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One Water Conference
August 23, 2023

Devastation to Optimization and Everything In-Between

Vayview, Planeview, and Murwood Lift Station Elimination Project

Kenneth Stewart, P.E., Greene County Sanitary Engineering Department
Adam Athmer, P.E., BCEE, Strand Associates, Inc.®

One Water

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GREENE COUNTY Sanitary Engineering

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Presentation Agenda

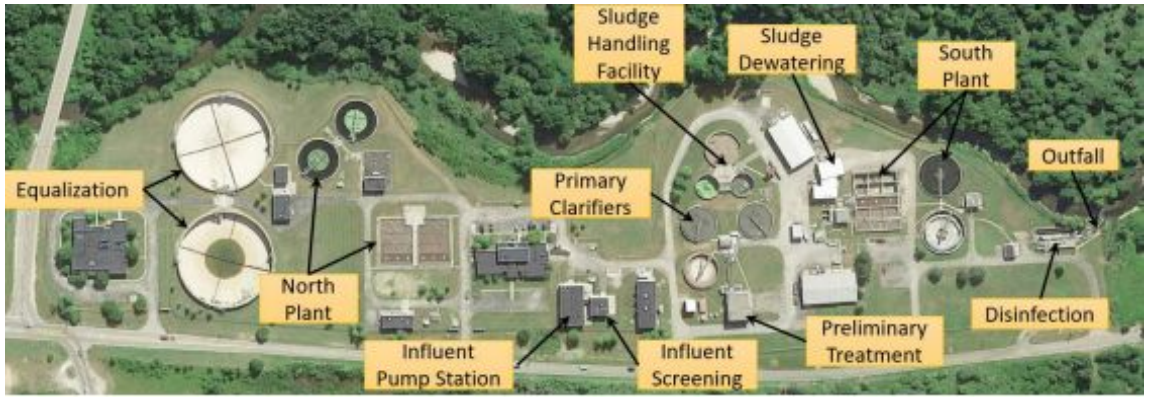
- Background on Greene County Sanitary Engineering Department (GCSED)
- Project Overview and Funding
- Design Considerations for Page Manor List Station Rehabilitation
- Design Considerations for Gravity Sewer Improvements
- Design Considerations for Vayview Lift Station Replacement
- Regulatory Permitting Requirements
- Construction Phase Progress

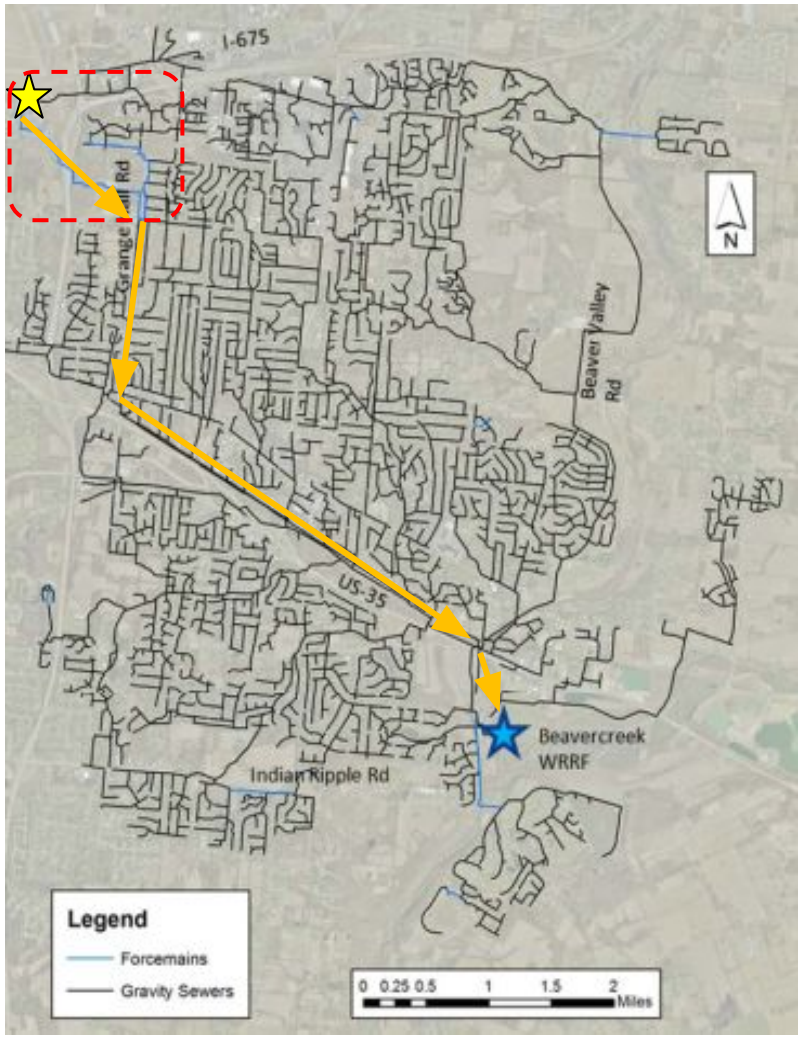
Greene County Sanitary Engineering Department – Background

- Located just east of the City of Dayton between Interstate 71 and Interstate 75
- Beavercreek sewer service area is in the northwest quadrant of Greene County
- Four lift stations located near I-675 and Colonel Glenn Highway
  - Page Manor Lift Station
  - Murwood Lift Station
  - Vayview Lift Station
  - Planeview Lift Station

Beavercreek Sanitary Sewer System

- Approximately 275 miles of gravity sewer and 10 miles of force main
- 10 sanitary lift stations
- Beavercreek Water Resource Reclamation Facility (BCWRRF) on Factory Road
  - Avg: 10.6-MGD / Peak: 25-MGD
- More than 47,000 people served

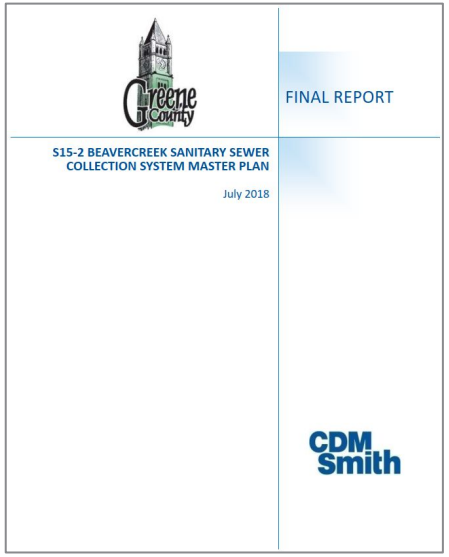


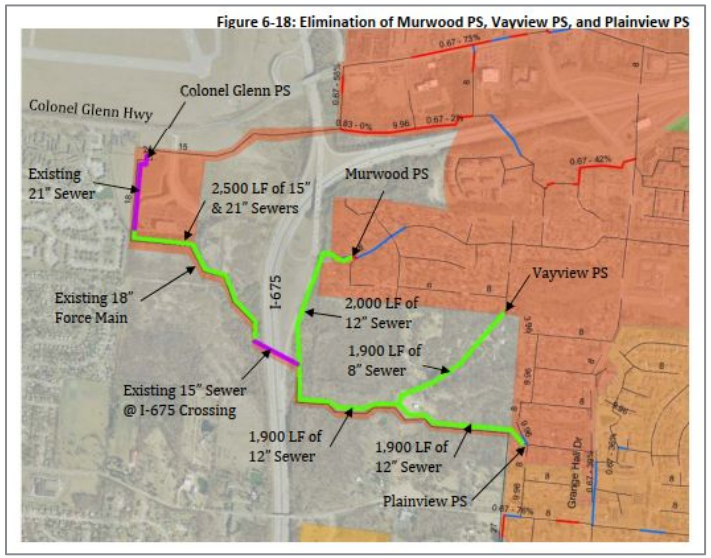


Source: S15-2 Beavercreek Sanitary Sewer Collection System Master Plan, July 2018

Project Overview and Funding

- Beavercreek Sanitary Sewer Collection System Master Plan completed in July 2018
- Lacking capacity and aging infrastructure
- Inefficient conveyance configuration
- Master Plan recommended high criticality
  - Eliminate (3) “smaller” lift stations
  - Install ~10,200 LF of new 12- to 18-inch diameter gravity sewer
  - Upgrade Page Manor Lift Station
- Projected 2025 implementation





Source: S15-2 Beavercreek Sanitary Sewer Collection System Master Plan, July 2018

Project Overview, Continued

- Page Manor Lift Station – Wet/Dry Well Configuration
  - Original construction - 1998
  - 2,100-GPM (3.0-MGD)
- Murwood Lift Station – Dry Well Can Station
  - Original construction - 1966
  - Converted to a submersible in 2019
  - 550-GPM (0.8-MGD)
- Vayview Lift Station – Ejector Can Station
  - Original construction - 1966
  - 100-GPM (0.1-MGD)
- Planeview Lift Station – Dry Well Can Station
  - Original construction - 1987
  - 610-GPM (0.9-MGD)

Murwood Lift Station

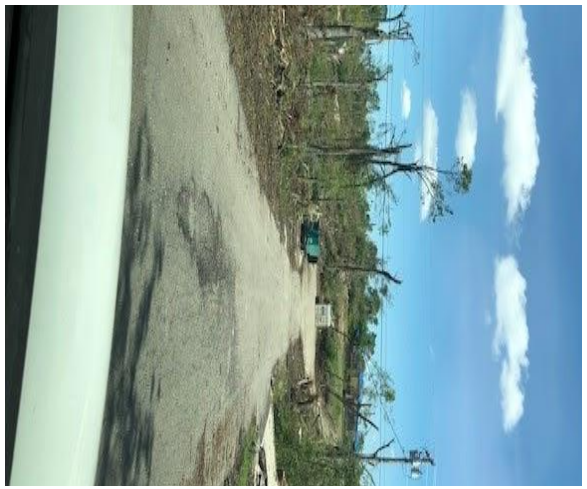
Page Manor Lift Station

Disaster Struck on Memorial Day 2019

Source: Dayton Daily News

Impact to Public Works

- Estimated overall private and public damage to be more than $1B
- Significant damage to existing private and public infrastructure.
- Complete power outage at Murwood, Planeview, and Vayview Lift Stations
- Restricted access from debris
- Emergency relief
- Temporary operations
- Expedite improvements immediately



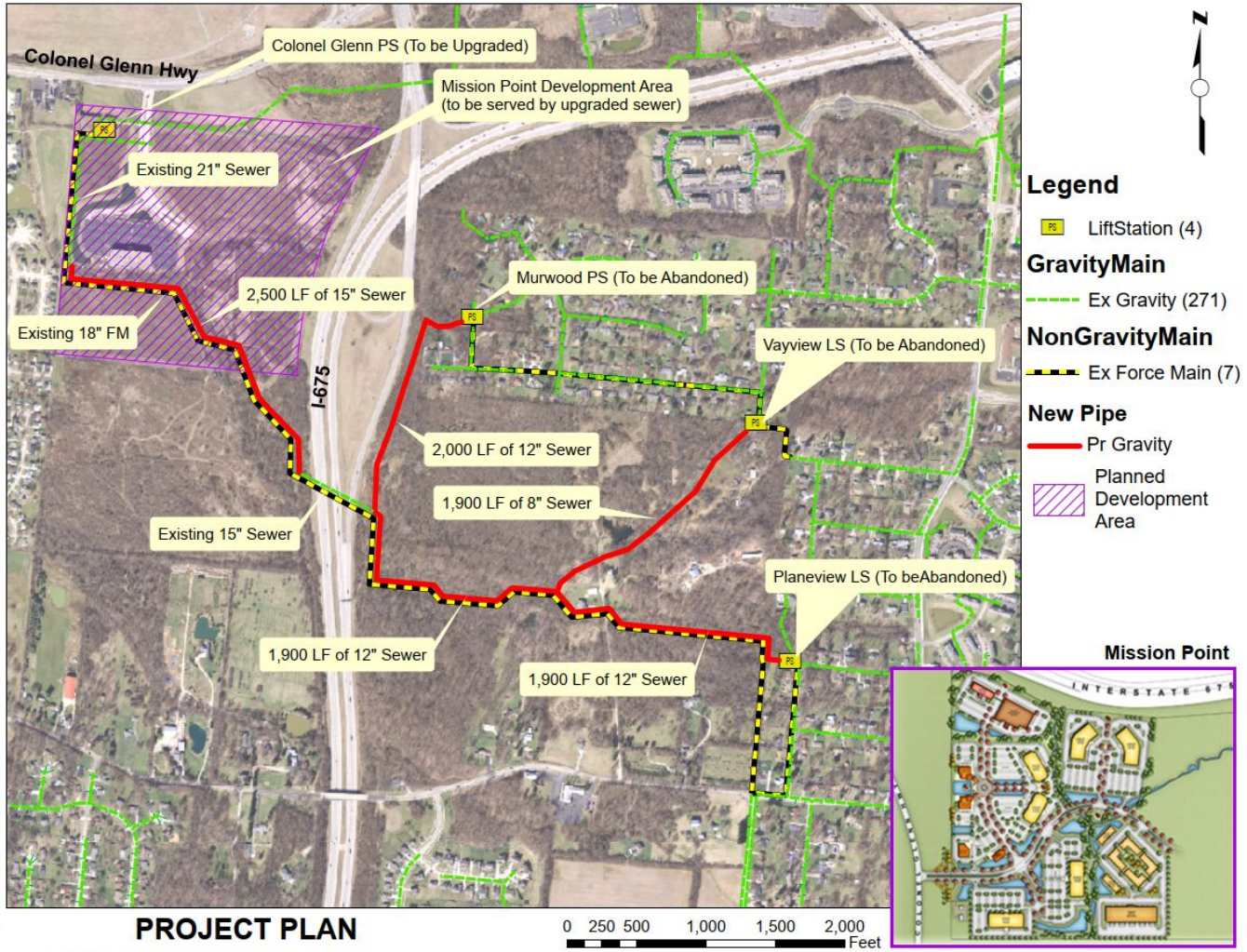
Images Courtesy of Greene County Sanitary Engineering Department

Federal Disaster Relief

- Economic Development Administration (EDA)
  - Provides economic financial assistance to communities so they can encourage innovation and entrepreneurship in a flexible manner.
  - Leverage existing regional assets
  - Can be utilized for planning, technical assistance, and infrastructure construction which will directly support economic development strategies.
- Federal Disaster Relief Funding
  - March 2011 □ Economic Recovery Support Function (ERSF)
  - February 2018 □ $600M per year to combat relief efforts related to federally declared natural disasters
  - June 2019 □ $600M additional per the Additional Supplemental Appropriates for Disaster Relief Act, 2019

Leverage for Public Funding

- December 10, 2019 – Initial EDA application submission
- August 12, 2020 – Greene County was awarded grant funding to assist with this project
- Improvements to sanitary sewer conveyance were necessary to spur job and housing growth
  - Mission Point - 600 jobs
  - Park Overlook - 75 jobs
  - ~550 homes ½ - 1 acre lots



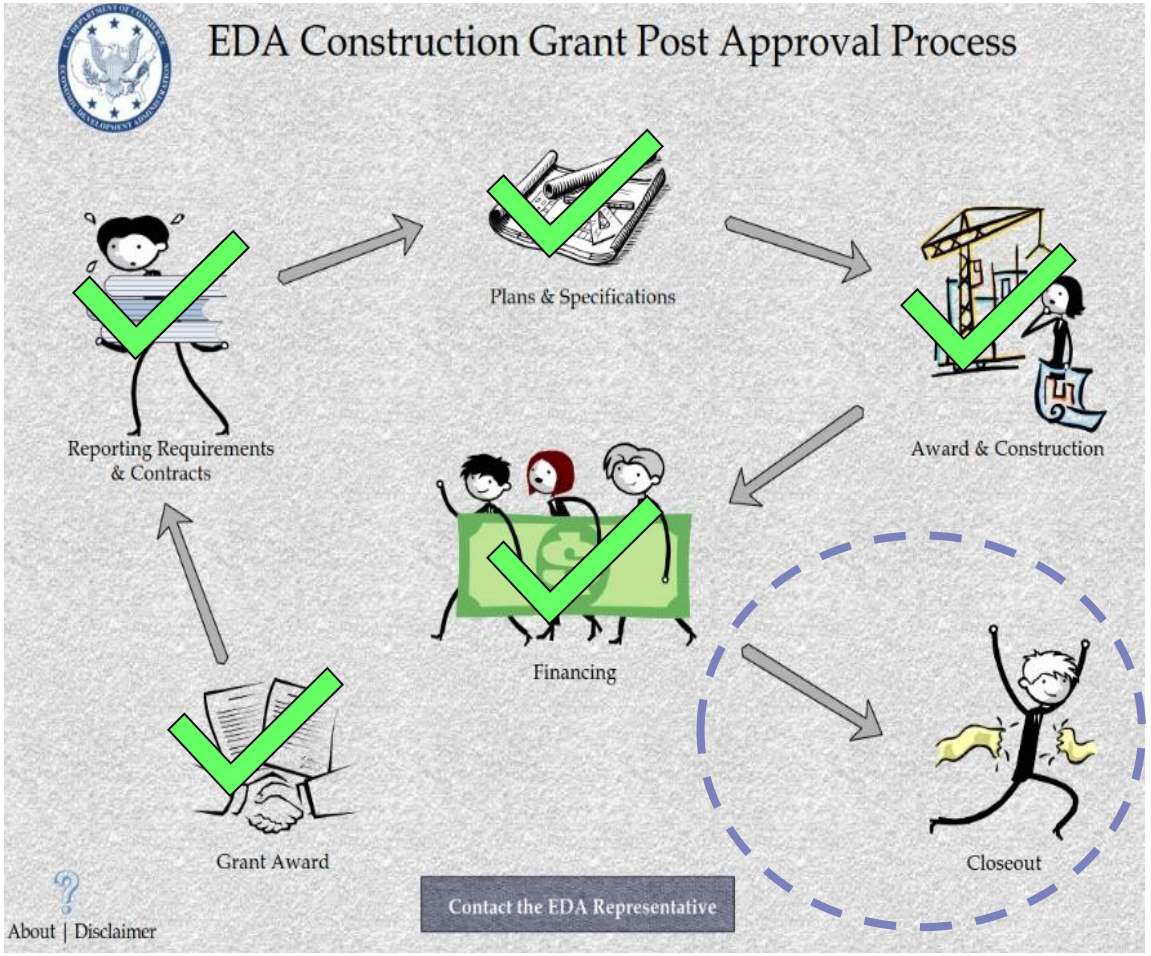
Source: GCSED EDA Application Submittal

EDA Special Award Conditions

No.	Condition
1	Specific to project as defined in approved application
2	Specific to recipient as defined
3	Standard EDA terms and conditions
4	Schedule milestones (total of 45 months)
5	Construction completion with a maximum of 5-years
6	Progress and financial reporting
7	Authorized budget
8	Matching share
9	Method of refund, interest, and unused funds
10	Design useful life of 20-years or greater
11	Goals for WBE/DBE in Construction
12	Procurement requirements
13	Agreement with Architect/Engineer
14	Evidence of good title

No.	Condition
15	Non-relocation
16	Performance measures
17	Reaffirmation of application
18	Reframe from employment of Dept. of Commerce employees
19	EDA Project Sign
20	Freedom of information act (FOIA)
21	Waste, Fraud, and Abuse
22	Buy American Executive Order
23	Conflict of Interest
24	Integrity and Performance Reporting
25	United States Army Corps of Engineers
26	United States Fish and Wildlife
27	Recorded Statement

Funding Process and Schedule



Source: EDA Project Toolbox

Design Consultant Selection — 4 months

Final Design by ~~November 2021~~ May 2022 — 17 months

Start Construction by ~~February 2022~~ August 2022 — 3 months

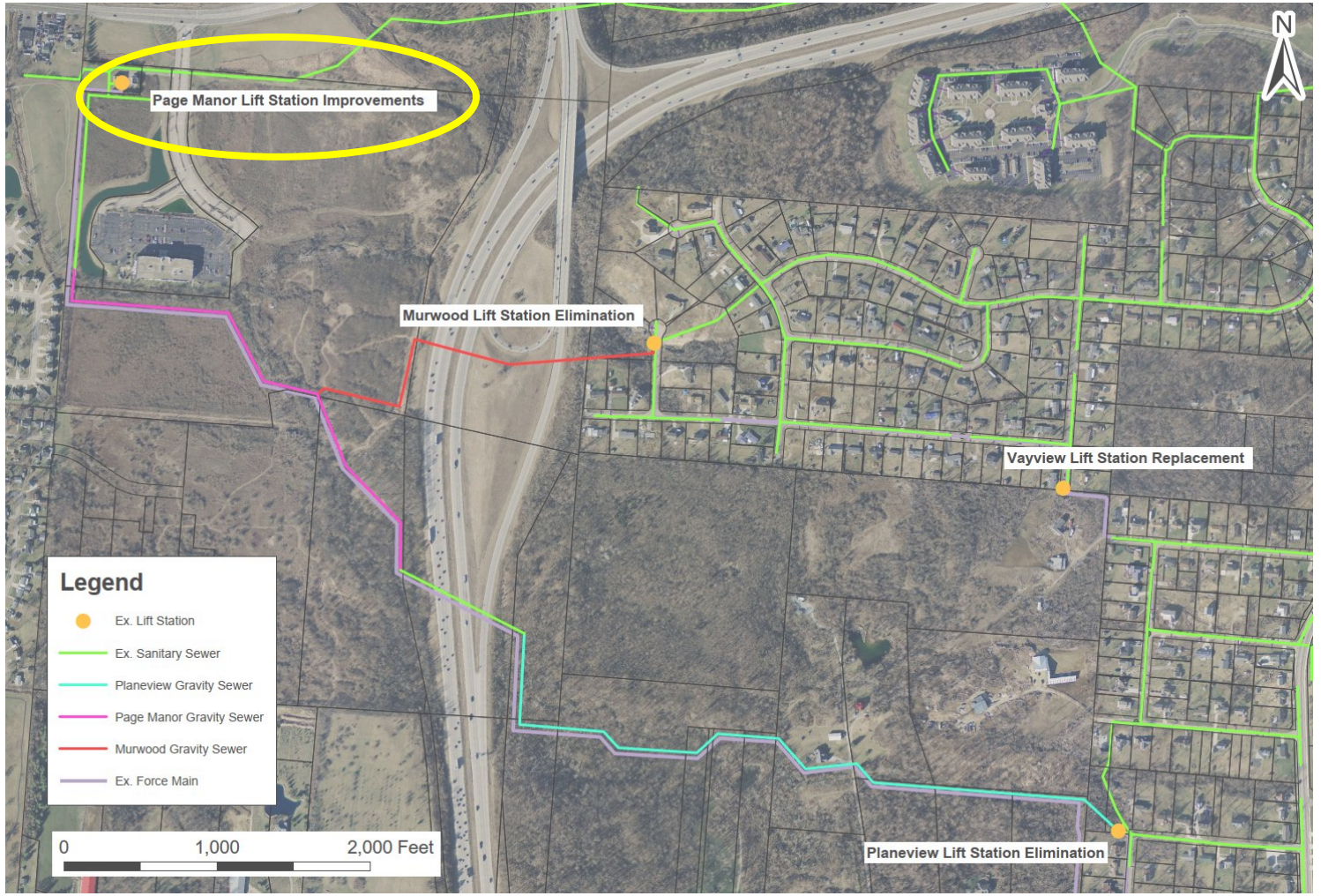
Construction Completion by February 2024 — 18 months

EDA Grant Deadline on May 12, 2024 — 3 months

45 months

Project Area Overview

- Page Manor Lift Station
- Murwood Lift Station
- Planeview Lift Station
- Vayview Lift Station
- Gravity sewers sized to accept flows from future development
- Existing 18-inch force main will be maintained



Page Manor Lift Station Improvements

- Located off Mission Point Boulevard south of Wright-Patterson Air Force Base (WPAFB)
  - Originally constructed to accept sanitary flows from WPAFB
- Current Capacity ~ 2,100 gpm (3 MGD)
- Design Capacity (w/o future development) ~ 4,000 gpm (5.8 MGD)
- Design Capacity (w/ future development) ~ 5,000 gpm (7.2 MGD)

Source: Google Earth

WPAFB

Preliminary Design and Alternative Analysis

- Structural analysis of existing lift station and generator buildings determined structures in good condition
- Improvements consider various elements for retrofit of exist structure:
  - Replacement/upgrade of pumping equipment
  - Wet well improvements
  - Bypass pumping considerations
  - Electrical, Controls, and HVAC Upgrades
  - Emergency power modifications
  - Site improvements
- Evaluated several dry pit pump models and manufacturers
  - Dry-pit submersible vs. traditional end-suction

Existing Dry Well Piping

Existing VFD Cabinetry

Pump Upgrade Alternatives

Horizontal End-Suction

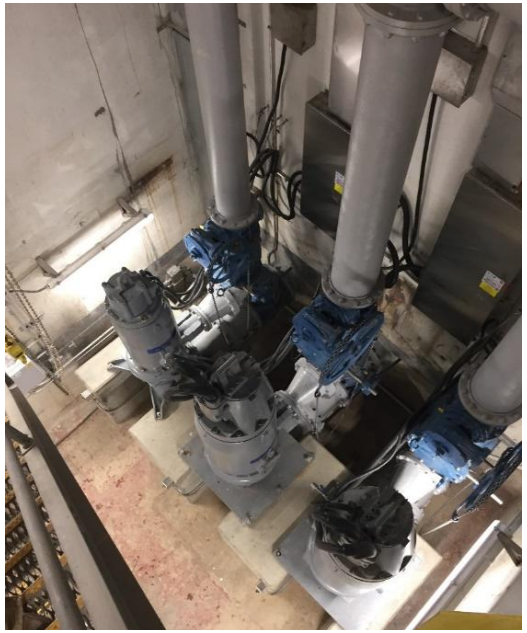
PS 31, Fox River WRF, Elgin, IL

Vertical End-Suction

Athens WWTP, Athens, OH

Pump Upgrade Alternatives

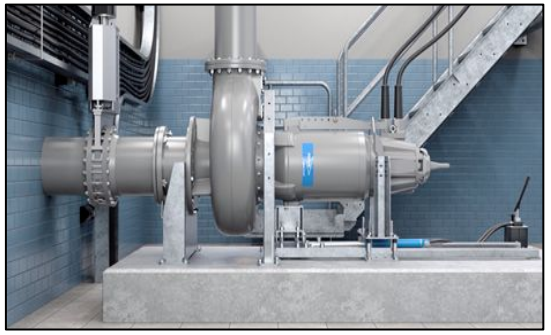
Vertical Dry-Pit Submersible



Richwood PS, SD1

Source: Grundfos

Horizontal Dry-Pit Submersible

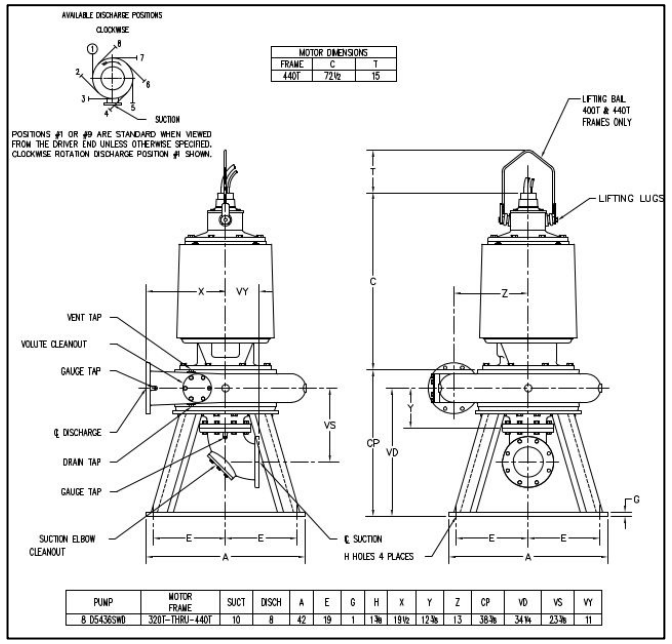


Source: Xylem-Flygt

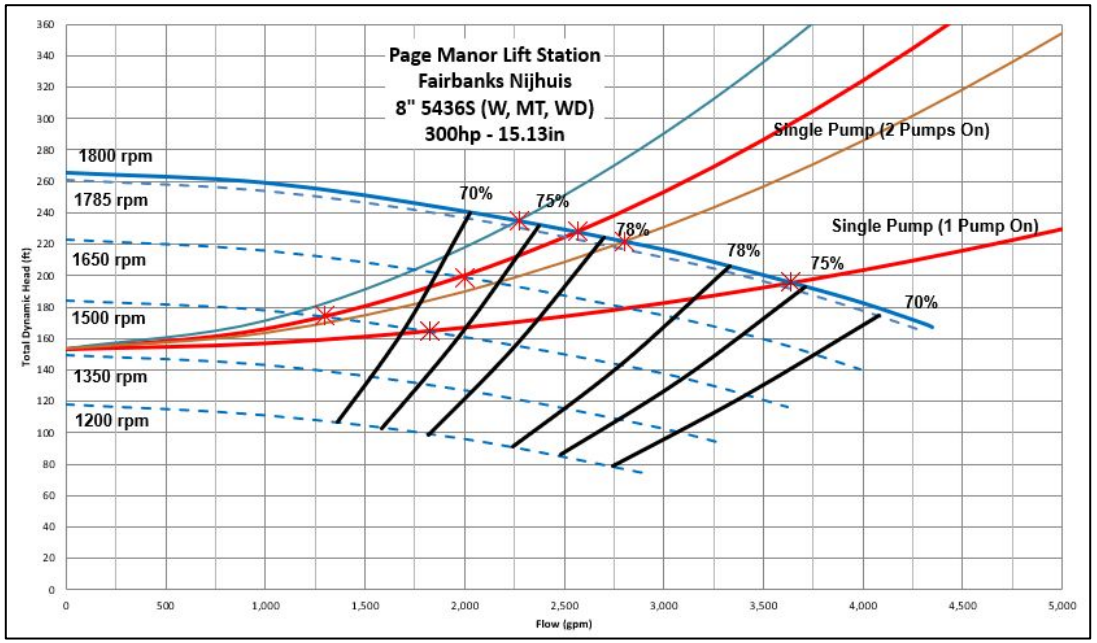
6th Street PS, Parkersburg, WV

Pump Selection and Configuration

- Maintain manufacturer as Fairbanks-Nijhuis
- Triplex configuration
- Vertical orientation



Fairbanks Nijhuis – 8” 5436 Cut Sheet



Design Pump Curve and Performance

Wet Well Improvements

- Existing wet well design as an open trench-type per HI 9.8.3
  - Significant grit build-up due to low velocities
- Stainless Steel Flow Splitter
  - Increases scouring velocities
- Floor Cone, and Anti-Rotation Baffle Wall
  - Mitigates swirling/vortexing at lower pump intake

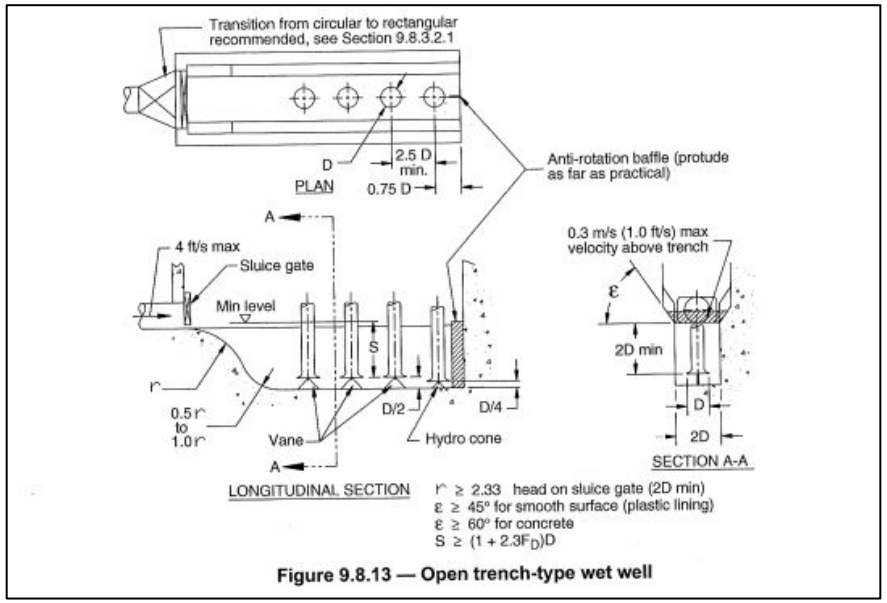
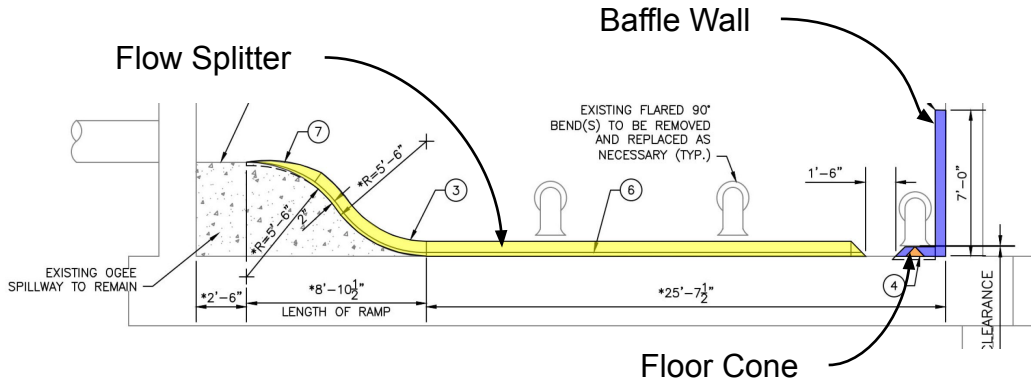


Figure 9.8.13 — Open trench-type wet well

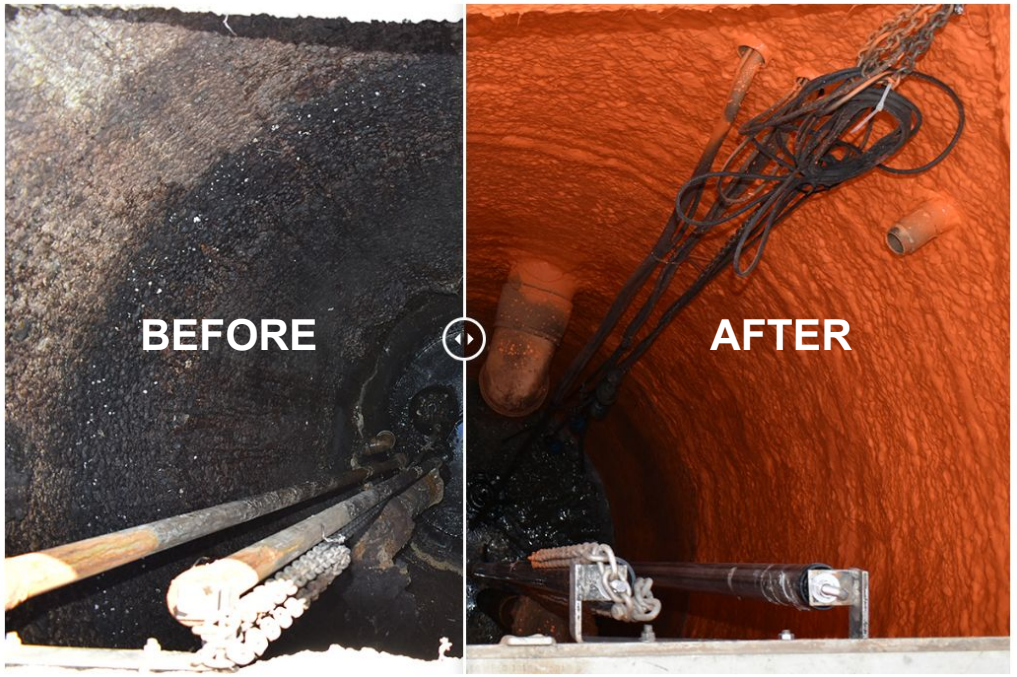
Source: Hydraulic Institute Pump intake Design, 1998



Internal Structural Lining

- Wet Well Interior Lining
  - Corrosion-resistant monolithic lining to improve resistance to wastewater off-gassing
  - Maximize use of bypass pumping
- Manhole Lining
  - Force main discharge manhole
  - Next (2) structures downstream
  - Mitigate long-term corrosion issues due to discharge turbulences

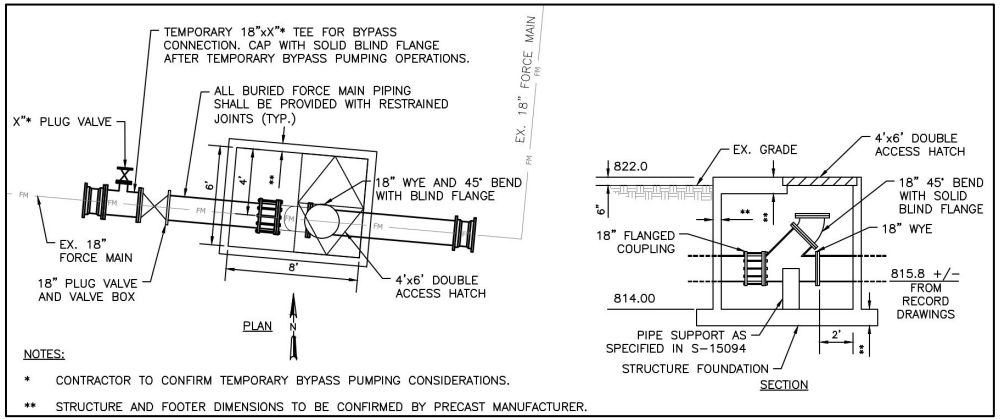
Polyurea wet well and manhole liner



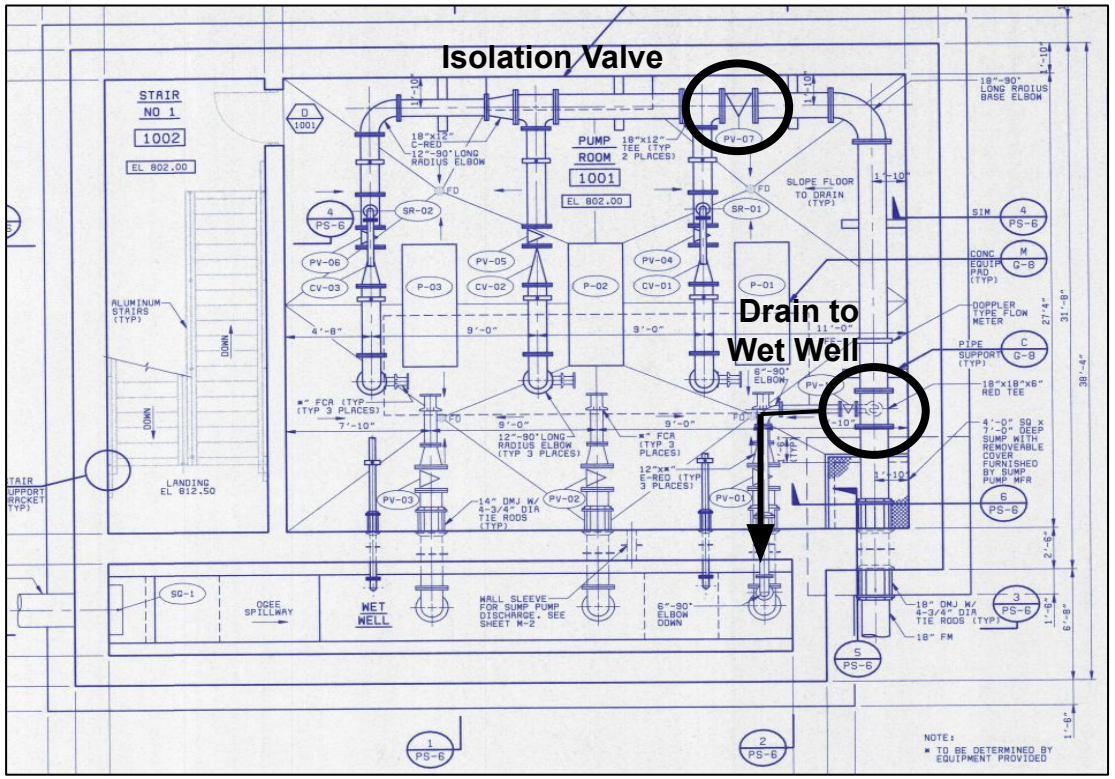
Source: OBIC Products

Permanent Bypass Options

- Existing piping arrangement does not allow the existing force main to be isolated or maintained
- Permanent Bypass Connection Vault
  - Currently no practical measures to bypass the lift station



New Bypass Valve Vault Installation



Northwest Beavercreek Trunk Sewer Project S94-2, Phase IV, 1998

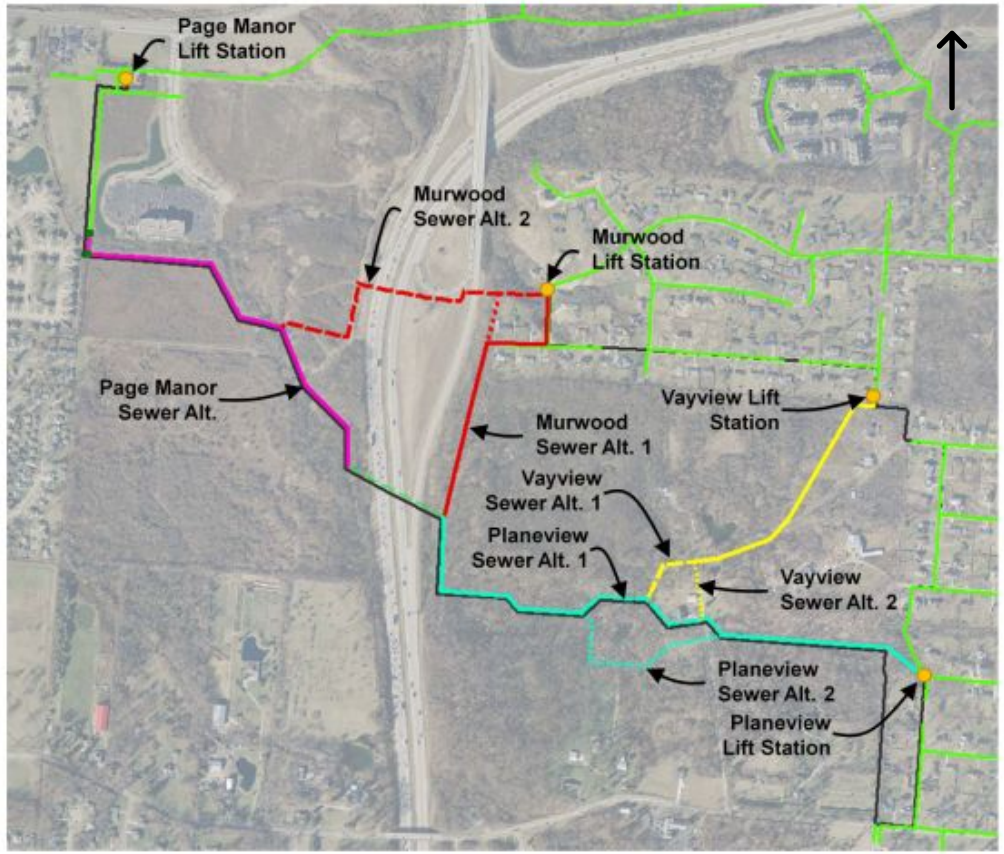
Max. Wet Well Volume = ~21,000 gallons
Total Force Main Storage Volume = ~125,000 gallons

Electrical/Mechanical Improvements

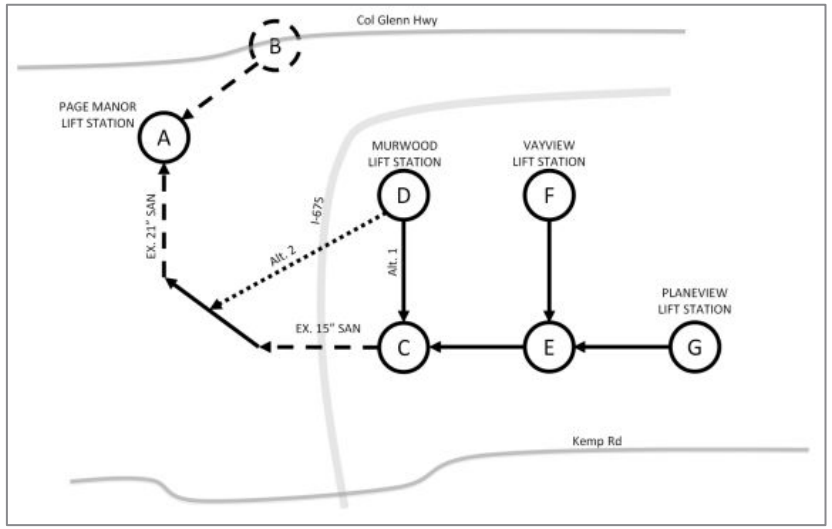
- Electrical/Control Improvements
  - SCC/VFDs/SWBD/ATS
  - LED Lighting
  - SCADA Integration
  - Standby Diesel-Powered Generator
- Mechanical/HVAC Improvements
  - RTU
  - Ductwork
  - Damper control
  - Unit Heaters
  - Sump pump(s)
- Roofing membrane and insulation

Existing Electrical and Mechanical Components

Preliminary Design – Gravity Sanitary Sewer Improvements



Overall Project Alternative Overall

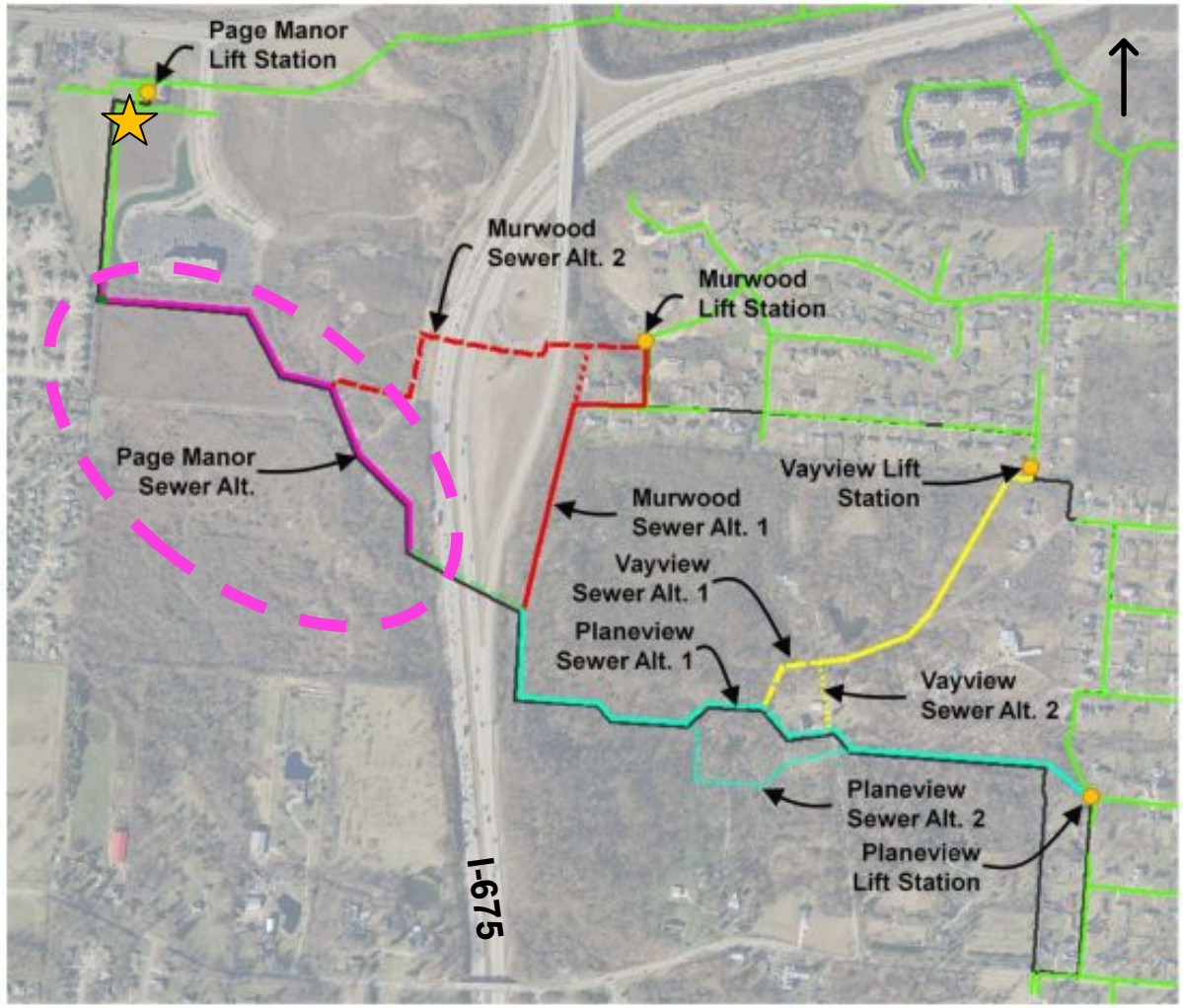


Sewer Connectivity Schematic

Node Location Description	Downstream Node	Upstream Node	Average Design Sewer Flow Rate (gpm)	Peak Design Sewer Flow Rate (gpm)
Total Flow to Page Manor Lift Station	A	-	493	4,980
Existing Flow to Page Manor Lift Station from the Colonel Glenn Highway Corridor	A	B	185	1,170
Flow to Page Manor Lift Station from I-675 Crossing	A	C	307	3,810
Flow from Murwood Lift Station to I-675 Crossing	C	D	30	480
Flow from Vayview to Planeview Confluence to I-675 Crossing	C	E	231	3,330
Flow from Vayview Lump Sum to Vayview-Planeview Confluence	E	F	52	750
Flow from Planeview Lump Sum to Vayview-Planeview Confluence	E	G	179	2,580

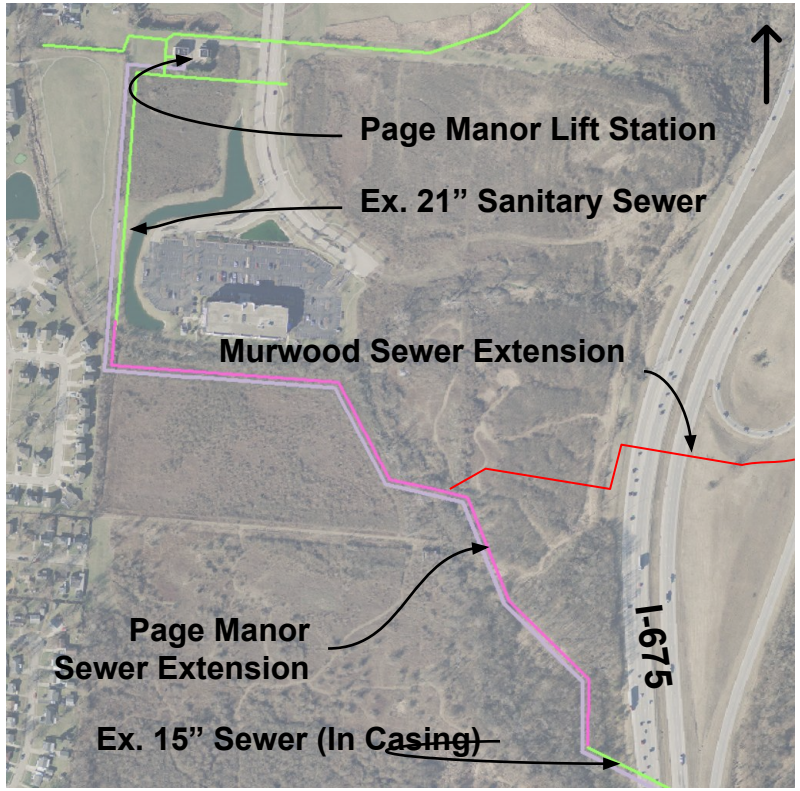
Table 9 Design Average and Peak Sewer Flow Rates

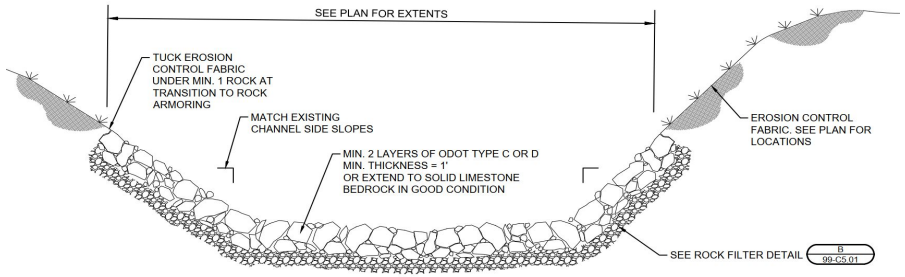
Gravity Sewer Improvements – Page Manor Sanitary Sewer Extension



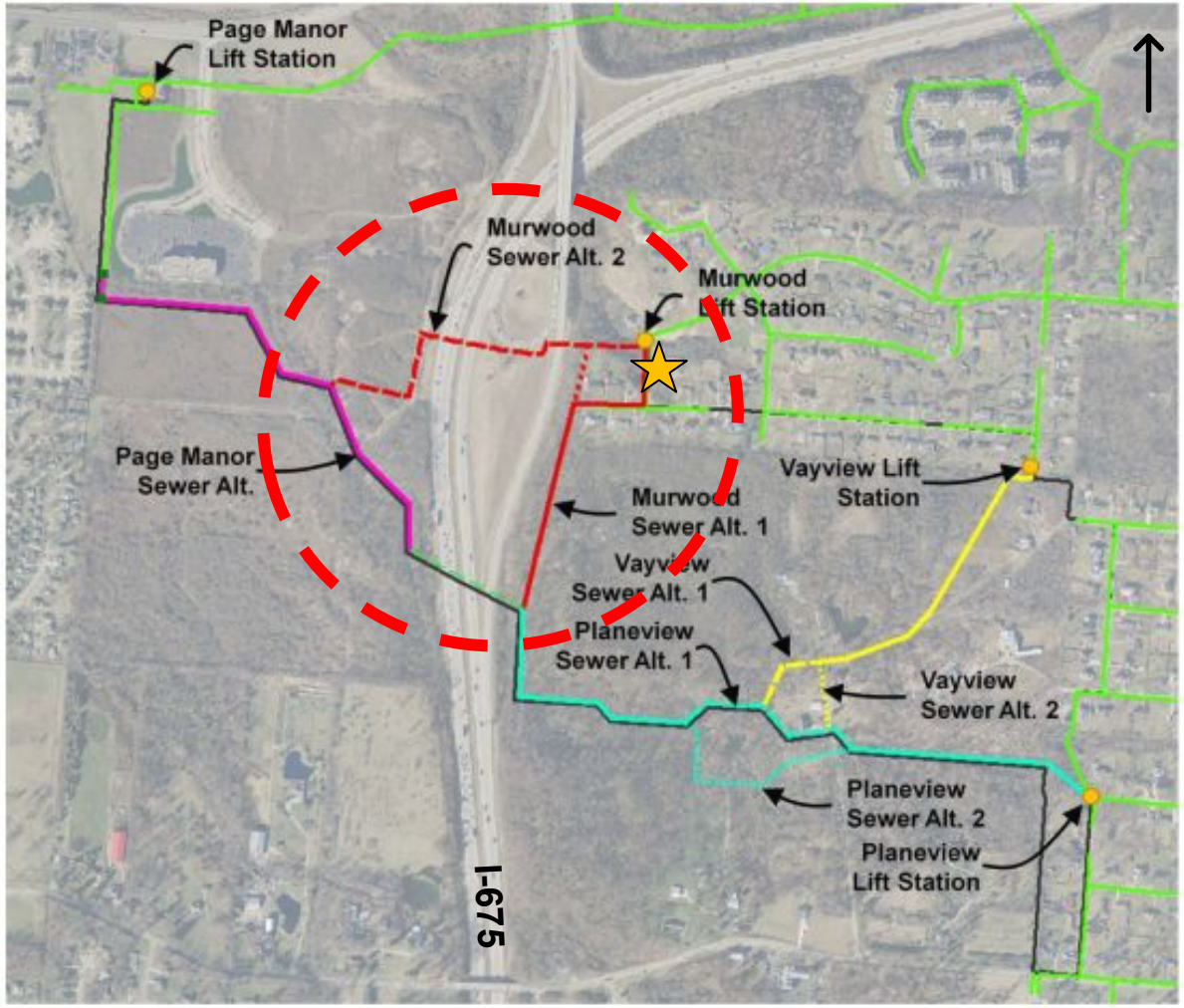
Page Manor Sanitary Sewer Extension

- Approximately 2,600 LF of 18-inch PVC (PS 115)
- Existing 21-inch sewer installed with development
- Existing 15-inch sewer installed with force main
- Adjacent to ephemeral stream with (3) stream crossings along alignment
  - Rock armoring within stream bed to protect stream and sanitary sewer pipe from stream erosion
  - Temporary Flow Diversions
- No additional easement acquisitions necessary for construction



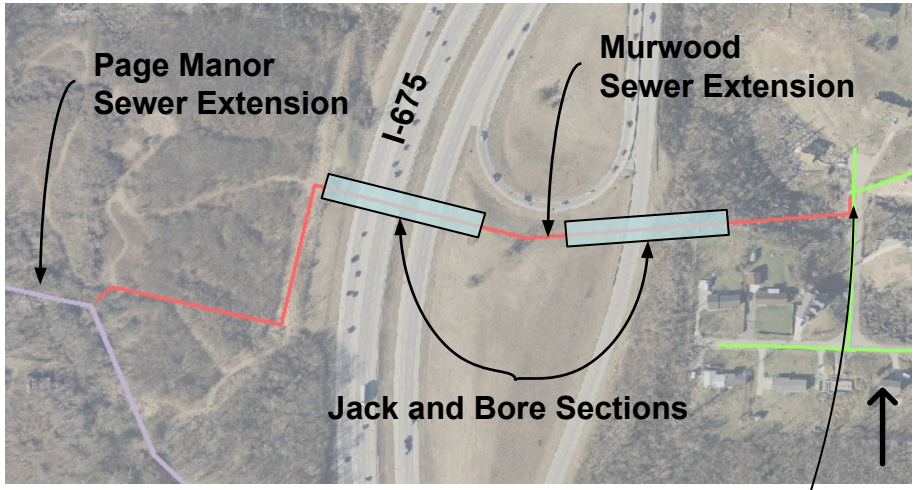


Gravity Sewer Improvements – Murwood Sanitary Sewer Extension



Gravity Sewer Improvements – Murwood Sewer Extension

- Allows elimination of the Murwood Lift Station
- Approximately 2,060 LF total
  - ~ 980 LF 10-inch PVC outside ODOT Limited Access Right-of-Way (LA-ROW)
  - ~ 1,080 LF 10-inch ductile iron inside ODOT LA-ROW
- Utilizing Jack and Bore and open-cut installation to install sewer casing within ODOT LA-ROW
- Utility easements acquired from two private property owners
- One manhole will be installed in the infield of I-675
- Ohio Department of Transportation (ODOT) MR-505 Permit



Murwood Lift Station

Trenchless Construction Issues

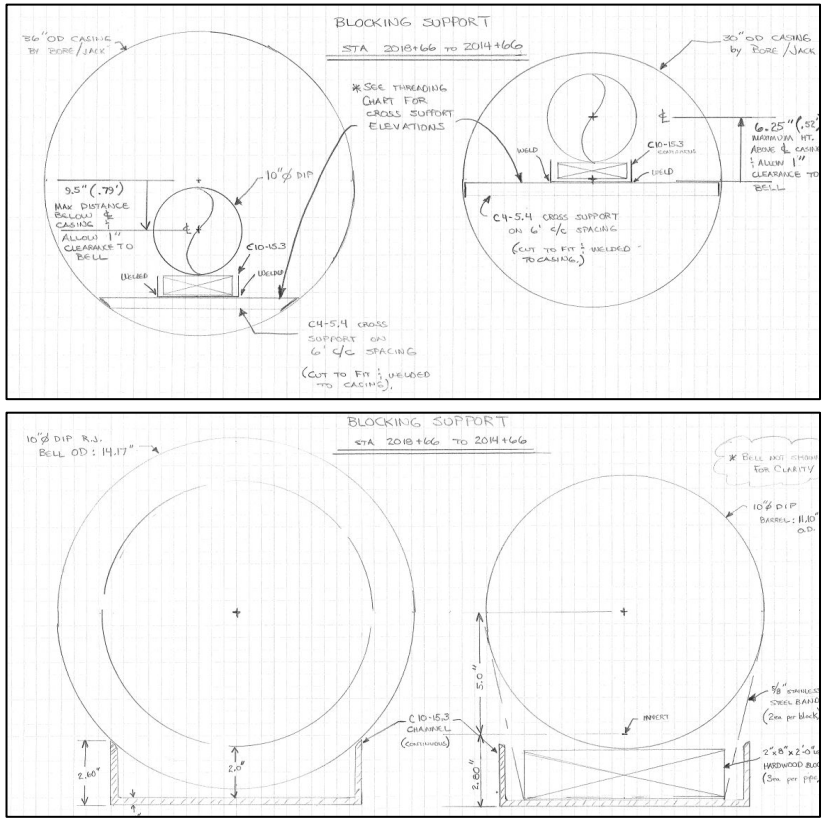
- Variability of soils and mechanical issues led to unique Jack and Boring Approach

30” Steel Casing From the East

36” Steel Casing From the West

Trenchless Construction Solutions

- Custom designed blocking supports and bulkheads

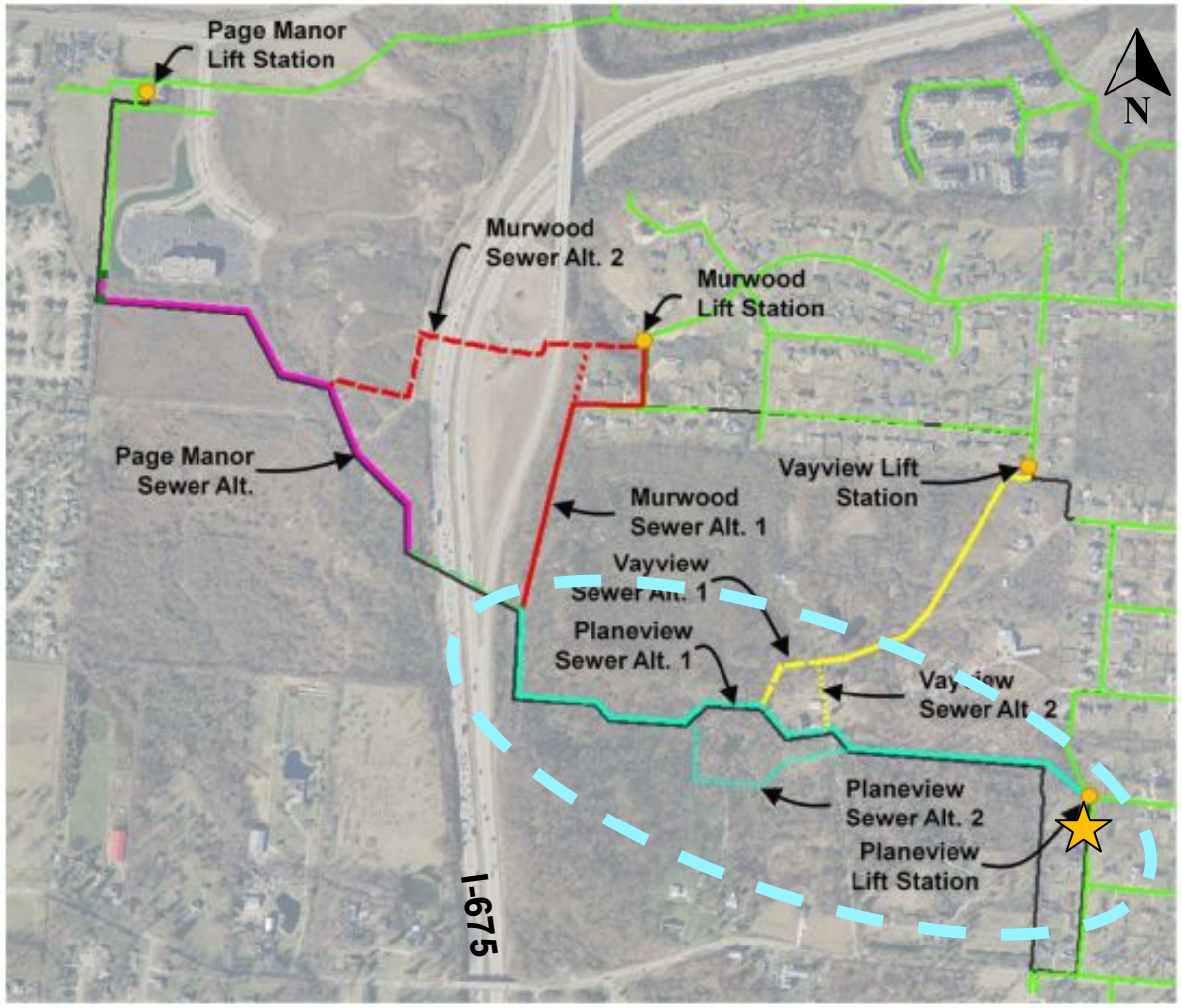


Source: Capitol Tunneling, Inc.

Source: Howell Contractors, Inc.

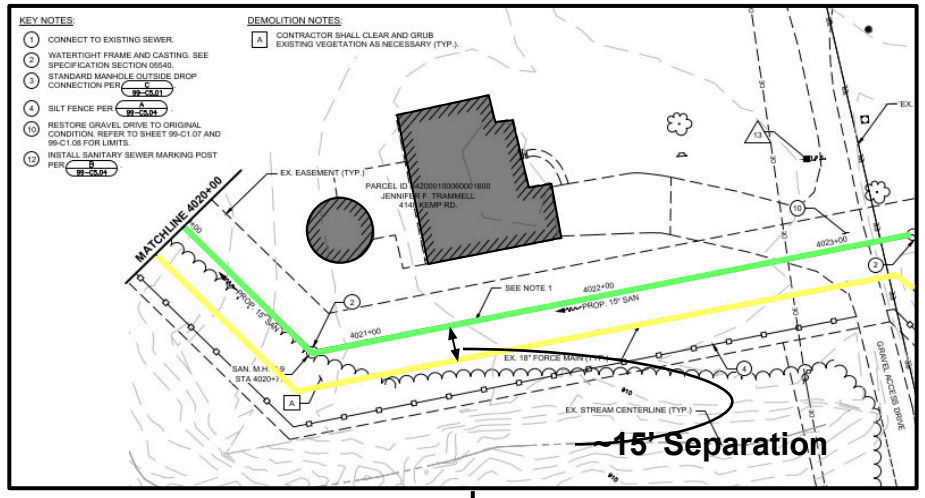
Source: Howell Contractors, Inc.

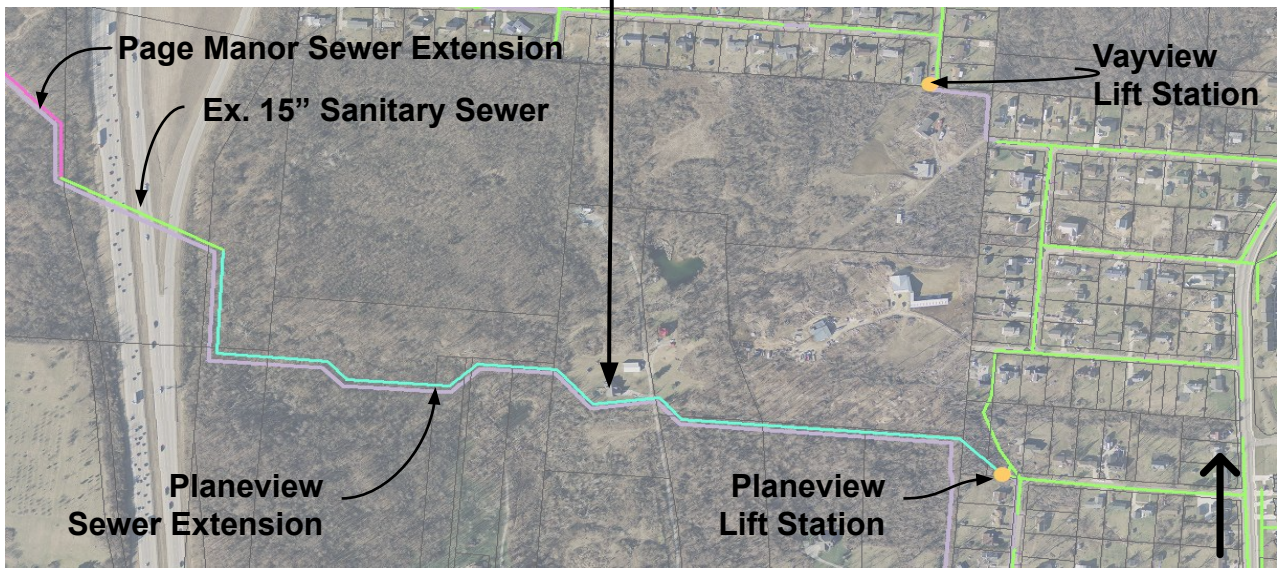
Gravity Sewer Improvements – Planeview Sanitary Sewer Extension



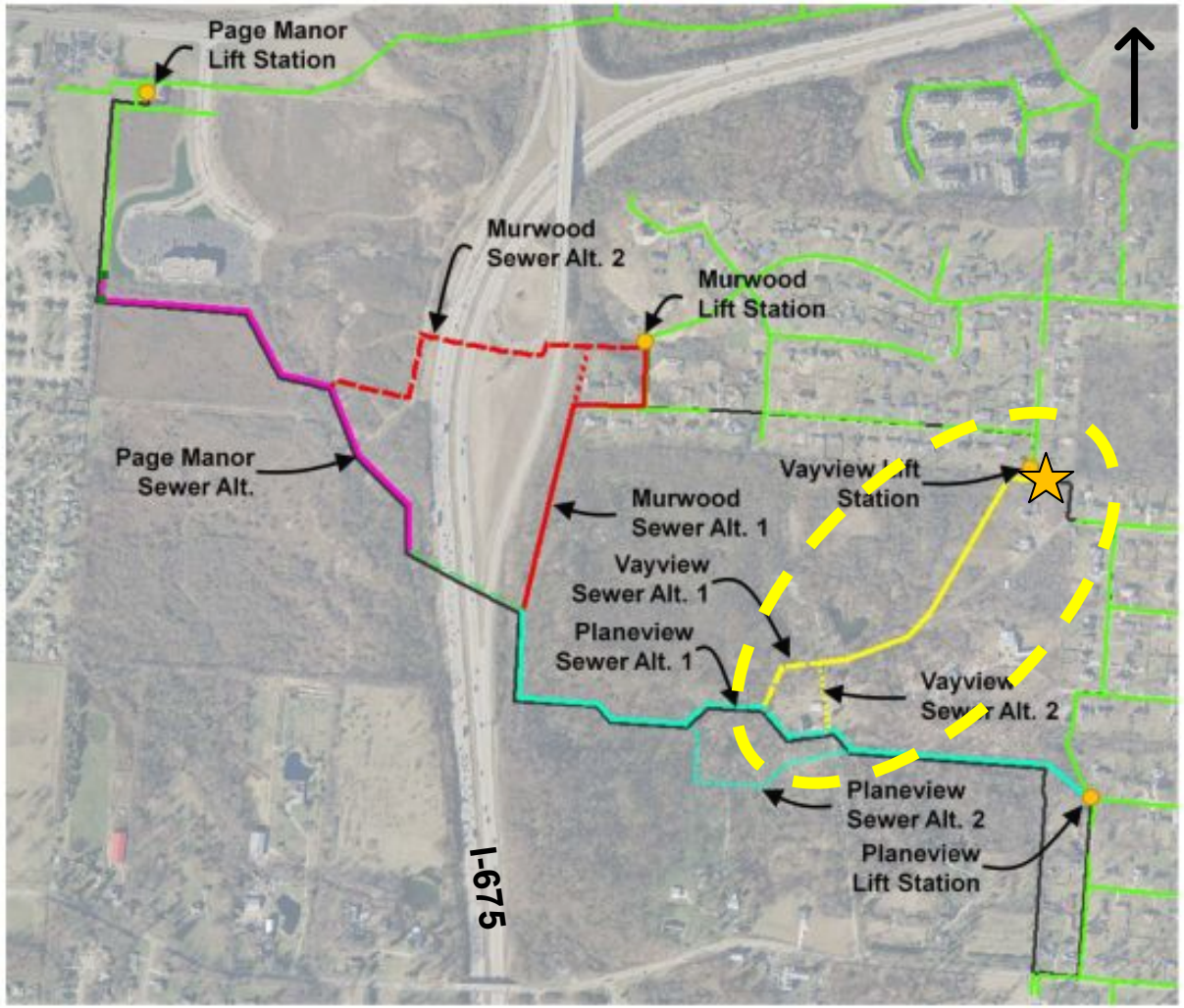
Gravity Sewer Improvements – Planeview Sewer Extension

- Allows the elimination of the Planeview Lift Station
- Approximately 3,770 LF of 15-inch PVC (SDR 26)
- 7 stream crossings along alignment
- Utility easements acquired from one private property owner
- Existing 15-inch sewer installed with force main
- Construction access from Planeview Ave and Kemp Rd





Gravity Sewer Improvements – Vayview Sanitary Sewer Extension

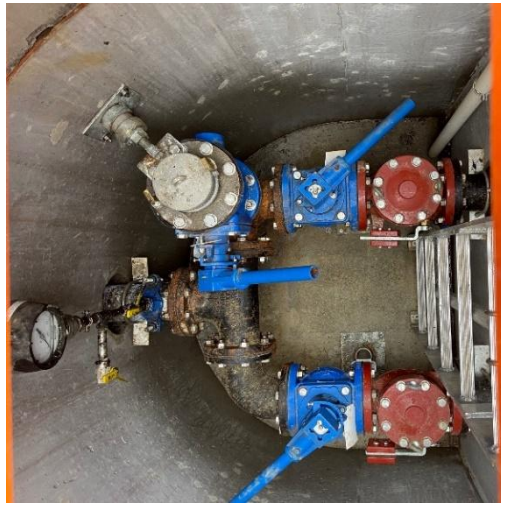


Vayview Lift Station Replacement

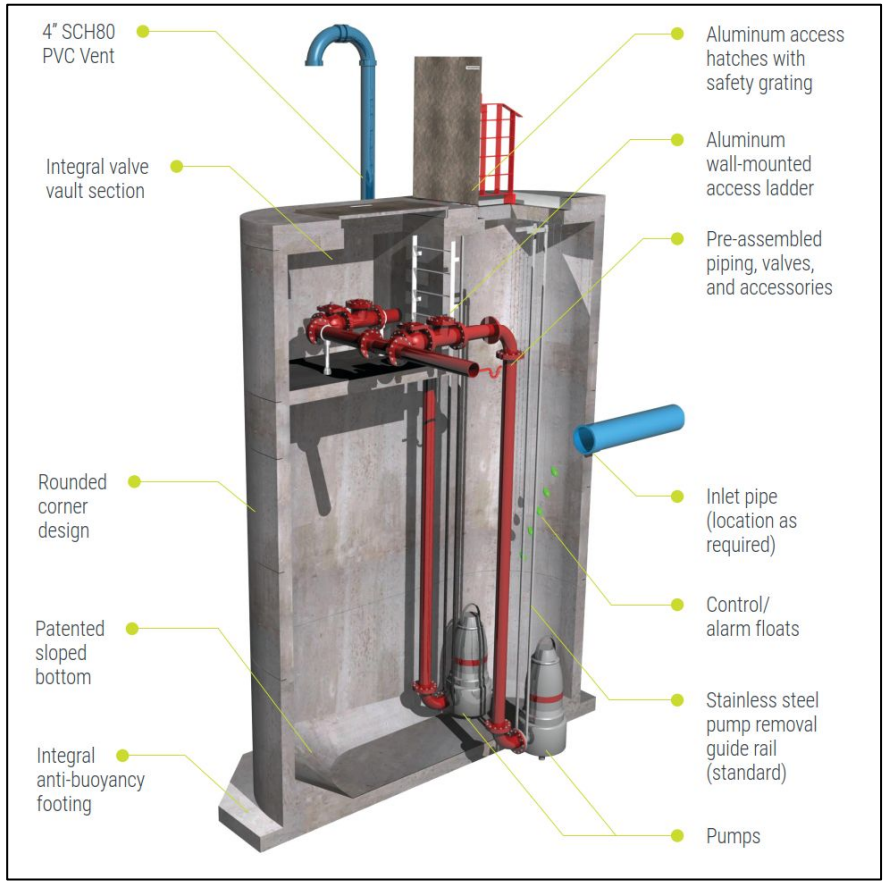
- Inability to secure utility easements for Vayview sewer extension resulted in lift station replacement in lieu of elimination
- To be replaced in the same location and reuse the existing force main
- Reuse of portions of existing Vayview and Murwood Lift Stations
- Barnes-Sithe Chopper Pumps
  - Wet Well Submersible, Duplex Configuration

Prefabricated Lift Station Package

- GCSED selected packaged-style lift station
  - OneLift precast lift station by Oldcastle Infrastructure
  - Reduce footprint inside public right-of-way
  - Reduce onsite construction time
  - Customizable pumps, valves, equipment, etc.



Citizen Energy Group, Thornwood Drive PS



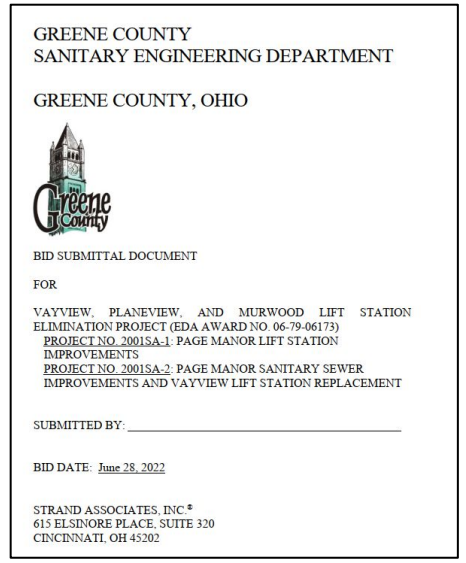
Source: Oldcastle OneLift Package Pump Station Brochure

Regulatory Permit Requirements

- Ohio Environmental Protection Agency (OEPA) Permit to Install
- US Fish and Wildlife (USFWS)
  - Habitat Survey for Eastern Massasauga Rattlesnake
- United States Army Corps of Engineers (USACE)
  - Nationwide General Permit Inclusion under Section 404
- Ohio Department of Transportation (ODOT)
  - MR-505 Permit for utility construction
- Economic Development Administration (EDA)
  - Site Certification and contract document approvals

Bid Award and Construction Schedule

- Bid Opening – June 28, 2022
- Project bidding under one contract with two bid packages
  - Bid Package 1 – Page Manor Lift Station Improvements
  - Bid Package 2 – Page Manor Sanitary Sewer Improvements and Vayview Lift Station Improvements
- Pre-Construction Conferences – September 1, 2022
- Contractor 1 Mobilization – April 2024
- Contractor 2 Mobilization – December 2022
- Construction Completion – February 2025
- Current Construction Funding Completion – May 12, 2024
- Funding Expiration – August 12, 2025



GREENE COUNTY
SANITARY ENGINEERING DEPARTMENT

GREENE COUNTY, OHIO

BID SUBMITTAL DOCUMENT

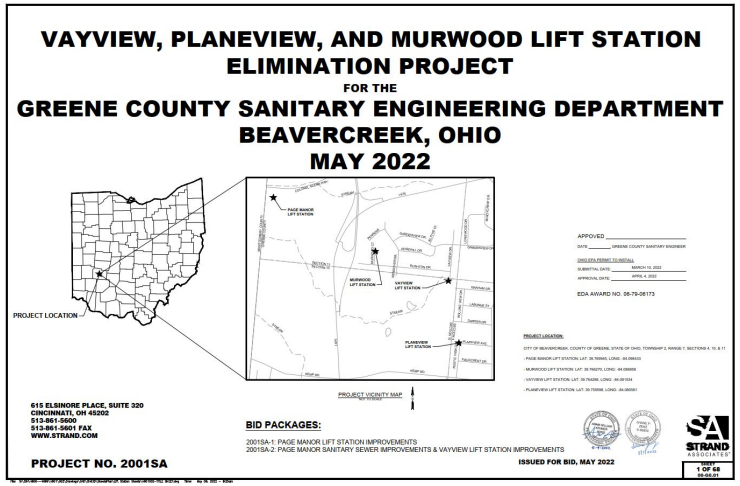
FOR

VAYVIEW, PLANEVIEW, AND MURWOOD LIFT STATION ELIMINATION PROJECT (EDA AWARD NO. 06-79-06173)
PROJECT NO. 2001SA-1: PAGE MANOR LIFT STATION IMPROVEMENTS
PROJECT NO. 2001SA-2: PAGE MANOR SANITARY SEWER IMPROVEMENTS AND VAYVIEW LIFT STATION REPLACEMENT

SUBMITTED BY: _____

BID DATE: June 28, 2022

STRAND ASSOCIATES, INC.®
615 ELSINORE PLACE, SUITE 320
CINCINNATI, OH 45202



VAYVIEW, PLANEVIEW, AND MURWOOD LIFT STATION ELIMINATION PROJECT
FOR THE
GREENE COUNTY SANITARY ENGINEERING DEPARTMENT
BEAVERCREEK, OHIO
MAY 2022

PROJECT LOCATION

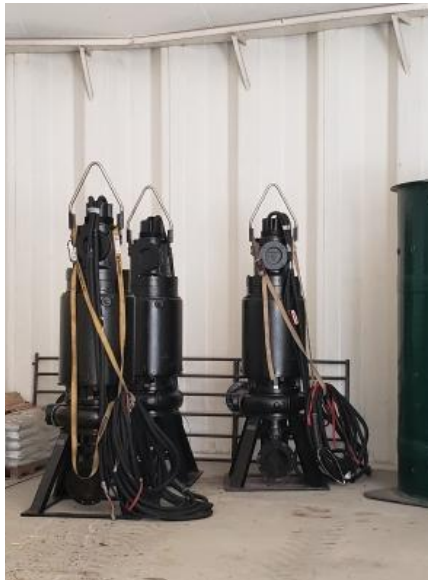
615 ELSINORE PLACE, SUITE 320
CINCINNATI, OH 45202
513-861-5600
513-861-5601 FAX
WWW.STRAND.COM

BID PACKAGES:
2001SA-1: PAGE MANOR LIFT STATION IMPROVEMENTS
2001SA-2: PAGE MANOR SANITARY SEWER IMPROVEMENTS & VAYVIEW LIFT STATION IMPROVEMENTS

PROJECT NO. 2001SA

ISSUED FOR BID, MAY 2022

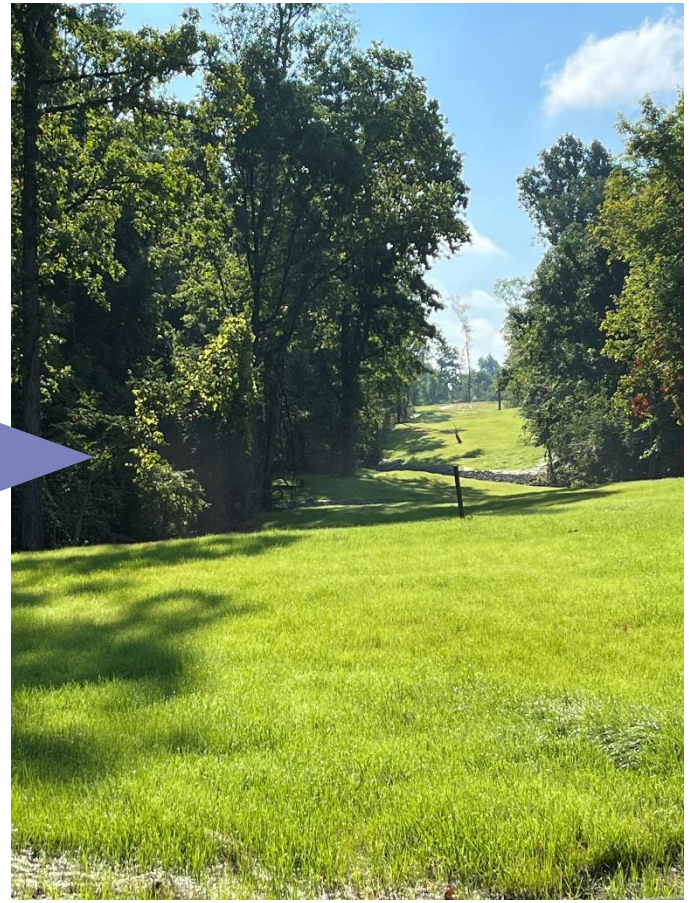
Construction Progress – Page Manor Lift Station



Construction Progress – Gravity Sewer Extensions

- 97% of all gravity sewers installed
- 90% of stream crossings completed
- Murwood LS decommissioning
  - August 2023
- Vayview LS replacement
  - August 2023
- Planeview LS decommissioning
  - Forecasted May/June 2024

September 2021



July 2023

Question and Answer

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