Tighe&Bond

Engineers | Environmental Specialists

CITY OF QUINCY COASTAL INFRASTRUCTURE MITIGATION AND CLIMATE RESILIENCY STRATEGIES

NEWEA Spring Meeting & Exhibit
June 5, 2019

Paul Costello, PE – City Engineer
Marina Fernandes, PE – Project Manager
Gabrielle Belfit, CFM – Senior Environmental Scientist

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PRESENTATION OVERVIEW

- **Present and Future Flooding Hazards**
- **A Resilient Quincy**
  - Planning for Climate Change
  - Prioritizing Strategies
  - Implementation
- **Winter Storm Riley Emergency Assessment and Response (stuff that happens while planning)**

CITY OF QUINCY

- 27 miles of coastline
- 25% of properties vulnerable to flooding
- 5th most repetitive loss claims in Massachusetts
- Municipal Vulnerability Preparedness Community

QUINCY'S TOP NATURAL HAZARDS

SEVERE WINTER WEATHER

COASTAL AND INLAND FLOODING

NOR' EASTERS

+

CHANGING WEATHER

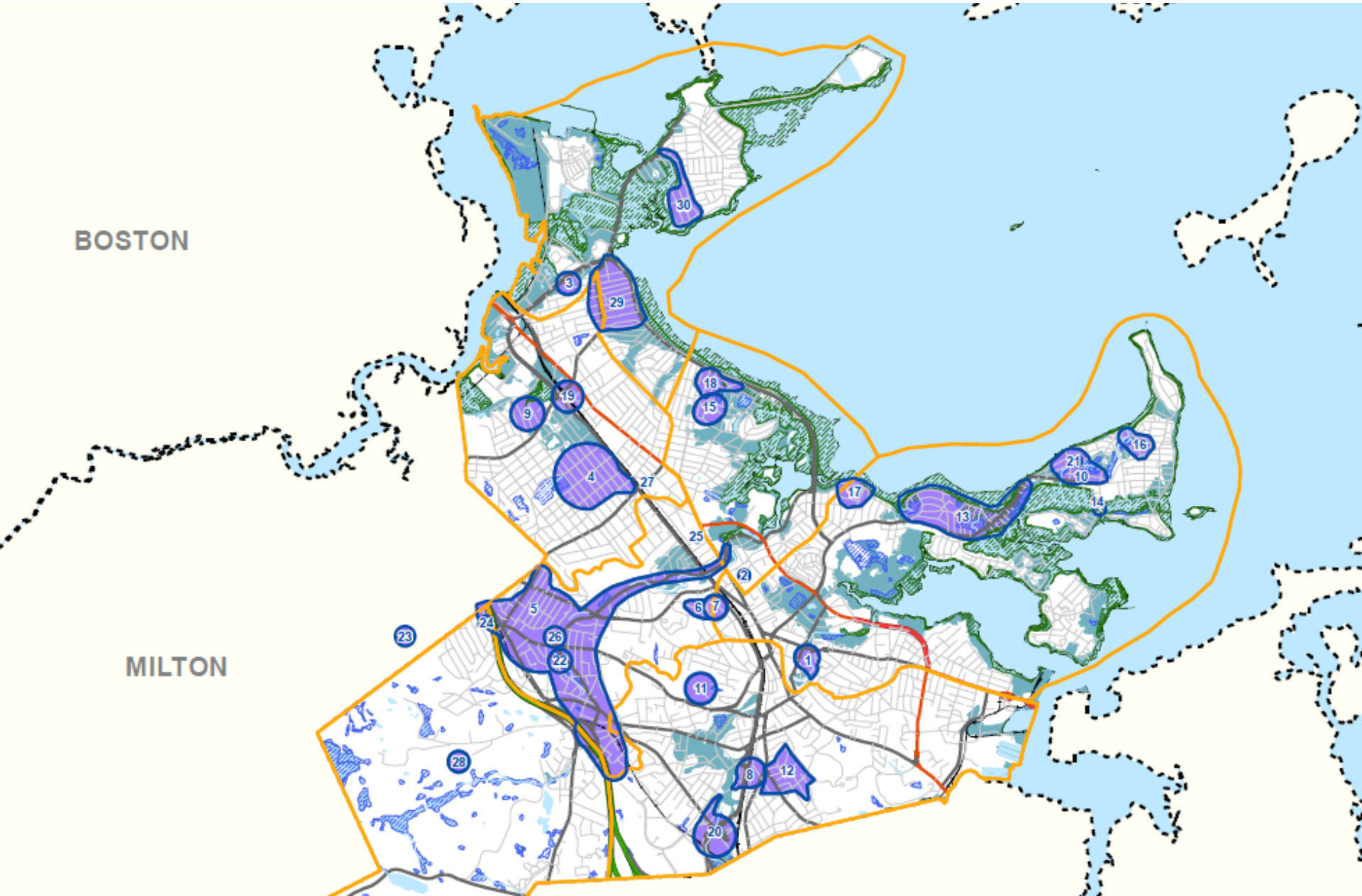
- Higher Temperatures
- Shorter Winters
- More frequent and intense storms
- Sea Level Rise
- Droughts

=

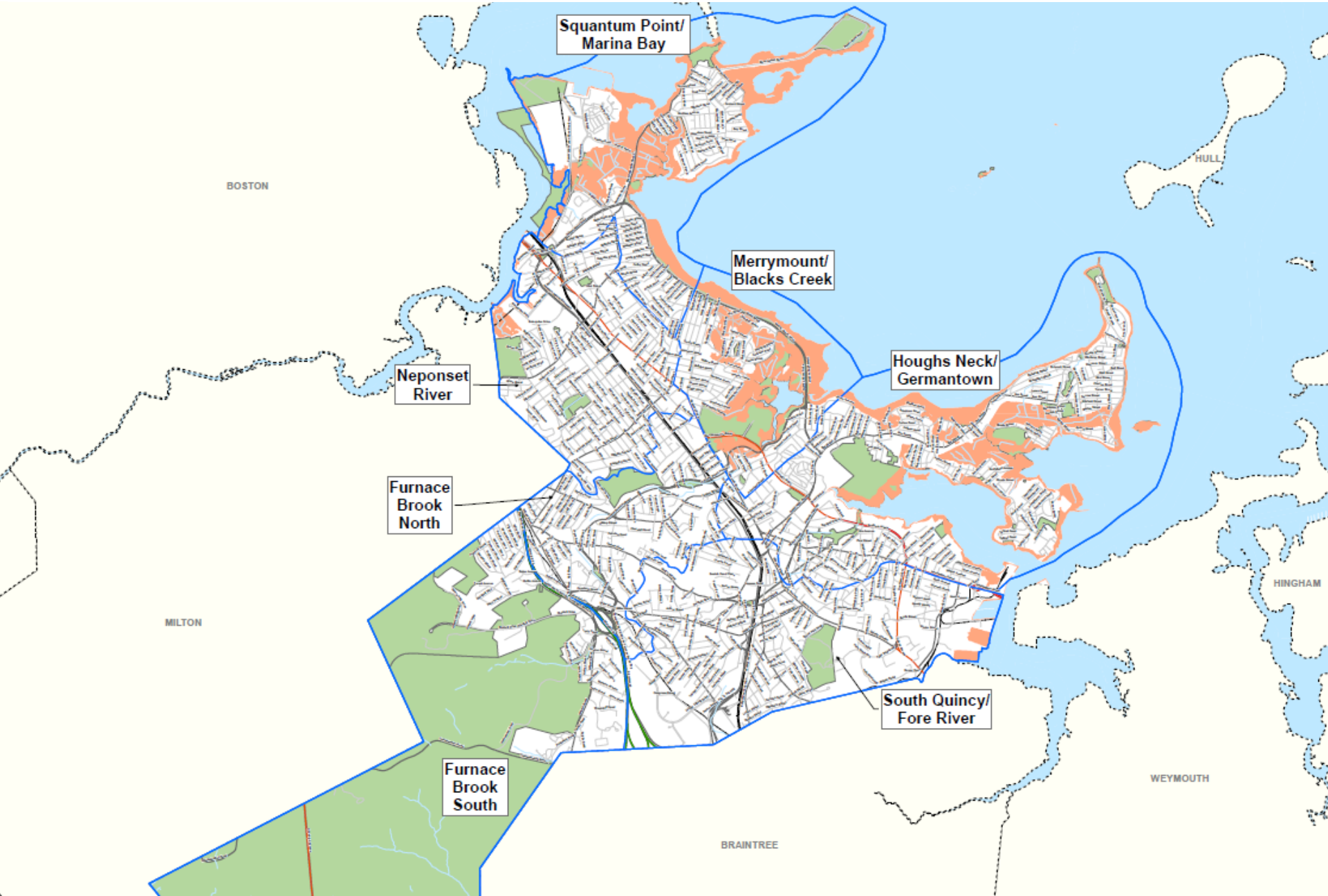
AMPLIFIED EXISTING RISKS

- Community and regional infrastructure
- Local and regional economies
- Public Health
- Natural resources and our environment

VULNERABLE AREAS… NOW



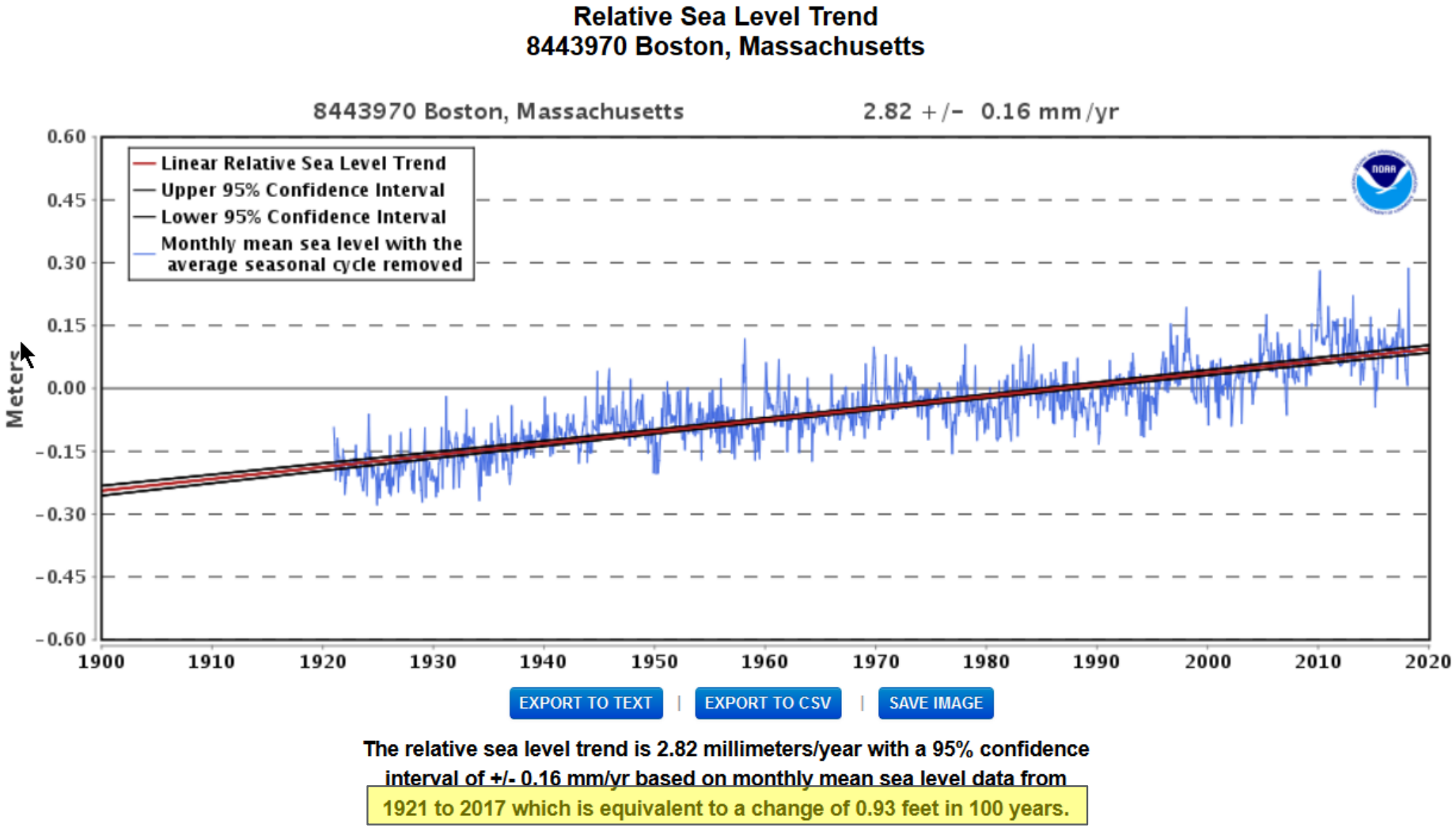
IN THE FUTURE SLR IS A CONCERN



STORM SEVERITY MAY INCREASE WITH CLIMATE CHANGE

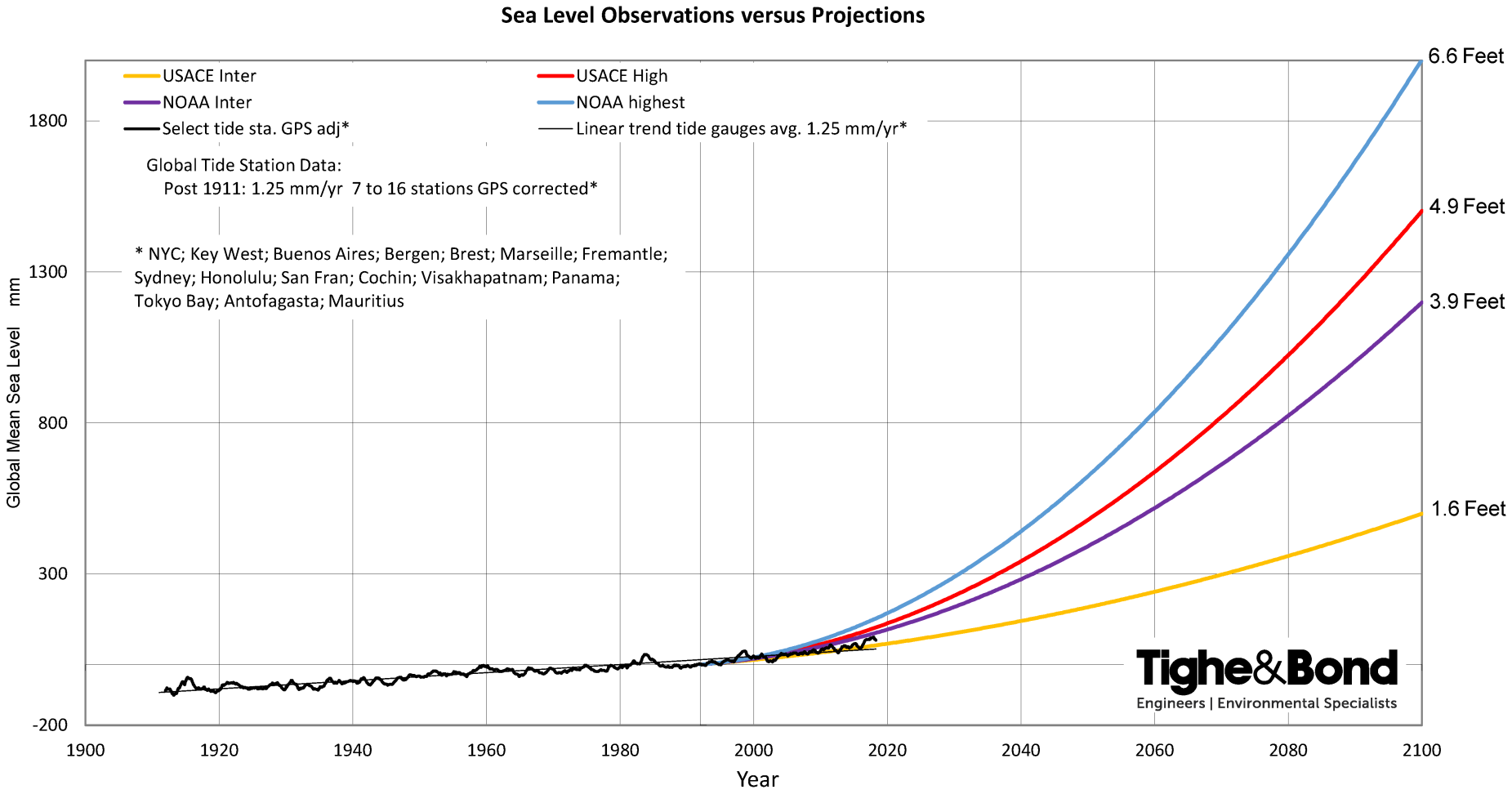
National Academies of Sciences, Engineering, and Medicine. 2016. *Attribution of Extreme Weather Events in the Context of Climate Change*. Washington, DC: The National Academies Press. https://doi.org/10.17226/21852.

SEA LEVELS ARE RISING: THE TREND



Includes Boston tide gauge subsidence est. by NOAA at -0.84 mm/yr

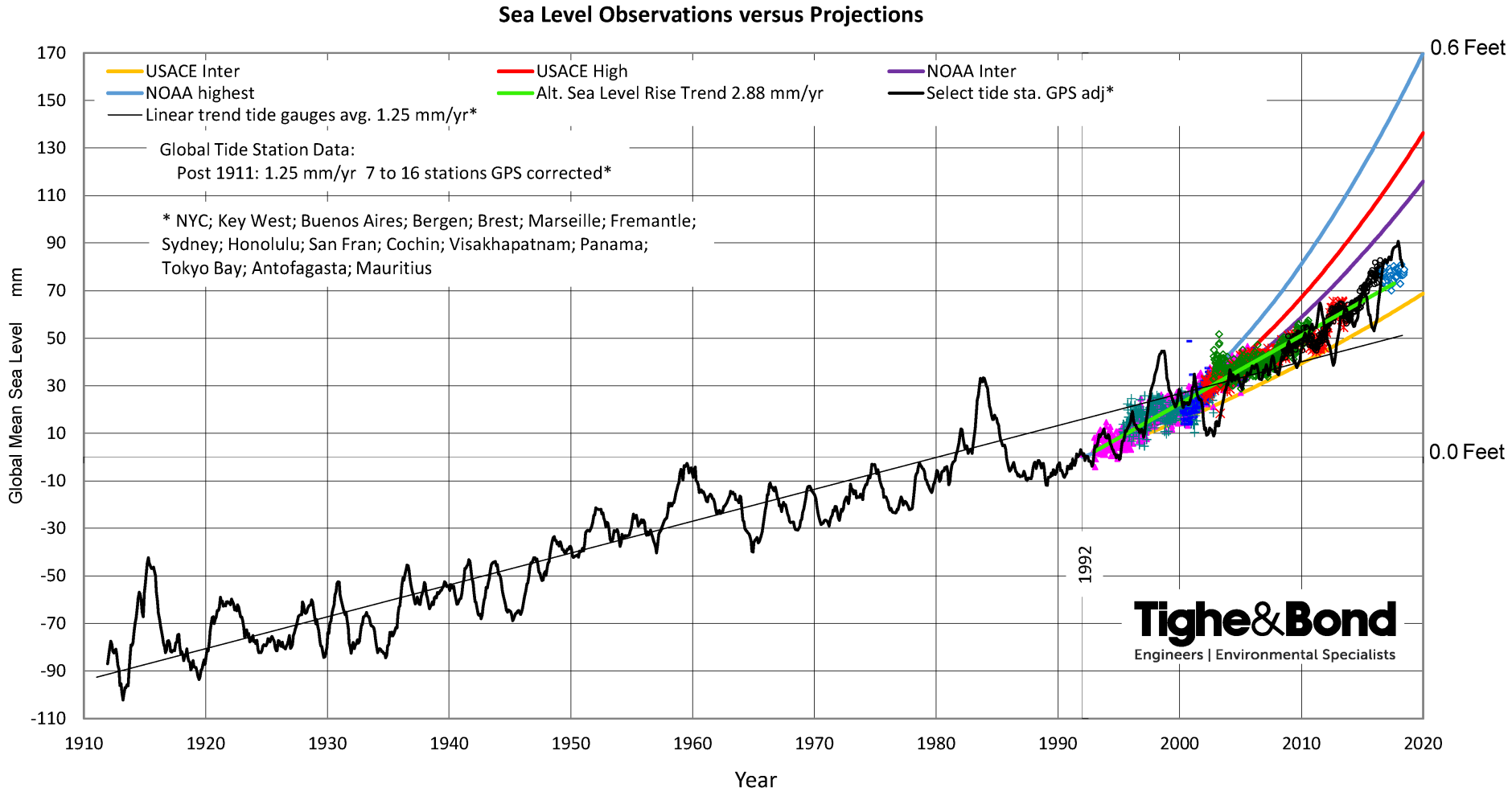
SEA LEVEL IS EXPECTED TO RISE FASTER



Projections: Global SLR Scenarios For the US National Climate Assessment, 2012

http://www.corpsclimate.us/ccaceslcurves.cfm

SEA LEVELS ARE RISING, BUT MINIMAL ACCELERATION SO FAR – REASONABLE FOR DESIGN



DESIGNING FOR CLIMATE CHANGE

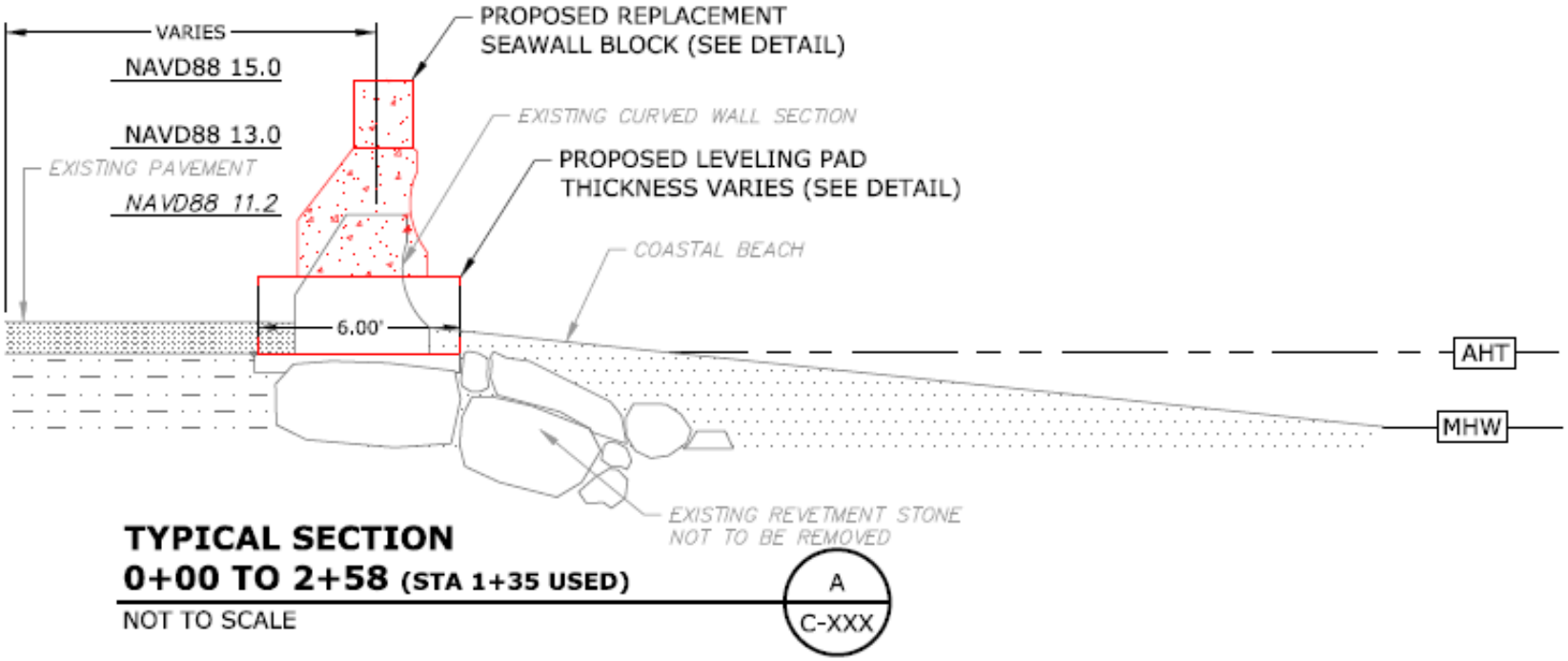
- **Recommended approach for sea level rise estimates for projecting future coastal flooding risk in Quincy MA**

Time Period	Sea Level Rise Projection[2] (Feet)	Likely Range[3] (Feet)
Base (2000)	0	n/a
Near Term (2030)	0.6	0.5-0.8
Mid Term (2050)	1.1	0.8-1.4
Long Term (2070)	1.6	1.3-2.4

[2] 50% percentile, or median value
[3] Range = 66% percent confidence limits (>17% and <83%)

Seawall Assement

Houghs Neck Area Seawall Design



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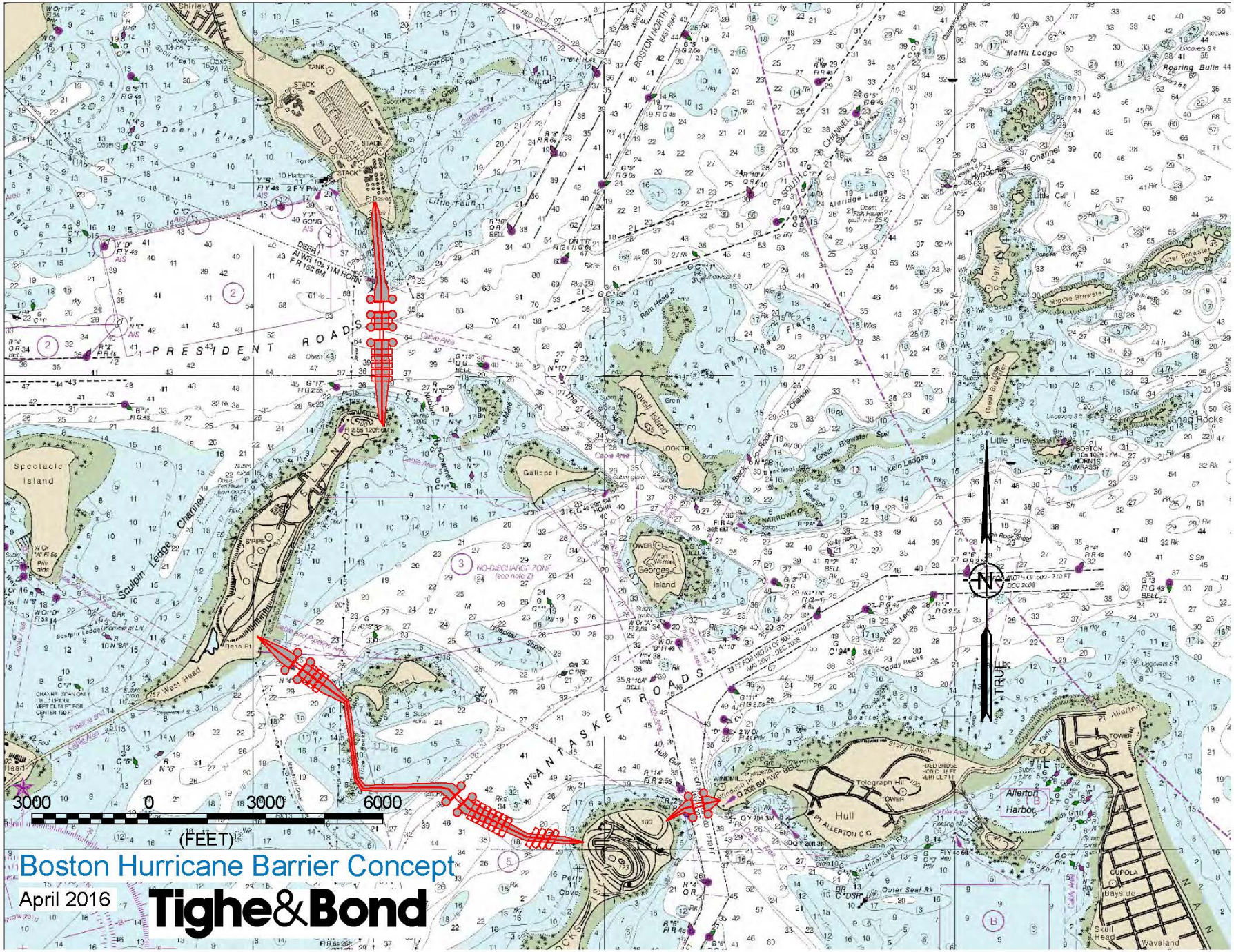
Houghs Neck Area Outfalls

THERE IS A PROBLEM AND A REGIONAL SOLUTION IS NEEDED

- There is a limit to what can be accomplished at the shoreline with down sides to making seawalls significantly higher, such as views and cost
- A regional surge barrier can be designed to offer huge benefits, such as flood damage reduction, reduced insurance costs, and property value preservation, while maintaining quality of life


3000
0
3000
6000
(FEET)
Boston Hurricane Barrier Concept
April 2016
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PLANNING FOR FUTURE NATURAL HAZARDS WITH CLIMATE CHANGE

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PLANNING FOR RESILIENCY

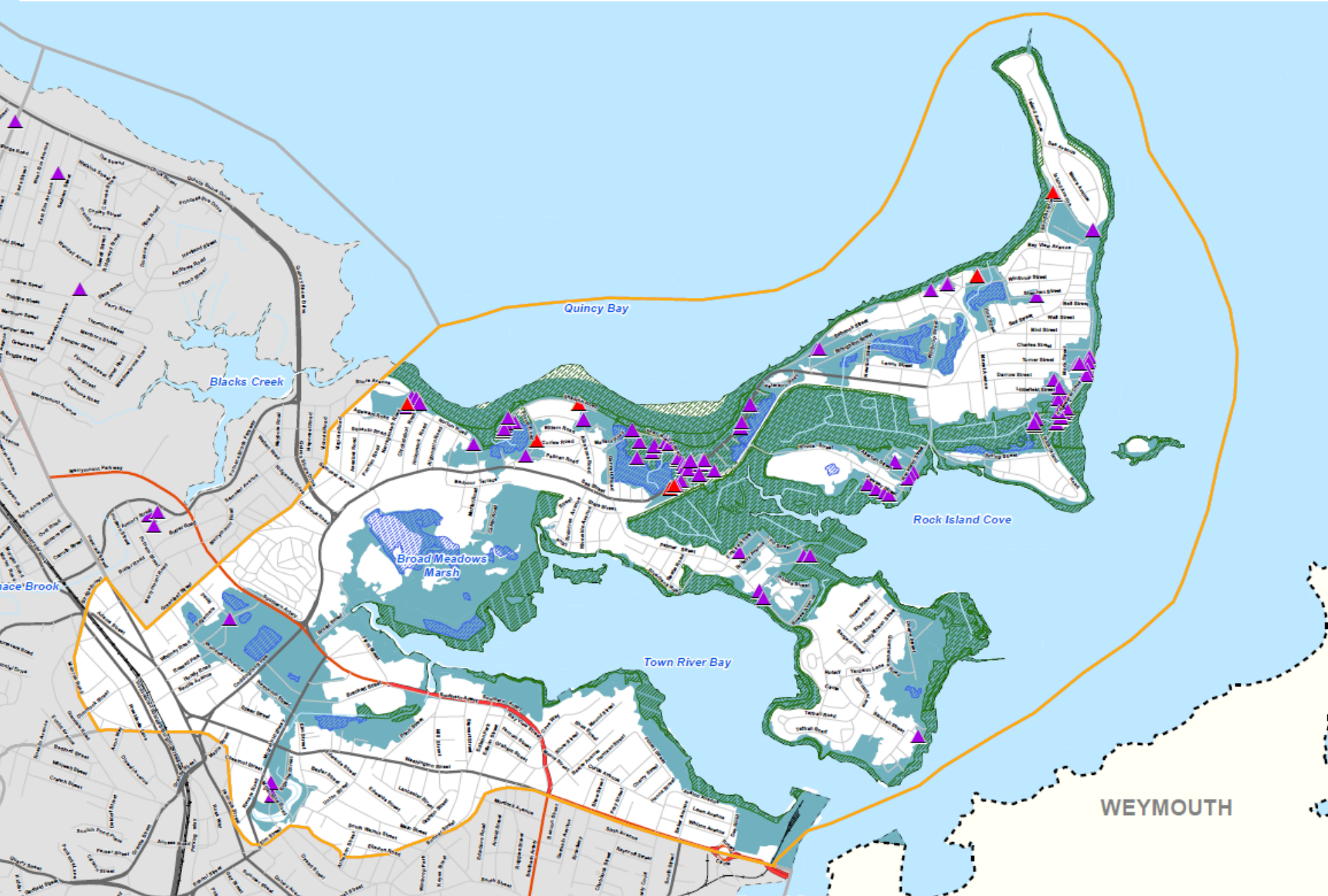
- City awarded a planning grant through Commonwealth's Executive Office of Energy and Environment

- Grant was to complete **Municipal Vulnerability Preparedness (MVP)** Community Resilience Building (CRB) Workshop Process

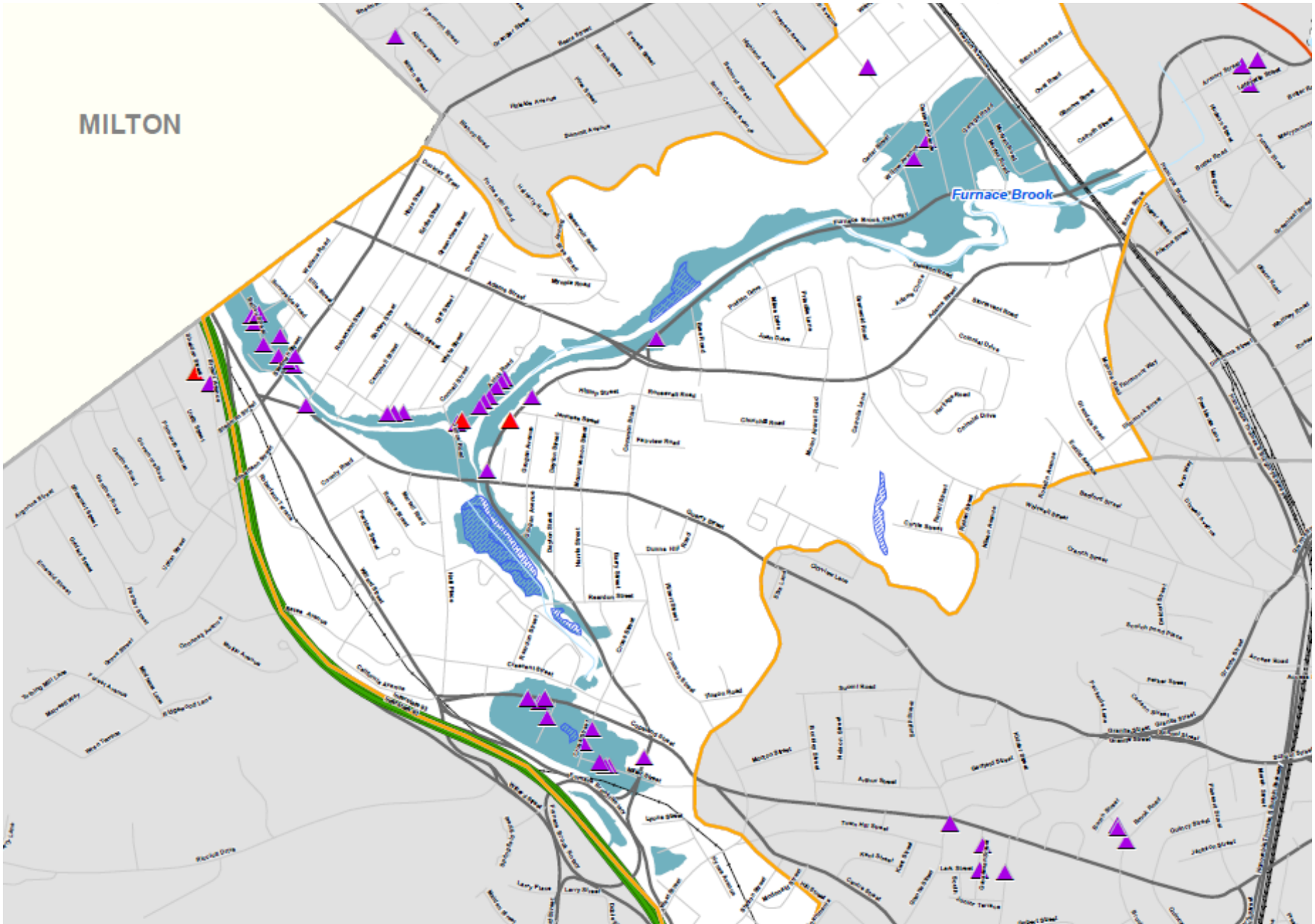
- This effort built on City's recently approved FEMA Hazard Mitigation Plan 5 Year Update (April 2019)

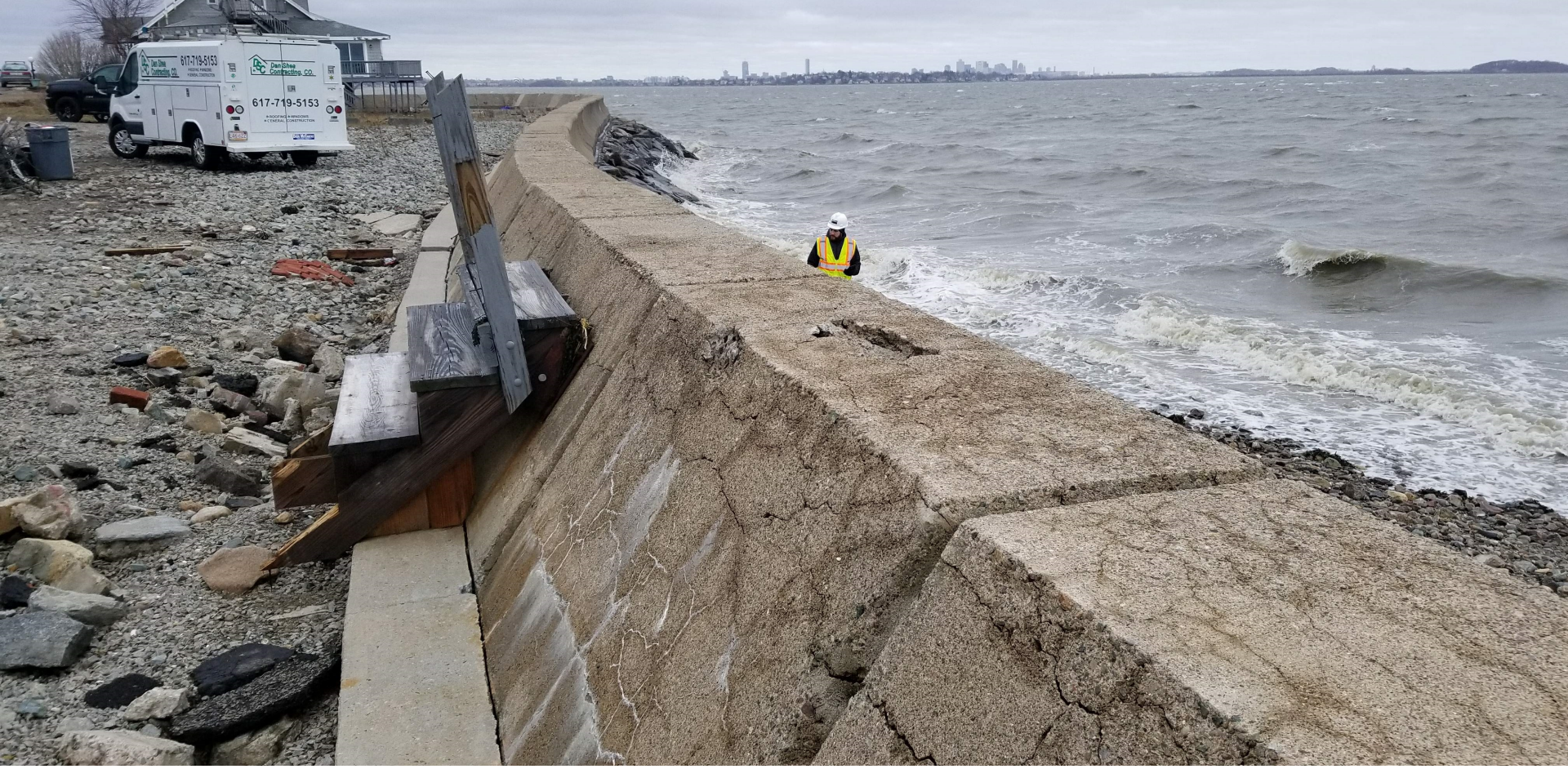
VULNERABILITY ASSESSMENT

RL HOUGHS NECK GERMANTOWN



RL FURNACE BROOK





RESILIENCY ACTIONS

TYPES OF RESILIENCY ACTIONS

1. Prevention
2. Property Protection
3. Public Education and Awareness
4. Natural Resource Protection and Green Infrastructure
5. Structural Projects
6. Emergency Services Protection

PRIORITY ACTIONS

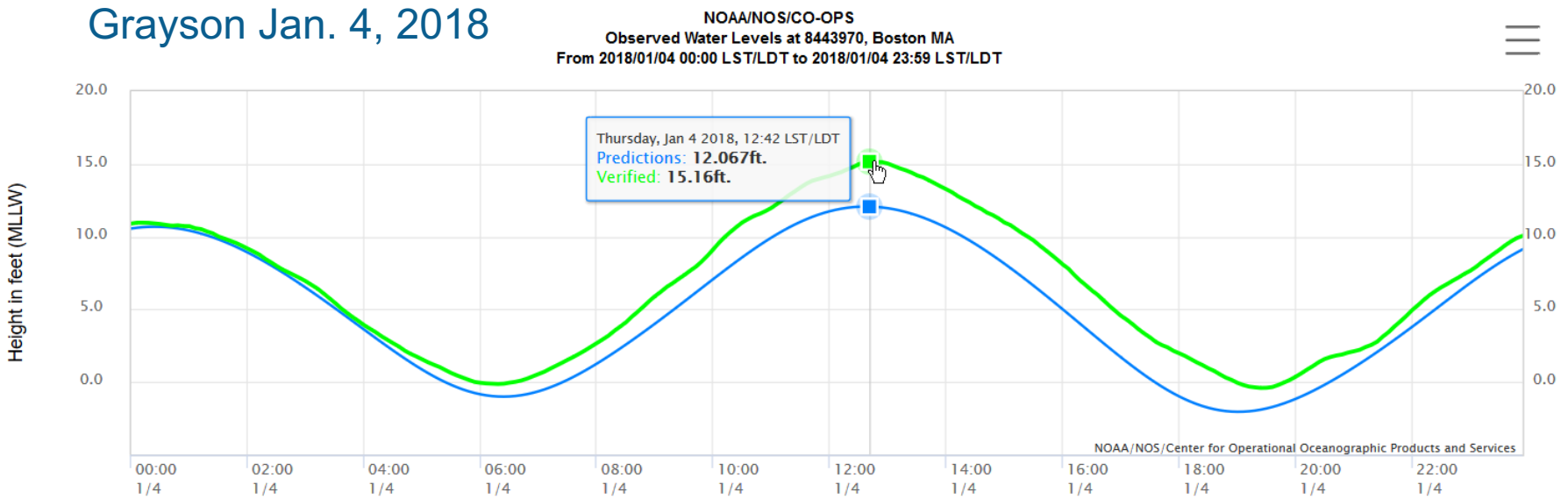
High Priority	Moderate Priority	Lower Priority
- Emergency Communications System	- Drainage Improvements	- Coastal Buffer Maintenance
- Emergency Power Generators	- Tree Removal Equipment	- Salt Marsh Restoration
- Stormwater Pumping Stations	- Slope Protection and Infrastructure Hardening	- Seismic Impact Evaluation and Gas Utility Study
- Seawall Construction	- Sewer System Modernizations	- O'Rourke Field Conversion
- Building Inspection Records System	- Sewer System Interceptor Relief	
- Tide Gate Construction and Management Plan	- Hurricane Barrier Evaluation	
- Public Education and Post Disaster Support		

2018 STORM RILEY

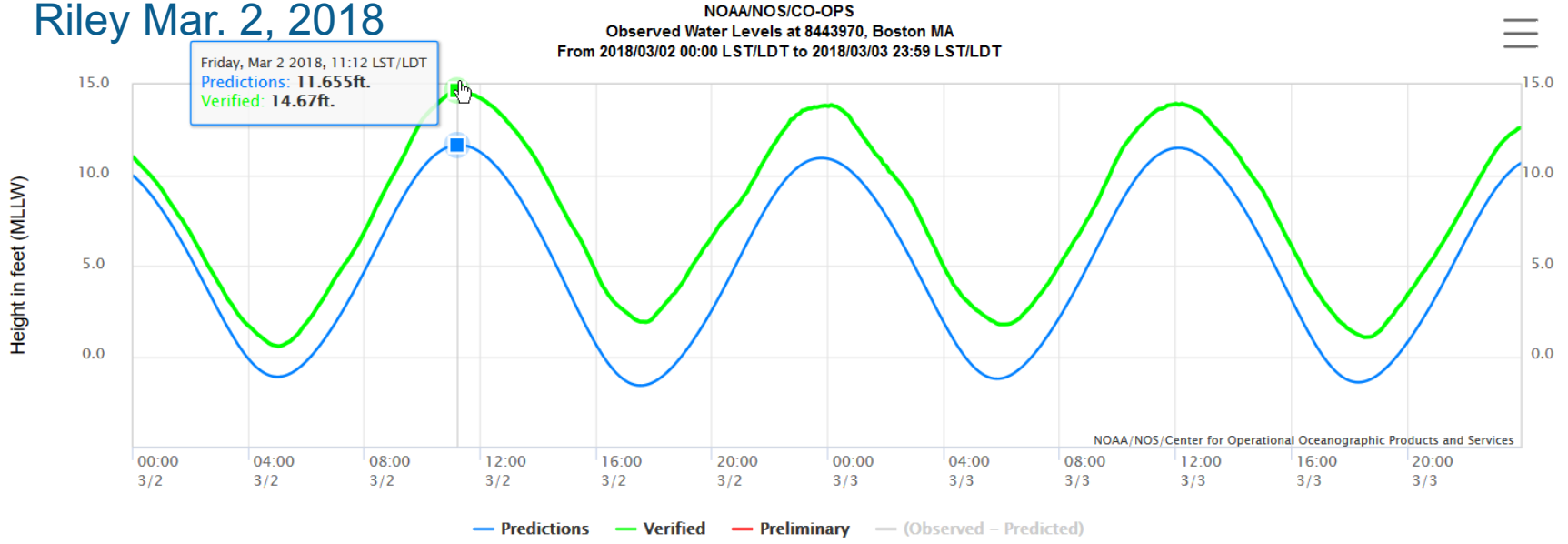

y firefighters rescue a mother and child by boat after their residence was flooded along Post Island Road in the Houghs Neck section of Quincy, Mass., Friday, March 2, 2018. (John Tlumacki/The

RECENT STORM SURGES (NEAR 1% EVENTS)

Grayson Jan. 4, 2018



Riley Mar. 2, 2018



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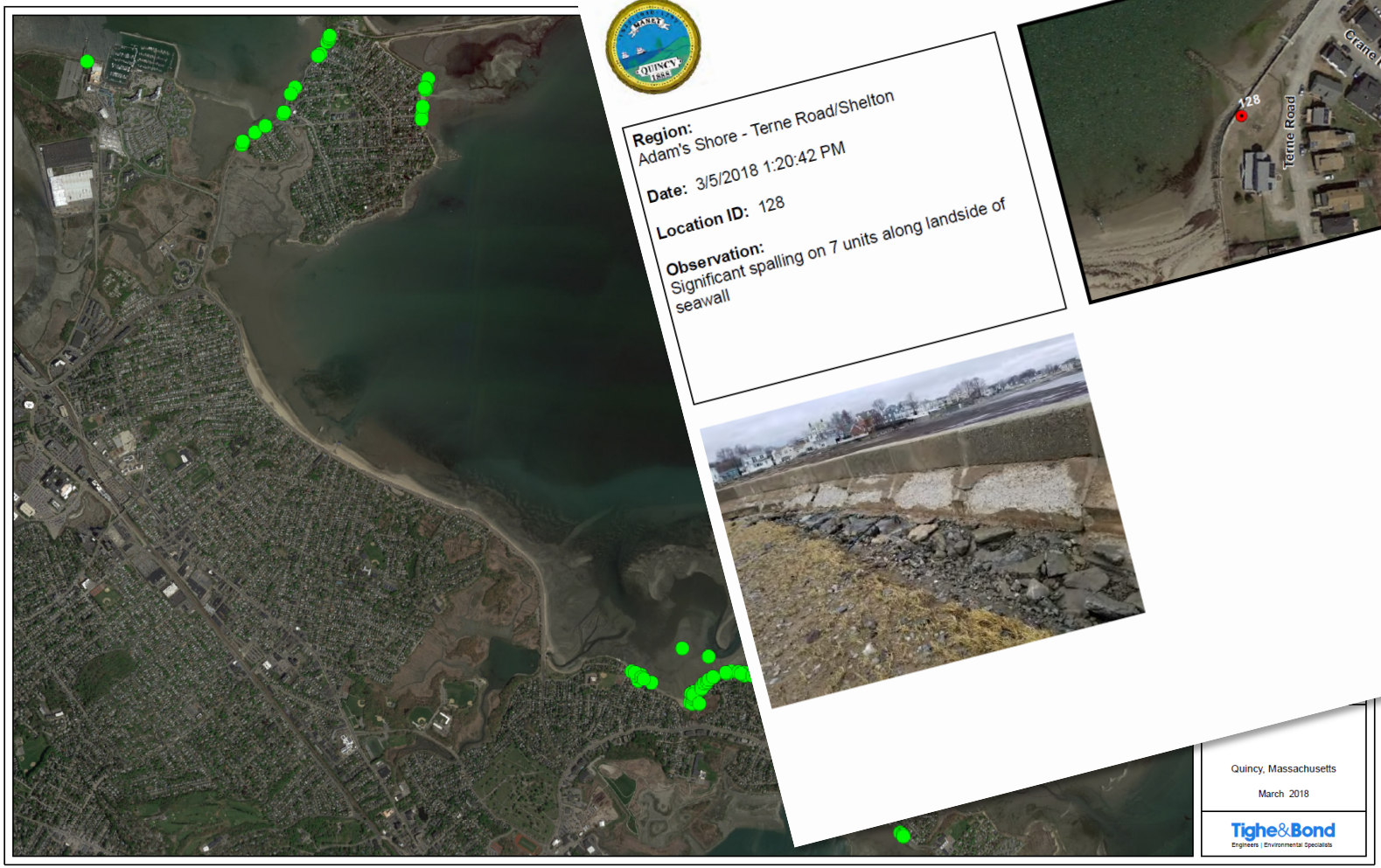
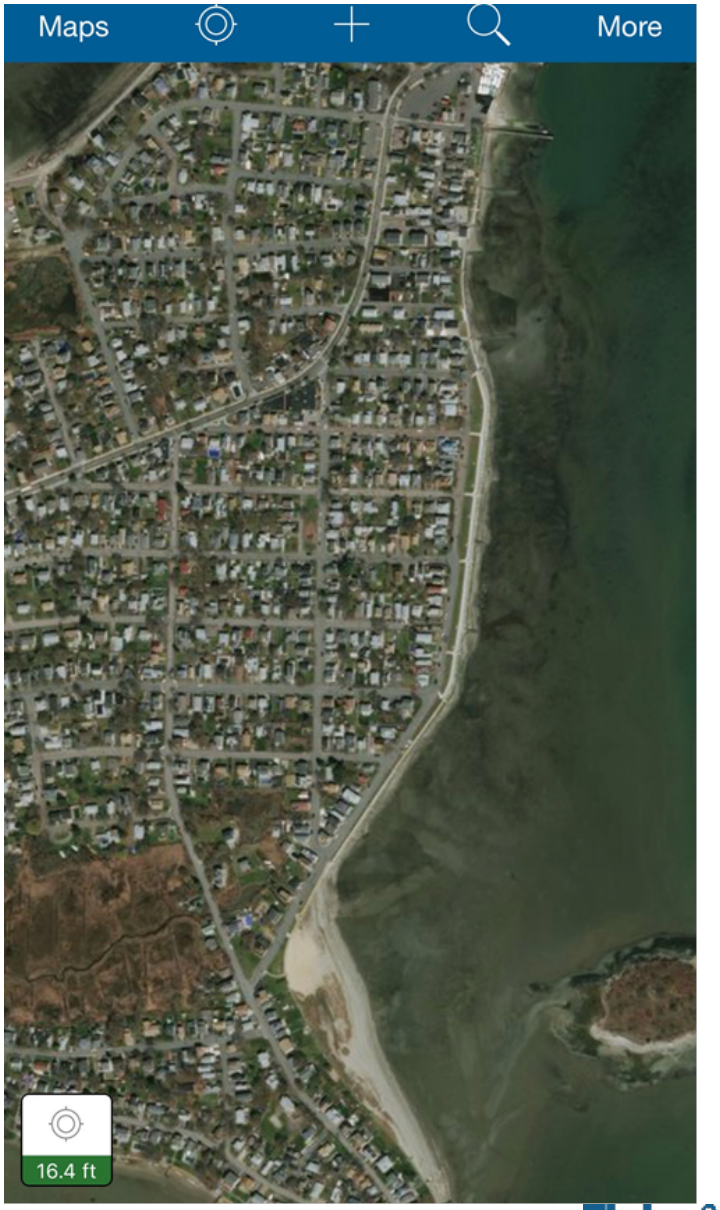
POST STORM EMERGENCY ASSESSMENT – MOBILIZATION

- March 3rd – 5th

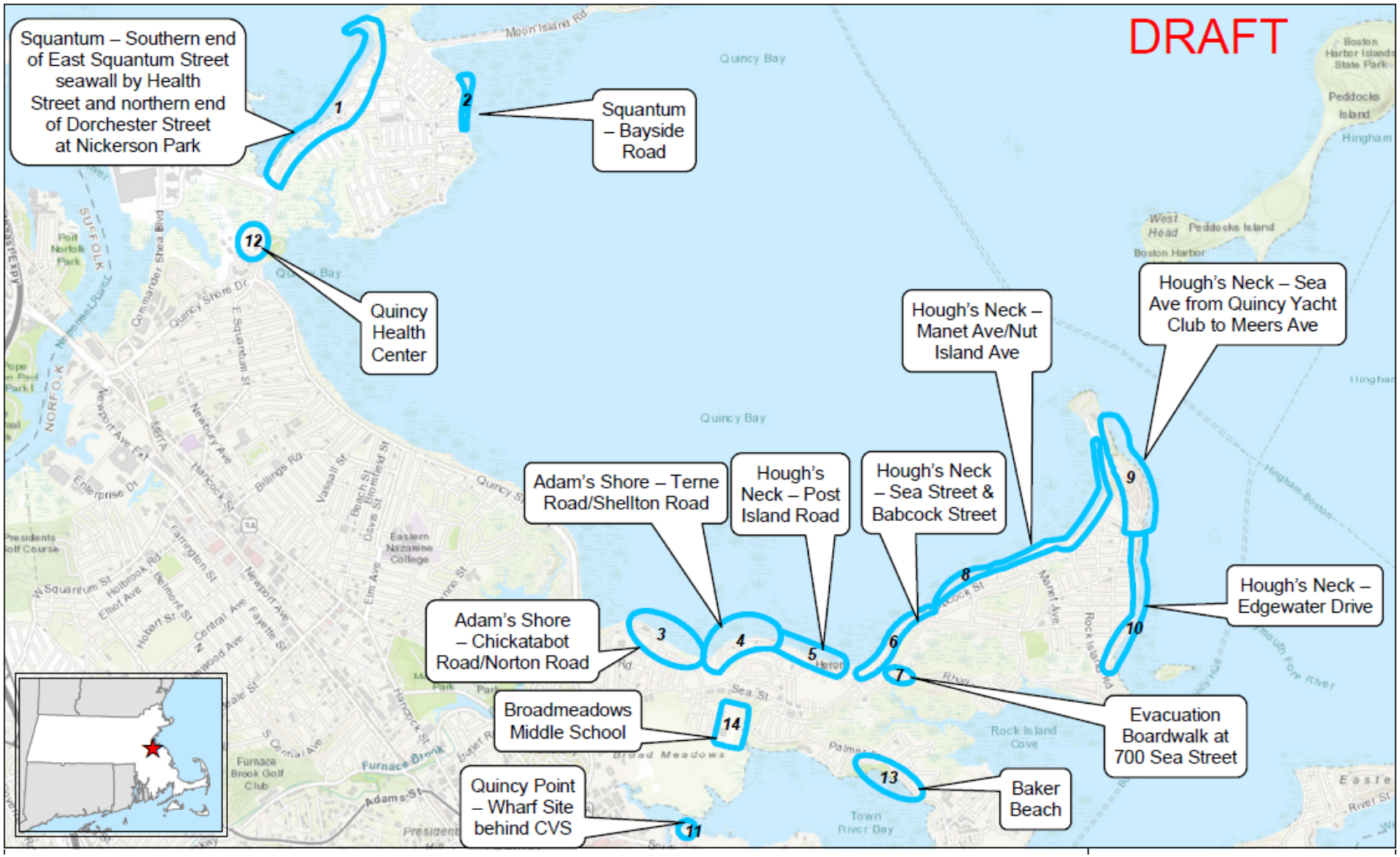


POST STORM EMERGENCY ASSESSMENT – GIS TOOL APPLICATION

- **GIS Application for Efficient Field Data Collection**
  - Application created for the City using ESRI Collector for ArcGIS
    - Photographs
    - GIS Points
    - Measurements
    - Notes



EMERGENCY REPAIR AREAS



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LOCATION 1 – EAST SQUANTUM

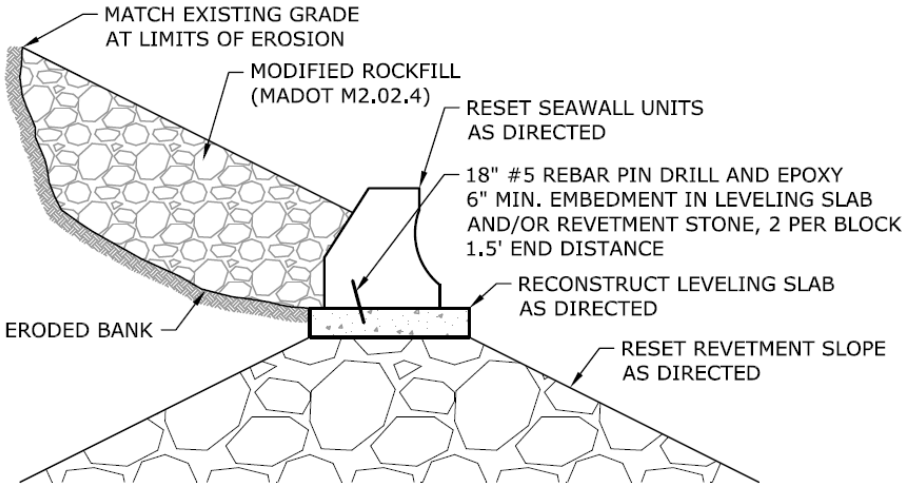
Roadside view of grouted joints along Dorchester Ave.

Revetment repair and curb reset at Nickerson Beach.

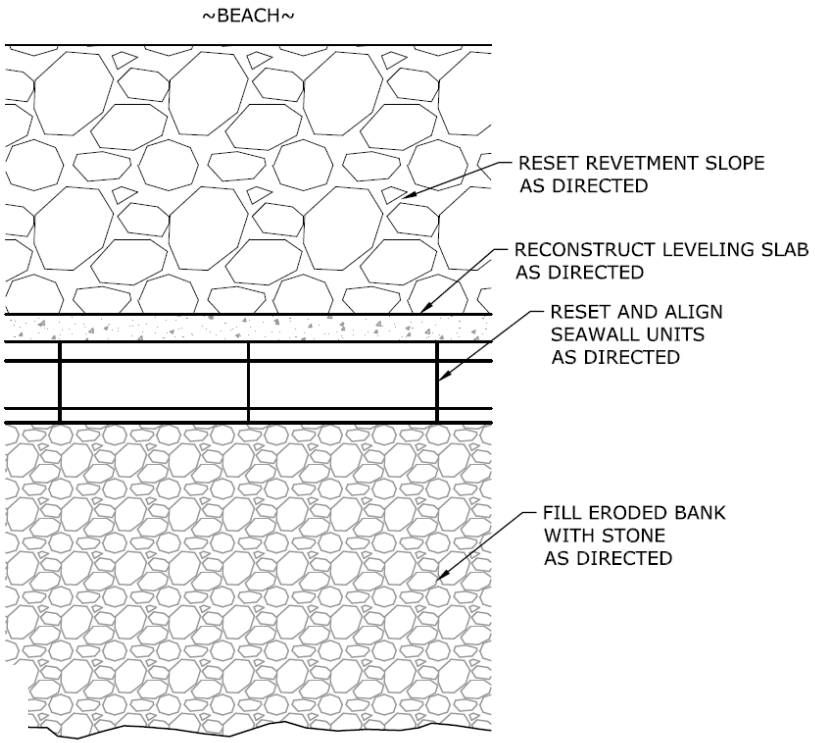
LOCATION 2 – BAYSIDE ROAD

Revetment repair along Bayside Road.

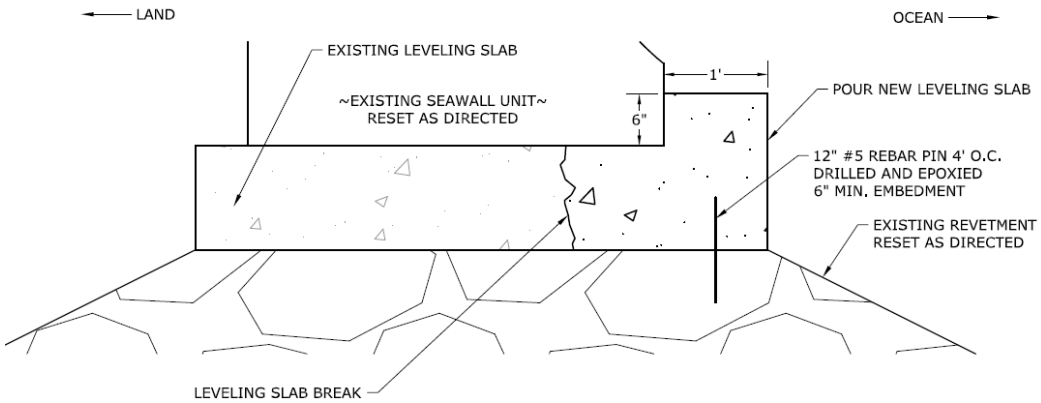
DESIGN DETAILS



TYPICAL SEAWALL REPAIR SECTION



TYPICAL SEAWALL REPAIR PLAN



TYPICAL SEAWALL REPAIR SECTION

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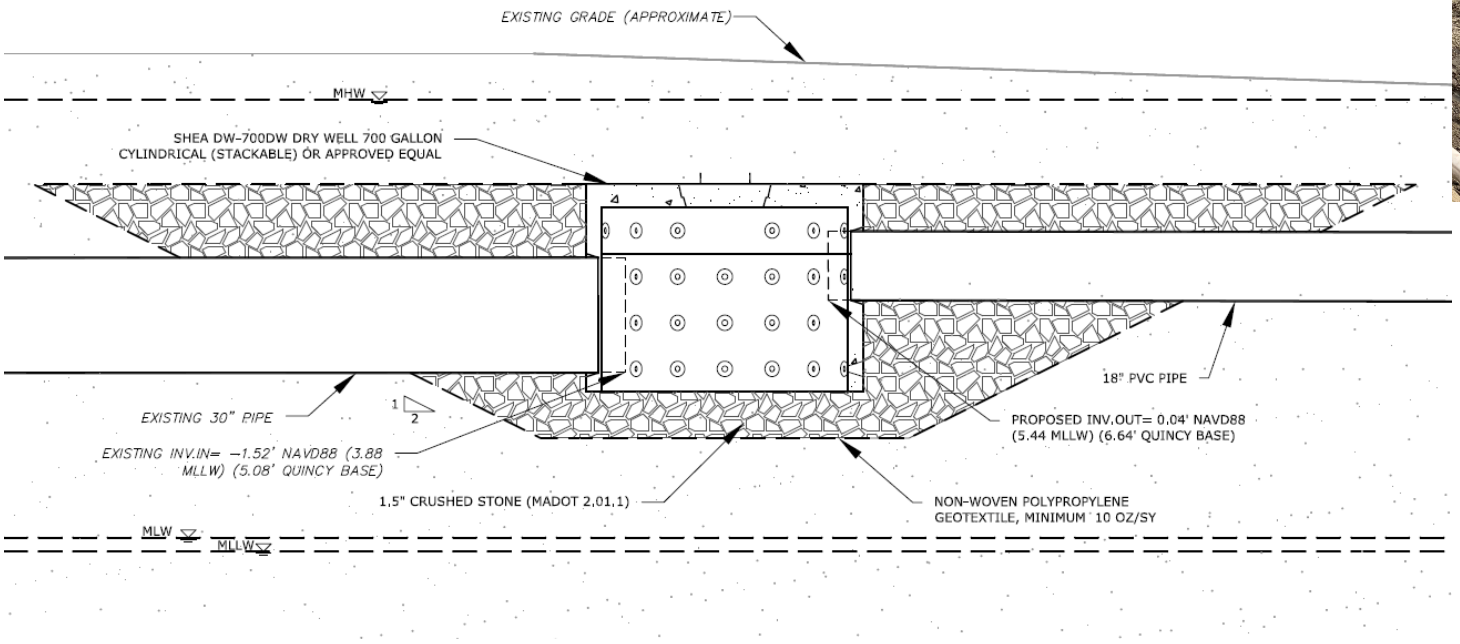
LOCATION 4 – TERNE RD. / SHELTON RD.

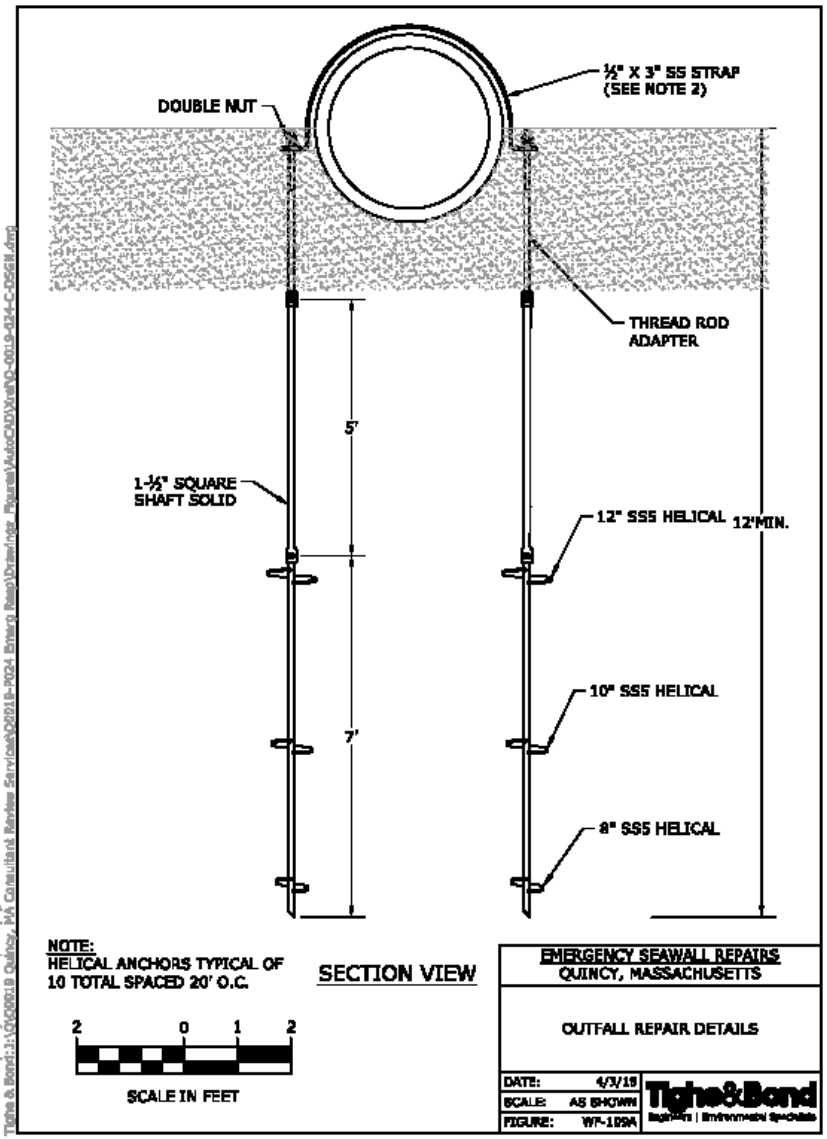
Leveling slab repaired at seawall along Shelton Rd.

LOCATION 8 – MANET AVENUE

NORTON BEACH OUTFALL



BAYSWATER OUTFALL



ROCKLAND STREET OUTFALL

QUESTIONS