Force Main and Trunk Line Sewer Installation/Rehabilitation Utilizing Three Trenchless Technologies

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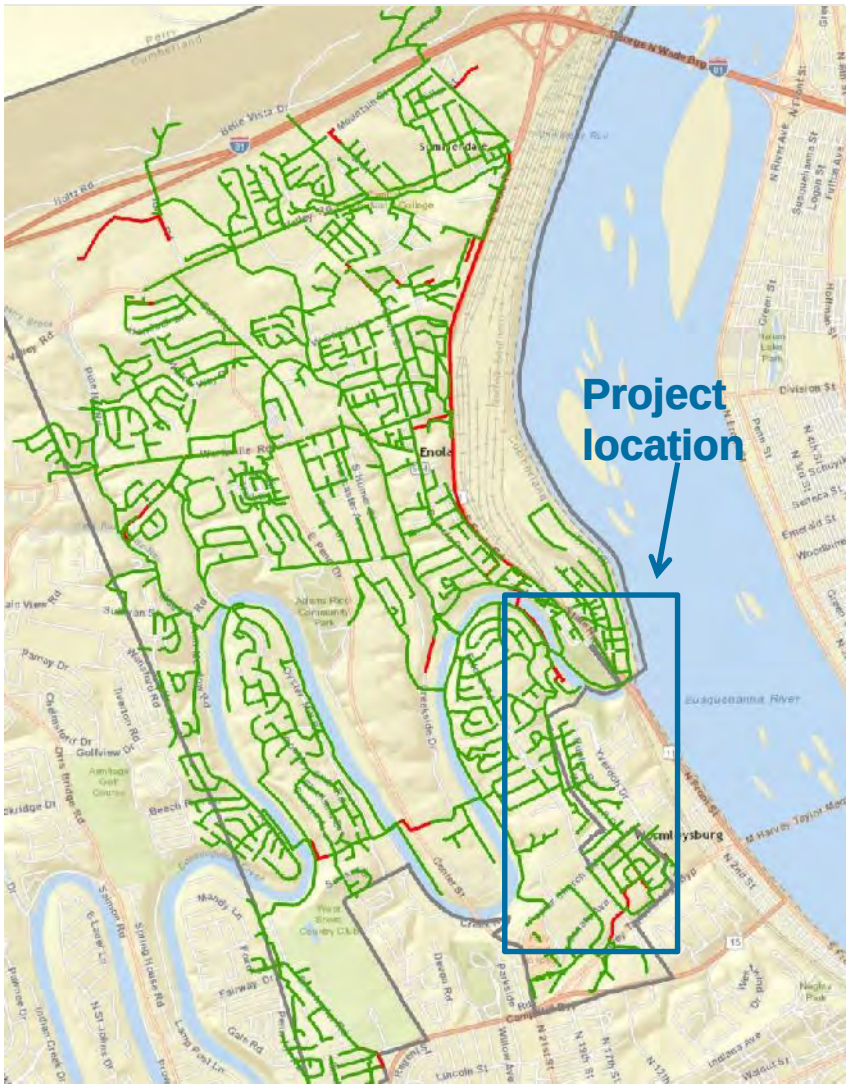
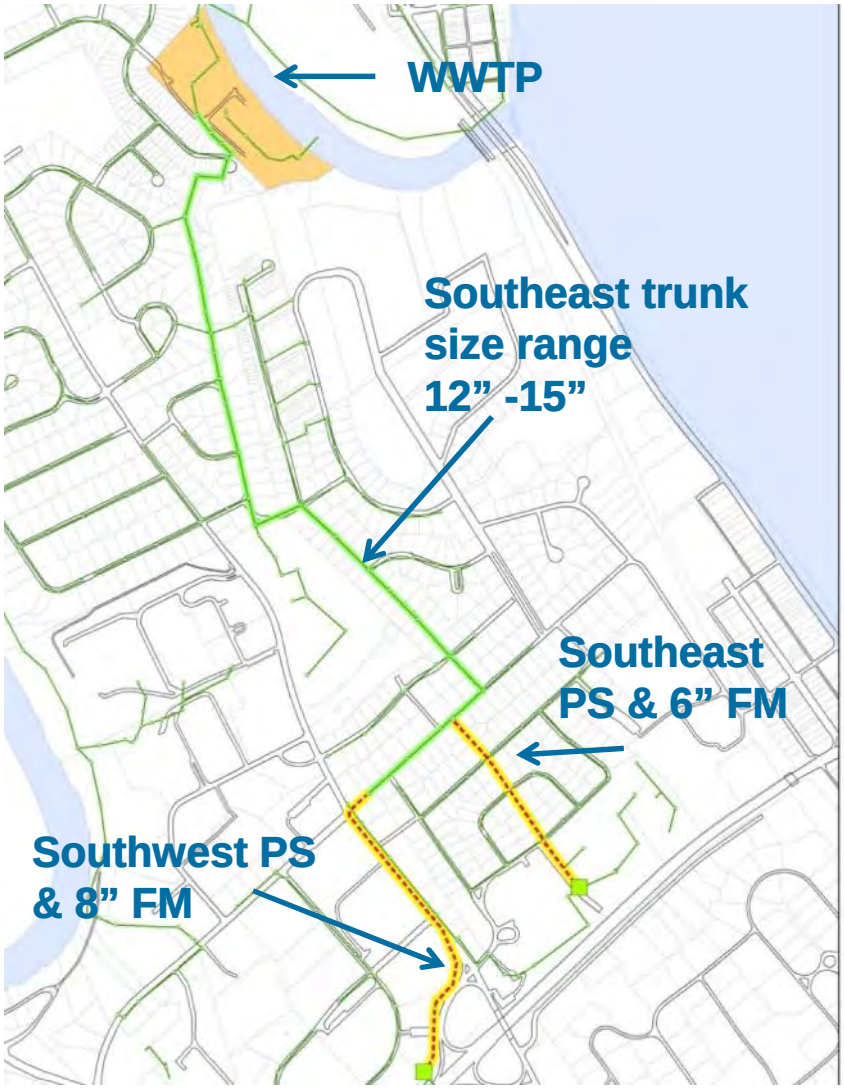
Project location



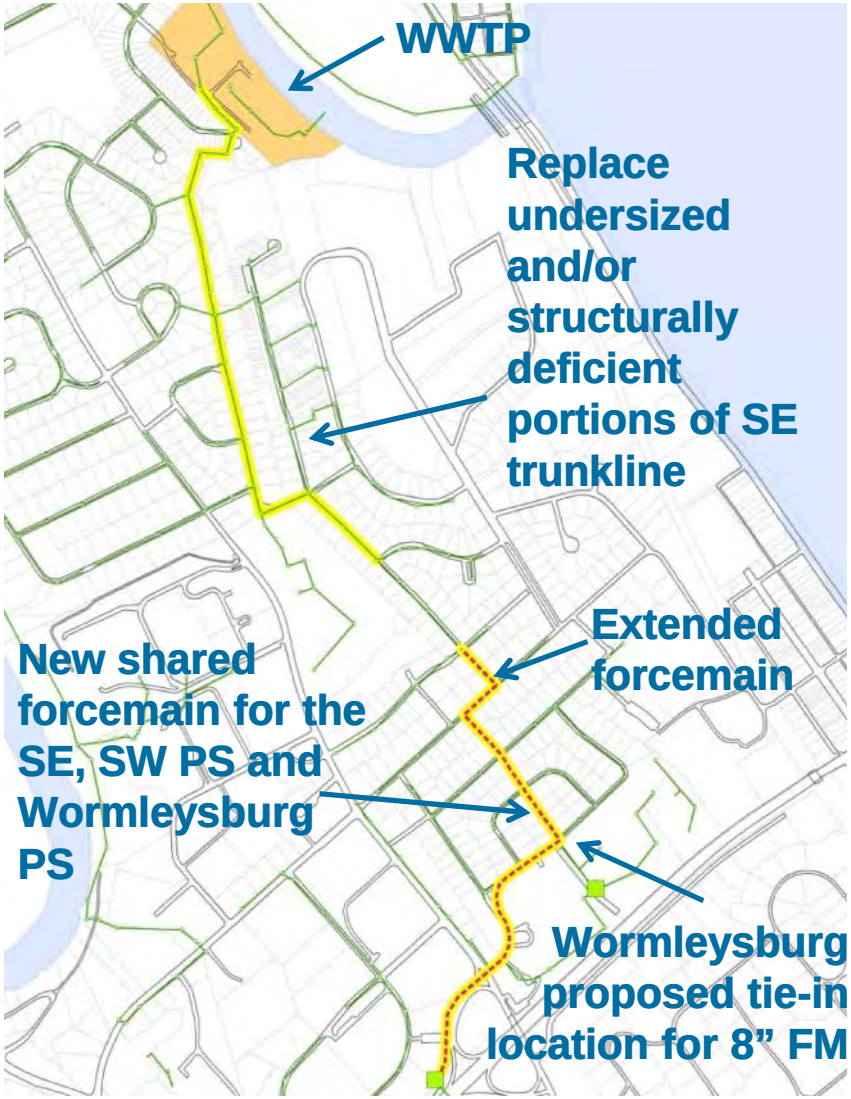
Sanitary sewer system

- 260 miles of sanitary sewer mains
- 11 pumping stations
- 4.4 MGD WWTP
- Serves a population of 21,000 within the Township
- Serves a portion of Hampden Township and now all of Wormleysburg Borough
- Project area in southeast corner of Township



Original facilities

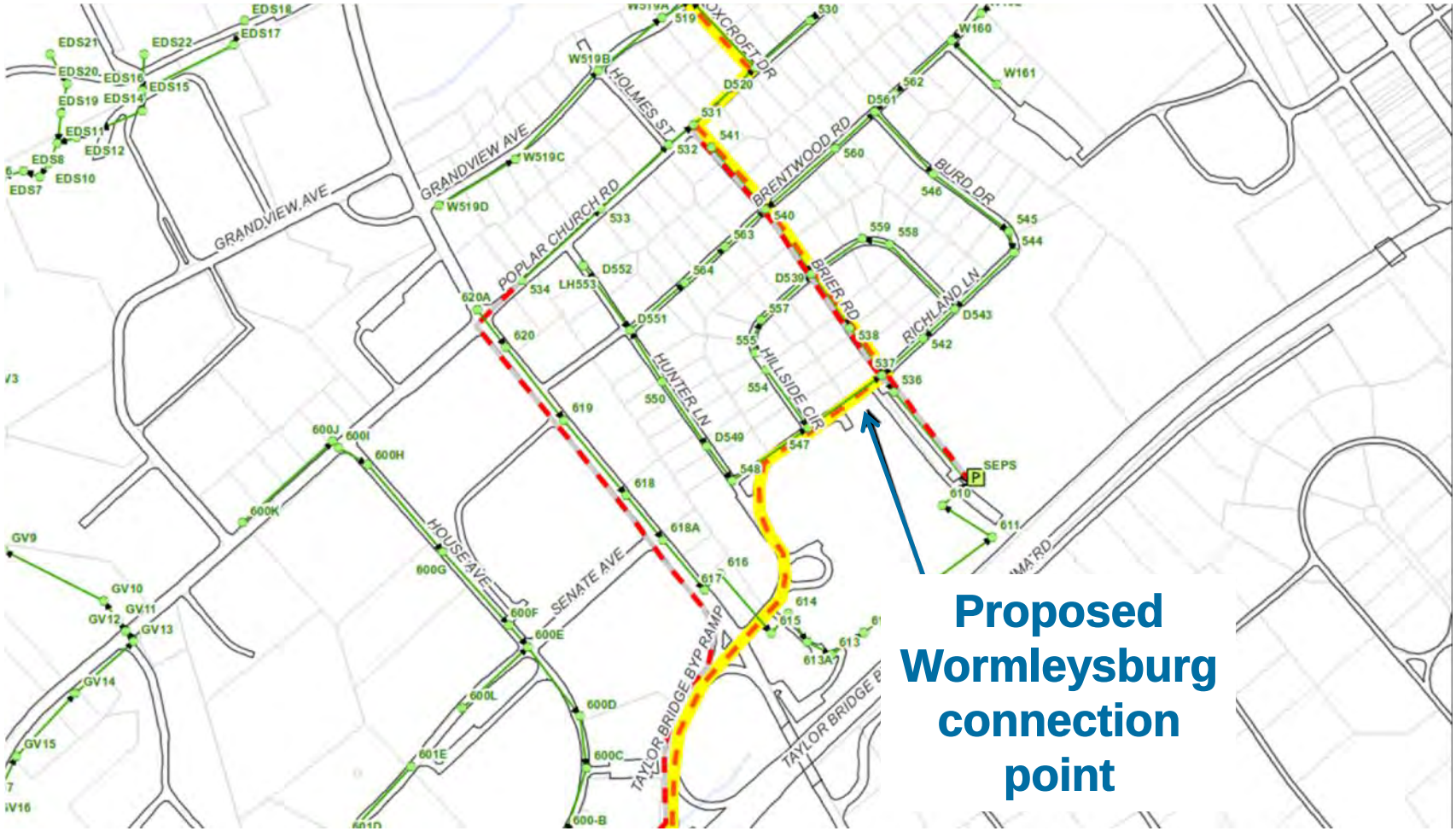
- Original system constructed in 1958
- WWTP expanded in 1960 when Southeast Trunk and Southeast and Southwest Pumping Stations were constructed.
- Original Southeast Trunk was 12”-15” VCP, mostly through undeveloped area
- Force mains for Southeast and Southwest pumping stations were 6” C.I.P. and 8” C.I.P., respectively.



Planned project

- In order to serve Wormleysburg, the Township would need to replace/rehabilitate the following:
- 3,300 feet of 8” &10” FM
- 3,700 feet of trunk sewer
- Install pinch valve in the Southeast Pumping Station to control flows in the shared FM

Background – forcemain layout



Actual project

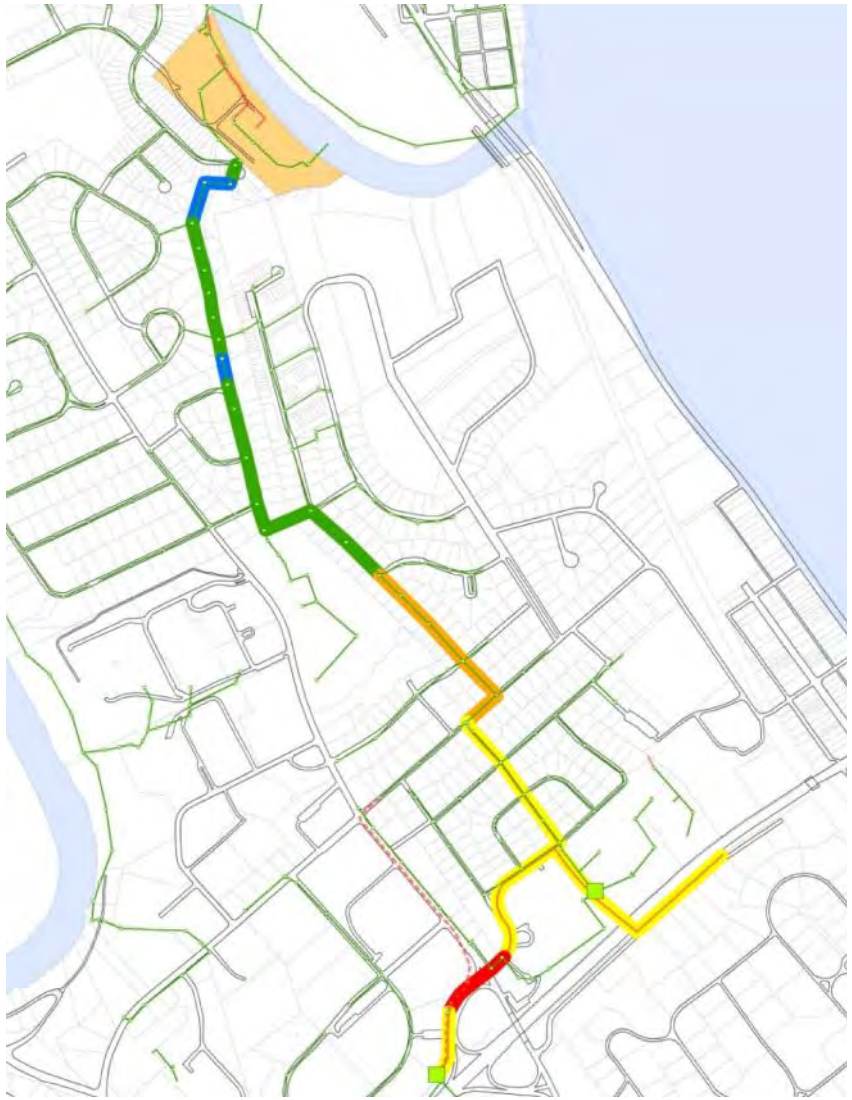
DIRECTIONAL DRILLING

LINED PIPE

OPEN CUT GRAVITY

OPEN CUT FORCE MAIN

PIPE BURST



Design challenges

- Force main crossed a congested PennDOT intersection and open cut was not permitted
- Multiple underground utilities located within the PennDOT intersection
- Streets had recently been paved in areas where the sewer needed to be repaired/ replaced
- Substantial fill had been placed over the southeast trunkline in locations

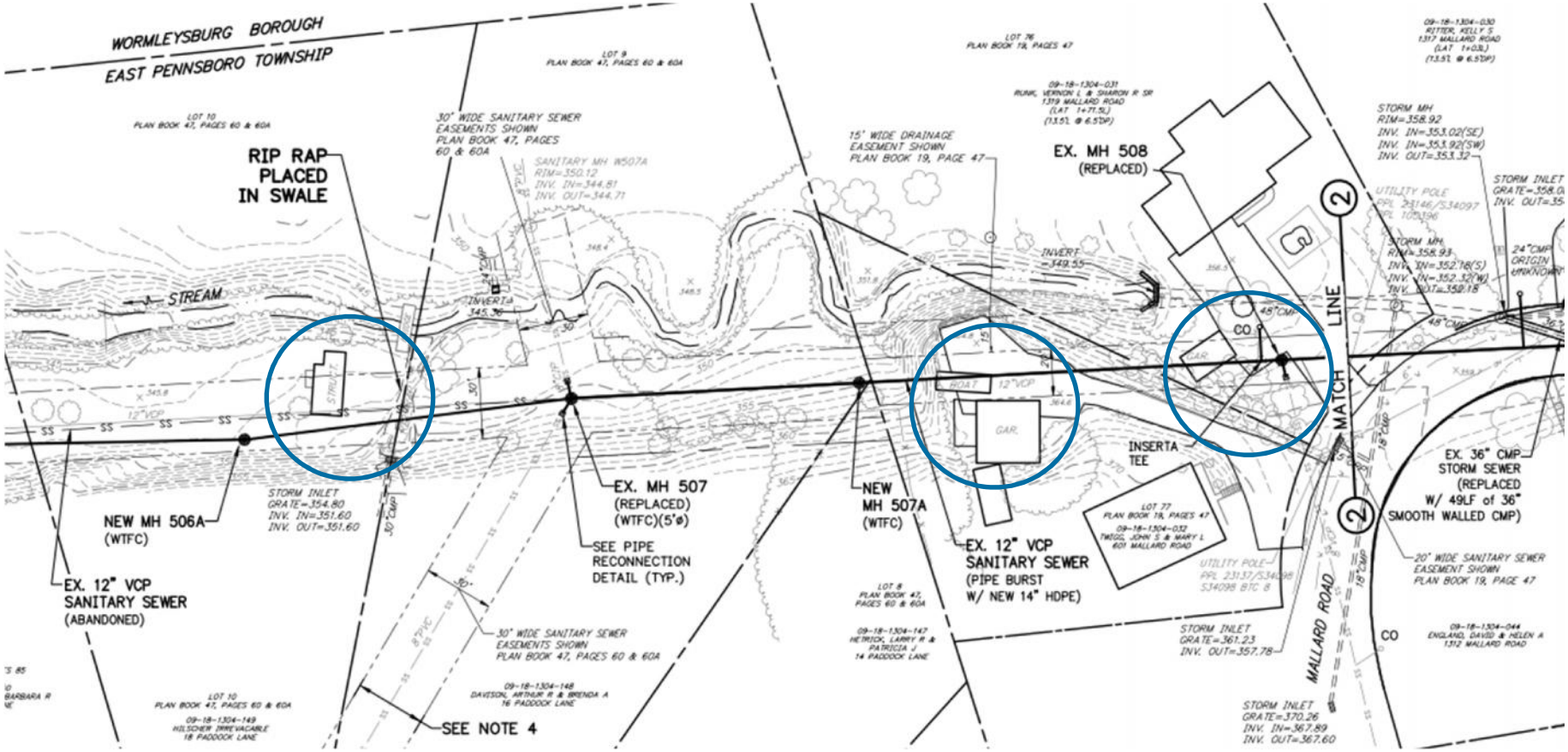
Design challenges

- Trunkline was located in areas that had steep slopes
- Homeowners constructed pools and sheds overtop of the trunkline
- Trunkline could not be rerouted due to existing structures, terrain, wetlands and a branch of the Conodoguinet Creek
- Difficult access areas
- Tight construction areas
- Storm sewer conflicts

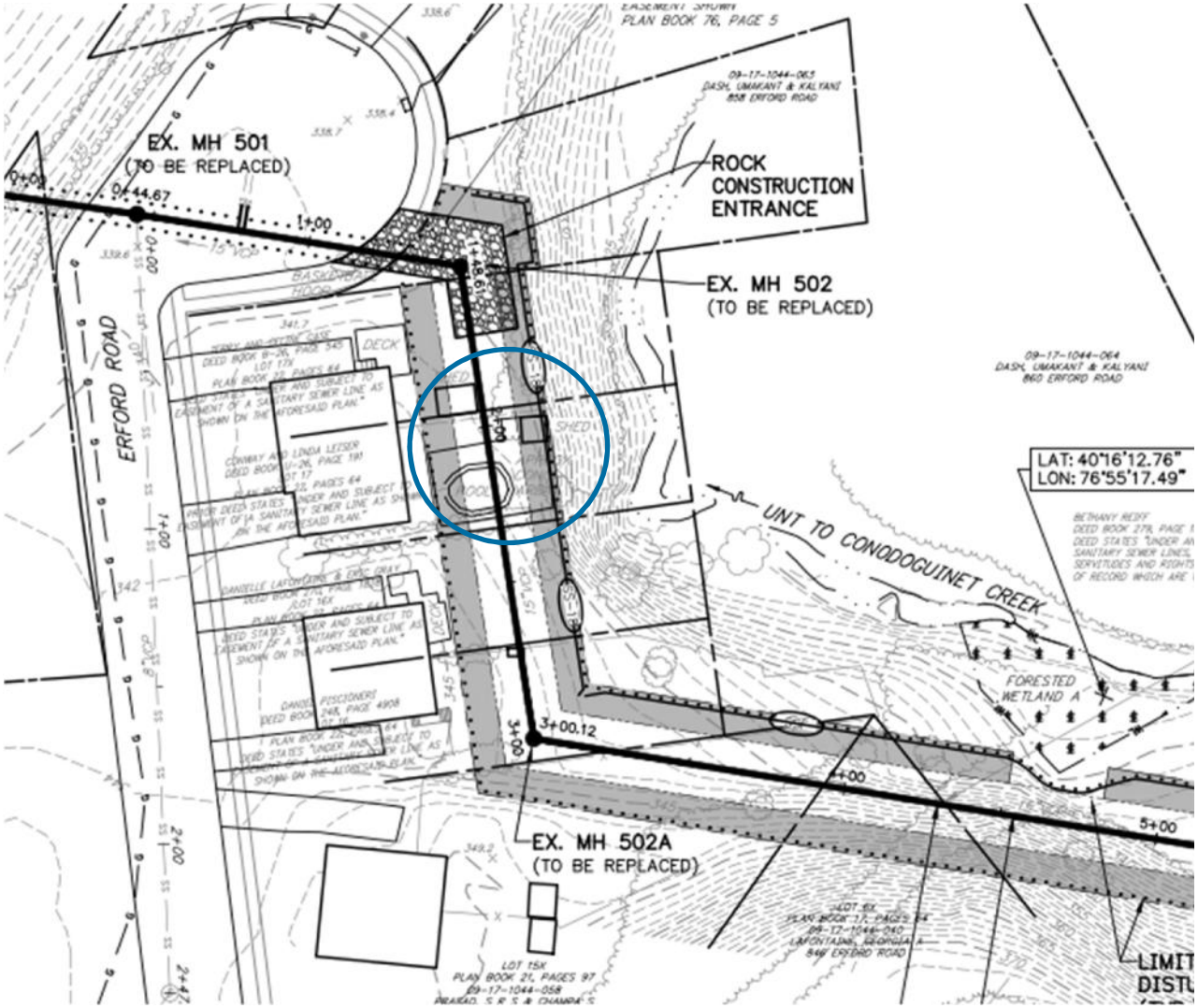
Design challenges – PennDOT intersection

Design challenges – recently paved road

Design challenges – sheds, garages, fences and other structures

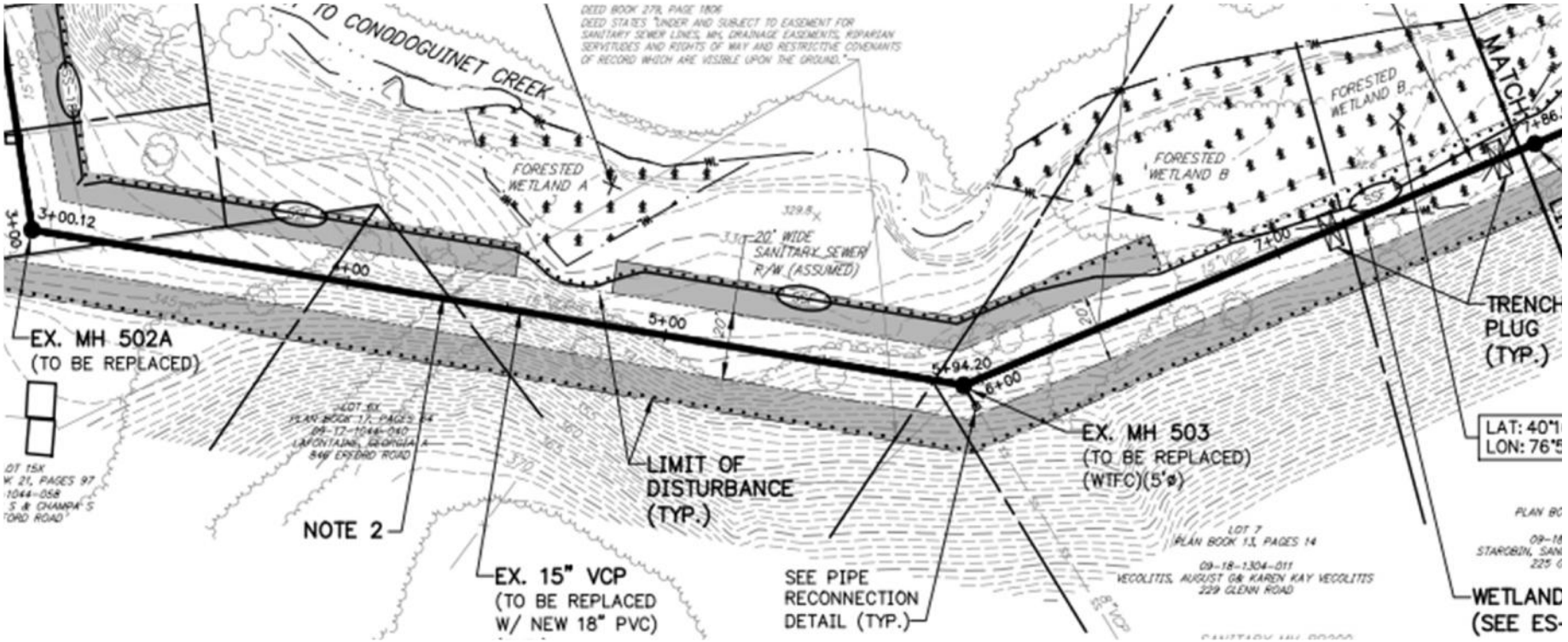


Design challenges – pools, sheds, and fences



Design challenges – fences and sheds

Design challenges –steep slopes & wetlands



Design challenges – difficult access areas

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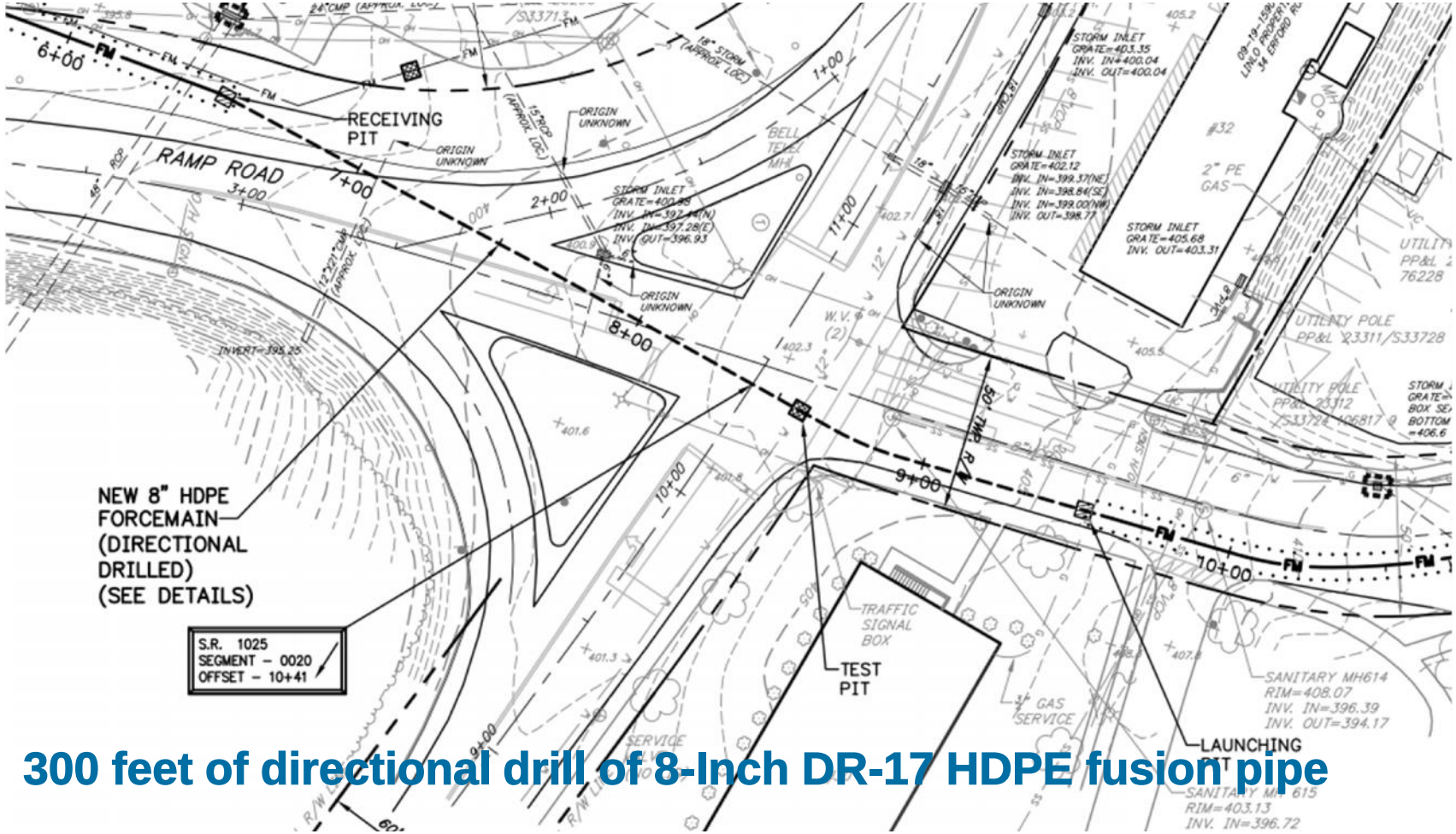
Solutions for areas where open cut was not feasible or practical

- **Directional drilling** new force main through the PennDOT intersection that could not be open cut
- **Lining** the portion of the trunkline in newly paved PennDOT road that was leaking or with structural deficiencies but otherwise had adequate capacity to carry peak flows
- **Pipe bursting** the portions of the trunkline in areas with difficult access, obstructions, and/or steep slopes that were in poor condition and/or needed additional capacity

Directional drilling



300 feet of directional drill of 8-Inch DR-17 HDPE fusion pipe

Lining

- 1,380 feet of 12-inch vitrified clay pipe with Blue-Teck CIPP liner from Reline America, Inc. and 4 brick manholes were lined with Sprayroq

Pipe bursting

Performed by No-Dig Pipe Liners, Inc.

- First location
  - 450 feet of 20-inch HDPE pipe through 15-inch VCP
  - Sewers were 15 feet deep
  - Directly behind and close to existing houses
  - Underneath pools and sheds

Pipe bursting

Performed by No-Dig Pipe Liners, Inc.

- Second location
  - 180 feet of 14-inch HDPE pipe through 12-inch VCP
  - Sewers were 8 to 18 feet deep
  - Underneath an existing driveway and boat storage areas and sheds

Pipe bursting

Pipe bursting

Pipe bursting

Pipe bursting

Pipe bursting

Project timeline

- Design authorized in February 2011
- Bids opened on March 2, 2012
- Notice to Proceed issued to general contractor on May 15, 2012
- Project substantially complete January 10, 2013
- Wormleysburg connected new force main to East Pennsboro's sewer system on January 13, 2013

Construction costs

Total construction costs were $1.35 Million

• **Force main**	**$300,000**
- Open cut	$251,819
- Directional drill	$ 39,657
- Traffic/bypass pumping	$ 8,000
• **Trunk line**	**$618,000**
- Open cut (main/laterals/MHs)	$348,108
- Lining	$101,559
- Pipe bursting	$151,170
- Traffic/bypass pumping	$ 17,000
• **Storm sewer**	**$152,000**
• **Paving**	**$199,500**
• **Misc.**	**$ 81,000**

Construction costs

Directional drill

- 3% of total construction costs

Lining

- 7.5% of total construction costs

Pipe bursting

- 11% of total construction costs


Thank you!
Questions?
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