Not on My Watch

Using CIPP to Ensure Disaster Doesn't Strike Again

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January 30, 2019

Background

- Coastal community south of Boston
- ~100,000 residents
- MWRA community
- Over 200 miles of collection system
  - ~29 miles within 200 ft. of the ocean
- Average Pipe Age ~ 96 years

Introduction

- This presentation will illustrate how the City of Quincy used a city-wide consequence of failure analysis to identify critical coastal infrastructure, schedule proactive assessment and rehabilitate a beachfront sewer segment using CIPP to ensure disaster doesn't strike again.

Bayside Road

Bayside Beach Sewer

History Lesson

- Spring 2010
- Two 25-year coastal storms within days of each other
- Bayside Beach impacts
  - Broken sewer lines
  - Dislodged manholes
- 1,100 LF of 12-inch sewer and 8 manholes replaced
- Emergency replacement cost $245,000

2010 Storm Damage

Emergency Replacement

Consequence of Failure Analysis

- Every sewer asset evaluated
- Ranked on a scale of 1 to 6
- Assessed for triple bottom line
  - Economic impacts
  - Social impacts
  - Environmental impacts

Consequence of Failure

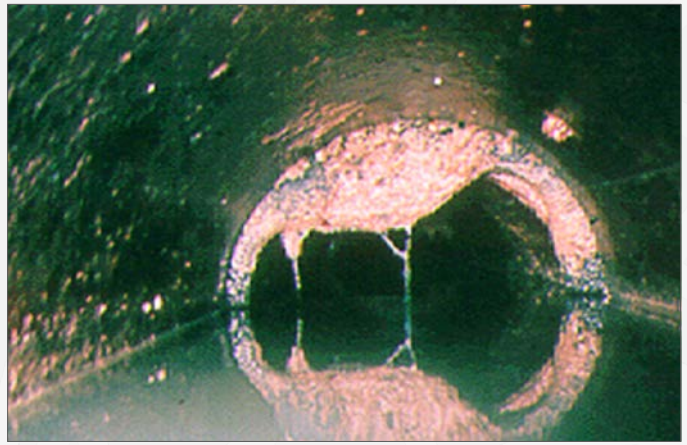
- Social impacts
  - Number of affected properties
  - Types of affected properties
  - Duration of failure
  - Public image
  - Public health and safety
- Economic Impacts
  - Asset Repairs
  - Legal Fees
  - Fines
  - Property Values
  - Utility's Credibility
- Environmental impacts
  - Proximity to wetlands and waterways
  - Proximity to Federal Emergency Management Agency (FEMA) flood zones
  - Possible contamination of potable water sources
  - Sensitivity of nearby soils

Consequence of Failure

Consequence of Failure Computation				
Asset ID #	**02974-02984**			
Asset Description	**Bayside Beach**			
	Data	Economic	Social	Environmental
Weighting Factor		25%	35%	40%
Network Position				
Diameter / Force Main	12"	3	3	
Depth	2'	1		
Network Position of Pipe	70 upstream pipes	3	3	
Location of Pipe				
Classification of Road	Unpaved	1	1	
Proximity to Railroad	> 100' Buffer	1	1	
Accessibility of Pipe	No vehicle Access	6		
Proximity to Environmentally Sensitive Features				
Flood Zone	Within Flood Zone			6
Waterbodies & Wetlands	< 25 LF			6
Proximity to Critical Users				
Critical User Upstream	Residential		2	
Land Use	Coastal		6	
Total		15	16	12
Total / Possible (6*#)		0.417	0.444	1.000
Weighted (Total * Weighting Factor)		0.10	0.16	0.40
CoF = SUM(of Weighted Factor) *6		**3.96**		

Proactive Inspection

- CoF recommended 5-year inspection frequency
- CCTV completed in 2017
- Identified
  - Internal corrosion
  - Encrustations at pipe joints
  - Internal manhole structural damage
- Overall adequate condition but deteriorating and vulnerable

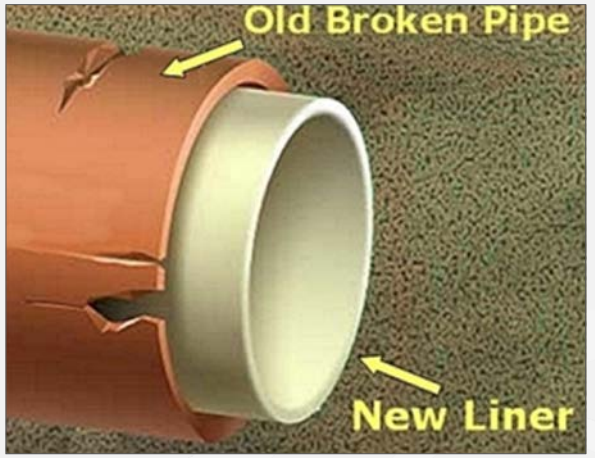


Alternatives Analysis

Alternative	Cost
1. Replacement	$540,000
2. CIPP + Manhole Coating	$240,000
3. Pump Station and Reroute	$3,900,000

What is CIPP and How do we Use it?

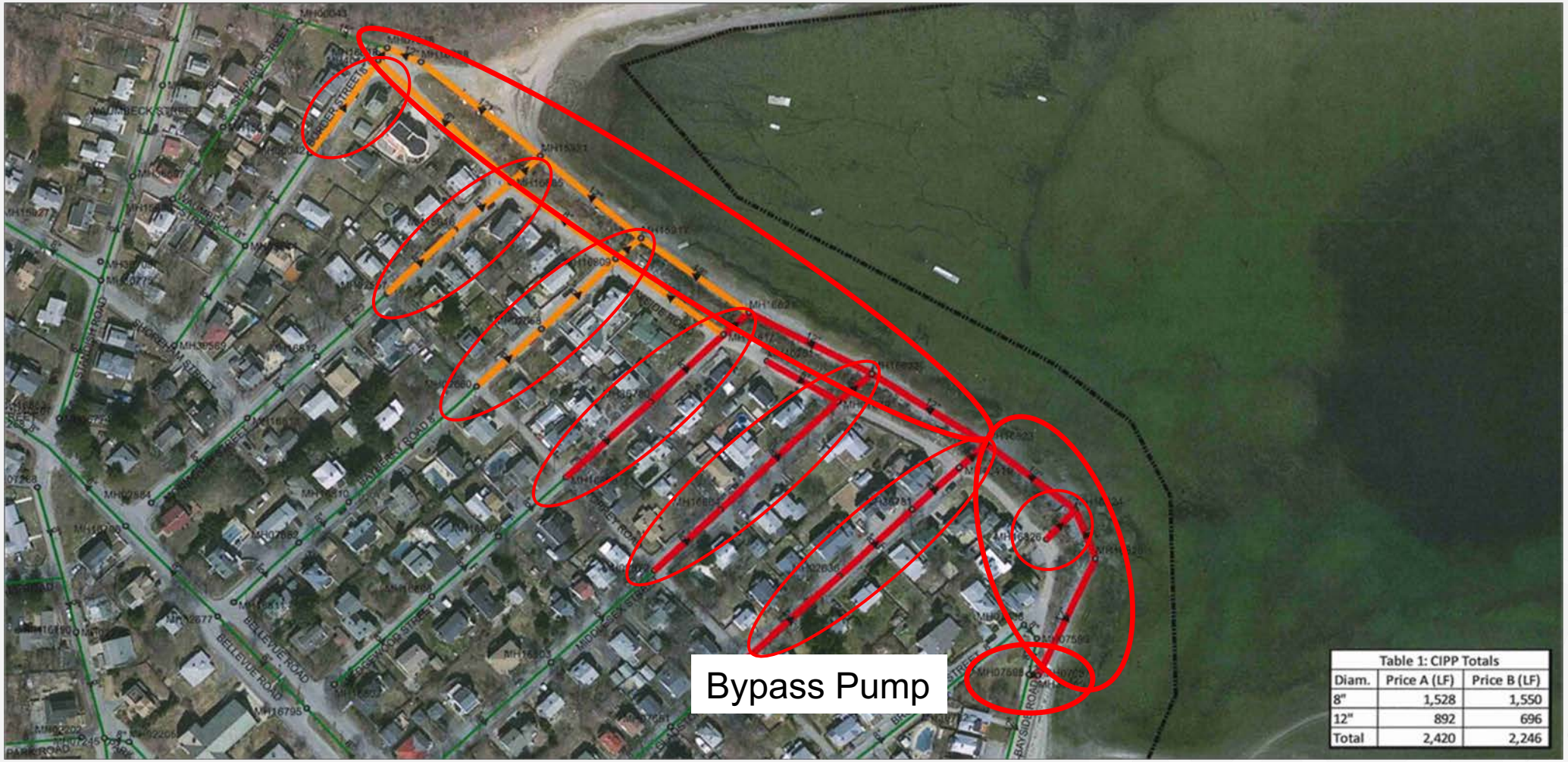
- Cured-In-Place Pipe (CIPP) is a rehabilitation process of installing a pipe within a pipe
- CIPP can be installed in pipes ranging from 4- to 108-inches
- CIPP can be fully structural and watertight if designed and installed properly
- The key to utilizing CIPP as a solution is to identify pipes for rehabilitation before failure



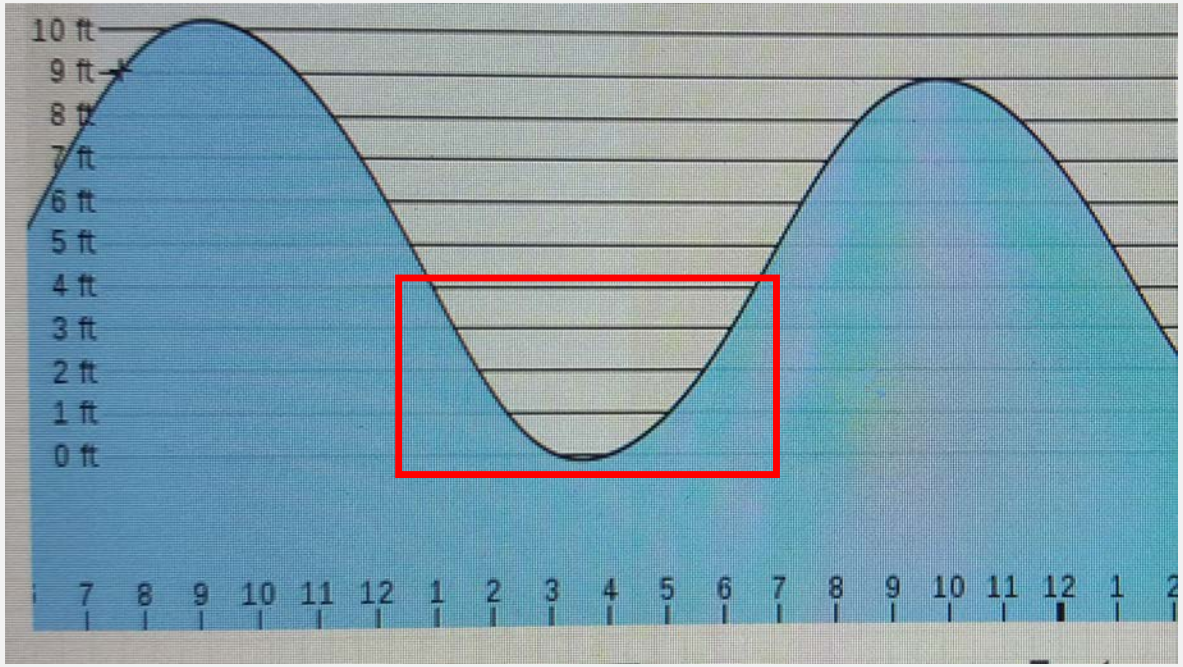
Leverage Existing Contract

- Existing Contract with Insituform
- Nearby IDDE project
- CIPP prices
  - 8-inch - $60/LF
  - 12-inch - $97/LF

Project Area & Construction Sequence



Planning Around the Tides



Construction

- Curing Technology – Steam
- Longest run ~ 1,000 LF

Custom Access Structures

Final Product

Conclusions

- Desktop CoF valuable tool but can be limiting
- Assess and Rehabilitate Before Failure
- Trenchless Technologies are your friend!
  - Beachfront Construction Cost $192,230
  - 1,600 LF of 12-inch pipe and 10 manholes
  - CIPP Work completed in 2 days
  - No environmental permitting

Save Money
Do More with Less
Save Time
Reduce Impact

Thank you!

- Acknowledgements
  - City of Quincy
  - Insituform Technologies
  - National Water Main Cleaning Company

- Questions?

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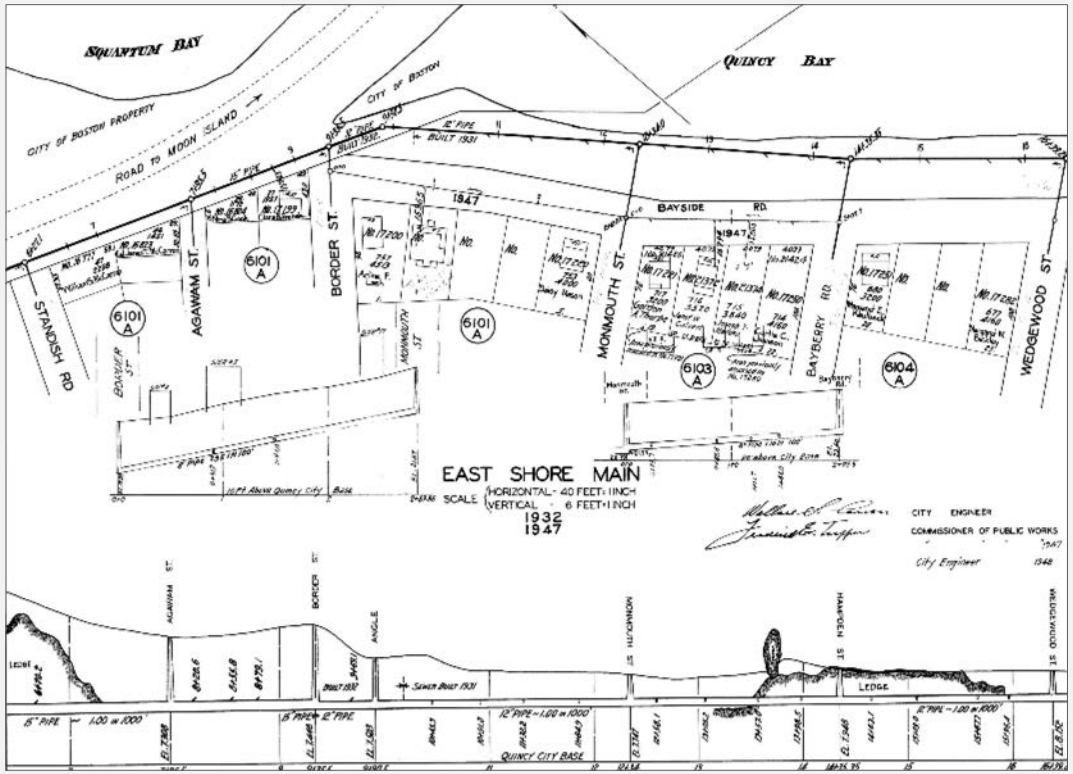
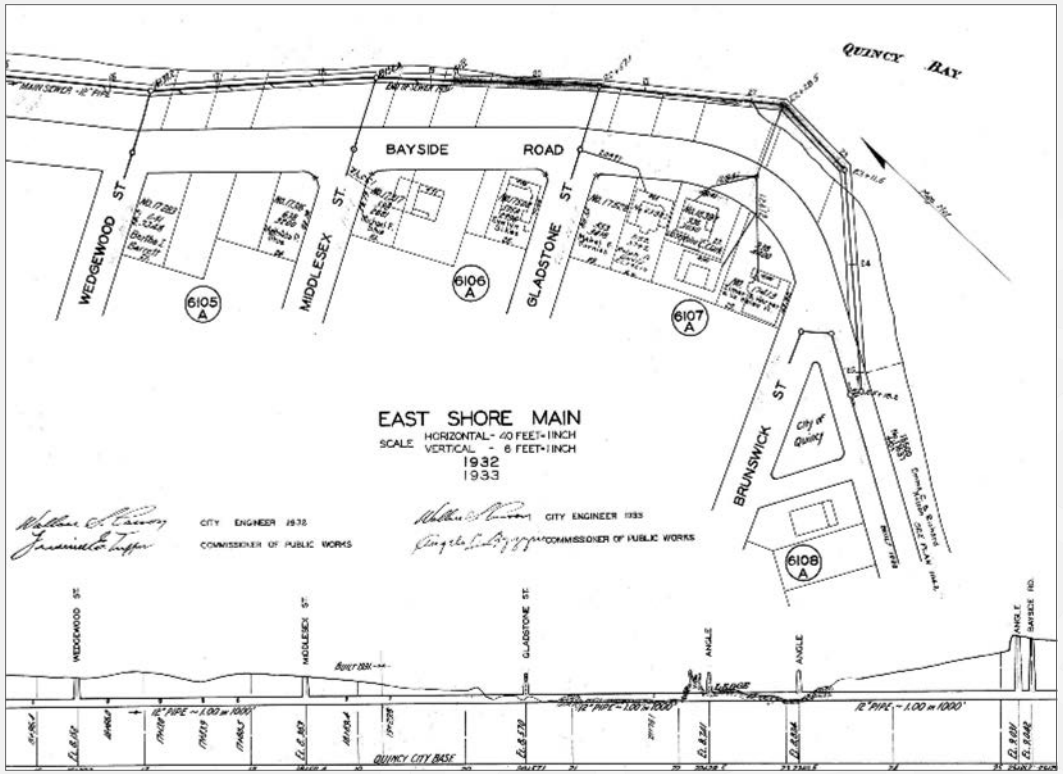

SQUANTUM BAY
QUINCY BAY
CITY OF BOSTON PROPERTY
ROAD TO MOON ISLAND
CITY OF BOSTON
BAYSIDE RD.
STANDISH RD
AGAWAM ST.
BORDER ST.
MONMOUTH ST.
BAYBERRY RD
WEDGEWOOD ST.
6101 A
6103 A
6104 A
EAST SHORE MAIN
HORIZONTAL - 40 FEET = 1 INCH
SCALE
VERTICAL - 6 FEET = 1 INCH
1932
1947
CITY ENGINEER
COMMISSIONER OF PUBLIC WORKS
City Engineer
QUINCY CITY BASE


QUINCY BAY
BAYSIDE ROAD
WEDGEWOOD ST.
MIDDLESEX ST.
GLADSTONE ST.
BRUNSWICK ST
6105 A
6106 A
6107 A
6108 A
City of Quincy
EAST SHORE MAIN
HORIZONTAL - 40 FEET = 1 INCH
SCALE
VERTICAL - 6 FEET = 1 INCH
1932
1933
CITY ENGINEER 1932
CITY ENGINEER 1933
COMMISSIONER OF PUBLIC WORKS
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QUINCY CITY BASE

Total Construction Costs

- $378,716.00
  - 1600 LF of 12-inch
  - 3000 LF of 8-inch
  - 10 manholes coated