A Tite Fit

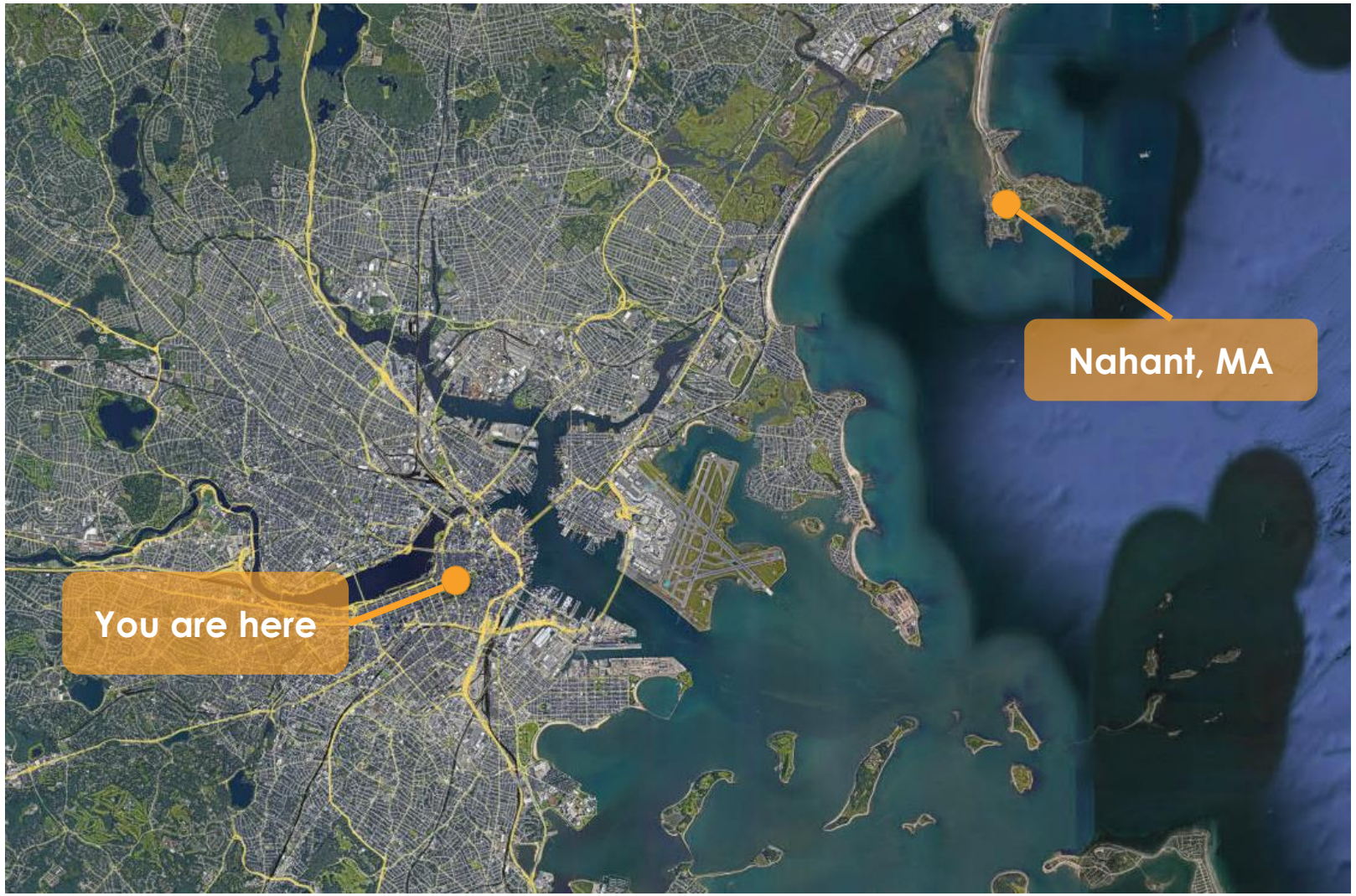
Novel Slip Lining of Nahant's Force Main

January 2023

Stephanie Salerno

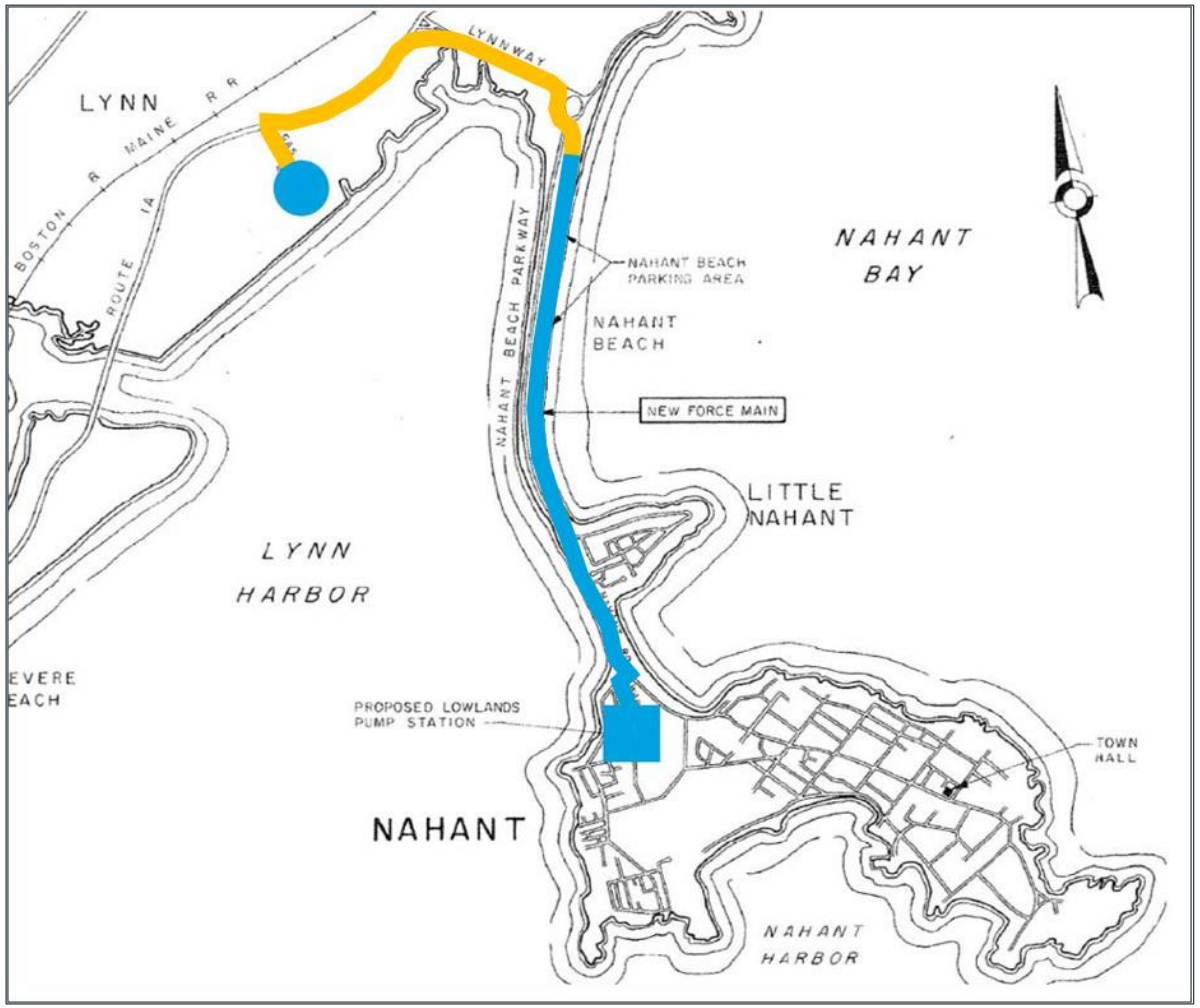
WRIGHT-PIERCE
Engineering a Better Environment

Presentation Overview



- Background
- Evaluation
- Design
- Construction
- Challenges
- Q&A

Background: Lowlands Pump Station Force Main



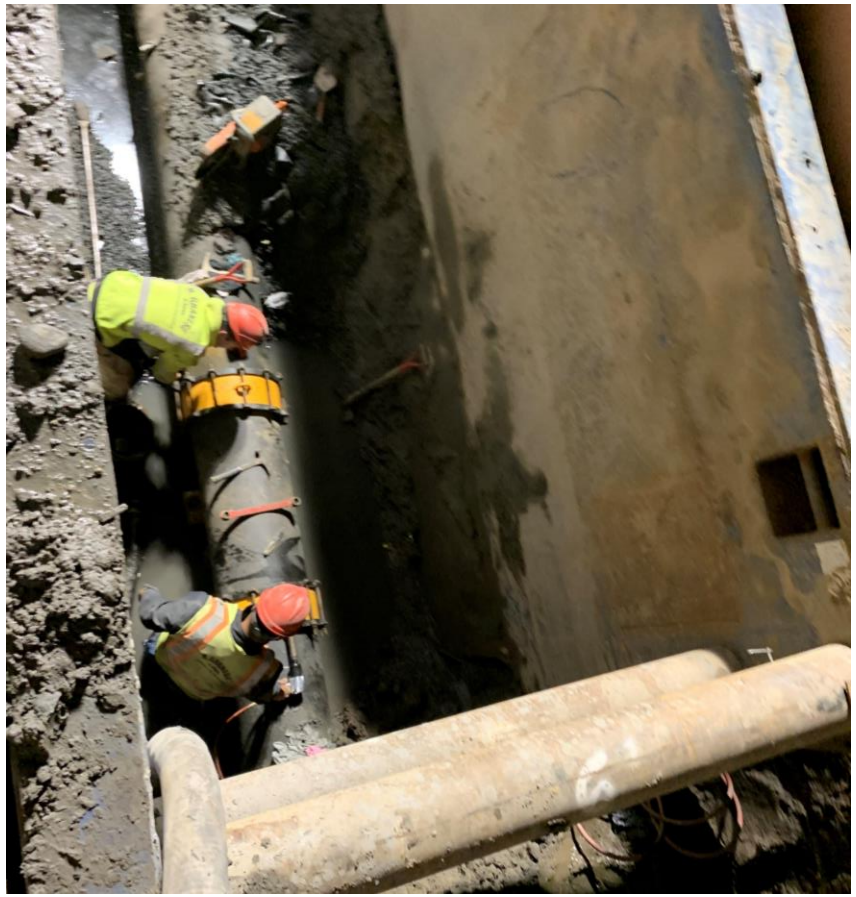
Lowlands Pump Station

- 0.7 MGD avg daily flow
- 2.82 MGD peak flow
- Discharge to Lynn Regional WWTF

Force Main

- Size: 18” Diameter
- Length: 17,000 feet (3.2 miles)
- Age: 40 years (1983)
- Material: Ductile Iron
- Interior: Cement Lined
- Exterior: Bituminous Coated

Background: Force Main Breaks



- April 7, 2017, break 282 Lynnway
- April 25, 2017, break 330 Lynnway
- June 3, 2019, break 260 Lynnway
- June 11, 2020, break 260 Lynnway
- September 29, 2020, break Lynnway
- June 2, 2021, break Lynnway

Evaluation: Methods of Corrosion

Break due to Hydrogen Sulfide

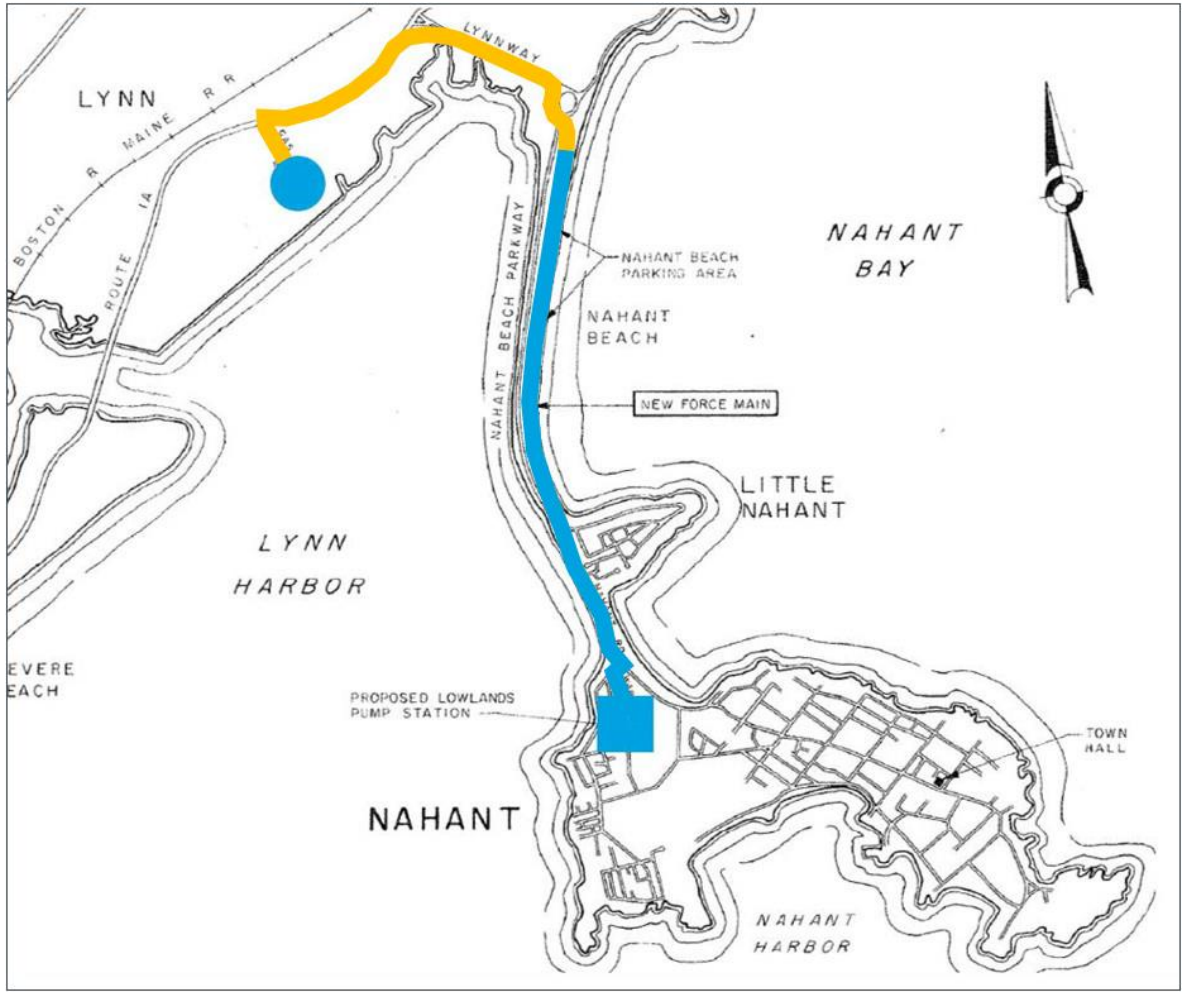
Break caused by Electrolic (Stray Current)

Evaluation: Ultrasonic Thickness Testing

Pipe Wall Thickness

Location	Pipe Thickness (inches)	Thickness Loss (Percent)
Causeway	0.51	Minimal
Causeway	0.38	7%
Rotary	0.32	22%
Lynnway	0.48	Minimal
Lynnway	0.21	50%
Lynnway	0.10	76%
Lynnway	0.10	76%
Lynnway	0.13	69%

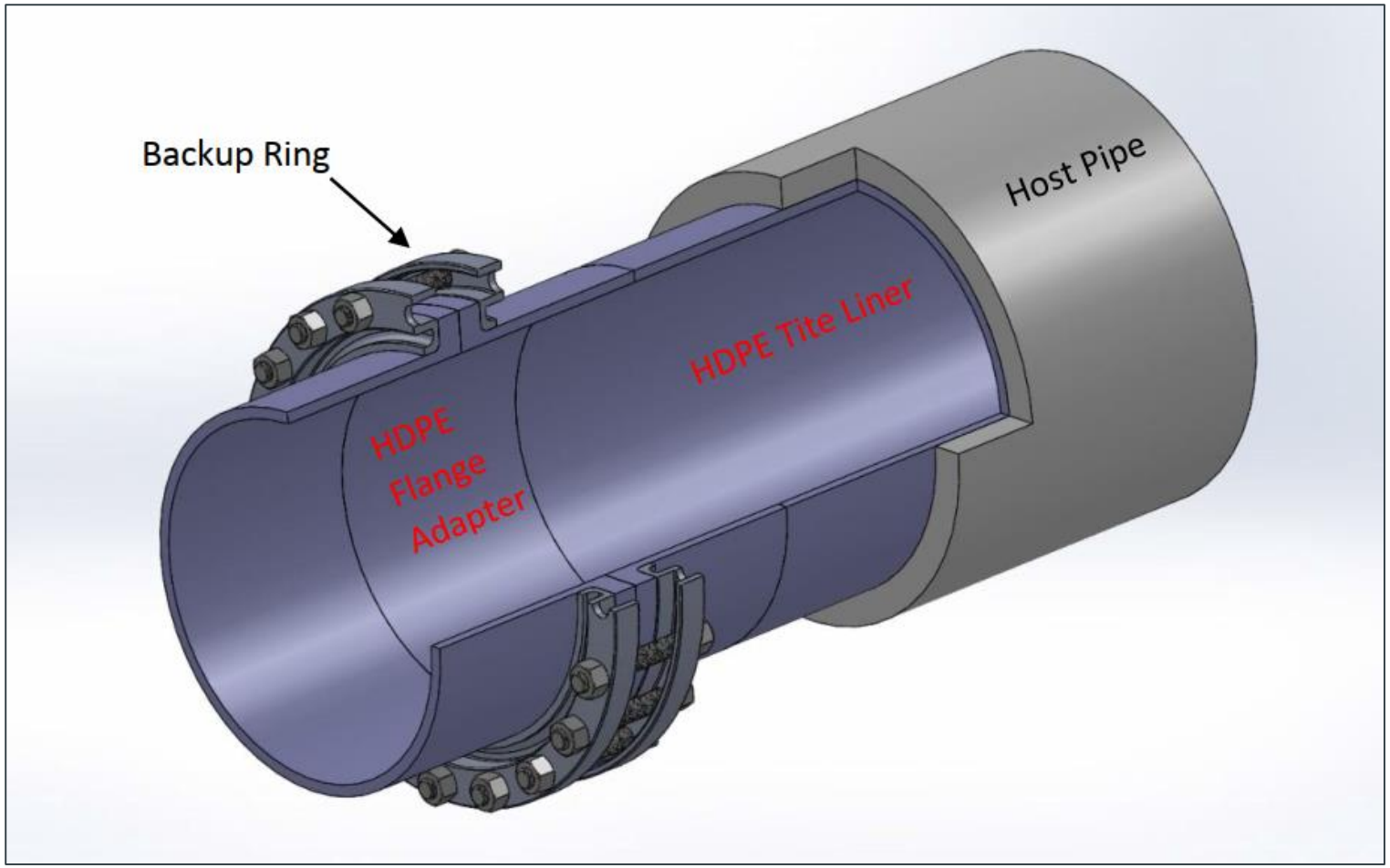
Evaluation: Recommendation



- **Lynnway section is identified for immediate design and repair.**
- **Repair & Replacement methods considered**
  - **Repair as Required**
  - **Traditional Dig & Replace**
  - **Cross-Harbor Directional Drill**
  - **Trenchless Technologies**

Design: Aegion Tite Liner System

Benefits



- AWWA Class IV product
- Custom pipe size
- 18-inch DR17 HDPE
- Pull length up to 1,000 LF
- Pull through 11-degree bends
- Minimize number of access pits

Design: Compressed Fit HDPE Liner Pipe

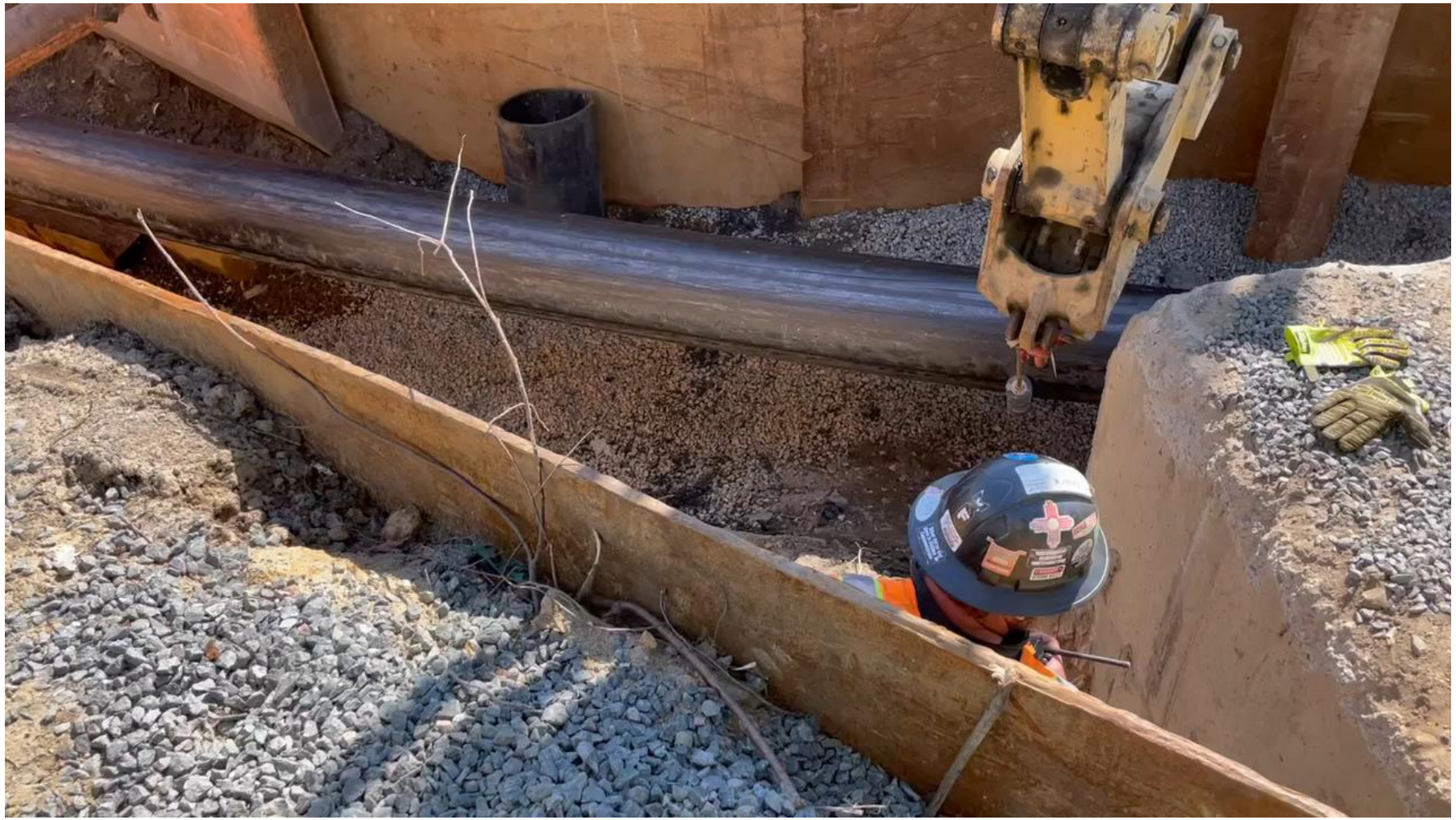
Close up of roller box

Construction: Pipe Cleaning

Construction: Pipe Fusing

Construction: Pipe Insertion

Construction: Pipe Insertion



Construction: Pipe Receiving

Construction: Equipment Change

Construction: Pipe Receiving

Construction: Challenges

Contaminated groundwater and soils uncovered during excavation

Custom trenching required due to large quantity of utilities in the Lynnway

Construction: Challenges

Large concrete thrust blocks discovered in field

A Swampscott manhole installed on top of Nahant's force main

Construction: Challenges

Daytime Construction

Nighttime Construction

Acknowledgements

- Tony Barletta
- Zach Taylor

- Mario Romania
- Davide Marinilli

- Tom Simbro
- Andrew Smith
- Zach Diacetis
- Vicky Masone

THANK YOU

Design: Cured In Place Pipe

Structural Slip Line

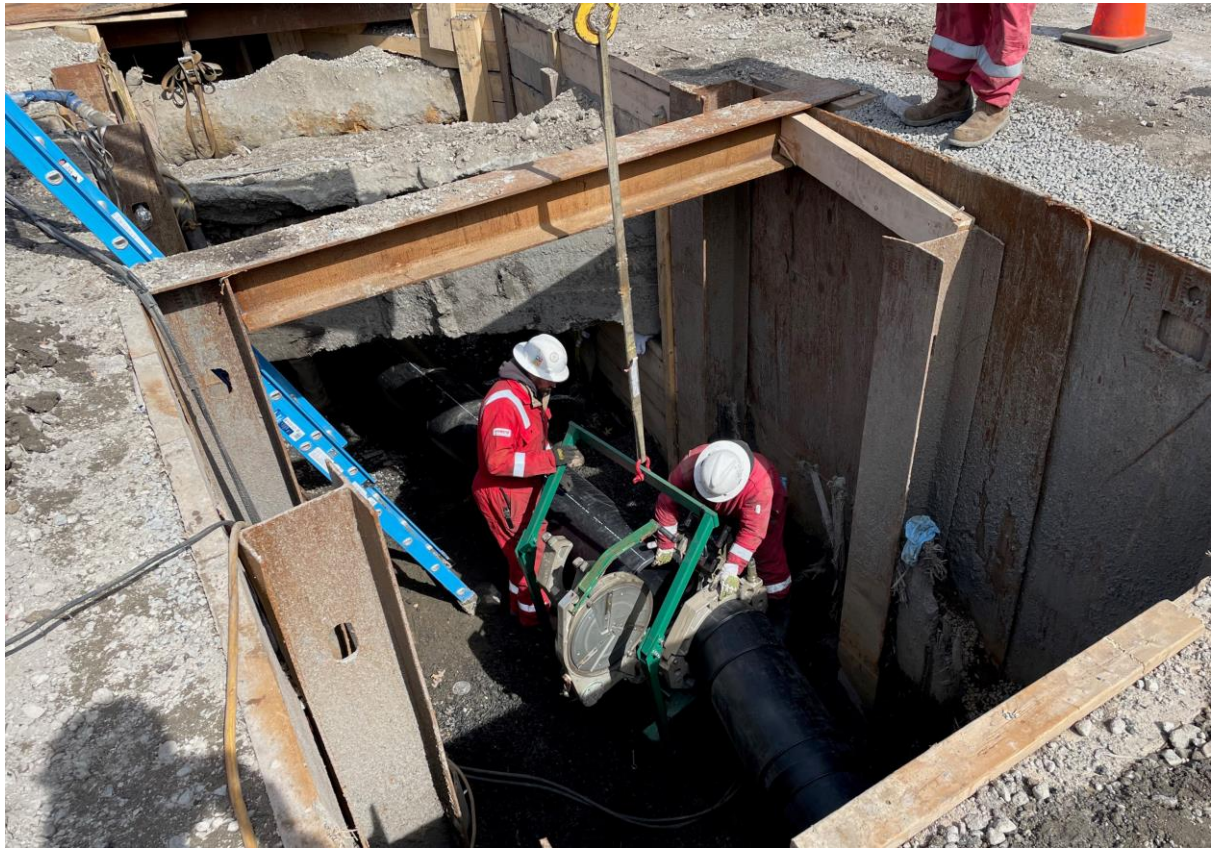
- Tite Liner System by Aegion
- Class IV fully structural
- 8 access pits
- 1,000 foot lengths
- 11 deg bends or smaller
- 2019 Cost est. $6.0 M
- Shorter construction time

CIPP

- InsituMain by Aegion
- Class IV fully structural
- 17 access pits
- 700 foot lengths
- 45 deg bends or smaller
- 2019 Cost est. $6.8 M
- Longer construction time

Construction: Pipe Fusing

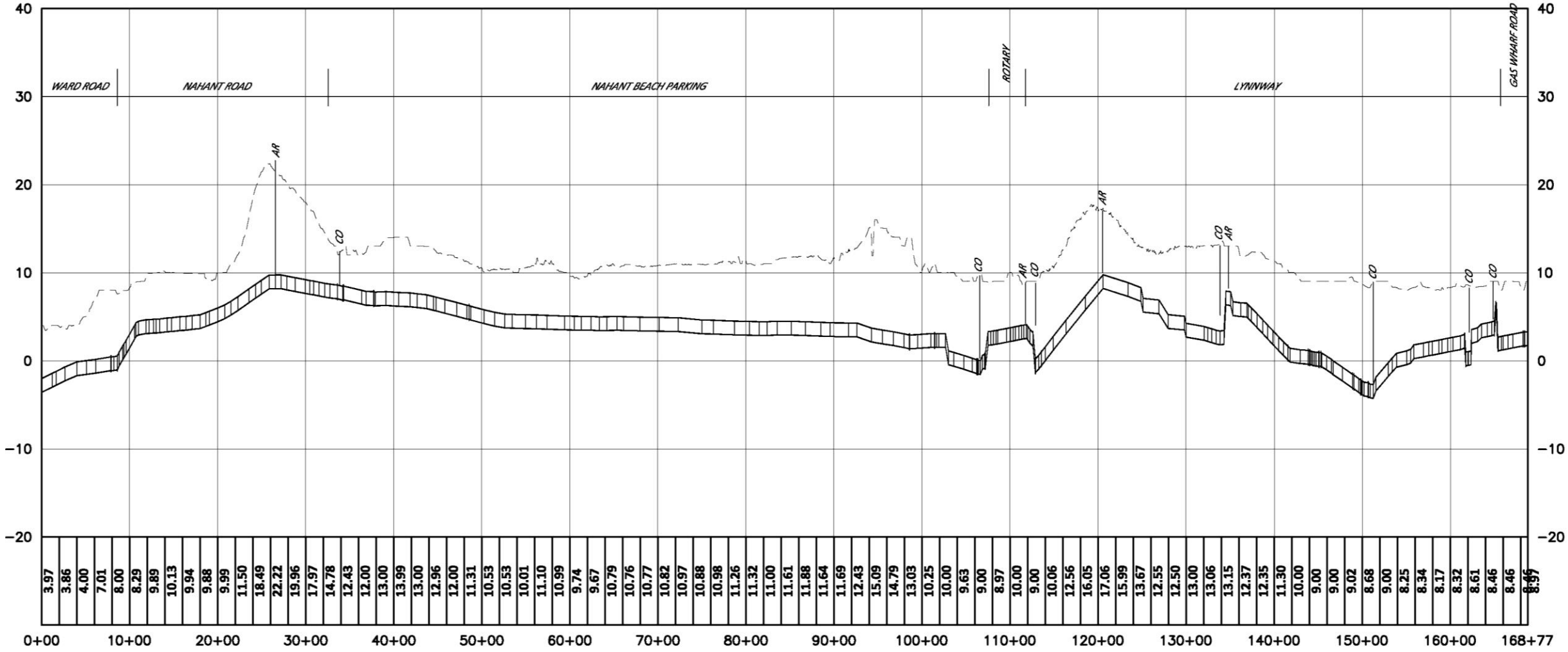
Construction: Pipe Connections and Fittings



Construction: Bypass

Construction: Pipe Cleaning

Force Main Profile



FULL PROFILE
SCALE: 1"=1000' / 1"=10' VERT

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Bidding

2021

Aug.

- Project is put out to bid
- P. Gioioso is low bidder
- Total bid $8,831,287.50

Sept. – Oct.

- Town appropriates additional funds
- NTP is issued

Nov. – Dec.

- ACO extension
- Bypass tie-in is installed

2022

Jan. – Feb.

- Bypass startup
- Excavation
- CCTV

Mar. – July

- Cleaning
- Slip lining