Collaboration and Innovation Leads to Great Changes in Sewer Conveyance

Shrewsbury, MA

Weston & Sampson

Town of Shrewsbury, MA

Town Information:

- Located adjacent to Worcester, 36 miles west of Boston
- Population: 38,325 (2020 federal Census)
- Size: 21.66 sq miles, 1.05 sq miles of lakes and ponds
- Elevation: 755 ft above sea level in the Rawson Hill area to approximately 350 ft in the Edgemere area
- Five member Board of Selectmen and Town Manager
- Board of Selectmen also serve as Water Commissioners
- Three member Sewer Commission appointed by the Town Manager
- Municipally owned Light and Cable Department

Shrewsbury's Water Systems

Water System:

- 207.93 miles of mains
- 3 pressure zones
- 11,691 service connections
- 1,538 fire hydrants
- D3/T3 System
- Approximately 95% of the town is serviced by municipal water
- Established in 1905

Shrewsbury's Wastewater System

Wastewater System:

- 169.97 miles of mains

- 39 pump stations

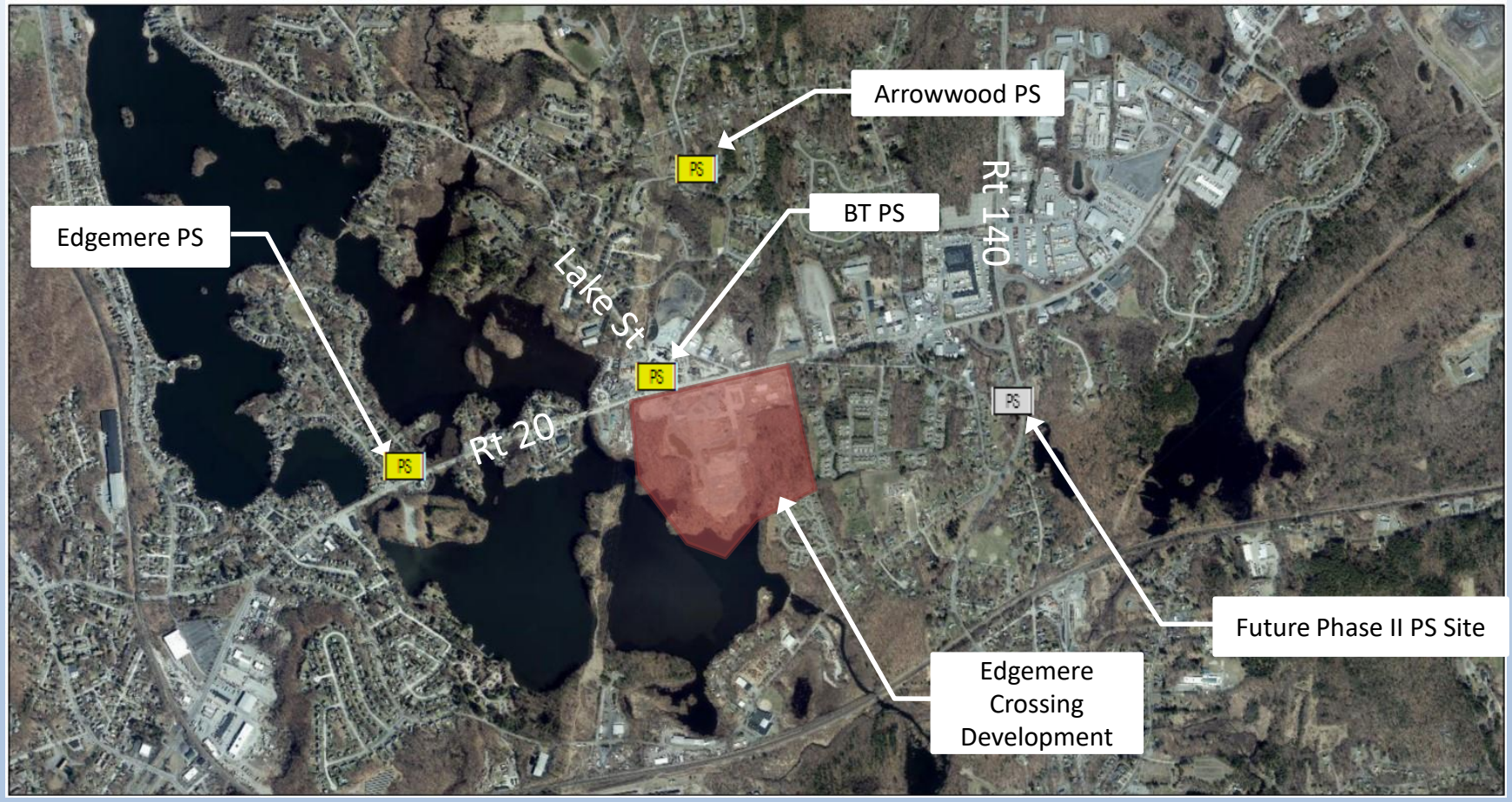
- 4,330 manholes

- The Town had a WWTP until the mid 1980's and then regionalized with Westborough. Most flow goes to Westborough and some goes to the Upper Blackstone Clean Water facility and the Town of Grafton.

- Approximately 90% of the Town is serviced by municipal sewer

- Established in 1963

The Route 20 Corridor



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Collaboration

- Capacity was identified at the Upper Blackstone Clean Water facility
- In 2016, state officials recognized the economic and environmental benefits of expanding sewer along the Route 20 corridor in Worcester and Shrewsbury and awarded Worcester with a 10 million dollar grant, which was matched by the City
- In December 2018, the IMA between Shrewsbury and Worcester was finalized to allow 1.5 MGD to flow to the Upper Blackstone Clean Water facility
- In January 2019, an easement at 625 Lake Street was finalized to allow for the BT Pump Station

Route 20 Corridor Project – Phase 1

- Evaluated and designed by Weston & Sampson, Phase 1 included over 8,600 feet of HDPE forcemain, one new pump station (BT Pump Station) and rehabilitation/redirection of two pump stations (Arrowwood and Edgemere Pump Stations
- This would extend sewer from the Worcester City line to Lake Street
- Sewer flow from the Arrowwood Pump Station was redirected to this new sewer to reduce the strain on the Westborough WWTP and the Town's two primary pump stations, Rolfe Avenue and Maple Avenue

Project Funding and Contractors

- Sewer Surplus Funds were used to fund the Phase 1 sewer expansion in Shrewsbury
- In July 2019, a contract was awarded to Pride Environmental for the construction of the BT Pump Station
- In April 2020, a contract was awarded J.L. Raymaakers & Sons, Inc. for the two pump station rehabilitations and the sewer force main installation in Route 20

Project Benefits

- Economic development opportunities along the Route 20 Corridor
- Approximately 125,000 gallons of sewer (ADF) was redirected from our primary pumping stations per day
- Reduction in the Town's inter-basin transfer (SuAsCo and Blackstone)
- SCADA equipment was replaced as part of the project and the existing equipment was reinstalled at two other pump stations
- Sewer service allowed for a large mixed use development at the former 67.74 acre Edgemere Drive-In site
- The next phase will address a failing septic system at a large commercial facility
- Standardization of pump station equipment and controls

Pump Stations

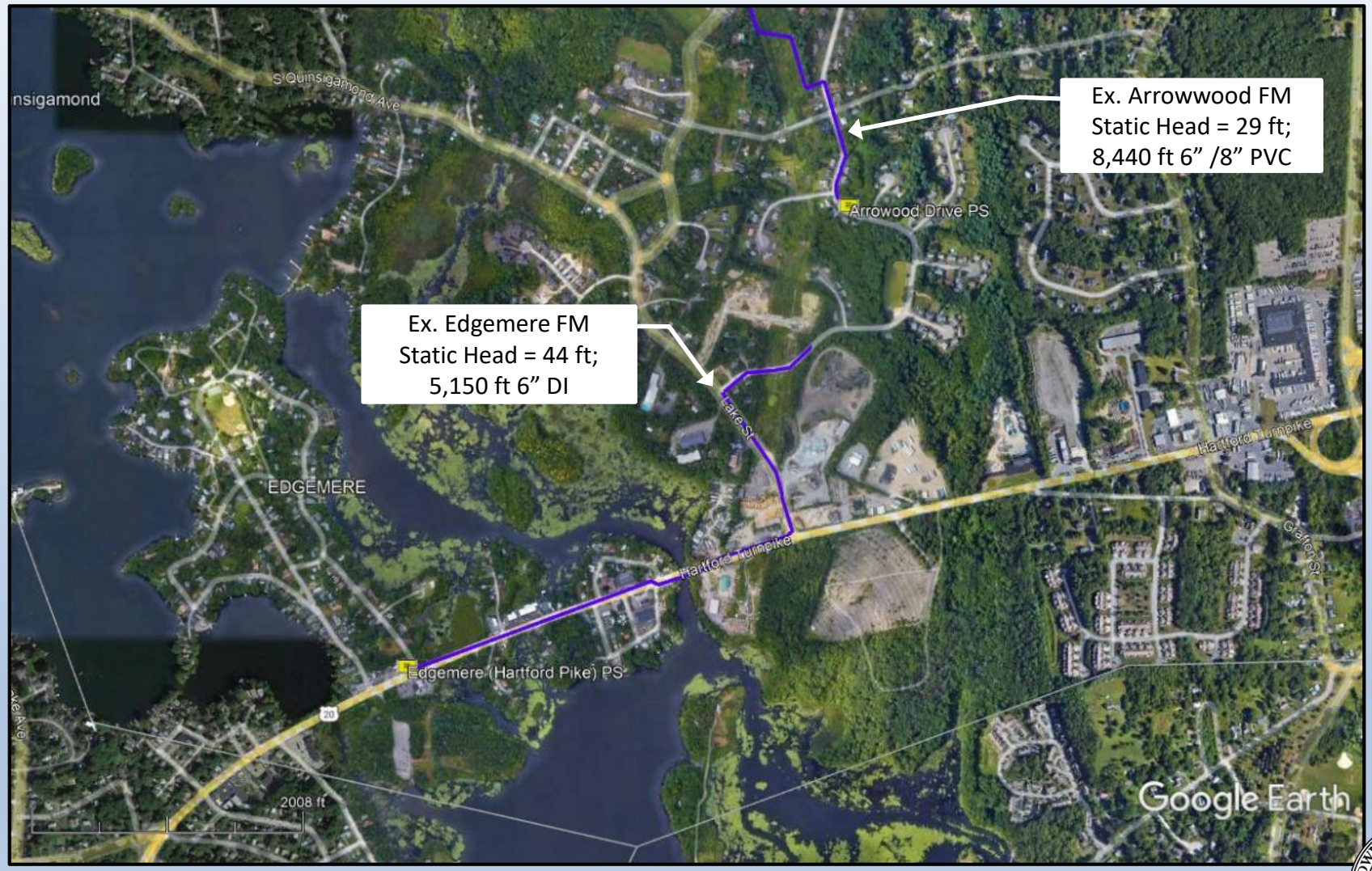
- Project required one new pump station and two rehabilitations due to complex pumping requirements/scenarios

BT Pump Station

Edgemere Pump Station

Arrowwood Pump Station

FM Routing & Hydraulics



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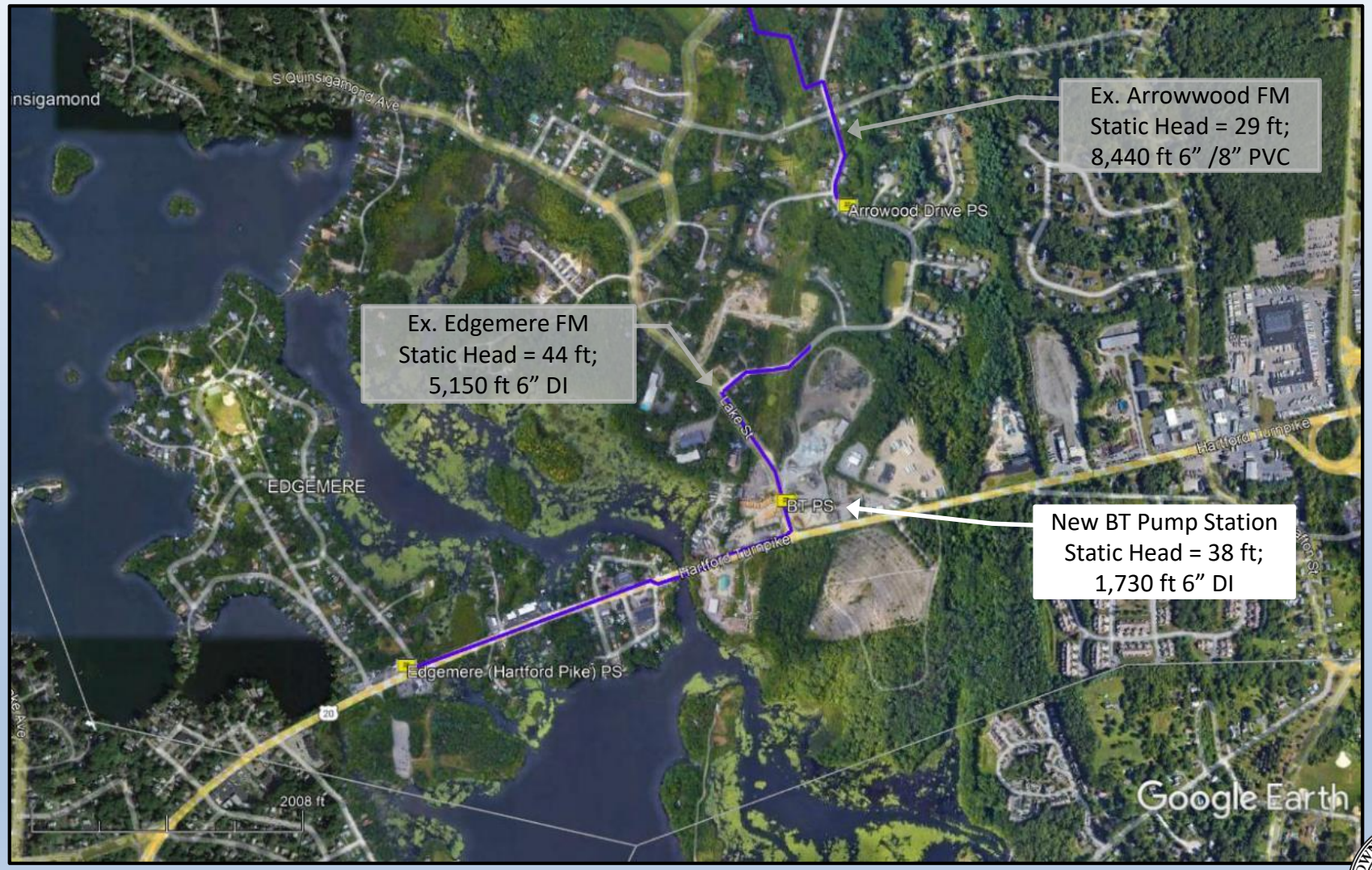
TOWN OF SHREWSBURY MASSACHUSETTS

FM Routing & Hydraulics



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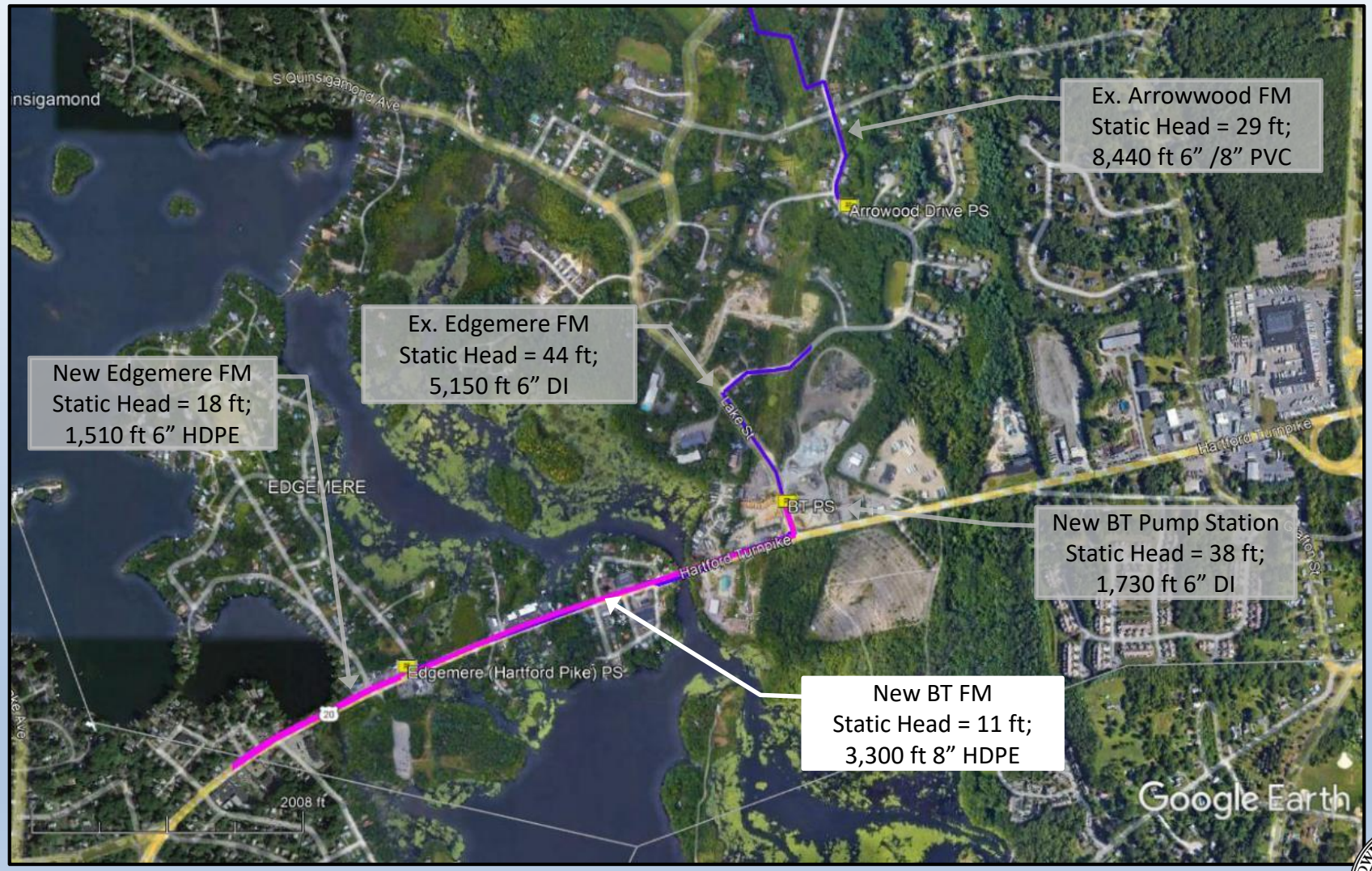

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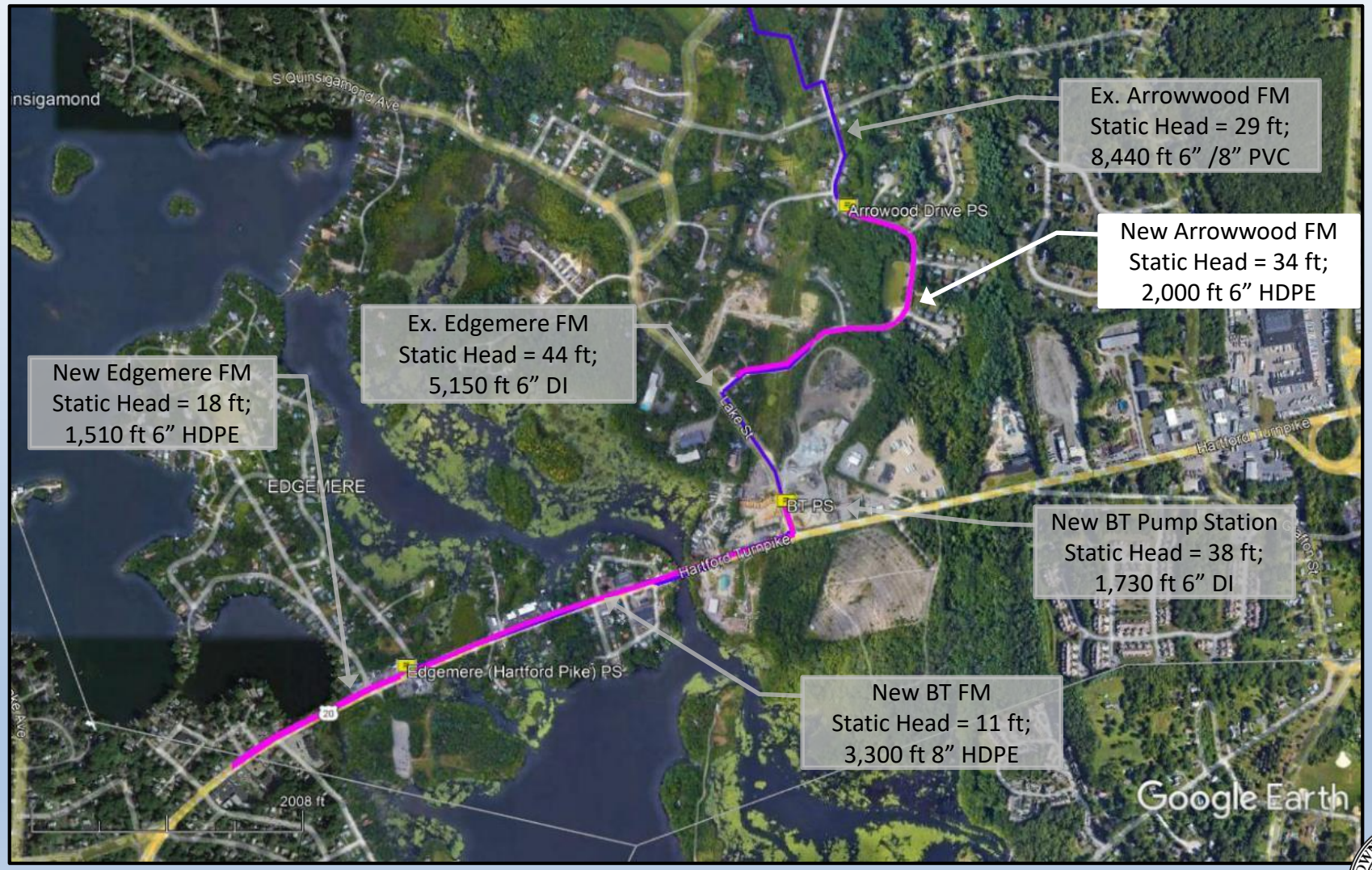

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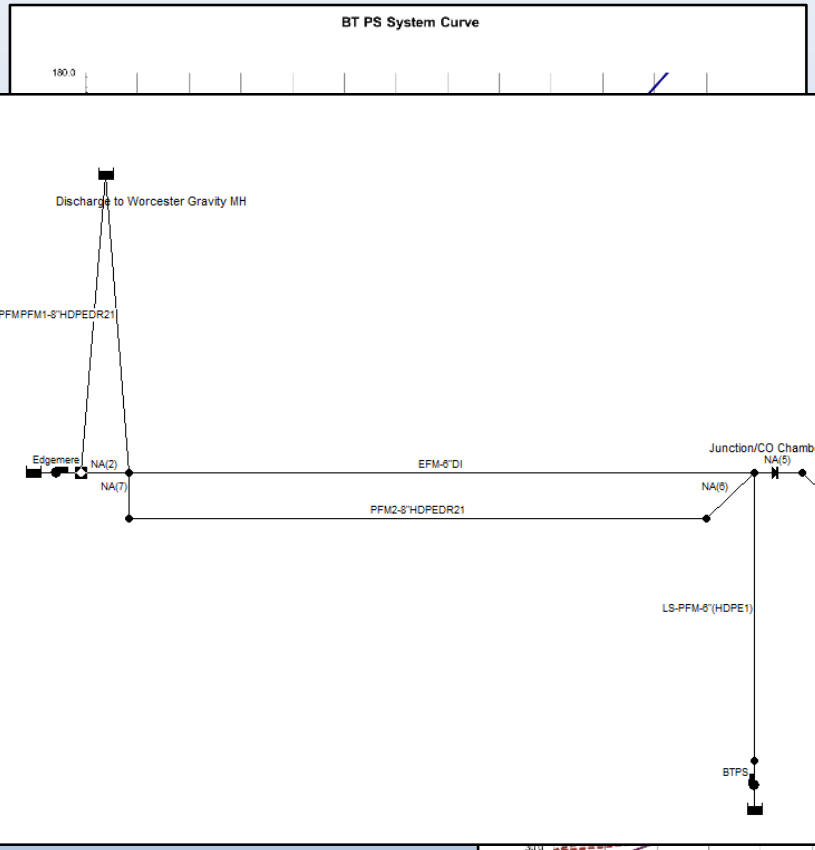
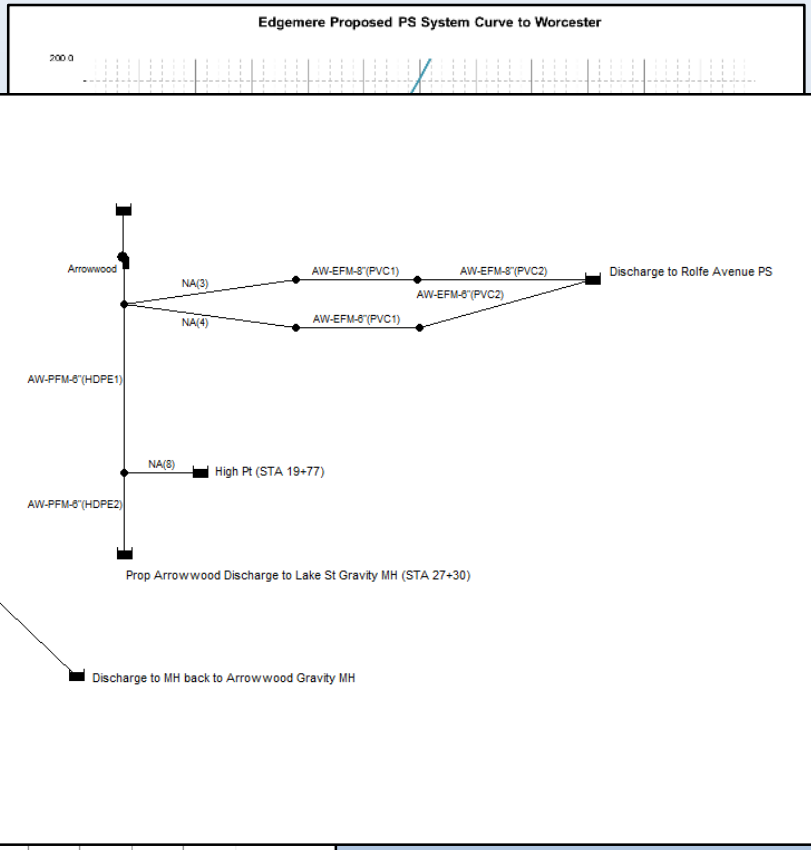
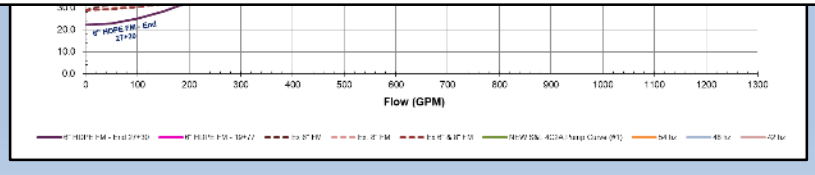
Hydraulic Calculations







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TOWN OF SHREWSBURY MASSACHUSETTS

Hydraulic Calculations

- BT Pump Station
  - 680± gpm to Arrowwood (Existing 6”, 500± gpm w/ Edgemere on)
  - 850± gpm to Worcester (New 8”)
- Edgemere Pump Station
  - 280± gpm to Arrowwood (Existing 6”, 200± gpm w/ BT on)
  - 600± gpm to Worcester (New 6”)
- Arrowwood Pump Station
  - 520± gpm to Rolfe (Existing 8”)
  - 540± gpm to BT PS (New 6”)

Pump Stations

- BT Pump Station (New Submersible PS)

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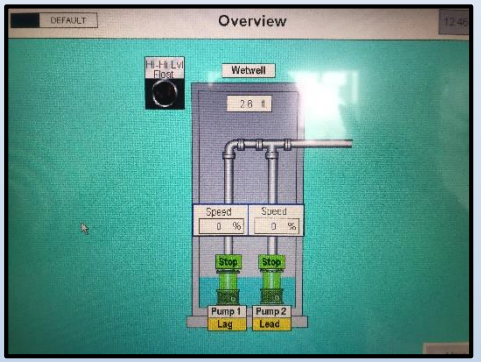
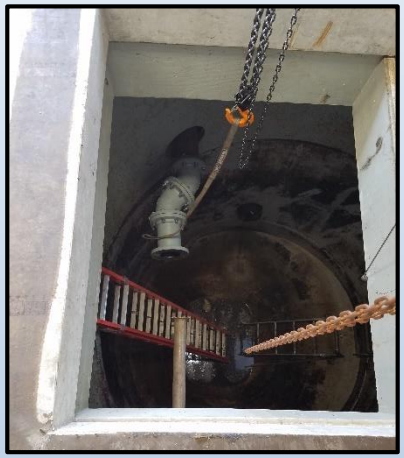


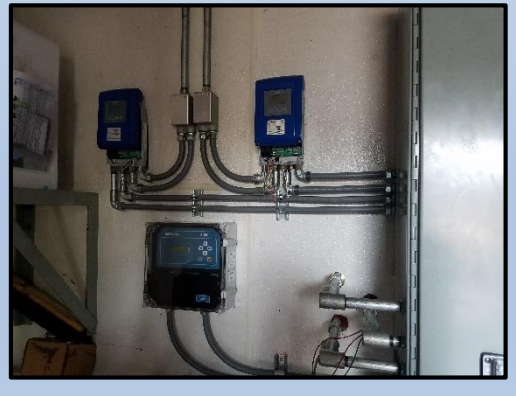
Pump Stations

- Edgemere Pump Station (Existing)

Pump Stations

- Edgemere Pump Station (New)





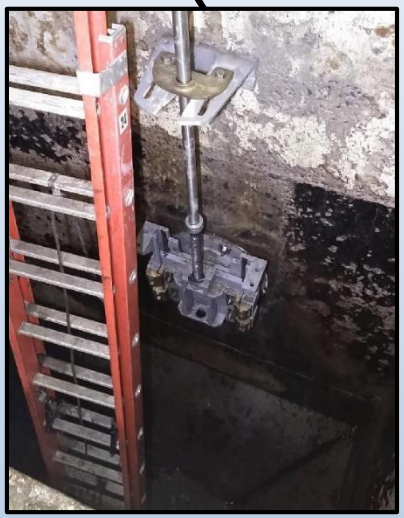
Pump Stations

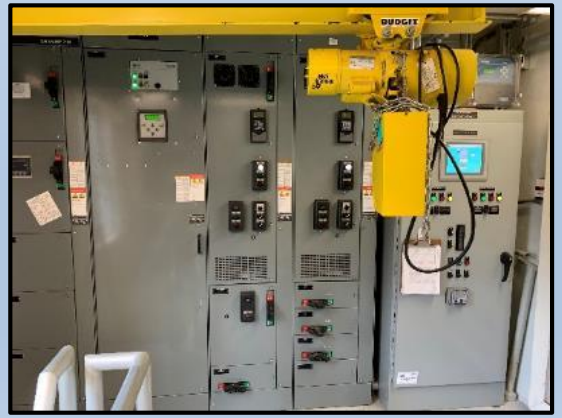
- Arrowwood Pump Station (Existing)

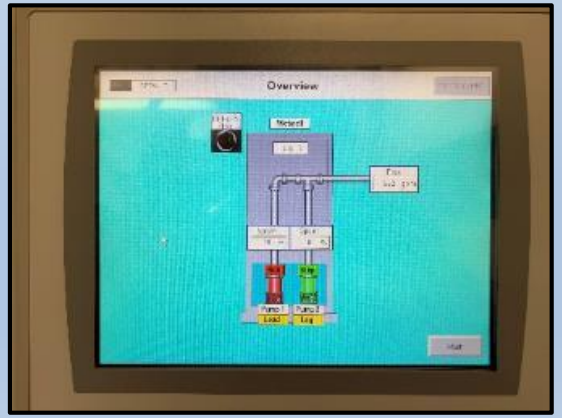
Pump Stations

- Arrowwood Pump Station (New Work)









Force Main & Soil Sampling

- 6-inch Ductile Iron
- 4 locations
  - Exterior corrosion
  - Up to 78% pipe thickness loss
- Corrosive soils
  - Low resistivity
  - Chlorides
  - High groundwater

New Pipe Installation

- HDPE force main

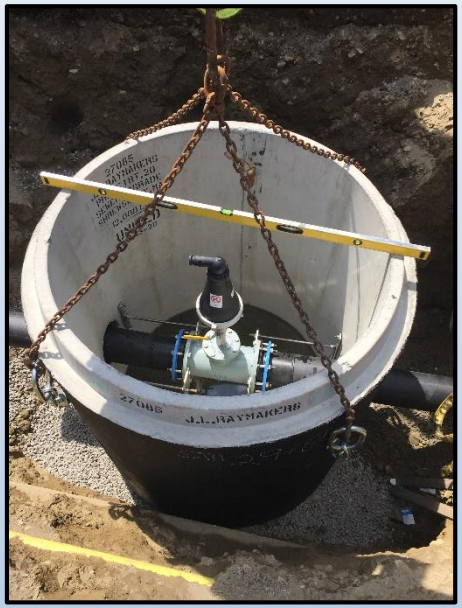
  - 1,450 LF dual 6” & 8” force main on Route 20
  - 3,120 LF single 8” force main on Route 20
  - 200 LF single 8” force main on Local Roads
  - 2,725 LF single 6” force main on Local Roads

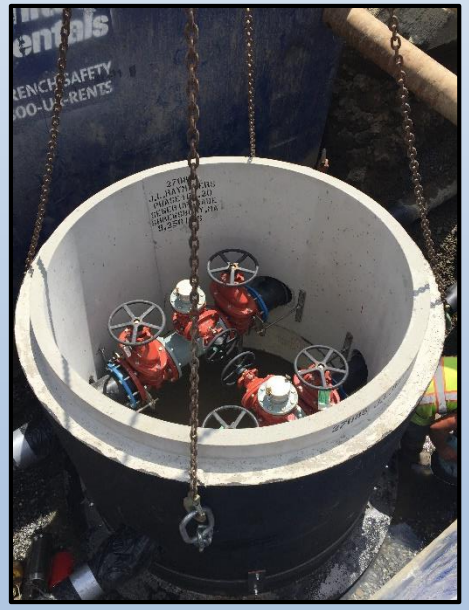
Total Pipe Installed = 8,650 LF

Force Main Structures

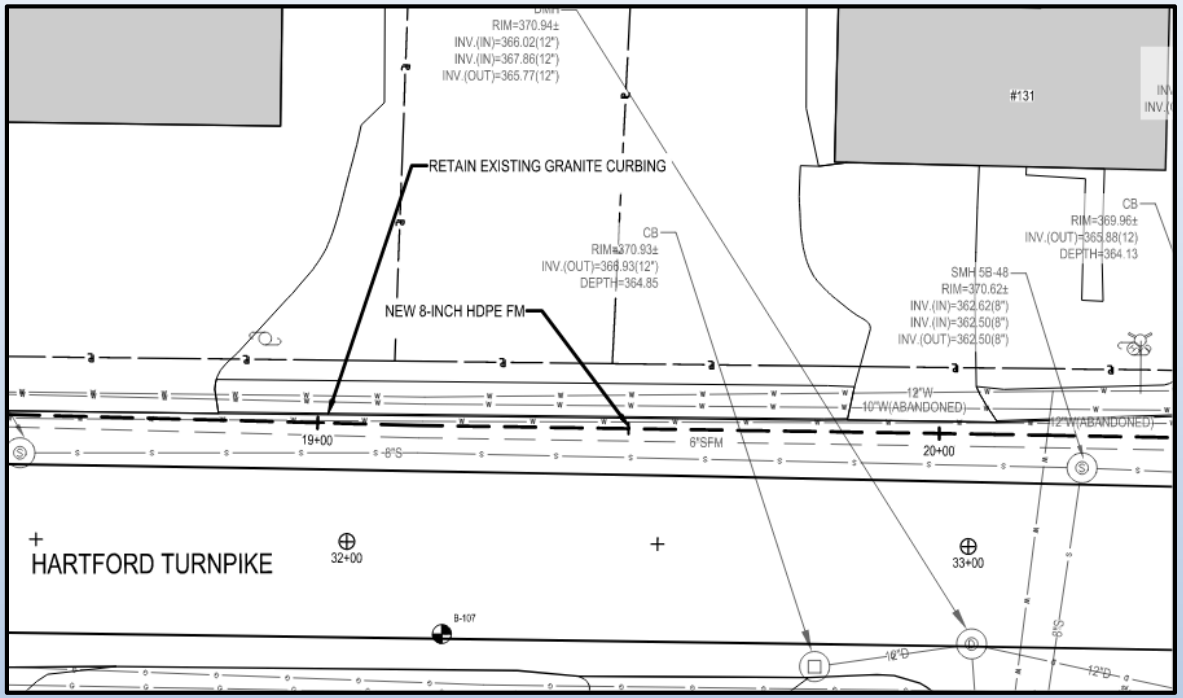
- Force Main Structures
  - Four single cleanout manholes (4’ dia.)
  - Four single air release manholes (5’ dia.)
  - Two dual cleanout manholes (6’ dia.)
  - One dual air release manhole(6’ dia.)
  - One 6’ x 8’ Valve Vault
  - One 6’ x 8’ Meter Vault

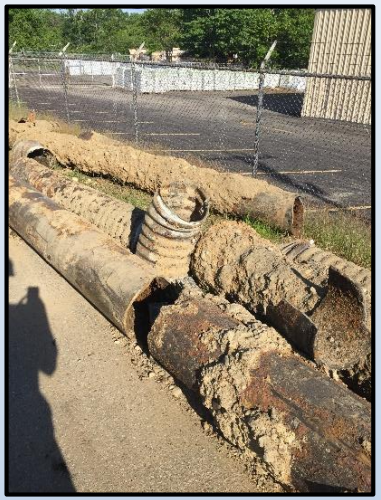
13 total structures





Obstacles/Challenges





- Other utilities
  - Active sewer force main often in trench
  - Parallel active/abandoned water/sewer mains
  - Drainage often in trench
  - General crossings (gas, water, sewer, cable)
  - Concrete slab in center of road

Obstacles/Challenges

- COVID Supply Chain Delays
  - Manufacturing delays for structures
  - Pipe installed, structures “cut” in later
- Bridge Crossing
  - Limited open bays
  - Environmental protection
  - Approach slab removal/replacement

Obstacles/Challenges

- 15” Gravity Pipe Install: Lake Street @ Route 20
  - Non-excavatable fill
  - 4 days of jackhammering – 2 crews
    - 12-inch water main crossing
    - 4-inch gas crossing
    - 6-inch force main crossing
  - 15 VF trench

Thanks COVID-19?

- Significantly reduced traffic volumes
- Allowed for day-time work, safer work environment, better progress and quality of work
  - Pipe work start end of May 2020
  - Pipe work complete October 2020

Project Success

- Minimize Change Orders/On budget
- Avoid above ground bypass due to innovative pipe configurations
- Communication with MassDOT and City of Worcester (IMA)
- Reduces strain on Westborough WTF
- Reduces inter-basin transfer
- Innovative sewer design for flexibility

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thank you

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transform your environment

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