Climate Change, Flooding & Frontage Road: What’s Coming

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Charles River Watershed
Charles River Watershed Association

- Program Areas
  - Field Science
  - Blue Cities Initiative (low impact development and green infrastructure)
  - Climate Change Adaptation
  - Law, Advocacy and Policy
Our Changing Climate

National Climate Assessment: Northeast

- Increases in total precipitation, especially winter and spring
- Extreme precipitation events
- Recurrent flooding
- Heat-related deaths, related to heat island effect, cities’ “abundance of concrete and asphalt and relative lack of vegetation”
- Evacuated and displaced populations
- All exacerbated by aging infrastructure including water, sewer, stormwater, transportation
What’s Wrong With Impermeable Surfaces?

Water that would have soaked into the ground now runs off into storm drains
- This “runoff” carries trash & toxins from the street straight into rivers/ocean

- Aging storm drains get overwhelmed → flooding
- Even new storm drains cannot handle volume of heavy rains → flooding

Fewer trees = less vegetation to slow water → flooding
- Increase heat island effect
- Summers getting hotter
- Pavement increases heat, up to 22F at night
- Fewer trees = less shade
- More storms = more power outages → no air conditioning → heat deaths, especially among elderly, infirm

Buried streams … are still streams
- Concrete does not absorb water as soil does
- Culvert is a certain size... but streams will grow in volume during heavy rains

January 2018 storms will be regular occurrence.

As sea level rises and chronic flooding increases, it is not enough to “adapt” by putting utilities on upper floors – roads will be impassable for daily life, much less emergency vehicles.
Frontage Road and Widett Circle
Facilities and Capital Planning

Municipal facilities—including administrative buildings, libraries, schools, community centers, and public housing—are critical for the City to be able to carry out its core duties and functions. Facility managers identified short- and long-term vulnerabilities of City facilities to increased flooding, extreme heat, and other risks that call for capital investment. Facility preparedness measures will vary greatly depending on the vulnerability and type, age, and use of building. Examples of measures include elevating or relocating critical equipment (boilers, electrical infrastructure, and computer equipment) in areas vulnerable to flooding, installing air conditioning for spaces prone to overheating, and replacing roofs to be higher performing in high-wind events. As we approach the middle of the century, the City may need to develop plans to replace or relocate facilities that may be unsustainable due to their design or location.

GENERAL MUNICIPAL BUILDINGS

Although most of City Hall is above both mean high high water (MHHW) plus 5 and plus 7.5 feet (see Figure 4), the first floor, which currently houses the City’s primary IT and communication servers, may be vulnerable to sea-level rise and storm surge. Loss of this infrastructure, a concern raised by many departments, would severely disrupt municipal operations. The Department of Innovation and Technology (DoIT) is addressing this vulnerability by diversifying where data is stored and creating redundancy in the system.

Another major set of facilities is the complex of buildings and assets around 400 Frontage Road and Southampton Street (see Figure 5), which include Central Fleet Maintenance, the City’s largest fueling station, operations facilities for the Transportation Department, ground-level telecommunications equipment for the Police Department, Boston Public Health Commission’s methadone clinic, and more. All these departments identified the increasing flood risk to this area as a high priority, especially because it is already prone to flooding.

Figure 4: City Hall with MHHW plus 5 and plus 7.5 feet.
Figure 5: 400 Frontage Road with MHHW plus 5 and plus 7.5 feet.
Climate Ready Boston Vulnerability Assessment
Stormwater Flooding and Low Income Populations
2050s-2100s: 21 INCHES OF SEA LEVEL RISE
Climate Ready Boston Vulnerability Assessment

**Sea Level Rise in Boston During the Twenty-First Century**

- **2000**: 0'
- **2030**: 4”
- **2050**: 7”
- **2070**: 1.5’
- **2100**: 7.4’

Max Possible: 10.5’

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1. Likely under all emission scenarios
2. Likely under moderate to high emission scenarios
3. Low probability under high emission scenario

Data Source: BRAG Report, 2016

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2070s OR LATER: 36 INCHES OF SEA LEVEL RISE
Flooding in Boston’s coastal neighborhoods takes residents by surprise

By Tim Logan and David Abel | GLOBE STAFF  | JANUARY 05, 2018

Everyone knew the snow was coming. But the flooding that swamped Boston’s coastal neighborhoods Thursday came as an icy shock and raised fresh questions about how to best build along the city’s waterfronts in a time of rising seas.

An unusually high tide, whipped by winds that gusted as high as 76 miles an hour, washed pools of frigid water into the streets of the Seaport, Fort Point, and the downtown waterfront Thursday afternoon. A stretch of the Blue Line in East Boston was briefly shut down, while firefighters pulled a man from a flooded car in Neponset Circle in Dorchester. Even the city’s tow lot, in low-lying Widett Circle, was partly underwater.
Boston 1700s

1795 coastline (yellow)
1995 aerial image
South Bay reduced to canal to the west and small stream to the east.
Natural History Research

1925

Google Street View July 2011
Natural History Research
Restoration Opportunities and Benefits
Option 1: Restore the Bay

Construct a large scale wetland at the "headwaters" of the Bass River

- Protect the surrounding area against extreme rain events; a 300 acre wetland could store runoff from a 10” storm from over 1,000 acres of the surrounding development
- Build flexibility to sea level rise at a vulnerable point along the coastline
- Create new open space and recreational opportunities
- Improve water quality and habitat
- Increase surrounding property values
Fort Point Channel Wetland
Restoration Opportunities and Benefits
Option 2: Restore the Stream

Integrate constructed stream channels or culvert “daylights” into any on site development

• Protect the surrounding area against modest rainfall events (~1 year storm)
• Improve water quality
• Reduce “upstream” stormwater flooding or CSOs from DBC and RCC
• Create new open space
• Improve water quality and habitat
• Increase surrounding property values
Near Term Design Options: Bass River Daylight
Resilient Boston Harbor

Climate Ready South Boston identifies the major flood pathways to many of the City's residential neighborhoods through Fort Point Channel and Moakley Park. In response, the following strategies have been identified:

• Create a resilient Moakley Park and a re-envisioned Fort Point Channel to protect homes and businesses in South Boston, the South End, Chinatown, and parts of Dorchester and Roxbury.
• Build a coalition of support from the private property owners surrounding Fort Point Channel to assist in creating a signature resilient park system.
• Secure federal support. The City is applying for a $10 million FEMA mitigation grant to begin resilience work along the Fort Point Channel.
• The Boston Water & Sewer Commission has begun installing essential infrastructure for reducing flood risk.

Thank you!

Any Questions?

For more information
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