RESILIENT BORDER STREET WATERFRONT PROJECT ENGINEERING ASSESSMENT

FOUNDATION FOR PRELIMINARY DESIGN EXECUTIVE SUMMARY

January 2025

Weston & Sampson℠

CITY of BOSTON

1. EXECUTIVE SUMMARY

INTRODUCTION

The Border Street area of East Boston's waterfront has emerged as a near-term priority in the City's efforts to address climate change and enhance coastal resilience (Figure 1). This stretch of coastline represents both a vulnerable zone and an opportunity for innovative urban planning and climate adaptation strategies. As the threat of coastal flooding intensifies, the Border Street waterfront has been recognized as a critical flood pathway as soon as 2030 requiring immediate attention and intervention.

During the first phase of "Coastal Resilience Solutions for East Boston"[1], a plan created in 2017 studying the East Boston waterfront, it was found that with projected sea level rise by 2030 and the growing intensity of major storms, such as the 1% annual chance flood, a flood pathway will develop through the Border Street waterfront. The Resilient Border Street Waterfront Project aims to protect East Boston residents, businesses, infrastructure, and open spaces from the impact of flooding by partnering with private landowners in the project area.

The full Resilient Border Street Waterfront Project Engineering Assessment and Preliminary Design report provides a comprehensive overview of the current state of the Border Street waterfront, focusing on the area extending from 36 New Street/60 Border Street to 276R Border Street, just north of Liberty Plaza/Shaws. It examines the physical, environmental, and social aspects of the project area, drawing from extensive site investigations, engineering assessments, and community engagement efforts to establish a baseline for future design and implementation phases.

[1] Coastal Resilience Solutions for East Boston and Charlestown. (2017).

The Resilient Border Street Waterfront Project goals include the following:

Develop and evaluate coastal protection options throughout the extent of the 2030 flood pathway along the Border Street waterfront and provide vertical protection to 40 inches of sea level rise during a 1% annual chance storm (2070), as set forth in the Coastal Resilience Solutions for East Boston and Charlestown Phase 1 Report;

Be informed by and reflect the input, priorities, needs, and constraints of the Community Coastal Resilience Implementation Council established through this project and the East Boston community more broadly;

Create new and enhance existing connections along the existing Harborwalk located near the project area that are Americans with Disabilities Act (ADA) compliant and accessible for people of all ages and abilities;

Integrate permeable open space, green infrastructure, and additional tree canopy throughout the design to improve stormwater management and mitigate urban heat island effect;

Restore degraded coastal ecosystems to enhance water quality and habitats to support wildlife and fisheries, where possible;

Continue to support and promote suitable water dependent industrial uses along the working shoreline and within the existing limits of the East Boston Designated Port Area (DPA), where possible; and

Identify feasible, permittable, and cost-effective solutions.

Figure 1. Aerial view of the Resilient Border Street Waterfront Project Area with projected flooding during a 1% annual chance storm with 9 inches of sea-level rise anticipated around 2030. Weston & Sampson, 2024.

UNDERSTANDING THE PROJECT AREA

CURRENT USES & STAKEHOLDERS

The Resilient Waterfront Border Street project area consists of seven privately-owned properties located along Border Street and New Street (Figure 2). Private property owners are crucial stakeholders in this waterfront design project as their properties and investments are directly affected by any changes that will be proposed for this waterfront area. Their involvement ensures that the project addresses concerns such as current uses and plans for future use or development, public access, and flood protection. As the project continues to engage these property owners, the project team has gathered valuable local knowledge and preferences that may lead to more effective and widely accepted solutions.

Current stakeholders and property use along the waterfront range from commercial enterprises and industrial operations to residential developments and community spaces.

Due to the nature of this project and its public/private partnerships across the properties within the project area, the main form of feedback has been gathered through the project's three established stakeholder groups. The stakeholder groups consist of the following:

Property Owner Stakeholder Group

Property owners within the project area and abutting property owners.

Community Stakeholder Group

Representatives of East Boston community groups who will also work on community engagement efforts.

Public Agency Stakeholder Group

Representatives from relevant City departments and State agencies.

Figure 2. Property owners and abutters in the Resilient Waterfront Border Street Project Area. Photo created by Weston and Sampson, 2024.

HISTORIC AND PRESENT-DAY FLOODING

Many waterfront neighborhoods in Boston were built on filled land to support the city's expansion. The Resilient Border Street Waterfront Project area in East Boston, developed in the mid-1800s for commercial port activities and housing, was initially elevated to meet the needs of the time. However, rising sea levels and increasingly severe storms have made the area more vulnerable to flooding.

Notably, the 2018 winter storms Grayson and Riley caused significant flooding in the project area, highlighting its growing exposure to coastal risks. This trend continued into January 2024, when a coastal storm resulted in high levels of inundation along the Border Street waterfront. Coastal flooding nearly breached existing flood protection, impacting numerous parcels within the project area (Figure 3). These events underscore the urgent need for resilience measures to address the ongoing and escalating challenges of sea level rise and extreme weather.

Figure 3. Flood waters reaching the scuppers on the seawall at the Boston East Apartments at 126 Border Street during January 2024. Coupled with a king tide event, or a few more inches of rain and the seawall's elevation would not have blocked the flood waters. Weston & Sampson, 2024.

FUTURE CLIMATE RISK AND VULNERABILITY

Understanding the extent of flood vulnerability in East Boston requires an analysis of both present-day flood risk and future projections under various sea level rise scenarios.

The Massachusetts Coastal Flood Risk Model (MC-FRM), developed by the Office of Coastal Zone Management's (CZM) StormSmart Coasts Program to "depict exposure of community facilities and infrastructure to coastal flooding under various conditions."[2] The MC-FRM data and flooding projections, serve as recommended standards for buildings and infrastructure projects across the Commonwealth.

The model, combining the risk of sea level rise with several other storm factors such as surge, waves, and tides, was used to understand the current coastal flood pathways, as well as the severity of future coastal flood risks in the project area. The project area is expected to be fully inundated in the first scenario of the projected 2030 1% annual storm (Figure 4). During the 2050 and 2070 storms (Figures 5 and 6), the inundation levels are projected to engulf the surrounding community, flooding much of the lower lying levels of East Boston.

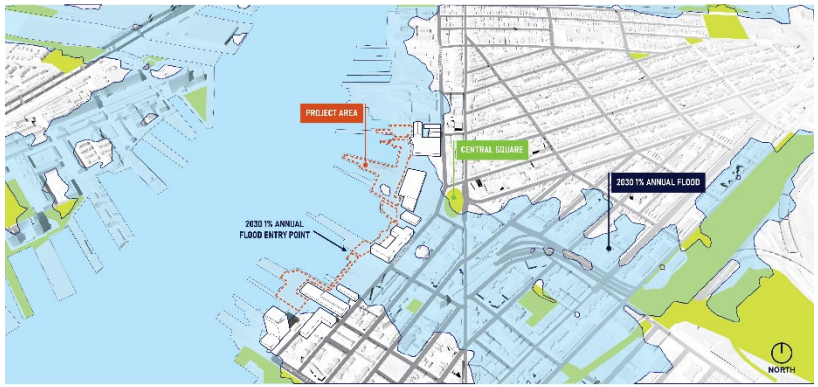


Figure 4. Conceptualization of the Projected 2030 1% Annual Flood Pathway for the Border Street Waterfront. Weston & Sampson, 2024.

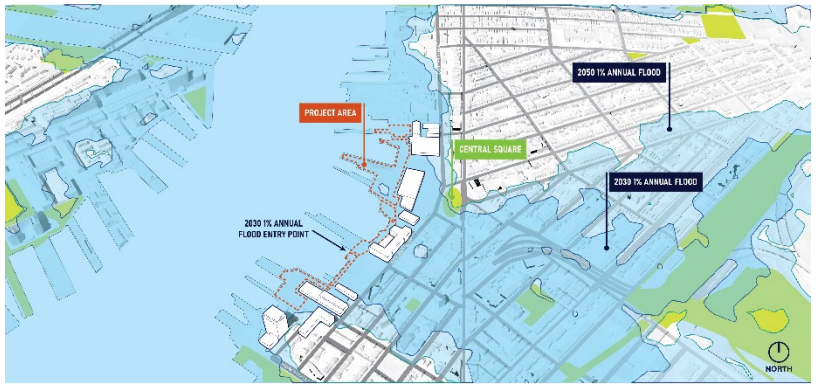


Figure 5. Conceptualization of the Projected 2050 1% Annual Flood Pathway for the Border Street Waterfront. Weston & Sampson, 2024.

[2] MA CZM Sea Level Rise and Coastal Flooding Viewer. MassGIS, CZM.

Figure 6. Conceptualization of the Projected 2070 1% Annual Flood Pathway for the Border Street Waterfront.

Weston & Sampson. 2024.

Comparison of Flood Elevations

In scoping this project, the City of Boston requested that the infrastructure span the extent of the 2030 1% flood pathway while being constructed to the height of the 2070 1% flood elevation. A summary of the maximum wave crest elevations based on MC-FRM outputs from the previously mentioned sources are summarized below in Table 1. The elevations provided are a preliminary baseline for developing concepts and will be refined as the design is further developed.

Table 1. Flood Elevations Comparison

Property	FEMA		BH-FRM[1]		MC-FRM					
	Historic/Present Day (Feet)		2070 1% Storm (Feet)		2030 1% Storm* (Feet)		2050 1% Storm* (Feet)		2070 1% Storm* (Feet)	
	NAVD88[2]	BCB[3]	NAVD88	BCB	NAVD88	BCB	NAVD88	BCB	NAVD88	BCB
34-36 New Street	11.0	17.5	14.0	20.5	12.5	19	14.5	21	16.5	23
All other properties	10.0	16.5			12.0	18.5	14.0	20.5	16.0	22.5

**Elevations are averages across the project area and used as a reference for further design discussion.*

[1]BH-FRM: Boston Harbor Flood Risk Model

[2]NAVD88: North America Vertical Datum of 1988

[3]BCB: Boston City Base

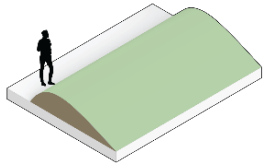
COMMUNITY FEEDBACK

Public engagement events for the Resilient Border Street Waterfront project are designed to foster community involvement and ensure that the local community has knowledge of the project that will shape the future of East Boston's waterfront. These events provide a platform for residents, business owners, and other stakeholders to share their concerns, insights, and ideas regarding coastal resilience and flood management strategies. To reach the broader community, the project team used a threefold approach: (a) issue an online survey, (b) attend local events, and (c) facilitate interactive exercises in the neighborhood.

Feedback from East Boston residents highlight a vision for a vibrant waterfront with essential infrastructure (restrooms, public transport, waste facilities), inclusive amenities (play areas, gardens, BBQ spots), water features (ferries, fishing, splash pads), dynamic programs (food trucks, festivals, markets), lush vegetation (stormwater gardens, pollinator spaces), and accessible paths (boardwalks, bike lanes, promenades).

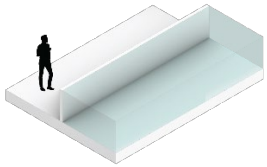
STRATEGIES FOR COASTAL FLOODING RESILIENCE

Each property along the Border Street waterfront has its own unique needs and challenges. One type of strategy for the entire waterfront is unlikely to be favorable or work technically given the uses and construction of waterfront structures. Additionally, flooding impacts each property differently given the change in elevation across the waterfront and exposure to waves. To address these challenges, several types of flood barrier strategies are being considered.



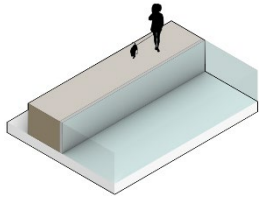
EARTHEN BERM

A berm is a raised barrier or mound of earth, often used in landscaping, construction, or erosion control, to manage water flow and provide visual separation between different areas.



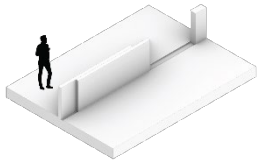
ELEVATED SEAWALL

A flood wall, whether a sea wall or an interior concrete wall is a robust, engineered barrier designed to protect land and infrastructure from rising water levels and flooding by redirecting or containing excess water.



ELEVATED HARBORWALK

Similar to the berm, an elevated Harborwalk is a raised earthen structure supported by structural walls.



DEPLOYABLE GATES & BARRIERS

A deployable flood barrier is a portable flood defense system designed for quick setup in response to imminent flooding. It provides protection by blocking or diverting water from vulnerable areas and can include deployable gates to support marine uses, such as those required by C. White Marine.

APPROACHES CONSIDERED FOR DESIGN

The following options utilize the various previously mentioned strategies to achieve resilience along the waterfront. The strategies that are ultimately used will vary depending on the site's unique conditions, and multiple strategies may be needed across the project area.

SEAWALL REPAIR AND ELEVATION

Figure 9. Visual of elevating a seawall along the waterfront.

Most of the waterfront in the project area needs seawall improvements or replacement. Given the poor condition of this infrastructure today, a required foundational step for any future investments along the waterfront must include improving the structural integrity of existing infrastructure, such as seawalls or bulkheads, and elevating this infrastructure above the projected flood elevation.

Elevating seawalls along the waterfront would achieve flood protection and have the least impact to the individual properties. However, this would result solely in improvements to flood resilience without aesthetic or other public-use benefit(s). This approach alone includes maintaining the Harborwalk where it currently exists, without expanding connection along the waterfront.

HARBORWALK CREATION AND CONNECTION

Figure 10. Visual of elevating a seawall and creating new Harborwalk connections along the waterfront.

While repairing and elevating seawalls along the waterfront would be the lowest probable construction cost to prevent long-term flooding, this approach by itself is not generally the preferred long-term vision for the waterfront. New Harborwalk connections could be created on top of or behind repaired, elevated seawalls to establish a north-south connection from the Eddy to Liberty Plaza.

The proposed approach would enhance accessibility, provide expansive views across the harbor, and improve connectivity from residential properties to the commercial uses at Liberty Plaza. Feedback from the waterfront property owners and the East Boston community more broadly revealed that this is strongly preferred to enhance the waterfront for public use.

FUTURE PROPERTY REDEVELOPMENT

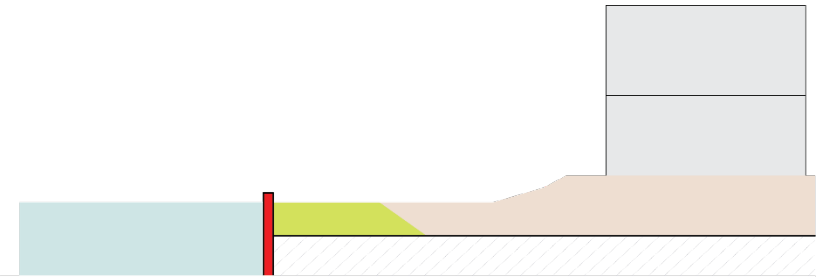


Figure 11. Visual of future build out potential along the waterfront.

Should the DPA be adjusted in the future, waterfront property owners could utilize the elevated seawall and/or Harborwalk connection to build resilience into future waterfront development. The creation of a new Harborwalk could be expanded to include potential pocket parks, esplanades, and vistas to fully integrate the community and waterfront in the project areas.

The Boston Planning and Development Agency requested a review of the DPA boundary in 2022; however, no parcels were removed. Many of the property owners believe that removal or reduction of DPA requirements would allow them to realize other uses for the properties and provide greater public access to the waterfront. If removed from the DPA, redevelopment of the sites would be subject to the City's Coastal Flood Resilience Overlay District requirements for building-level elevation and access to public space under Chapter 91.

NEXT STEPS

Following the completion of the existing conditions report, the project team will convene the Property Owner's Stakeholder Group to present a preliminary district-scale vision for the waterfront and discuss the next steps for design and permitting. Similar presentations will be held with the Community Stakeholder Group and with the Public Agency Stakeholder Group to provide a progress update and gather additional feedback. The team remains on track to achieve 30% design completion by spring 2025.

Members of the project team will also begin coordination discussions with regulatory agencies, such as CZM, Massachusetts Department of Environmental Protection (DEP), and Massachusetts Environmental Policy Act Office (MEPA), as well as coordinate separate meetings with city departments and regulators.