Metropolitan District

From Construction to Operation: Commissioning the MDC's South Hartford Conveyance & Storage Tunnel

CWWA – CTAWWA Fall Conference

November 5, 2026







ARCADIS

Speakers



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The Metropolitan District

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Arcadis U.S., Inc.

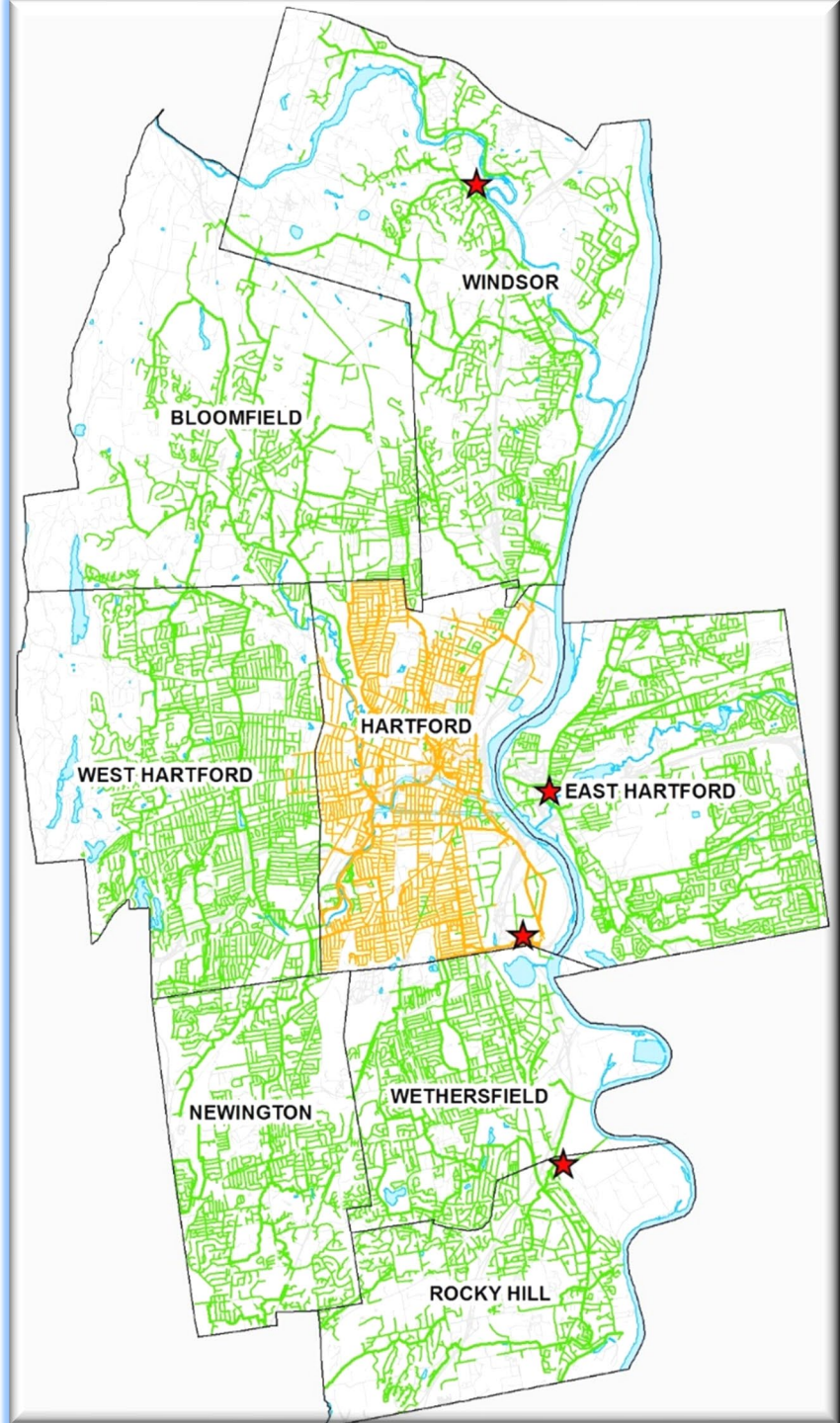
Agenda

- Background | Susan
- Tunnel Pump Station Site | Greg
- Commissioning | Greg
  - Operations Engagement
  - Equipment & System Testing
  - Safety & Training Documentation
  - Digital Efficiency Tools
  - Maintenance Readiness
- Implementation Schedule | Greg
- Key Takeaways & Q&A | Greg & Susan



Background on MDC

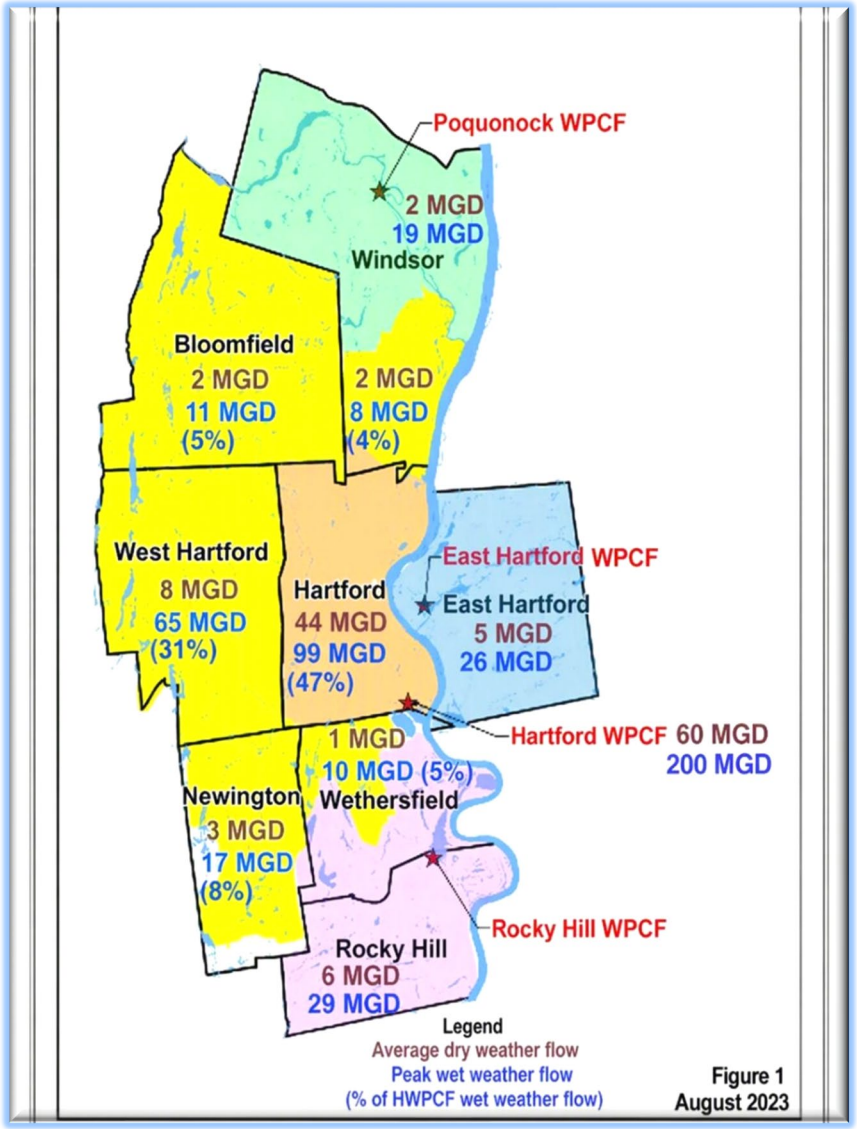
- Nonprofit municipal corporation chartered in 1929
- Water System
  - 39.8 billion gallon surface reservoir water supply
  - Produce approximately 45-50 MGD
  - 3 Water Treatment facilities
  - 1,500 miles of water mains in distribution system
- Wastewater System
  - 4 water pollution control facilities (WPCFs)
  - 1,200 miles of sewers: 1,013 separate (green), 187 combined (orange) in Hartford and part of West Hartford



Impacts on the Hartford Sewer System from Member Towns

- Wet weather events contribute a significant amount of flow to the MDC's sewer collection system – which includes the 8 Member Towns.

- This increase in stormwater combined with wastewater can overwhelm the MDC's Water Pollution Control Facility. Previously, this caused over 1 billion gallons of combined untreated sewage and stormwater to overflow into the CT River and other tributaries.



The Clean Water Project (CWP)

Clean Water Project
the choice is clear

The CWP is the MDC's Response to:

1. Consent Order from CT DEEP to address combined sewer overflows
2. Consent Decree from EPA to address sanitary sewer overflows



Project Goals:

- Reduce Combined Sewer Overflows (CSOs) to streams / rivers
- Eliminate CSO outfalls to Wethersfield Cove & North Branch Park River
- Reduce Nitrogen discharged to CT River
- Address Sanitary Sewer Overflows (SSOs) outside of Hartford

Five Components of CWP:

Inflow & Infiltration | Sewer Separation | Interceptor Pipes | Storage Tunnels | Treatment Plant Improvements

CSO Long Term Control Plan/ Integrated Plan (CSO LTCP/IP)

In 2018, District submitted 2018 CSO LTCP/IP

- Superseded prior updates in 2007 and 2012

Allowed District to meet Consent Decree/Consent Order requirements (including control of CSOs/SSOs), while also renewing aging sewer system

- 400 miles (33% of system) of sewer main rehab over 40-yr, ~$400M
- Focus on existing sewers, some new tunnels/conveyance
- Maintain affordability = spread work over 40-yrs

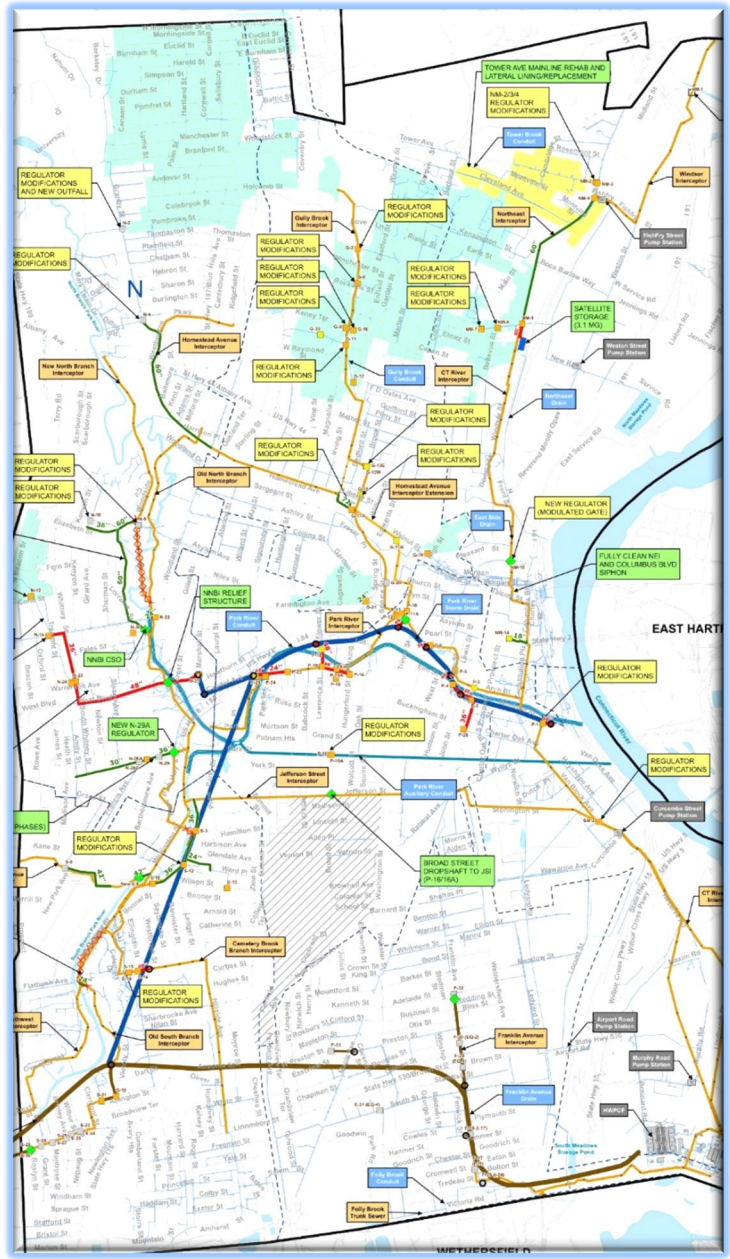
CSO LTCP/IP approved in late 2022, phase 1 to end by 2029

However: multiple significant storms (including >200-yr ARI) occurred 2021 to 2023; public concerns (North Hartford)

MDC, CT. Department of Energy and Environmental Protection (CTDEEP), & EPA revised CSO LTCP/IP in 2023

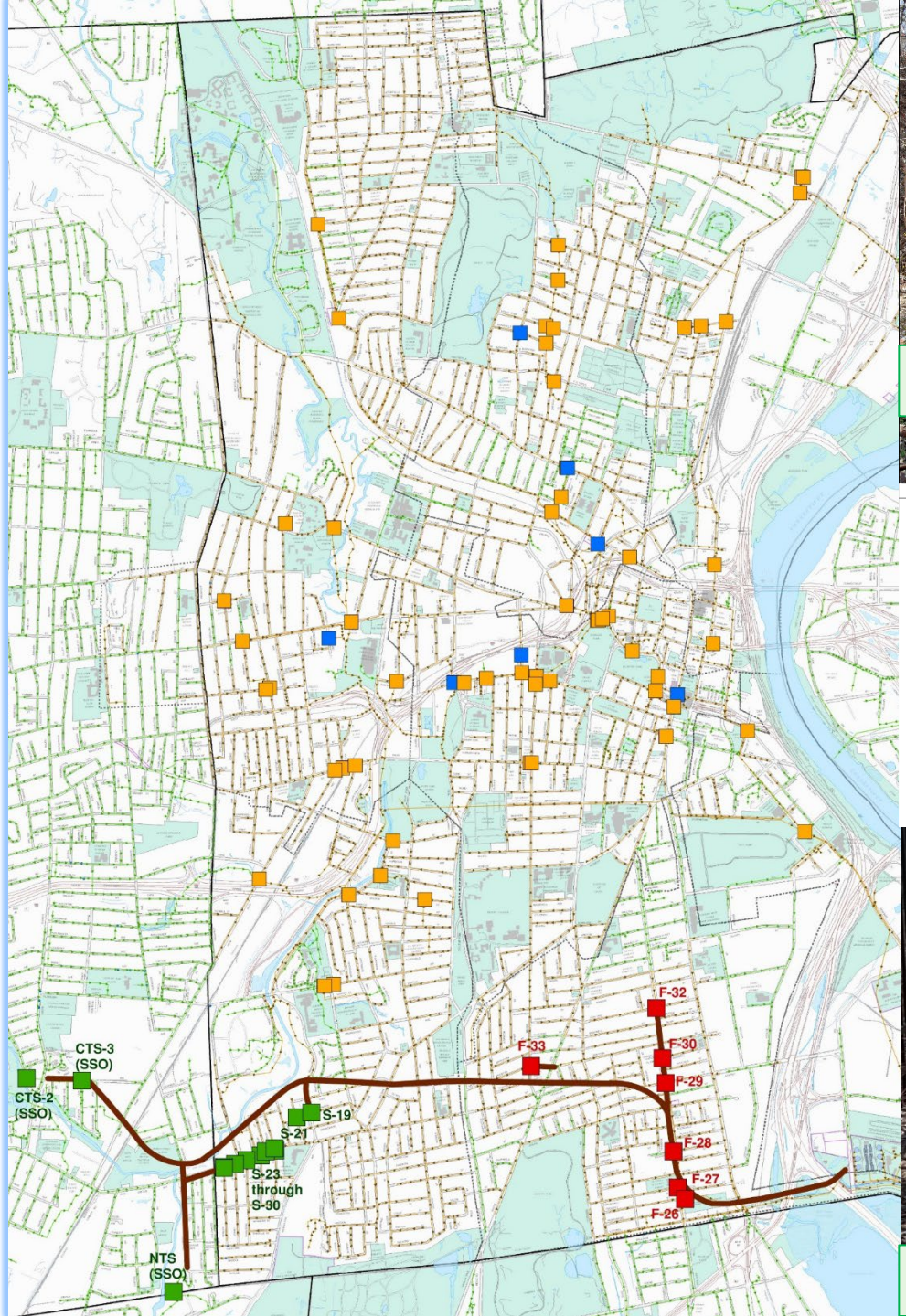
- More focus on accelerated separation, surcharge protection/internal plumbing improvements, and full lateral rehabilitation

Goal: still reduce CSOs and increase benefit to the community

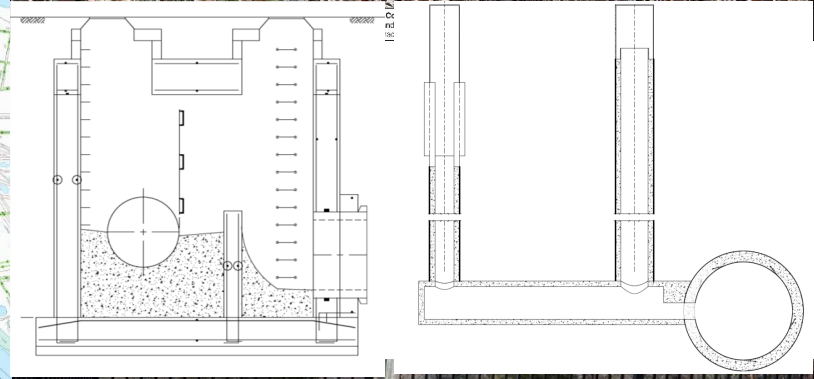


MDC CSO & SSO Level of Control Status

- SSO/CSO Regulator Connected to SHCST (13)
- Contract 4 CSO Regulator (7)
- Other Active CSO Regulator (<1-yr LOC) (59)
- Other Active CSO Regulator (1-yr LOC or greater) (7)



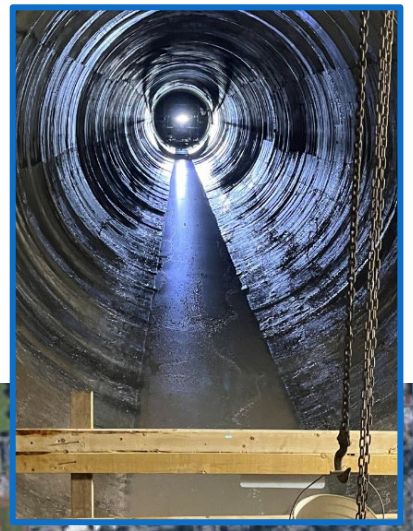

NTS (SSO)




CTS-3 (SSO)



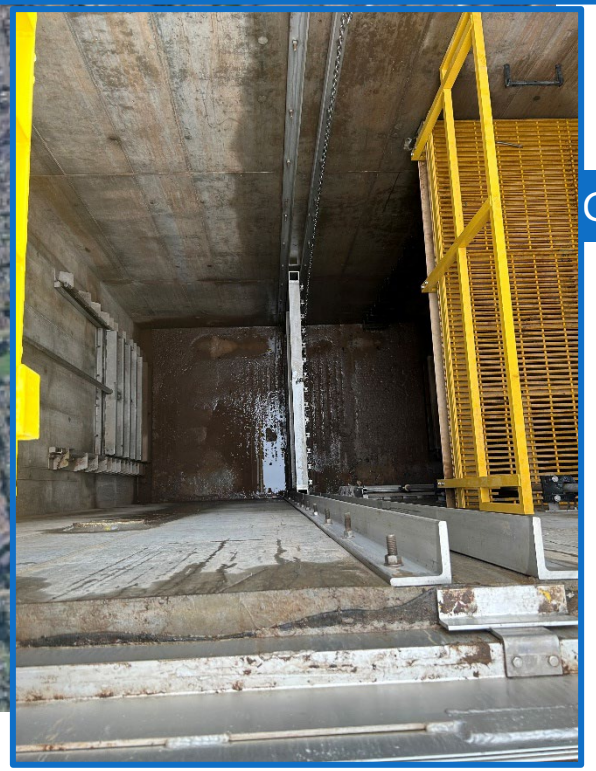
1.4 MG
00 LF)
ameter
deep



Tunnel System

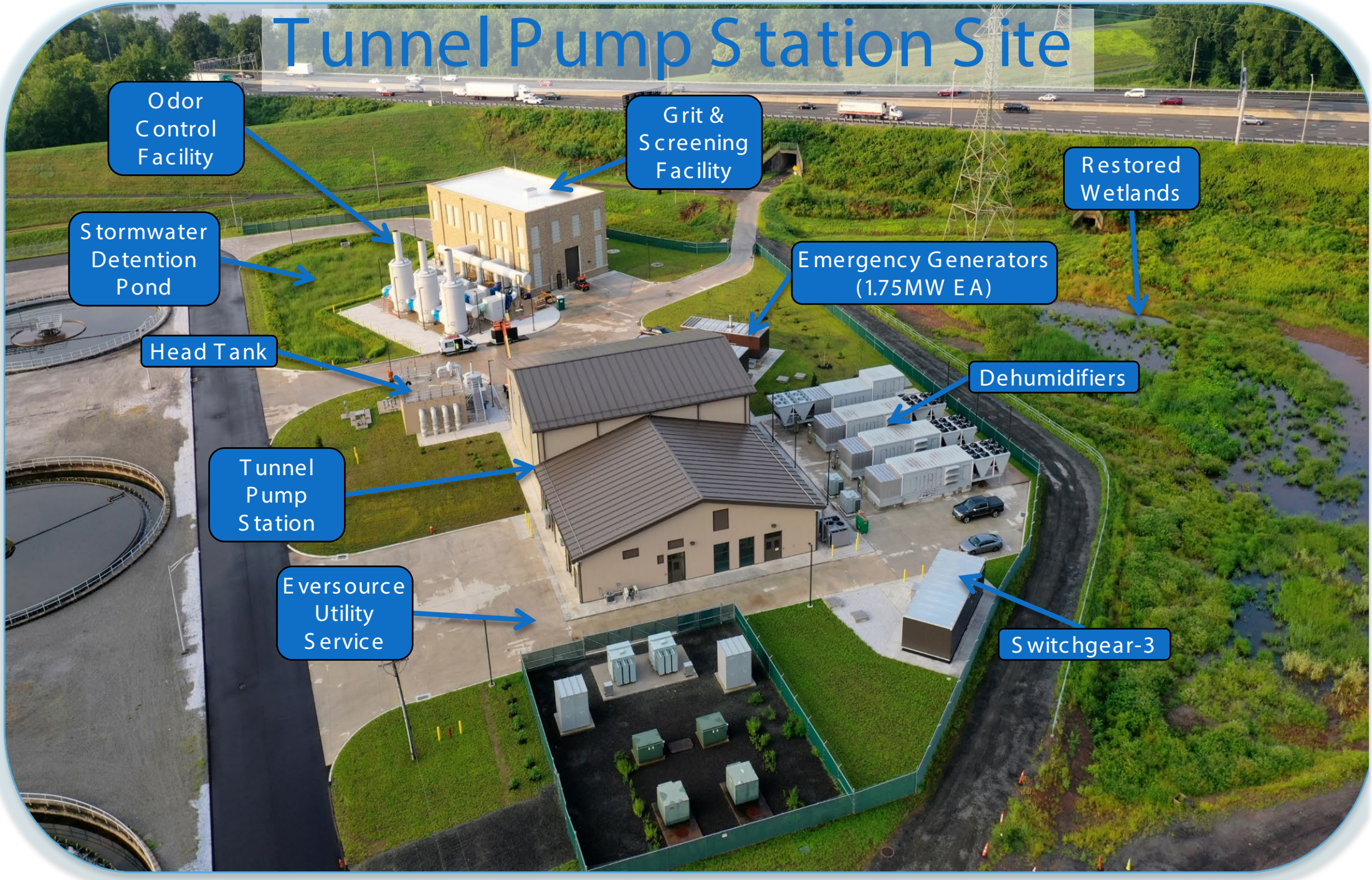




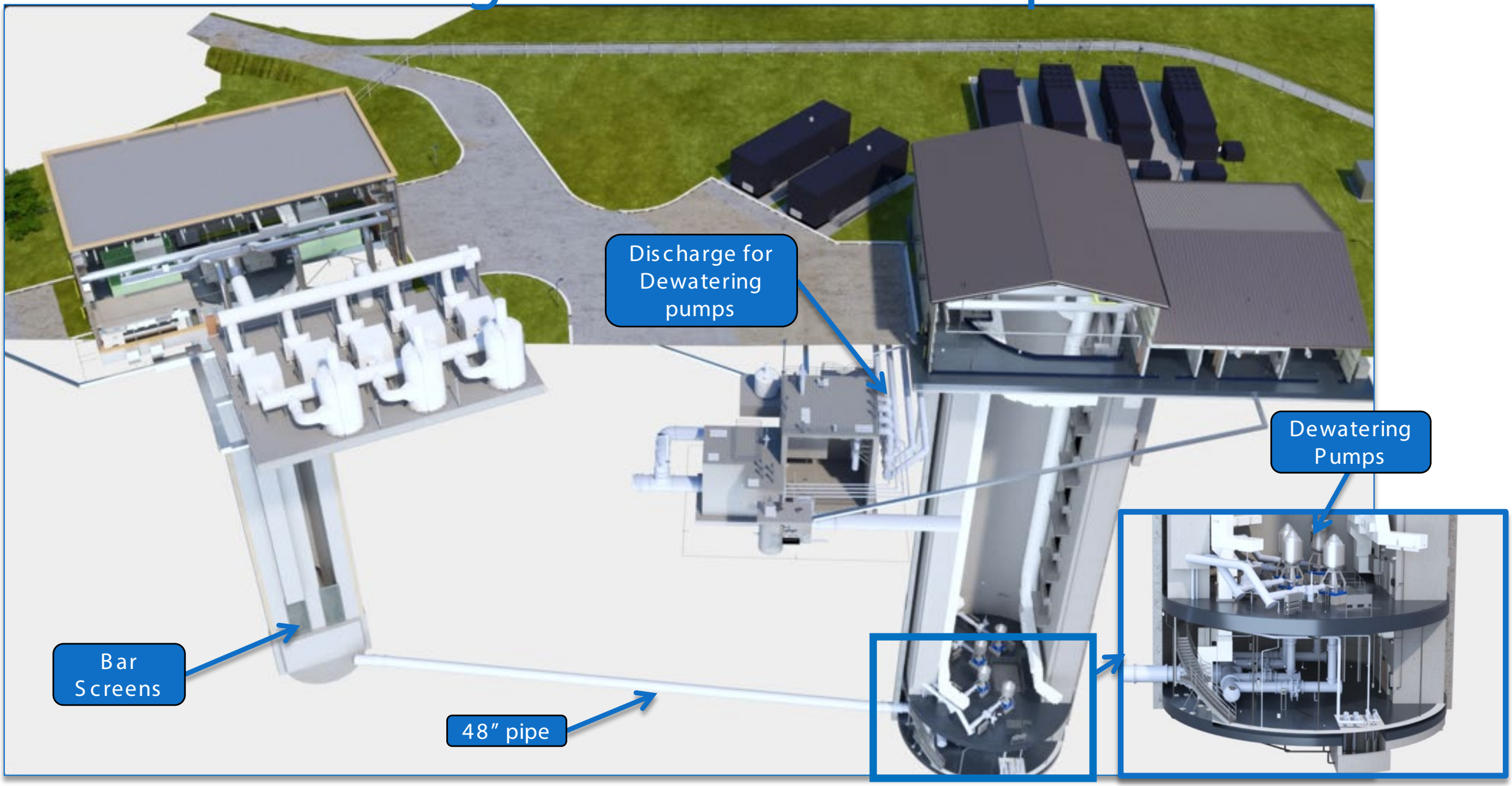


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Tunnel Pump Station Site



Grit/Screening and Tunnel Pump Station



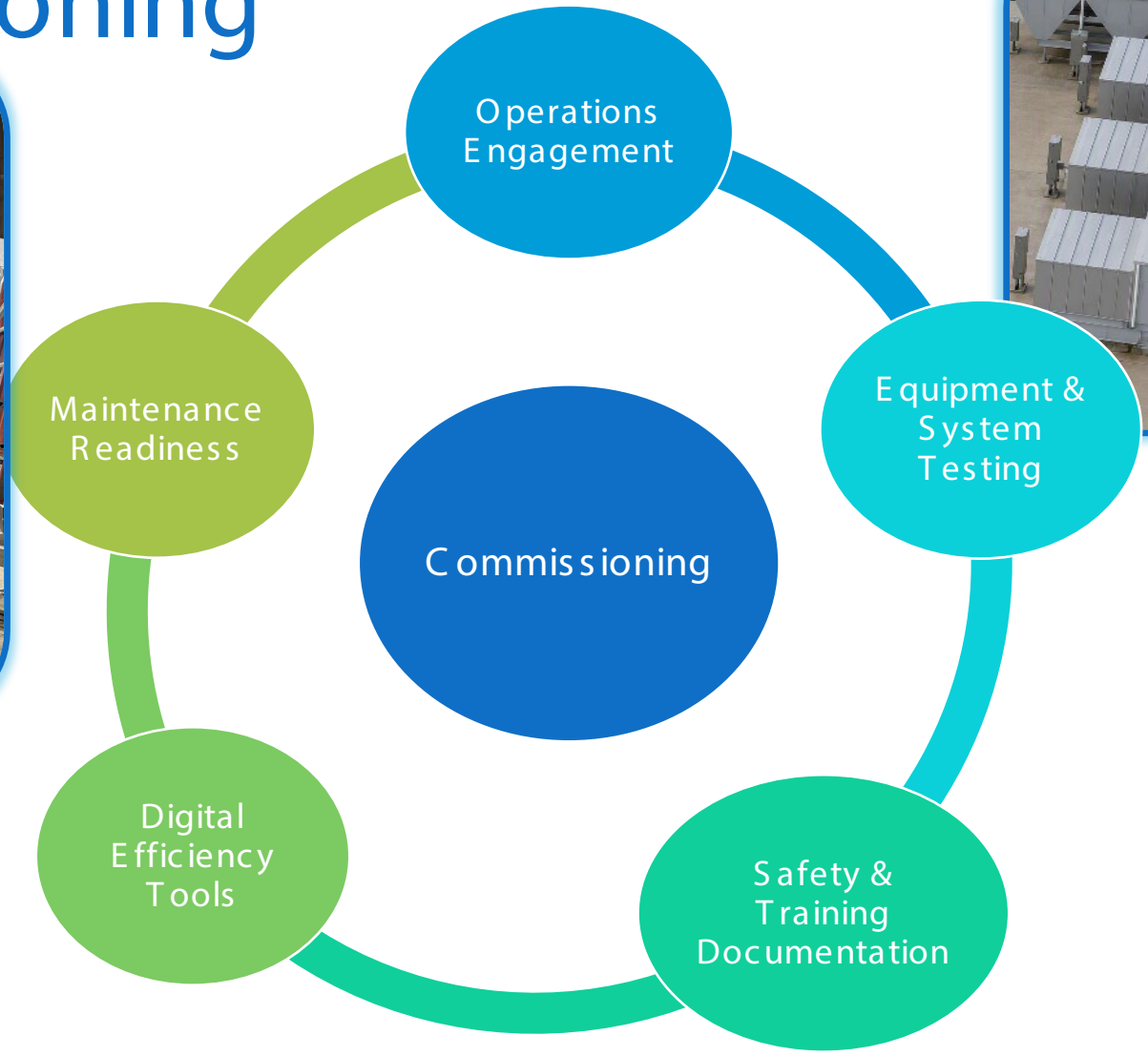
Commissioning







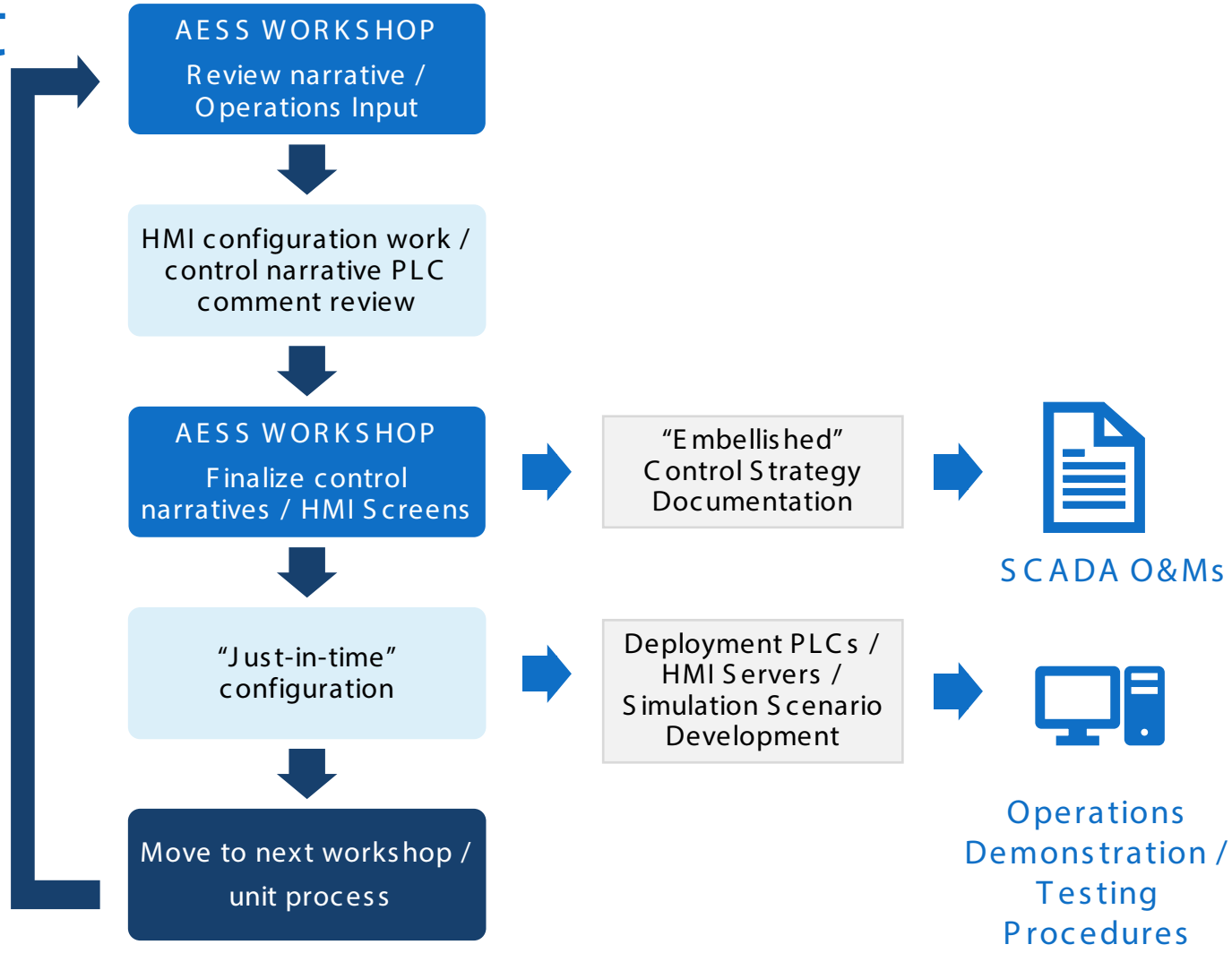




Successful Commissioning begins with operations engagement during design and continues during Construction and Configuration, culminating in Startup.

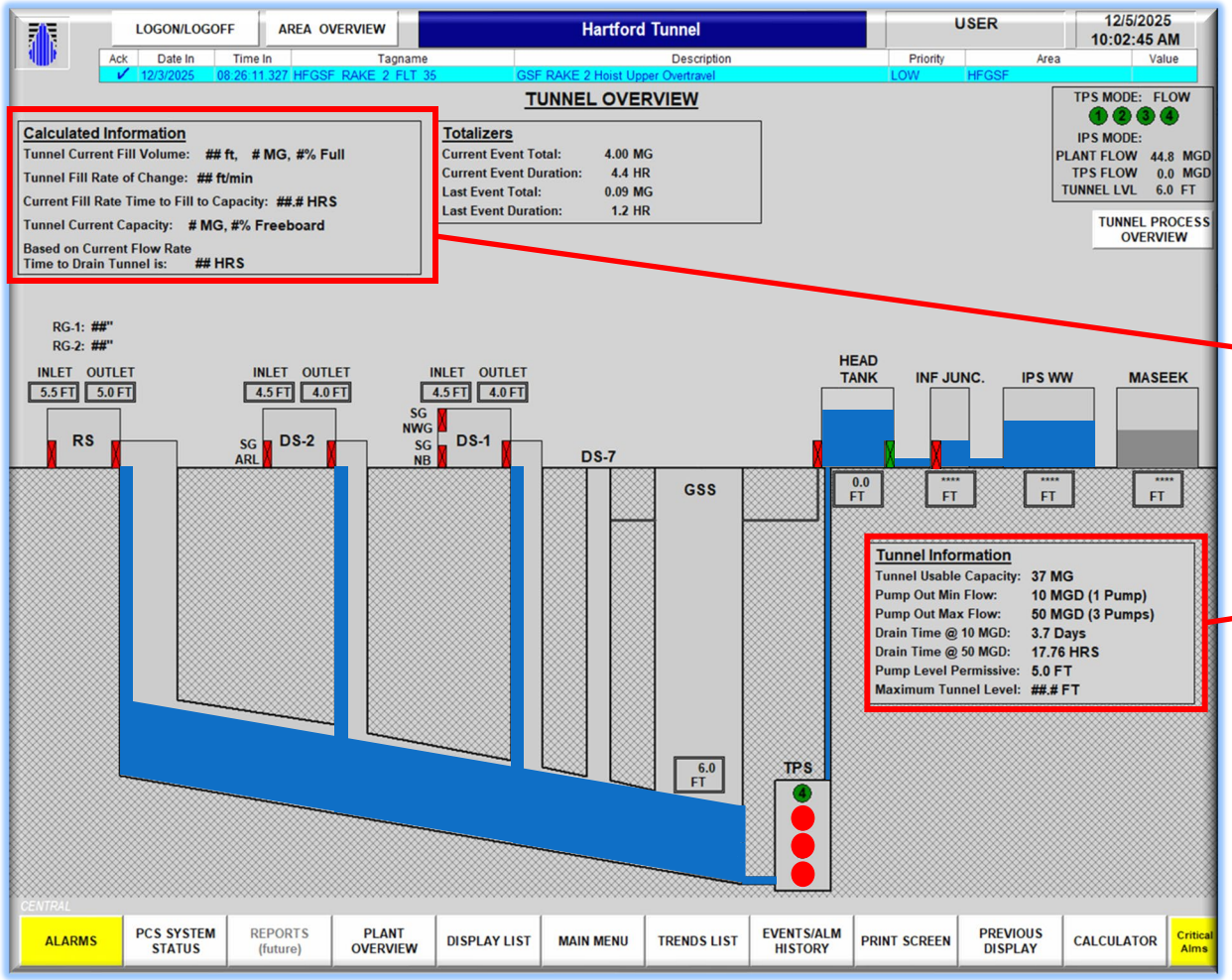
Operations Engagement

- Bi-monthly operations workshops (AESS)
  - Process Control / Operation Strategies
  - Alarm Management / Rationalization
  - Navigation
  - Trending / Historian
  - Information Management System
- HMI Development
- Control Strategy Development
- SCADA Simulation Demonstrations



Engagement early and often with MDC Operations drove understanding and planning for startup needs.

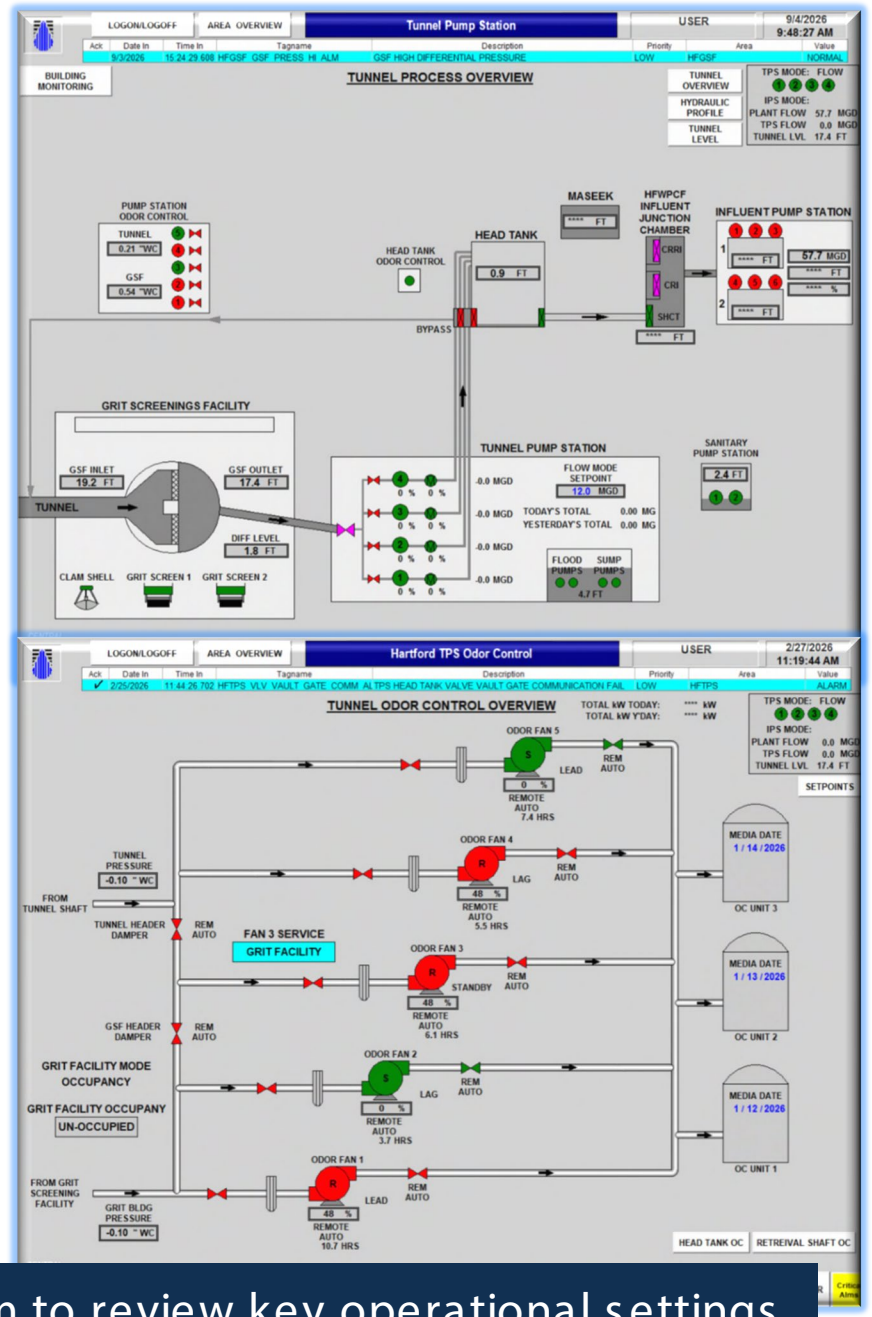
Operations Data for Tunnel System



Calculated Information	
Tunnel Current Fill Volume	## ft, # MG, #%Full
Tunnel Fill Rate of Change	## ft/min
Current Fill Rate Time to Fill to Capacity	##.# HRS
Tunnel Current Capacity	# MG, #% Freeboard
Based on Current Flow Rate Time to Drain Tunnel is:	## HRS

SCADA Simulation

- Live simulator HMI developed by team/integrator and used to simulate all field I/O and strategy conditions
- Stepped through flow events
  - All modes of control simulated
  - Demonstrations for the Grit and Screening Facility and the Tunnel Pump Station
- Operator Input / active review
  - Initial operator settings inputted into SCADA O&M (setpoints, alarm limits, etc.)
  - Early "offline" deployment of new project SCADA Screens reviewed by all shift operators for familiarity



Initializing and stepping through simulated scenarios forced the team to review key operational settings, paving the way for these to be included in draft System O&M development.

Testing

Preliminary Testing

- Manufacturer Checkout of Equipment
- Equipment Basic Functions
- Singular Pieces of Equipment

Final Testing

- Systems Testing
- All Modes of Operation Tested
- Functional Demonstration Testing

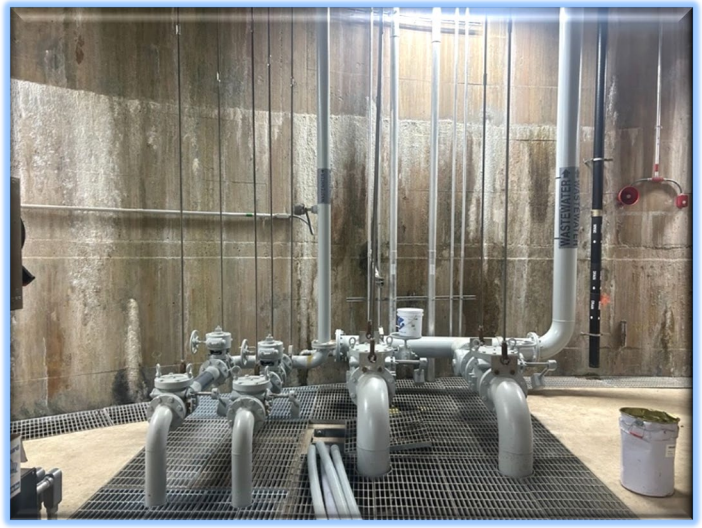
Performance Testing

- Long Duration Operation of Equipment & Systems
- Verification Systems Meet Design

→ Operational Demonstration



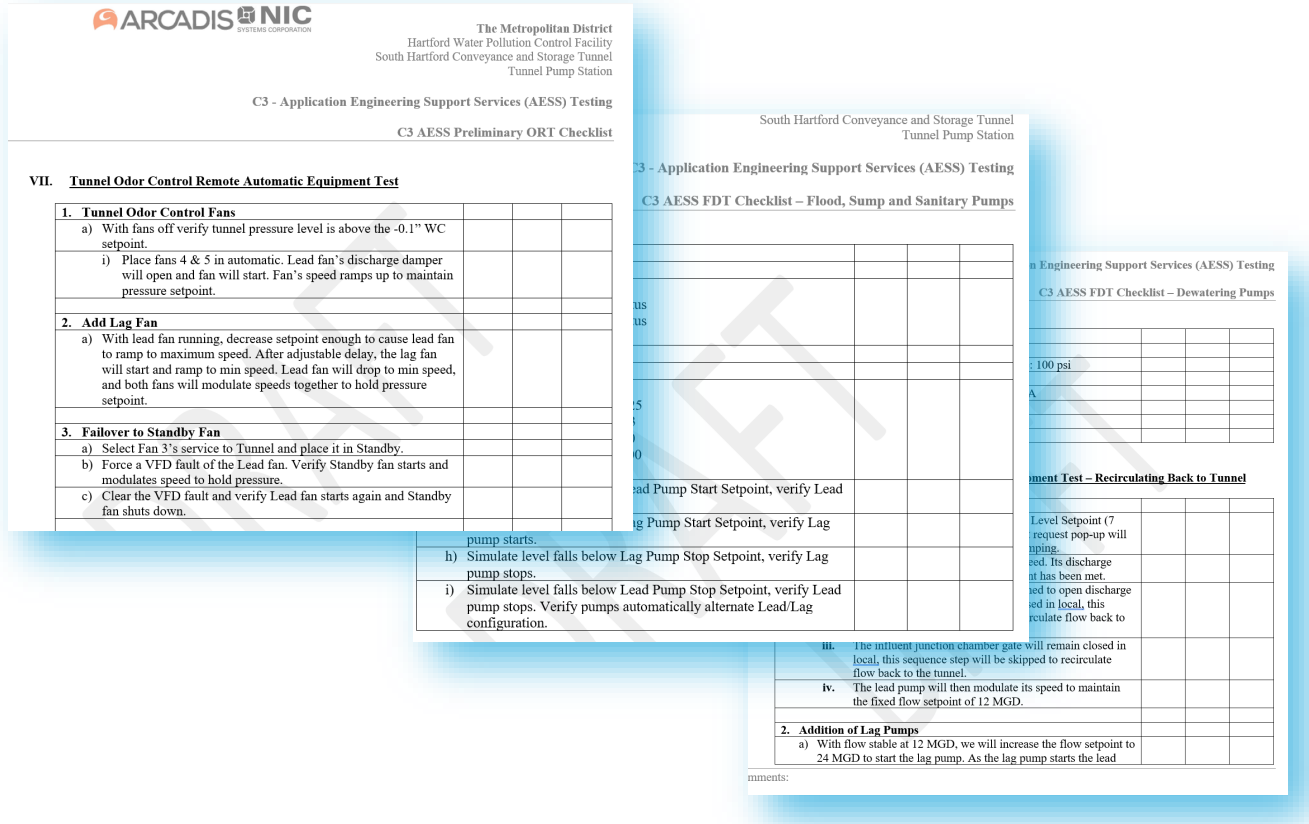






Functional Demonstration Testing

- Functional Demonstration Testing verifies that installed equipment operates as an integrated system, not just as individual components.
- The process bridges construction completion and operational acceptance.
- Testing is performed collaboratively with operations staff to build confidence and familiarity before startup



ARCADIS NIC SYSTEMS CORPORATION

The Metropolitan District
Hartford Water Pollution Control Facility
South Hartford Conveyance and Storage Tunnel
Tunnel Pump Station

C3 - Application Engineering Support Services (AESS) Testing

C3 AESS Preliminary ORT Checklist

VII. Tunnel Odor Control Remote Automatic Equipment Test

1. Tunnel Odor Control Fans			
a) With fans off verify tunnel pressure level is above the -0.1" WC setpoint.			
i) Place fans 4 & 5 in automatic. Lead fan's discharge damper will open and fan will start. Fan's speed ramps up to maintain pressure setpoint.			
2. Add Lag Fan			
a) With lead fan running, decrease setpoint enough to cause lead fan to ramp to maximum speed. After adjustable delay, the lag fan will start and ramp to min speed. Lead fan will drop to min speed, and both fans will modulate speeds together to hold pressure setpoint.			
3. Failover to Standby Fan			
a) Select Fan 3's service to Tunnel and place it in Standby.			
b) Force a VFD fault of the Lead fan. Verify Standby fan starts and modulates speed to hold pressure.			
c) Clear the VFD fault and verify Lead fan starts again and Standby fan shuts down.			

South Hartford Conveyance and Storage Tunnel
Tunnel Pump Station

C3 - Application Engineering Support Services (AESS) Testing

C3 AESS FDT Checklist – Flood, Sump and Sanitary Pumps

ead Pump Start Setpoint, verify Lead			
g Pump Start Setpoint, verify Lag pump starts.			
h) Simulate level falls below Lag Pump Stop Setpoint, verify Lag pump stops.			
i) Simulate level falls below Lead Pump Stop Setpoint, verify Lead pump stops. Verify pumps automatically alternate Lead/Lag configuration.			

n Engineering Support Services (AESS) Testing

C3 AESS FDT Checklist – Dewatering Pumps

: 100 psi

ment Test – Recirculating Back to Tunnel

Level Setpoint (7 request pop-up will mping.			
ed. Its discharge nt has been met.			
ed to open discharge ed in local, this rculate flow back to			
iii. The influent junction chamber gate will remain closed in local, this sequence step will be skipped to recirculate flow back to the tunnel.			
iv. The lead pump will then modulate its speed to maintain the fixed flow setpoint of 12 MGD.			
2. Addition of Lag Pumps			
a) With flow stable at 12 MGD, we will increase the flow setpoint to 24 MGD to start the lag pump. As the lag pump starts the lead			

mments:

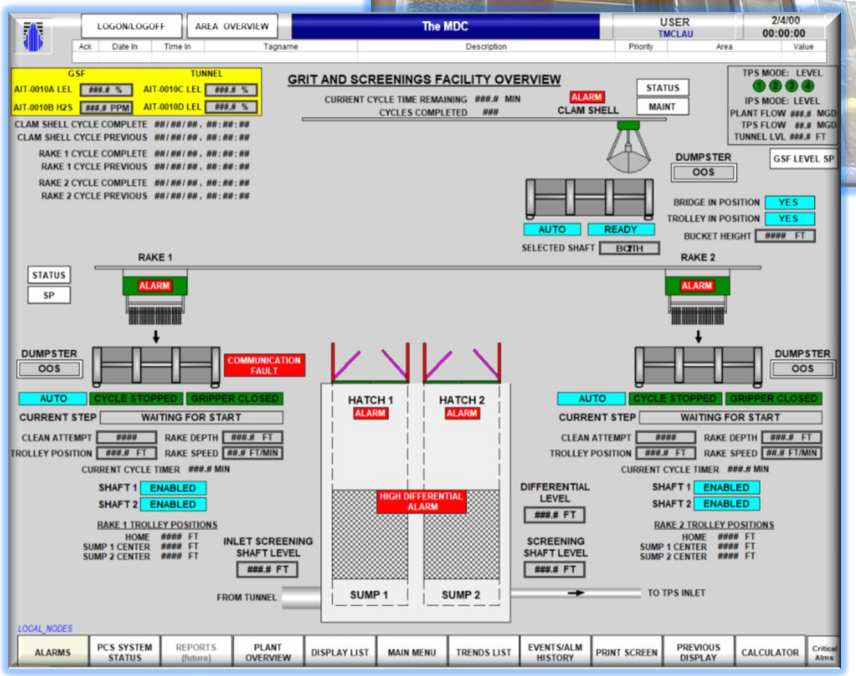
DRAFT

Commission the system, not just the equipment.

Grit & Screenings Removal

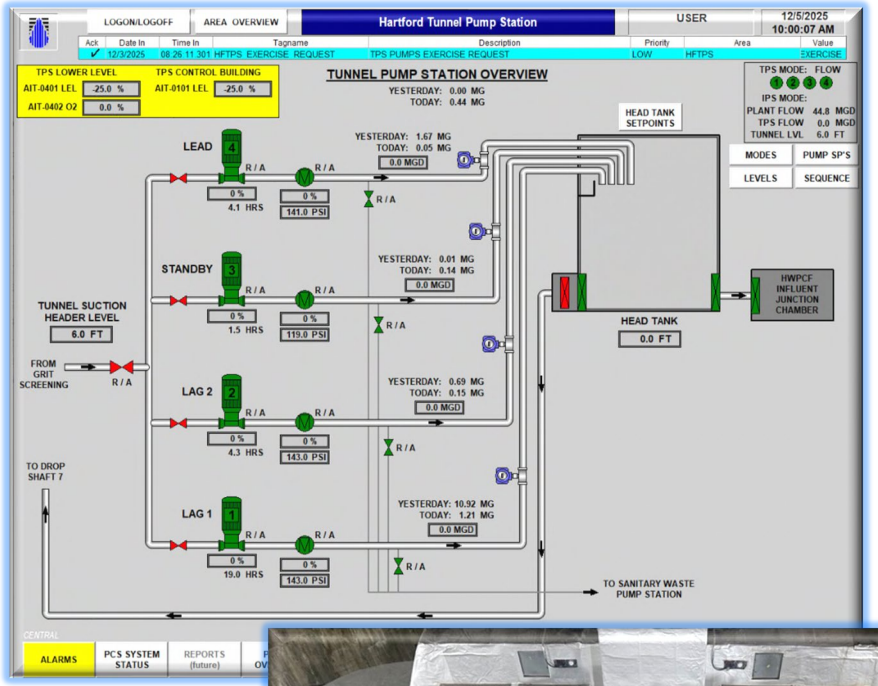
- Grit Removal Bridge Crane & Clamshell
  - Introduce & Remove Grit with Clamshell
  - Operator Initiated Automatic Operation
  - Verify Repeatability of Operation
  - Limit Settings for Bridge Crane & Clamshell Input
- Coarse Screenings & Bosker Rakes
  - Introduce & Remove Coarse Screenings
  - Test Rakes at Multiple Tunnel Elevations
  - Cyclic Multi-Hour Operation
  - Verify Repeatability of Operation





4 Dewatering Pumps – 16.7 MGD each

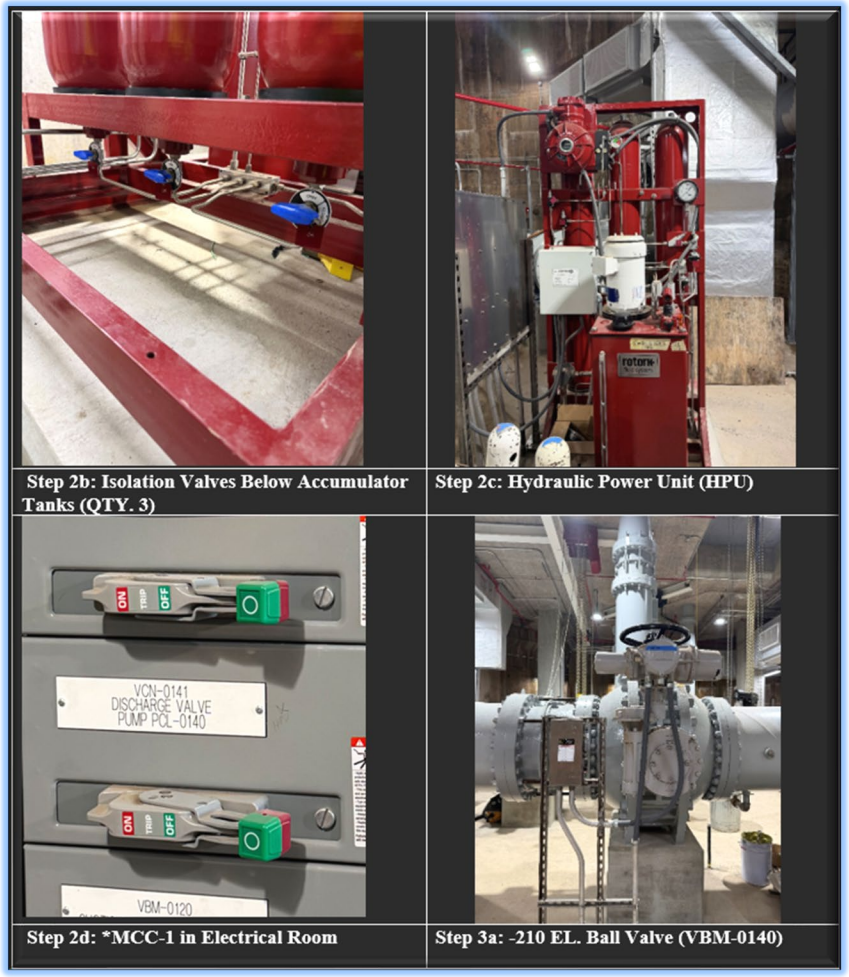
- Tunnel Filled to ½ Full
- Pump Flow Recycled from Head Tank to Tunnel
  - Test Pumps at 5 Tunnel Elevations for 30 min
  - Multi-Day Operation at 1 Tunnel Elevation
  - Individual and Multiple Pump Combinations
  - Test All Modes of Operation & Control
- Pump Flow to Head Tank and Gravity to HWPCF
- Initial Pump Settings
  - Seal Water Pressure
  - Range of Pump Speeds @ varying tunnel levels





Safety & Training Documentation

- Lockout Tagout (LOTO) Procedures
  - Developed for all major mechanical equipment
- Equipment Manufacturer Training
- System Overview & Component Training
- SCADA Training





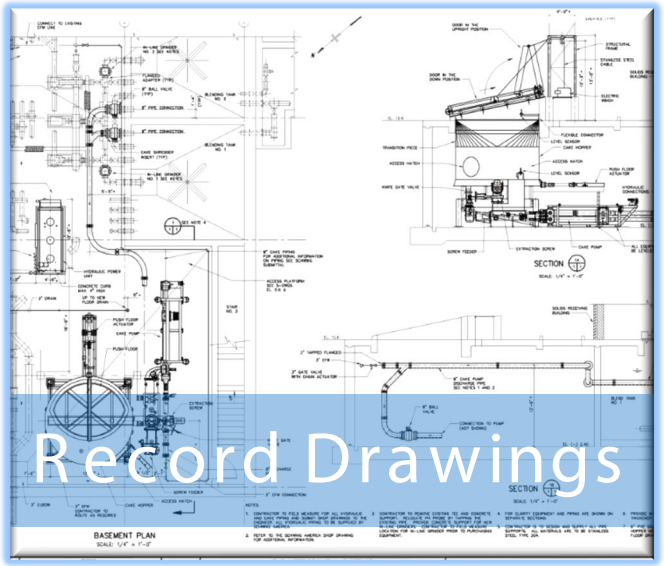


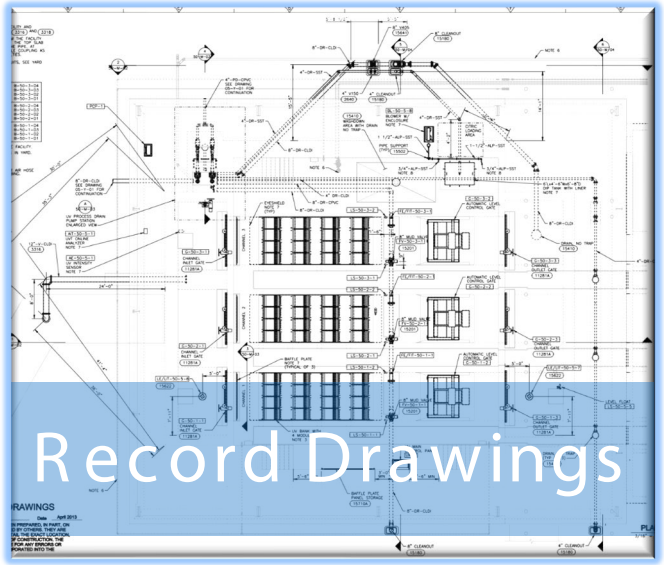
Digital Efficiency Tools

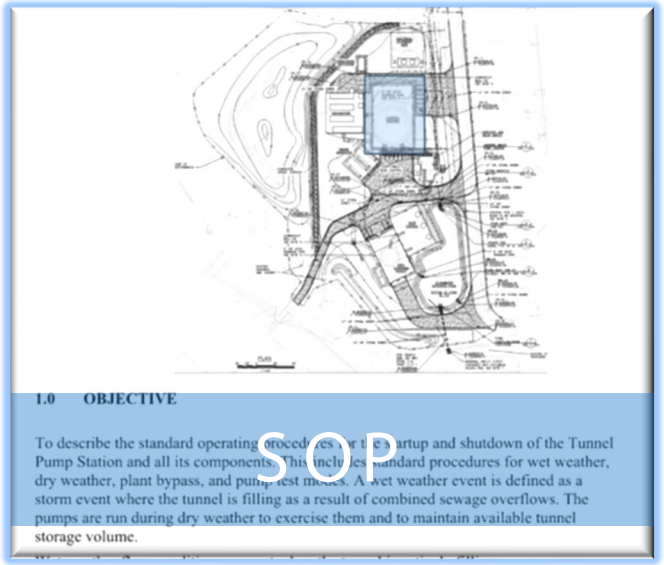
Electronic O&M

- System O&M
- Standard Operating Procedures
- Other Electronic information:
  - Operations and Maintenance Manuals
  - Testing Certificates and Results
  - Manufacture's Training Presentations & Videos
  - Project Documents / As-builts
  - Troubleshooting Documentation
  - LOTO Procedures



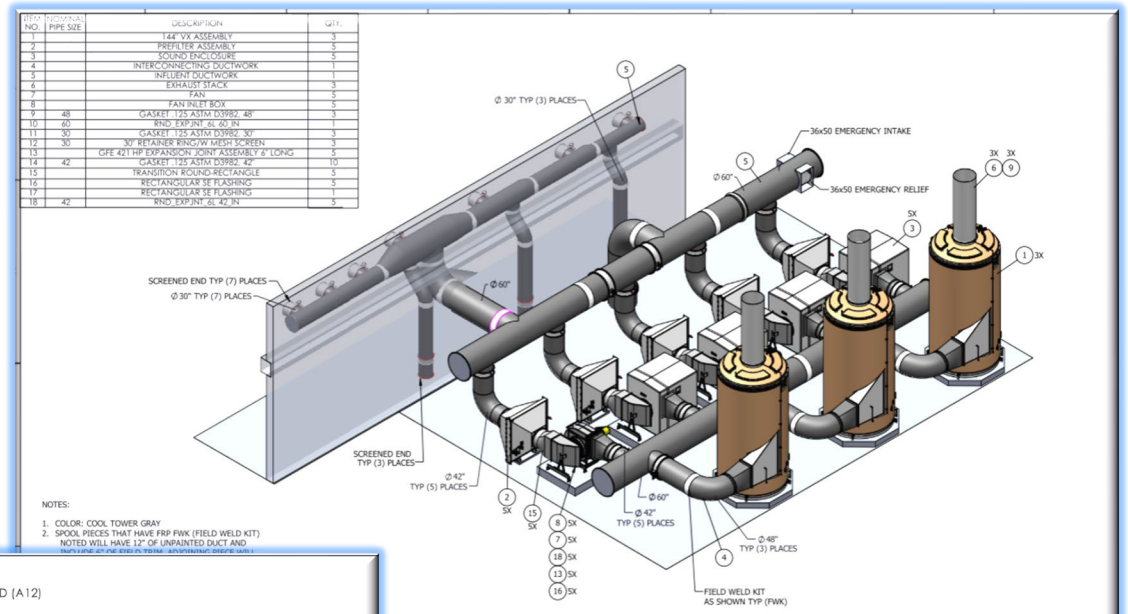


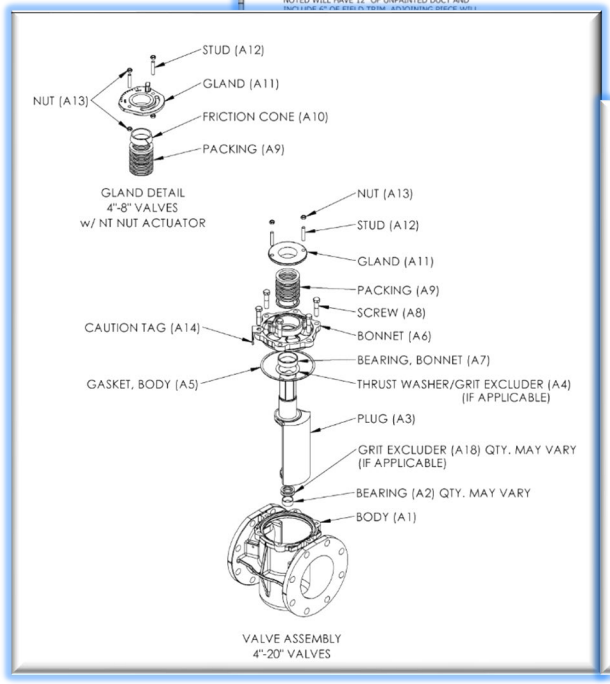


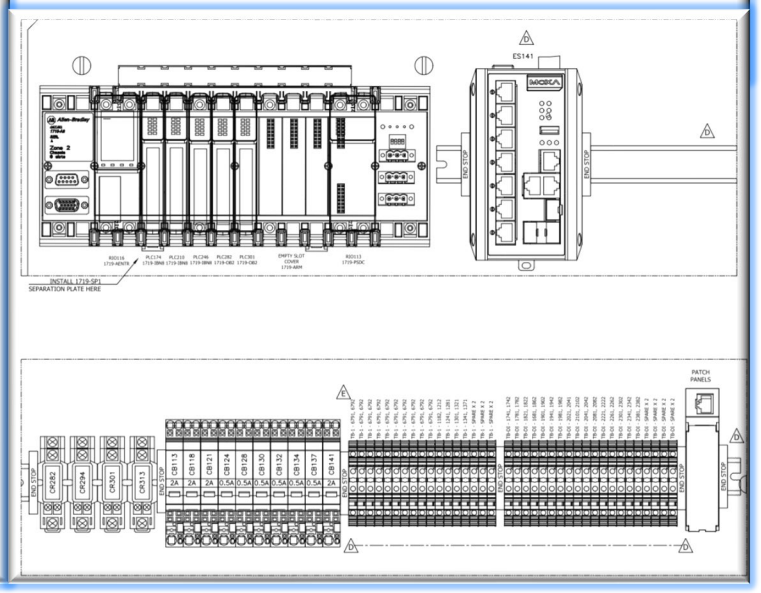


Maintenance Readiness

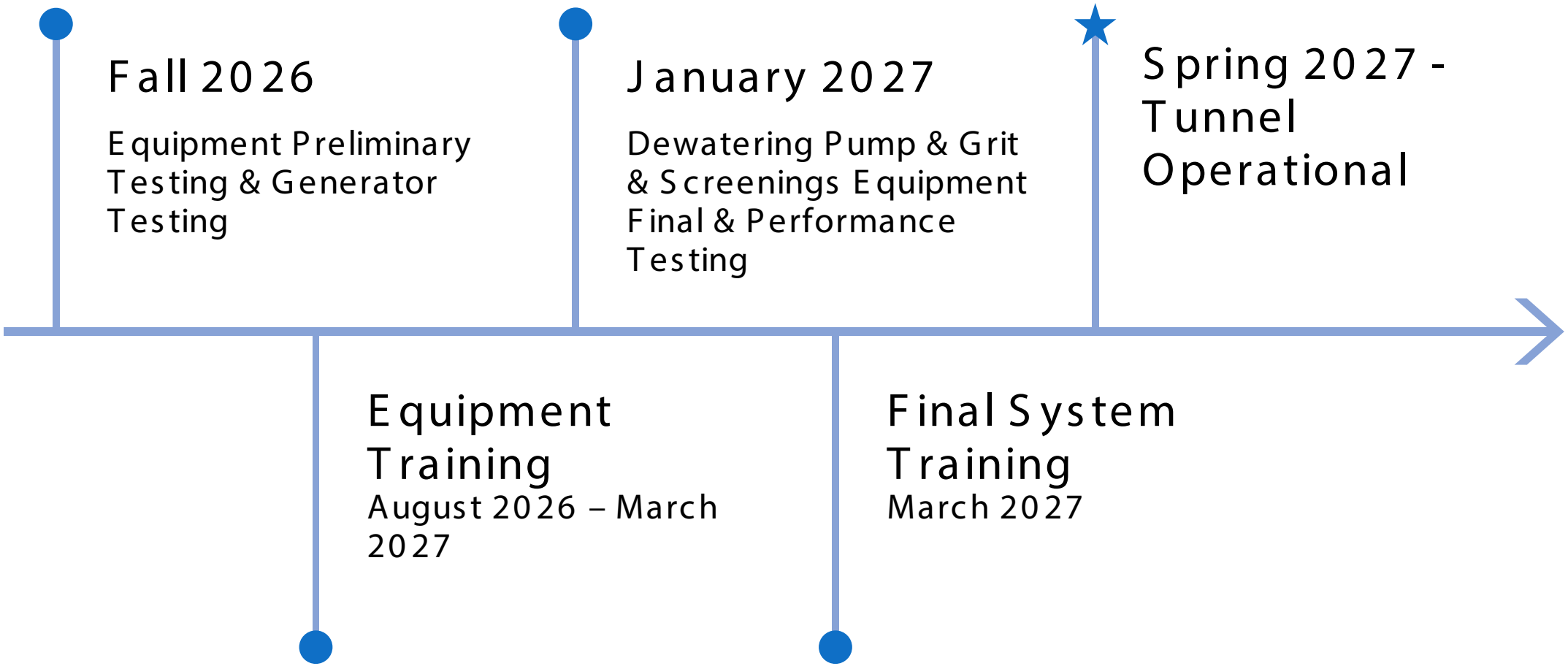
- Developed an equipment list to put into the MDC's Data Management System (SAP)
- Met with the MDC to create:
  - Maintainable equipment
  - Maintenance Lists
  - Criticality Assessment
  - Bills of Materials
- Uploaded into SAP to allow the District to create work orders against the installed equipment







Implementation Schedule



Key Takeaways

- Engage operations early. AESS workshops, control strategies and SCADA simulation from design through startup.
- Commission the system, not just the equipment. Preliminary, final and performance testing, with operations staff involved.
- Transfer knowledge with the tools. LOTO procedures, manufacturer and system training, and SCADA training.
- Keep the tunnel maintainable. eO&M, record drawings and SOPs, plus equipment loaded into SAP for work orders.
- What's next. Final testing and training through March 2027; tunnel operational in Spring 2027.

Spring 2027: South Hartford Conveyance & Storage Tunnel operational

Clean Water Project Partners



