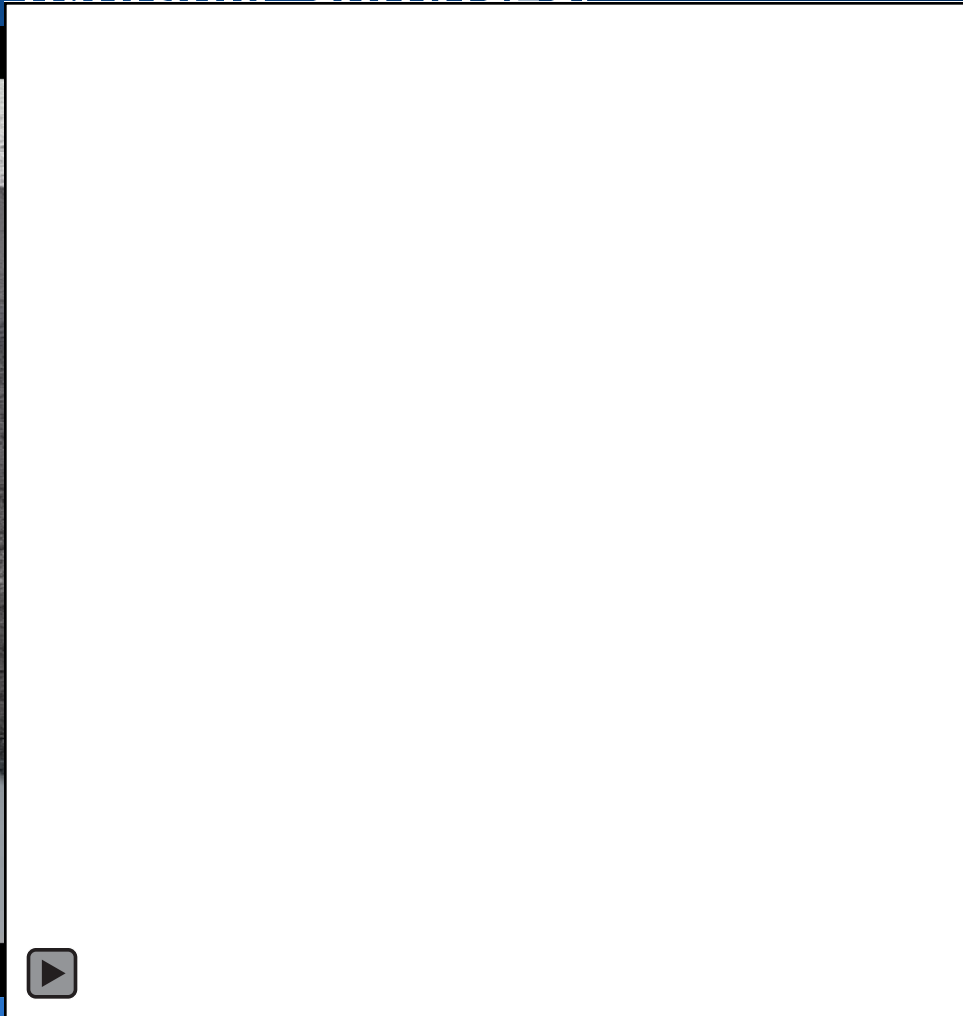


Contract 04-128-3P Startup Challenges





Watch for hydraulic surprises!





**Water is not compressible.
Air is.**



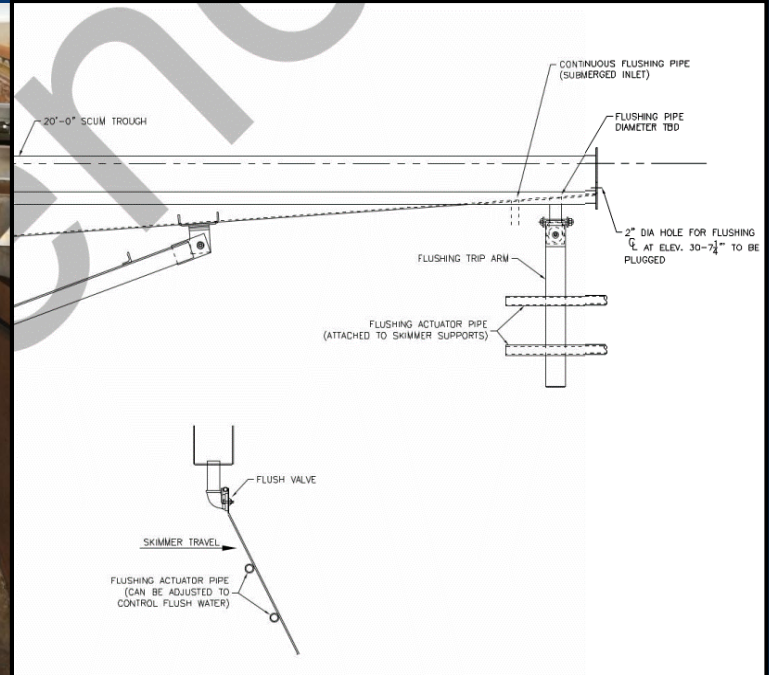


Contract 04-128-3P Startup Challenges





Contract 04-128-3P Startup Challenges





Other Problems





Other Lessons Learned

- Provide more flushing valves for lines prone to clogging. Locate valves in accessible areas
- Provide more sampling locations for sludge and primary effluent
- Coordinate bridge location with scum beach
- Increase slope of gravity scum lines
- DCS monitoring of current draw for grit screws and tank drives



Conclusion

- Coordination and planning required
- Make necessary adjustments and gain experience prior to full flow going through the new Project
- Allow sufficient time for the other processes at Stickney to adjust, specifically anaerobic digesters



Thank you!

- Thanks also to:
- Ryan Christopher and the design team at Greeley & Hansen
- Beth Zerfas and Greg Florek and their staff in the Construction Division