



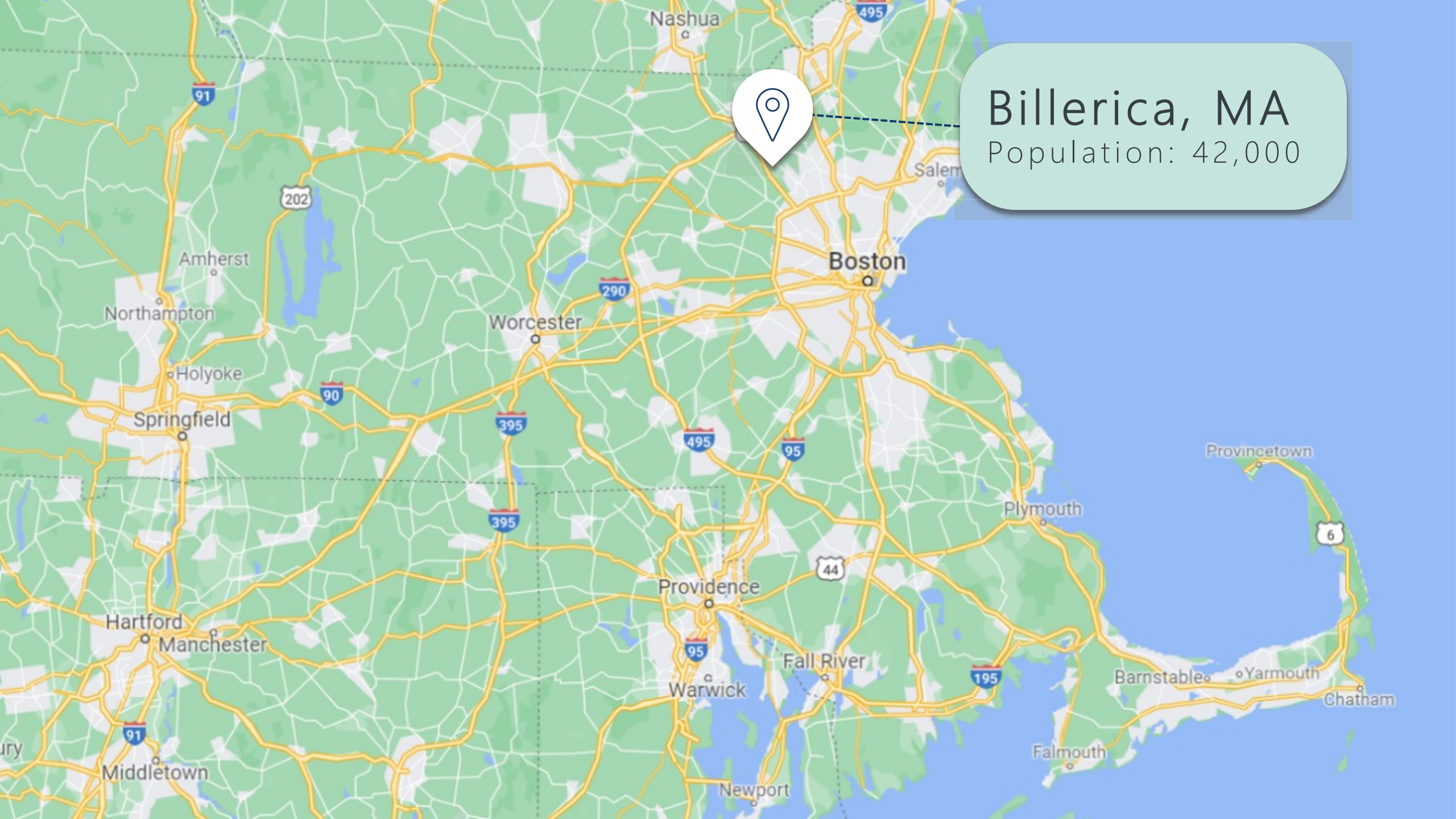
# HAVE YOU EVER BEEN RAILROADED?

Lessons from a Force Main Repair in a Railroad Right-of-Way

January  
2022

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Water Resource Recovery Superintendent  
Town of Billerica, MA

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Project Manager  
Woodard and Curran



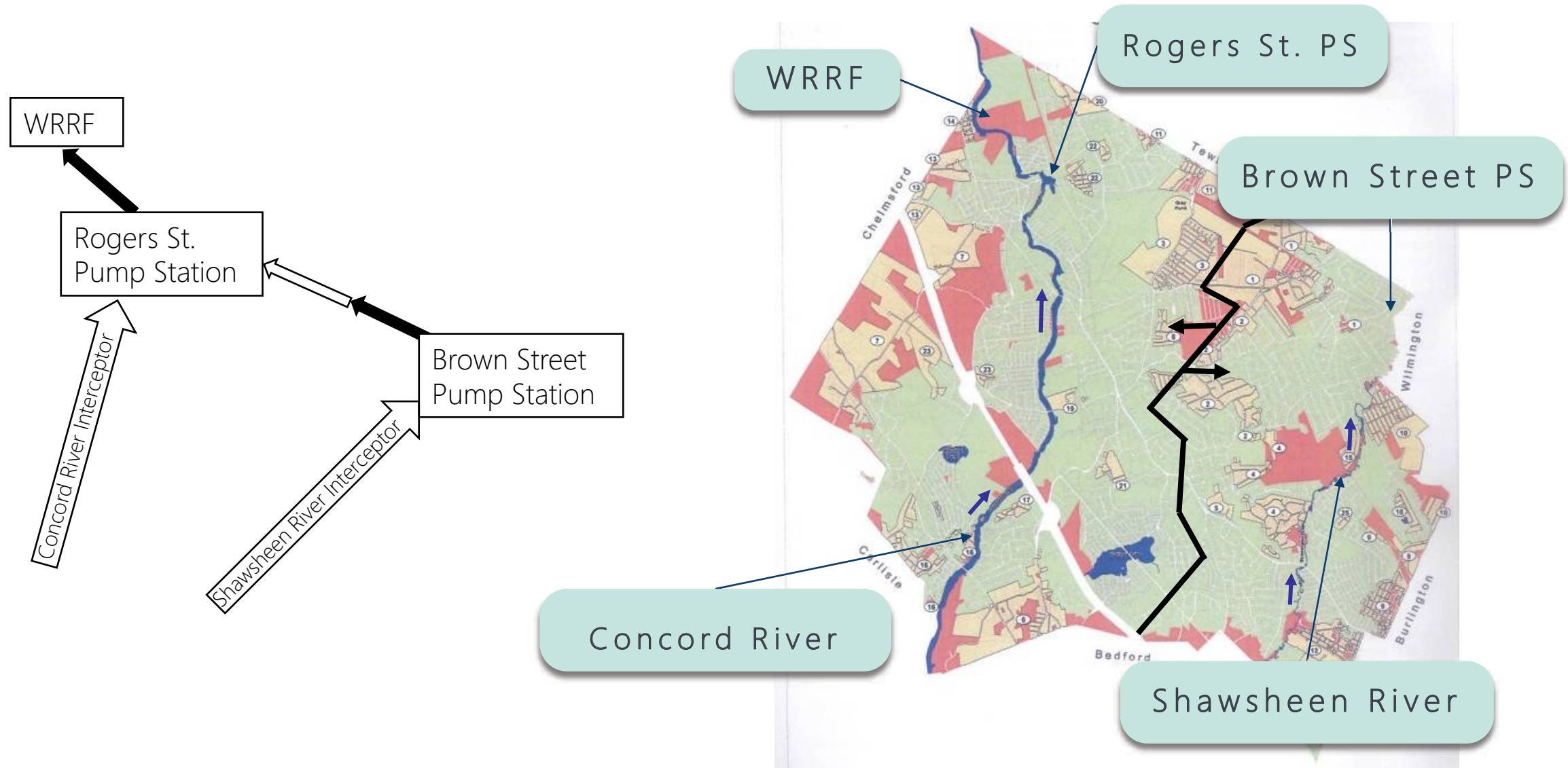
**Billerica, MA**  
Population: 42,000

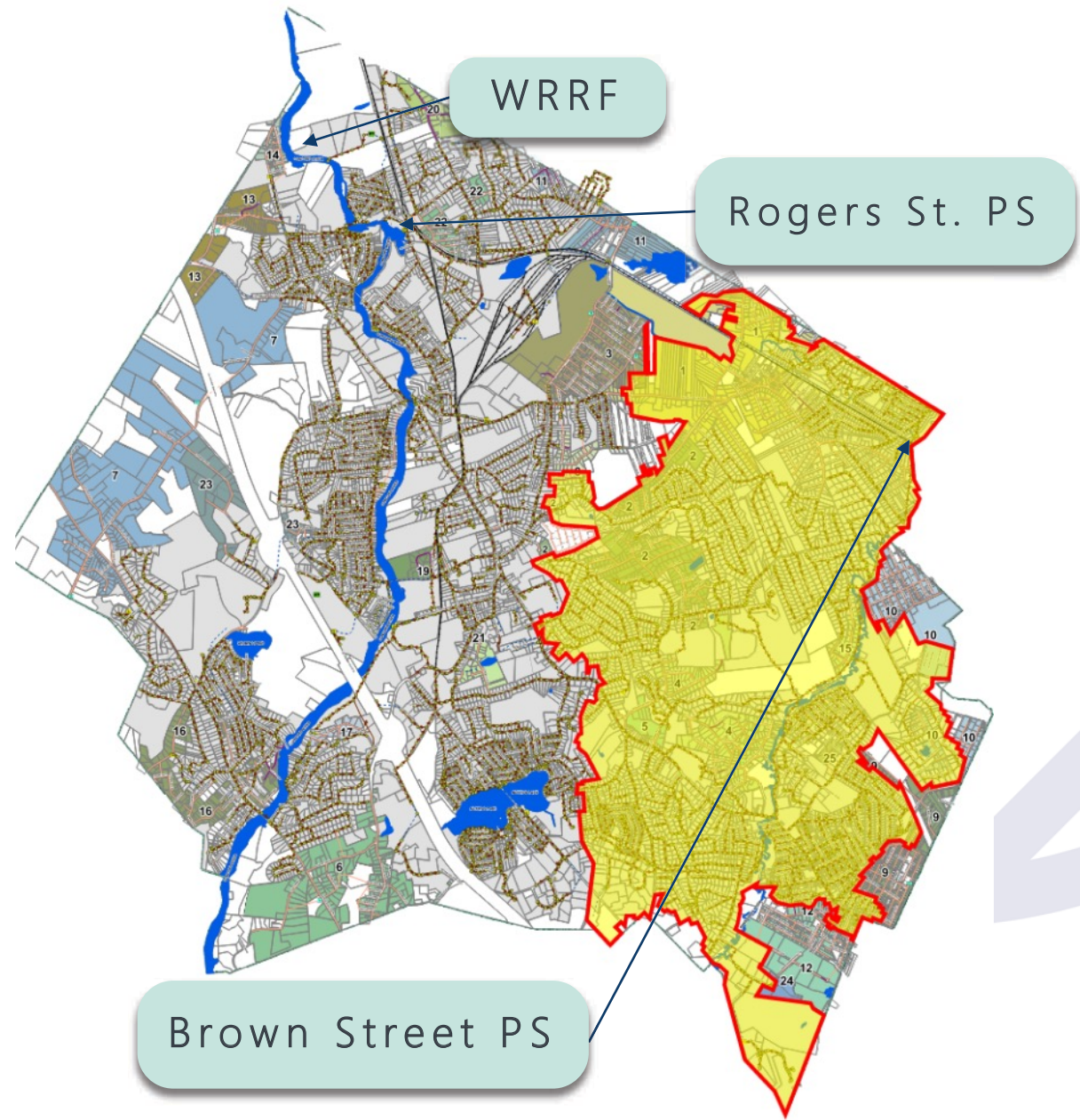
# BILLERICA, MA SEWER SYSTEM

- 85% Sewered
- 21 pump stations
- 14 miles of force main
- 175 miles of gravity pipe

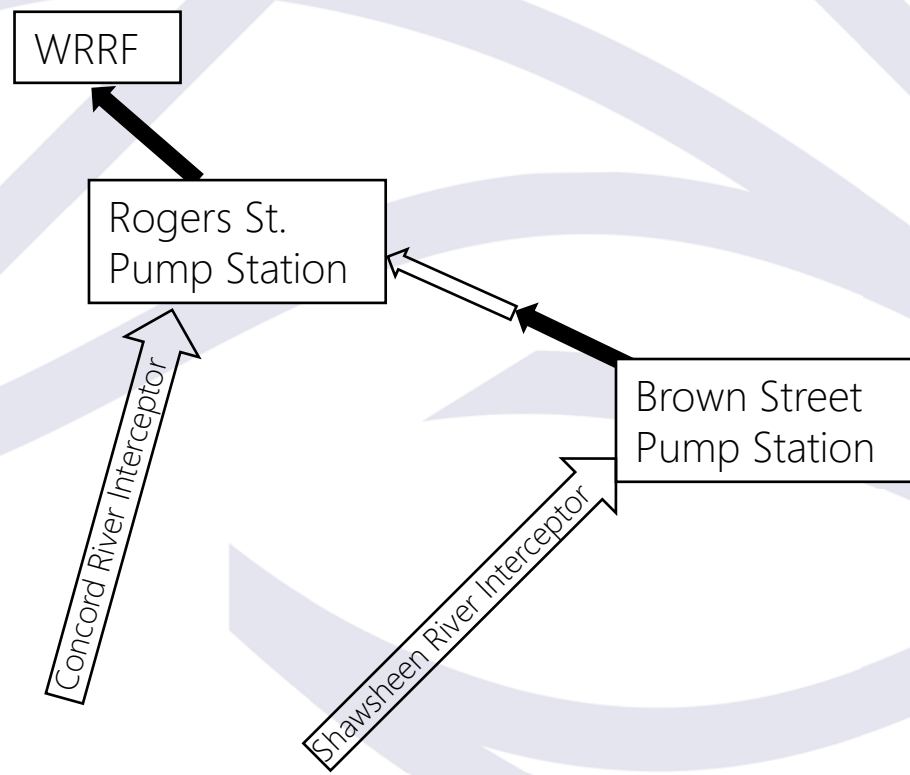


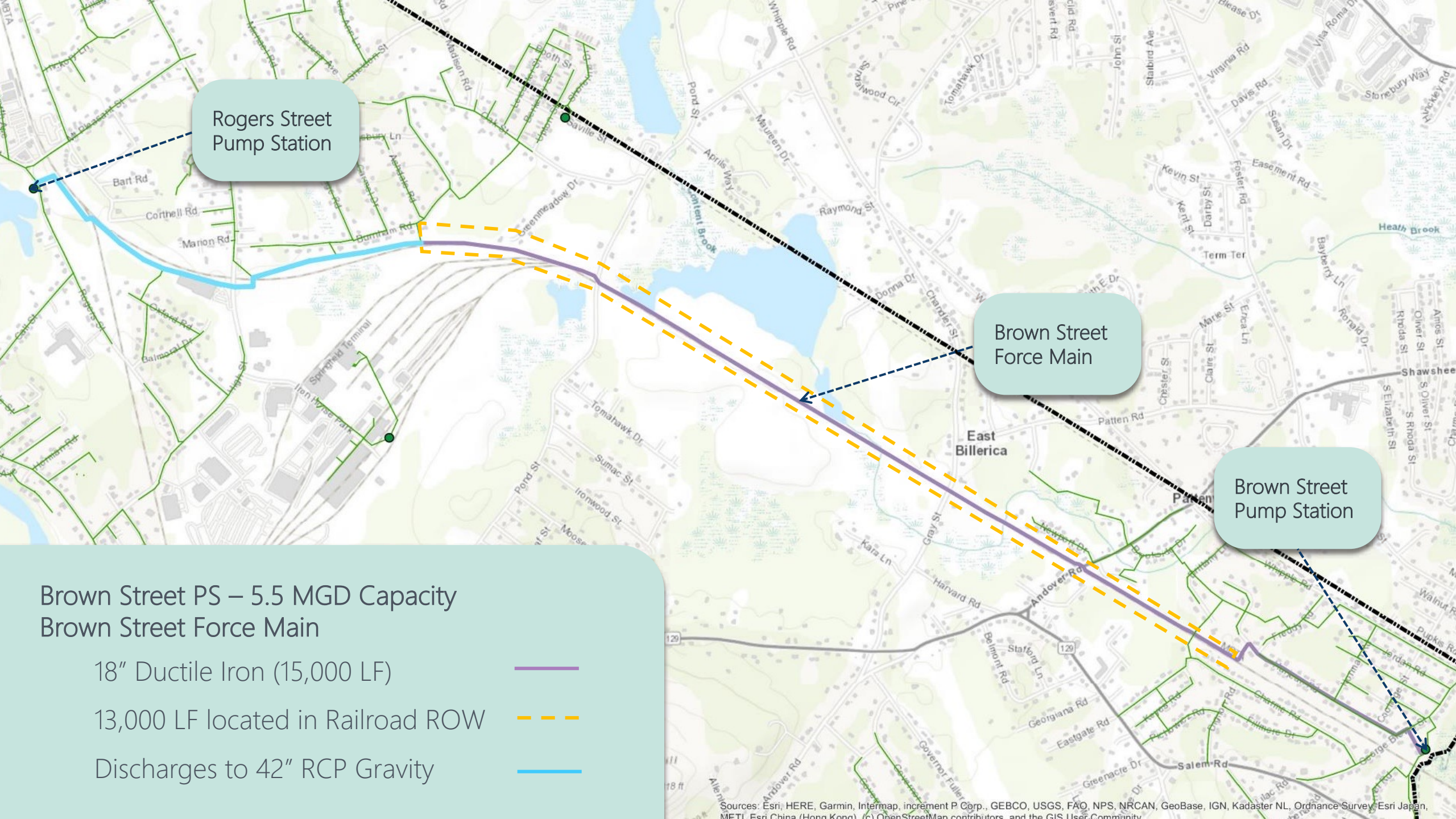
# BILLERICA, MA SEWER SYSTEM





Approx. 30% of Town's Sewer is pumped from the Brown Street Pump Station to Rogers Street Pump Station







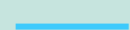
Rogers Street  
Pump Station

Brown Street  
Force Main

Brown Street  
Pump Station

Brown Street PS – 5.5 MGD Capacity

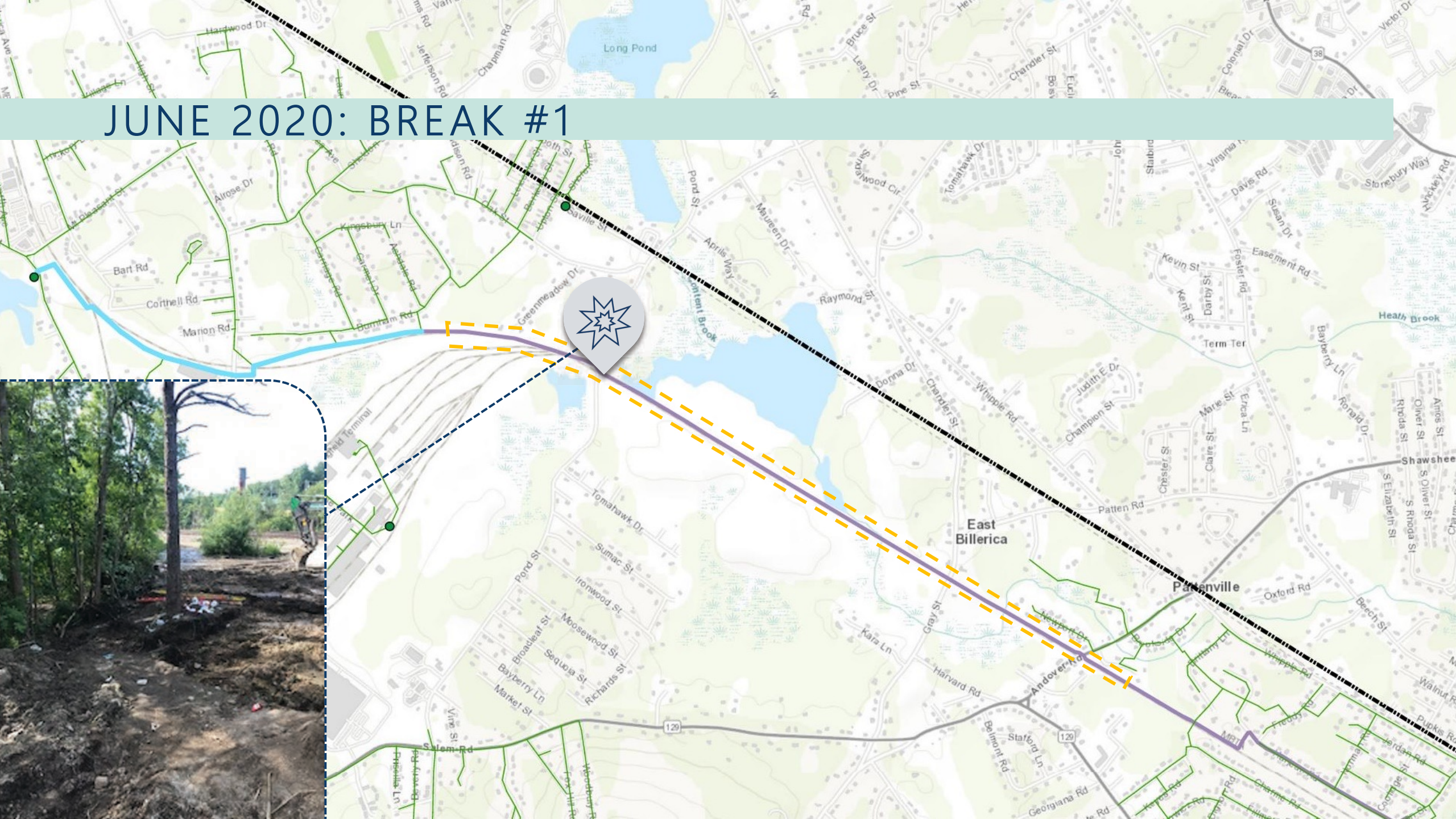
Brown Street Force Main

- 18" Ductile Iron (15,000 LF) 
- 13,000 LF located in Railroad ROW 
- Discharges to 42" RCP Gravity 

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

And now the Story Begins....

# JUNE 2020: BREAK #1





# JUNE 2020: BREAK #1

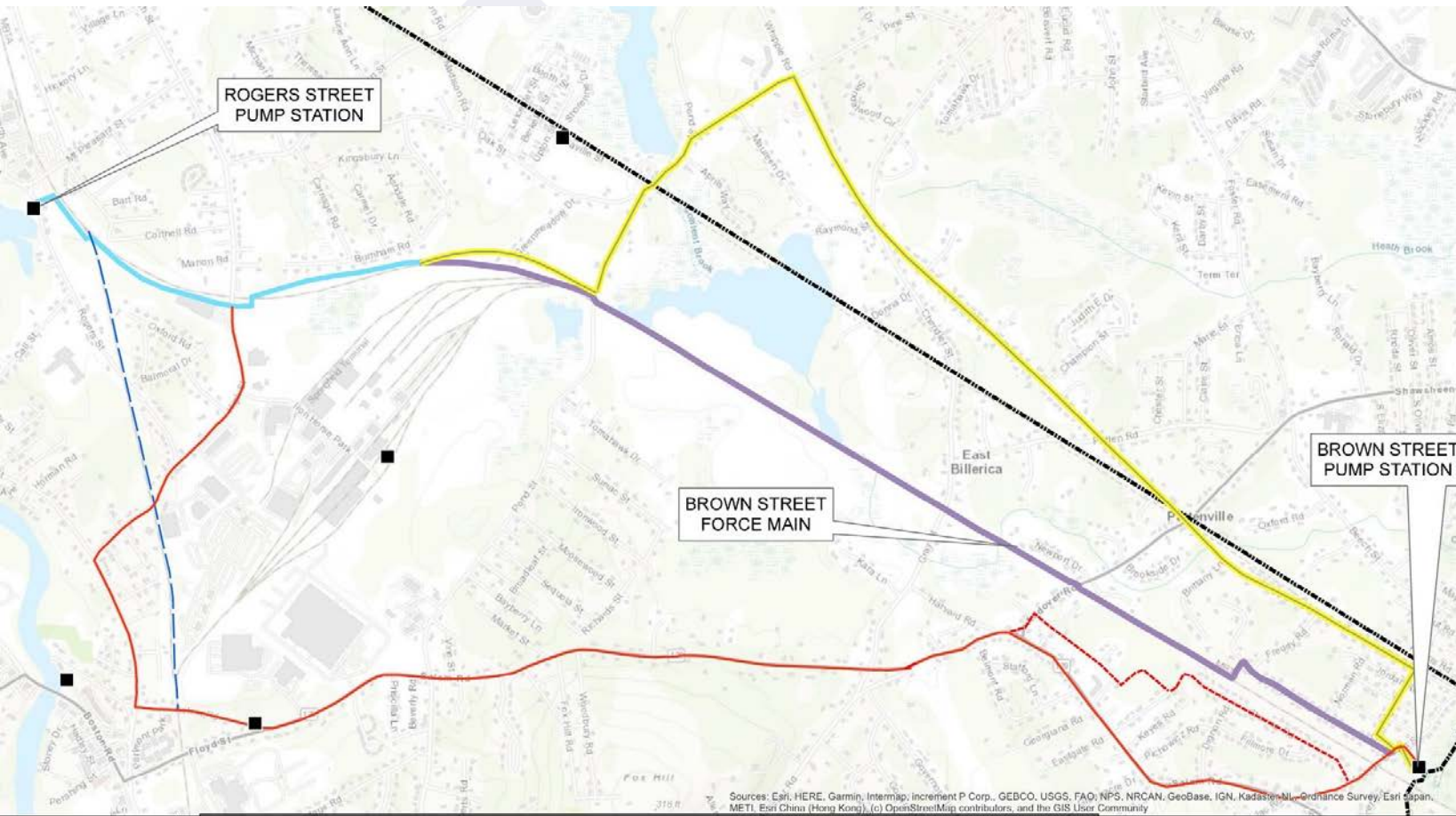
- Located east of Pond Street crossing within RR ROW
- Reported the SSO to DEP, Con Com
- Contacted Railroad
- Repaired in 4 days
  - 2 days for pipe repair
  - 2 days for reconstruction of hillside and seeding
- Total Cost approx. \$60K

## Lessons Learned:

- Agency coordination
- Importance of updated SOPs
  - Steps to follow during emergency
  - Contact information

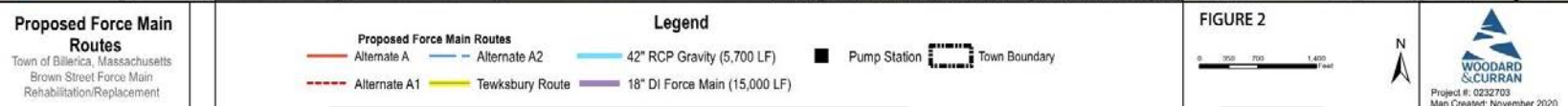


JULY 2020 → MARCH 2021



- Research for existing Railroad License Agreement
- W&C performed preliminary analysis of Force Main Rehab/Replacement Options
  - Preliminary alignment analysis to relocate from Railroad ROW
  - \$\$\$\$\$
- Rehab/Replacement Plans discussed, then ultimately DENIED, on March 9.

March 11 - new break discovered!



# MARCH 11, 2021: BREAK #2



- Break identified in similar location
- Followed updated SOPs
- Agency coordination
  - Board of Health
  - Conservation Commission (break adjacent to wetlands)
  - DEP
  - MBTA & Keolis
- Hired Wayne's Drains to Pump out Brown Street Pump Station wet well
  - 24/7 for 2 weeks!
- Adjusted pump station output

# MARCH 2021: BREAK #2

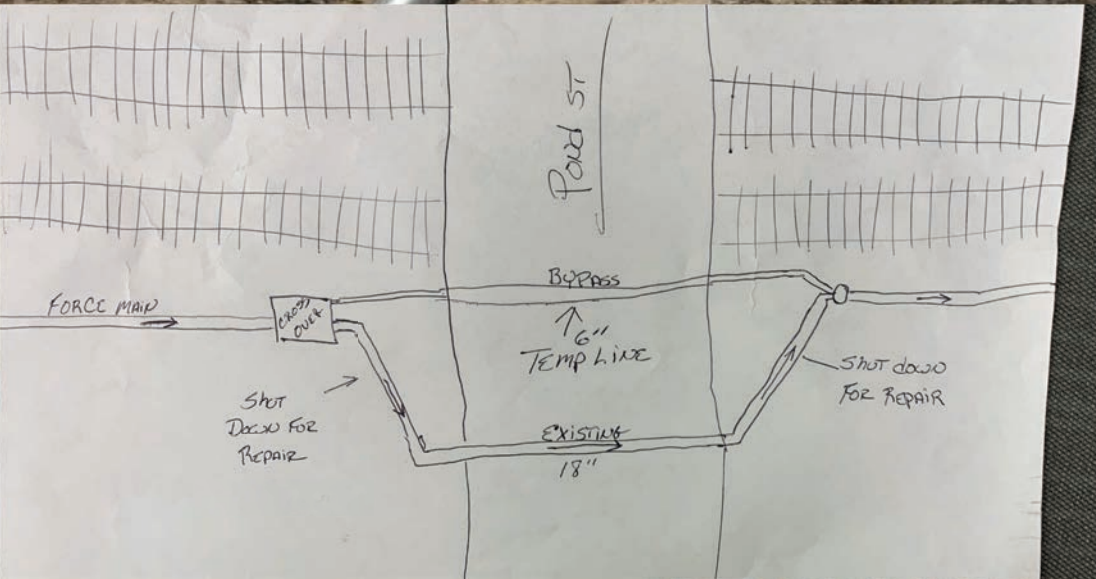
## NEXT STEPS:

- Assessment of break
- Bypass of Force Main will be required for repair
  - Above ground bypass in railroad ROW
  - Closest discharge point (downstream manhole) 3000 LF away
  - Maintain and monitor pump station and continuously vector the wet well until bypass in place
- Obtained required permits, licenses, insurance and railroad safety training (RWP)

## CHALLENGES:

- How does a municipality pay?
  - Speed of payment
- Access to Emergency Break site
  - Allowed some access, under watchful PAID eyes.
- Dig Safe
  - Dig Safe ticket was closed

March 12 to March 19 before this was completed!





## FORCE MAIN BYPASS

- Purchase and weld 3000 feet of 16-inch HDPE pipe plus 350 feet of 6-inch. 18" Ductile to 6" HDPE to 12" HDPE to 16" HDPE
- Install Line Stop – special order, overnighted from Tennessee. Extra Cost!
- Core into existing manhole to connect bypass

All work within the Railroad ROW and less than 15-feet from live track



Installing line stop



Bypass view



Working adjacent to wetlands

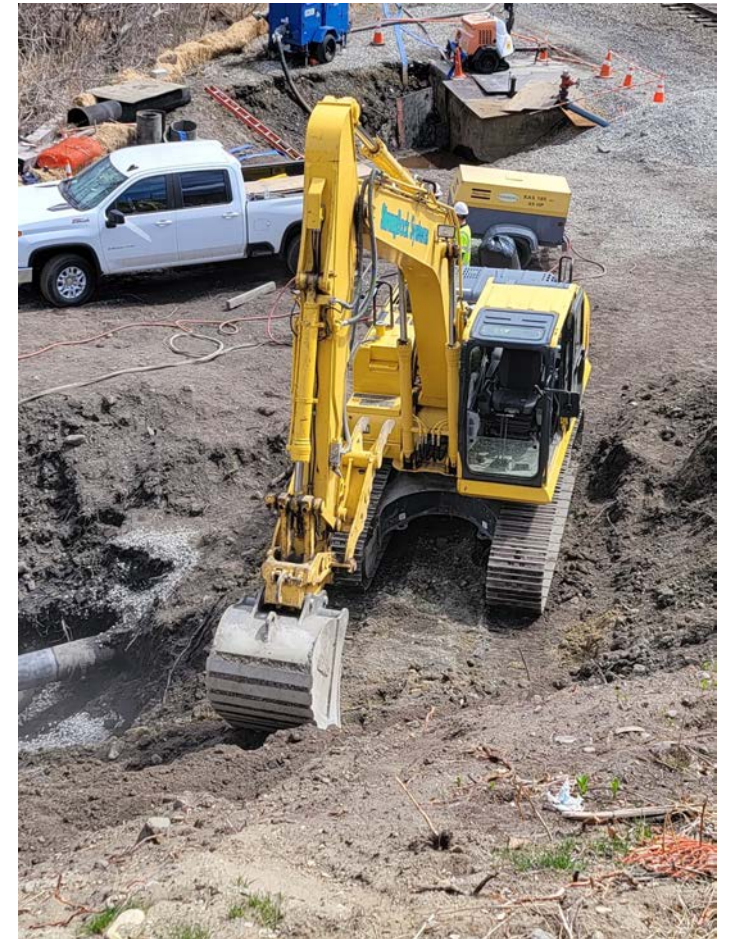
# IMPACT TO BROWN STREET PUMP STATION



- Low Flow Pumping + Heavy Ragging =
  - Grinder failure
  - Pump seal failure
  - Snapped a 3.75-inch pump shaft
- Setup a diesel backup pump during repairs, as an insurance policy.
  - This rental lasted 45 days after force main repair.

# Once bypass was set up – no longer an “emergency” to railroad...

- Misc. Railroad requirements
  - As project escalates, more people are required to obtain RR safety training (coordination and delays)
  - Excavation and Dewatering plans (2 week delay)
    - » Town submitted plans for excavation and dewatering accompanied by letters from certified OSHA trainers (x2) – DENIED
    - » Town required to hire Geotech for stamped SOE and Dewatering plan
  - Flagmen required; no flagmen available = no work
  - When the train was running, work had to stop – approx. every 30 minutes





# WHAT ELSE COULD GO WRONG?

- Lose site access
  - Billerica Rod and Gun Club wants us off their property and not use it as a staging area.
- Tennessee Gas
  - Existing force main crosses Tennessee gas line.
  - Helicopter flyover of job site, contacts Billerica Police Department, then along with Gas personnel force us off the job site.
  - Use Town's excavation to repair their gas line at Town's expense (2 days)
  - Keolis employee fabricates a story of MBTA property damage by Strongback and Town employees.
  - Keolis hears of helicopter flyover and claims we are running an unsafe jobsite and wants us gone.



# BREAK #2 SUMMARY

- Discovered on 3/11/21 - Normal flow through repaired pipe on 4/22/21 (42 days!)
- Another 8 days to rebuild the hillside and protect the crossover pipe box. We also flushed out the bypass piping and capped it. (50 day total job)
- Failed ductile iron pipe was analyzed - cause of the failure was corrosion due to groundwater and soil conditions, it rotted from the outside to the inside.
- Replaced 60 linear feet of force main with 16-inch HDPE pipe
- Total Job Cost = \$940,000





# LESSONS LEARNED

- Update SOPs annual
- Maintain access to existing infrastructure
  - Access easements
  - RR License Agreement
- Overall coordination required for work within the railroad ROW
  - Keolis, MBTA, Amtrack, Pan Am, Grey Co, MBTA Realty
- Be proactive with inspection and maintenance of existing infrastructure – could this have been avoided?!



# MANY THANKS

*Many Thanks to:*

- *Strongback Systems of Billerica*
- *South Shore Pipeline*
- *EJ Prescott*
- *Billerica WRRF Staff*
- *Woodard & Curran*



Thank You!

