

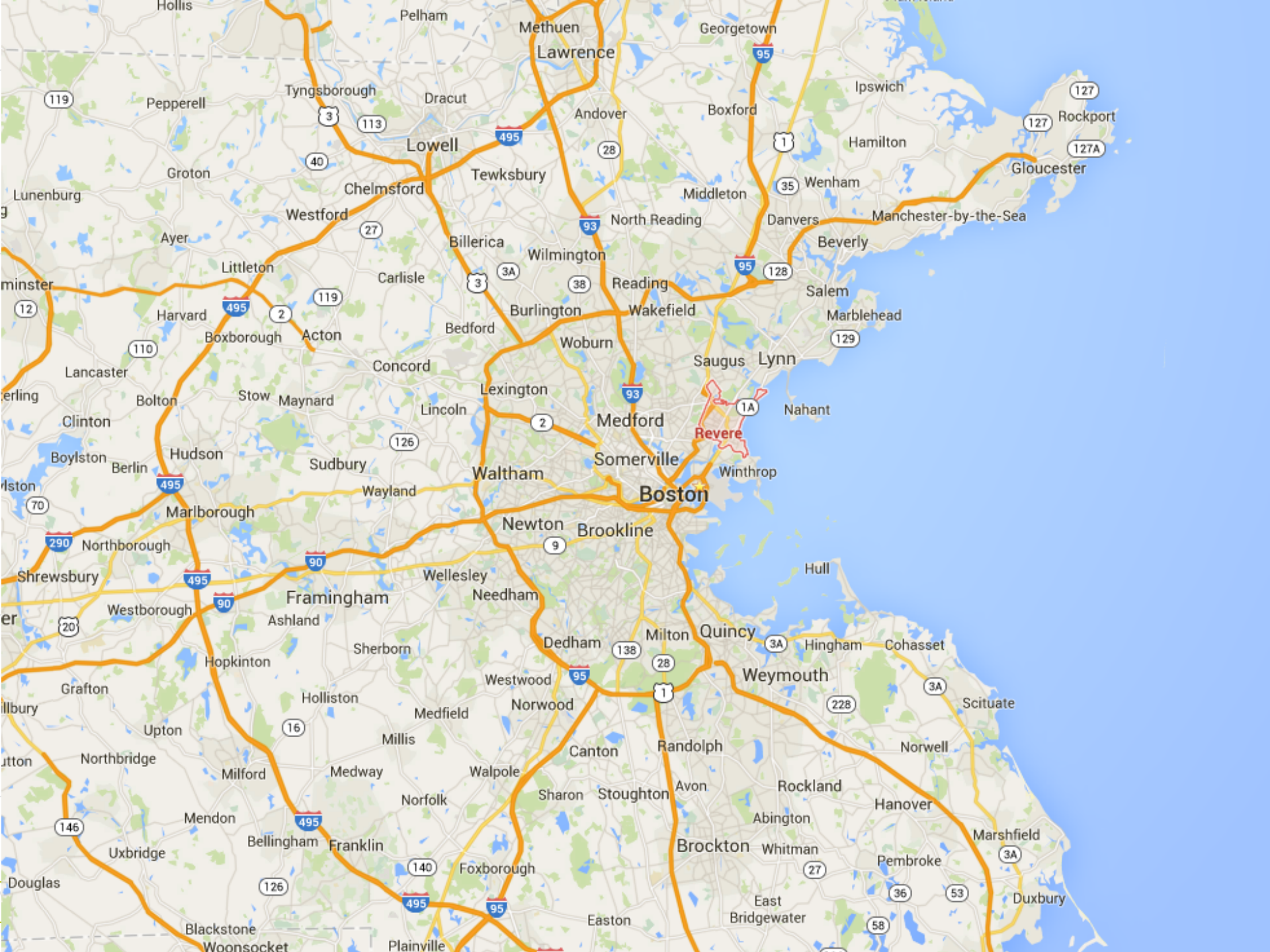
A Revolutionary City's Multi-Faceted Emergency Repair Under the Governor's Avenue



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Smith**®





The City of REVERE, MASSACHUSETTS



Revere, Mass., Crescent Beach.

Consent Decree (CD)

Civil Action No.
1:10-cv-11460

- Entered into in 2010 with MassDEP & USEPA
- Violations of Clean Water Act
- Compliance Requirements
 - Eliminate sanitary sewer overflows (SSOs)
 - Evaluate system conditions
 - Clean & CCTV inspect system
 - Remove inflow & infiltration (I/I)
 - Sewer system rehabilitation



EMERGENCY



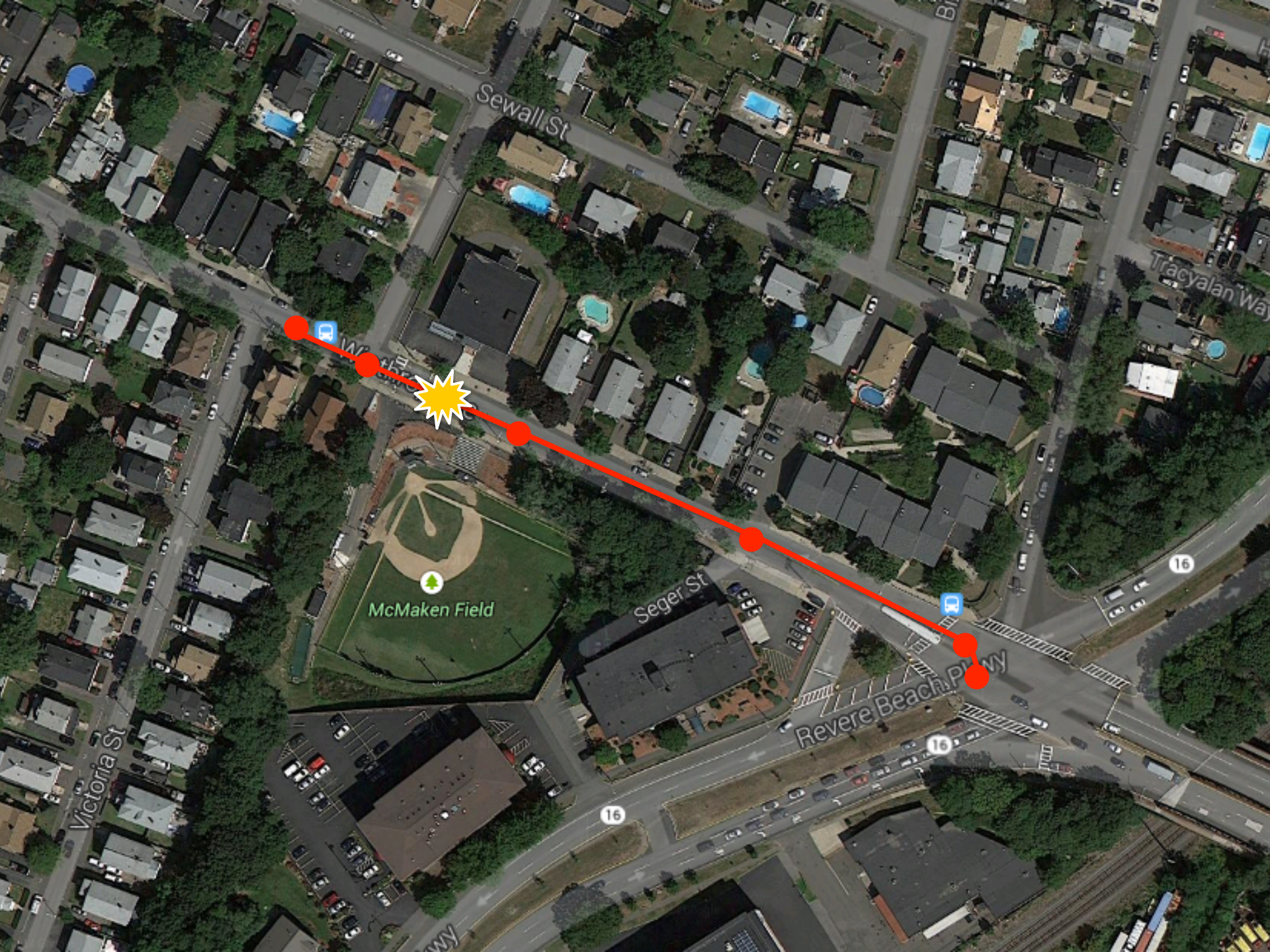
Experienced catastrophic collapse on Winthrop Avenue during cleaning and CCTV inspection



Winthrop Avenue Sewer The “Governors Avenue”

- 100 years old
- 18”Ø VCP
- 20’ deep
- Carries 30% of City flow
 - 2.3 MGD
- Very busy street





Sewall St

Tracyalan Way

McMaken Field

Seger St

Revere Beach Pkwy

Victoria St

16

16

16





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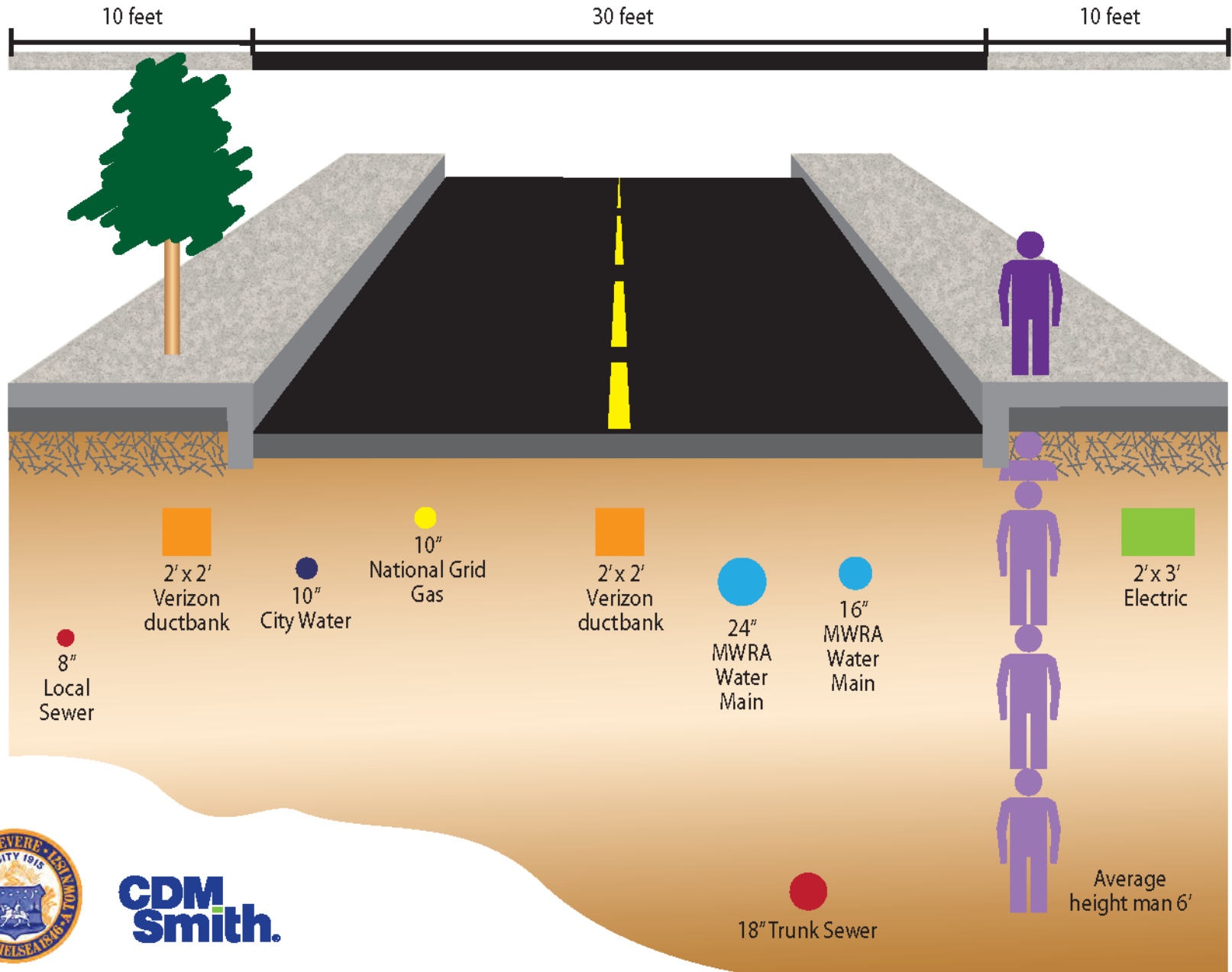
Goals of the Project

- Aiming for quick & easy repair with minimal disruptions to community
- Address long-term infrastructure upgrades while simultaneously executing the repair
- Alleviate ongoing O&M issues upstream
 - Grease and backups

Challenges Faced

- Existence of many other utilities within roadway
 - MWRA water mains
 - National Grid gas main
 - Local City water main (100 yrs old)
 - Local City sewers
 - Local City drains

Winthrop Avenue Looking East Toward Revere Beach Parkway



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MWRA Water Mains

- High pressure & large diameter
 - 16” & 24” directly over collapse
 - 10” on other side of the street
- Provides 4.6 MGD to 100,000 people
 - 50% of the City of Revere (1.91 MGD)
 - The Town of Winthrop (1.23 MGD)
 - East Boston High Service Area (0.21 MGD)
 - Deer Island WWTP (1.25 MGD)
- Required permits and special design considerations

Additional Challenges

- MassDOT Jurisdiction on Revere Beach Parkway
 - Permits
 - Special police details
 - Restricted work hours
 - Heavy traffic
- Extreme winter weather
- Funding

Evaluation of Alternatives

Pipe Bursting (existing pipe)

- Pros
 - Increase capacity
 - Repair collapse
- Cons
 - Vibration (other utilities)

Pipe Jacking/Micro Tunneling (new parallel pipe)

- Pros
 - Increase capacity
 - Eliminate collapse
- Cons
 - Large access pits
 - Cost

Evaluation of Alternatives

CIPP Lining (existing pipe to prevent further collapse)

- Pros

- Trenchless
- No open cuts

- Cons

- Inability to address capacity
- Inability to line through collapse

Open Cutting (existing pipe or new parallel pipe)

- Pros

- Increase capacity
- Eliminate collapse

- Cons

- Very deep
- Relocation of existing utilities

Recommended Alternatives

- CIPP Lining (existing pipe to prevent further collapse)
- Setup water main bypass
- Temporarily remove water mains above collapse
- Open cut removal and replacement of sewer collapse
- Replace water mains

Funding

- Capital funds not available in City budget
- City engaged MassDEP to help acquire funding
- Creative solutions were implemented
 - \$2 million acquired through CWSRF emergency funding
 - Funds utilized from contingencies of on-going sewer rehabilitation projects

Design – Part I

- Mitigate disruption and insure integrity of MWRA transmission lines
 - Redundancy Required
 - 2 of 3 mains in service at all times
 - Install insulated 16"Ø by-pass above ground
 - Temporarily remove (cut & cap) 16"Ø & 24"Ø water mains
 - Excavate collapsed sewer
 - Install new 16"Ø & 24"Ø water mains

Design – Part II

- Mitigate further damage to existing sewer infrastructure immediately up & down stream
 - By-pass related flows
 - Clean & CCTV inspection
 - CIPP line
 - 18”Ø sewer
 - 8”Ø local
 - Related services
 - Related MH structures

Design – Part III

- Perform open cut replacement of sewer collapse
 - Excavate & support 20' deep trench
 - Remove collapsed and aging VC pipe
 - Replace with 165' of new 18"Ø PVC

Construction: Bypass pumping

- Install sewer bypass
 - Trench across Revere Beach Parkway
 - Insulate and protect pumps
 - Monitor 24/7
- Restrict traffic on Winthrop Avenue
 - Reroute MBTA bus traffic
 - Close street to 2-way traffic





Construction: CIPP lining

- Extreme weather (polar vortex)
 - 40°F to 7°F
 - Curing water temperature
 - Equipment failure
 - Installation deficiencies
 - Lined approx. 800' of 8"Ø and 18"Ø pipe





Vermont
AMC 772
Green Mountain State



Construction: Service Laterals

- Service lateral lining & replacement
 - All but one lateral connection was lined with CIPP
 - One service tied to 18” sewer with gushing infiltration – 20’ deep
 - Rerouted to MH downstream at less depth
 - Difficulty navigating and relocating many existing utilities
 - Existing reinstated service eliminated with CIPP short liner

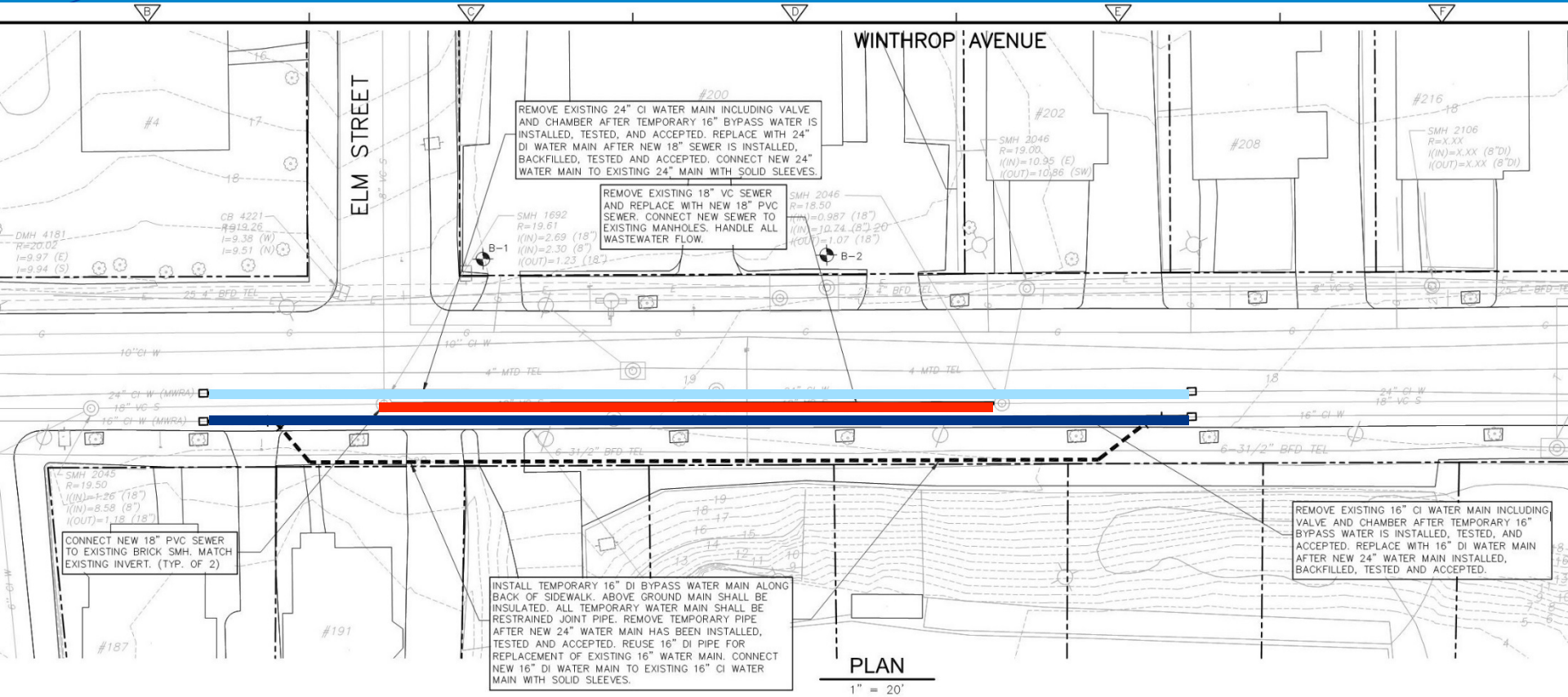




Construction: Water Main Bypass & Removal

- MWRA required redundancy – 2 mains active
- Isolate 16"Ø main, tap and bypass above ground
- Cut and Cap 16"Ø and 24"Ø mains

Construction: Water Main Bypass & Removal



Construction: Water Main Bypass & Removal

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LIUGONG

16 52 211
12 11 13



Construction: 18" Ø Sewer Collapse Repair

- Initial Emergency Repair
 - Support & excavate 20' deep cut
 - Remove 18"Ø VC pipe & replace with 18"Ø PVC
 - Test and activate new line

No significant problems encountered due to proper planning and upfront work







Construction: Water Main Reinstatement

- Install new 24"Ø water line in previous location
 - Test, disinfect and activate
- Install new 16"Ø water line in previous location
 - Test, disinfect and activate
- Remove temporary bypass



10x6



Construction: Manhole Rehabilitation

- Cementitious lining
 - Lined 4 manhole structures
- Interior drop connections installed
 - New service connection from #220

Summary of Project

- 7 months at a cost of \$2.5M
- 2 Contractors and 1 Consultant
- Multiple funding sources
- Amalgam of several different design and construction techniques
- Work on 4 different infrastructure systems
- Collaboration of 10+ different entities

THANK YOU!

- MWRA
- City of Revere – DPW
- CDM Smith
- Mass DEP
- Albanese D & S
- Green Mountain Pipeline Services
- National Grid
- Revere Police Dept.
- Mass. State Police
- Local Residents

Questions?

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Thank you for attending!