MUDDY RIVER FLOOD RISK MANAGEMENT – PHASE II

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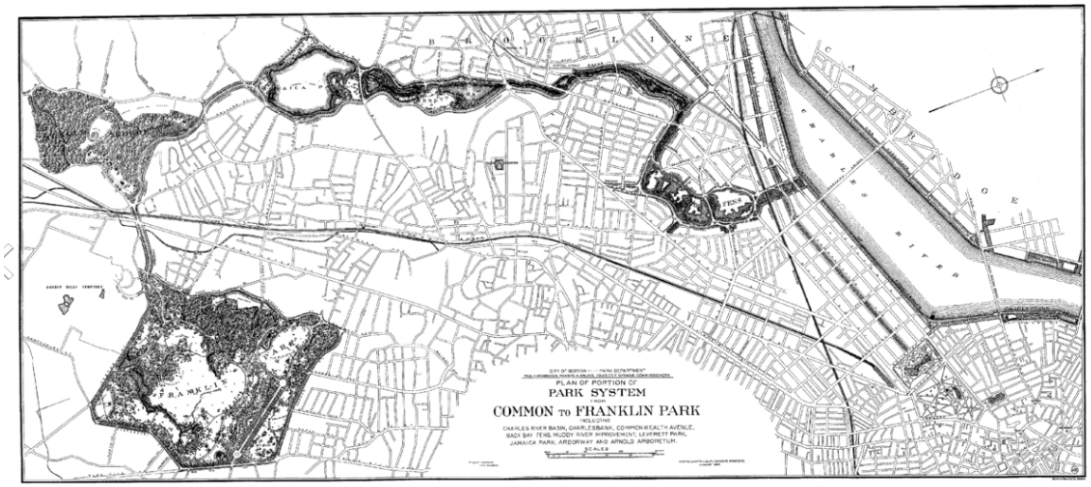
New England District/PPMD
Date: 27 FEB 2020

Kenmore Station Flooded up to the Signs 1996

U.S.ARMY

US Army Corps of Engineers

MUDDY RIVER THE HEART OF OLMSTED PARK



1894

This 1882 photograph shows the dredging of the northern basin of the Fens, which was necessary to provide storage for floodwaters. (Boston Park Commission Report, 1883.)

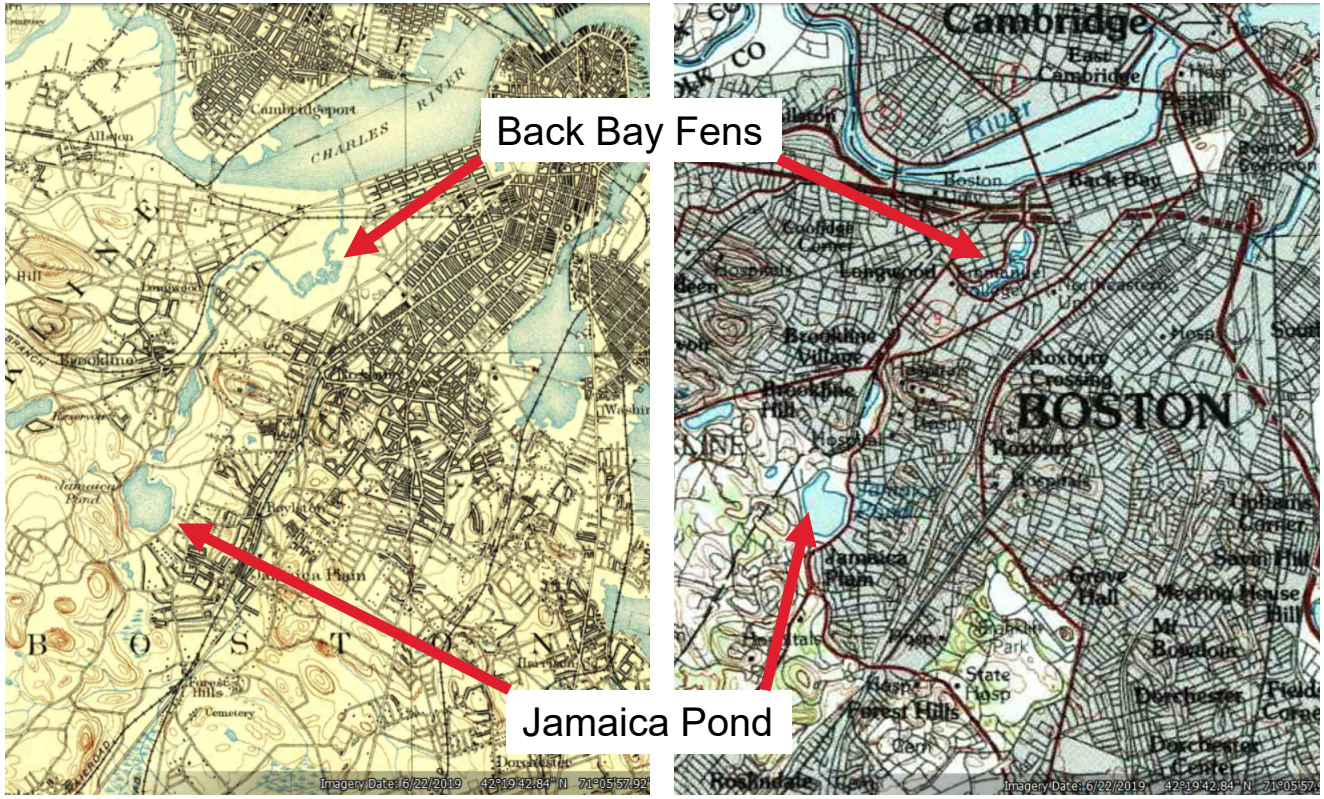
The Riverway section of the Muddy River is under construction here, in 1892.
(Collection of the National Park Service, Frederick Law Olmsted National Historic Site, Brookline, Massachusetts.)

- The park was designed by Fredrick Law Olmsted & completed in the 1890's
- Olmsted designed some of America's greatest city parks
- "The Necklace" is the oldest remaining linear park in the United States

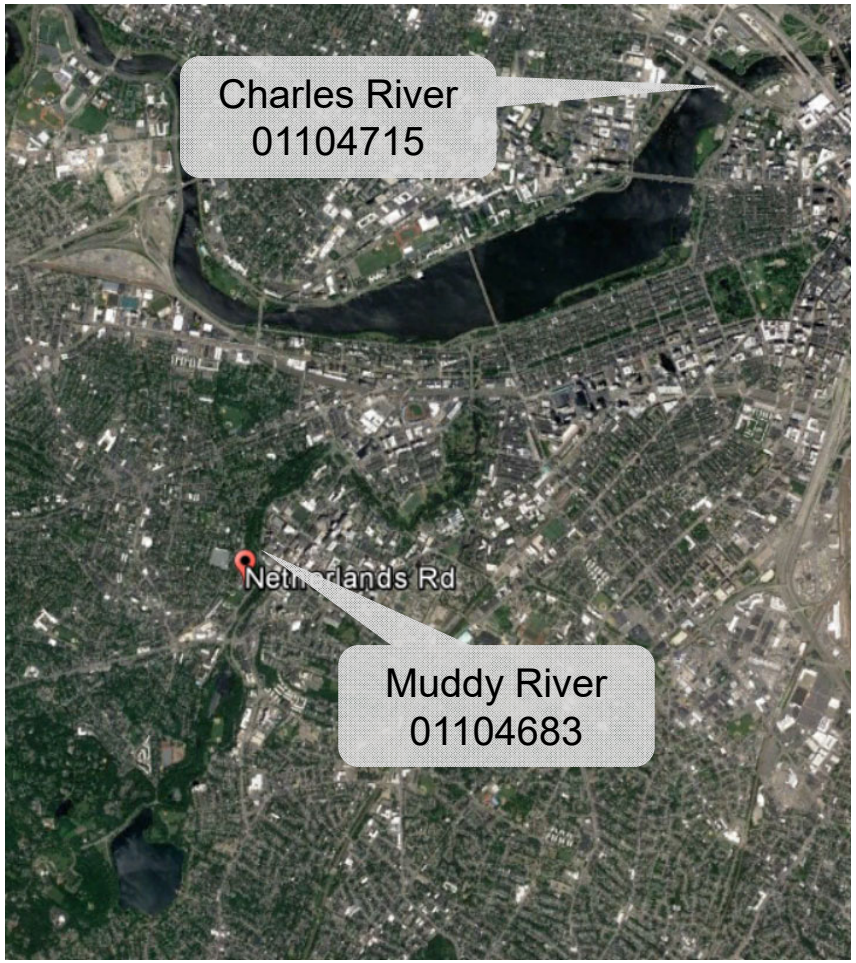
Images from http://www.muddyrivermmoc.org/restoring-olmsteds-vision/

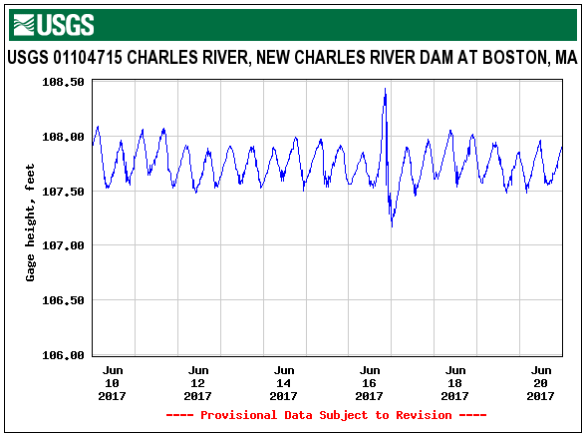
MUDDY RIVER

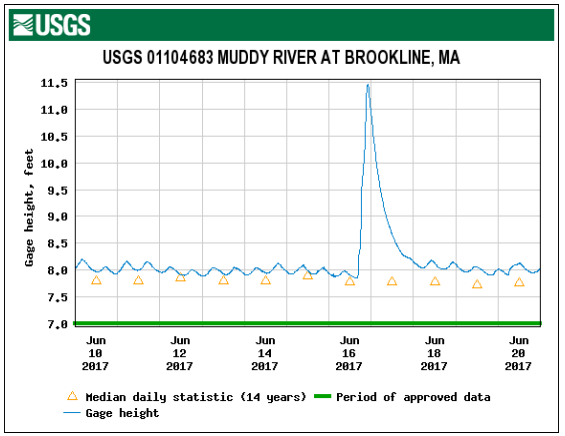
- 3.5 mile urban river winding through the Town of Brookline and the City of Boston
- 5.6 mi drainage area
- Over 90,000 people live within 0.5 miles of the river
- Runs through the Emerald Necklace, a chain of parks (6 miles) managed by the DCR



MUDDY RIVER HYDROLOGY



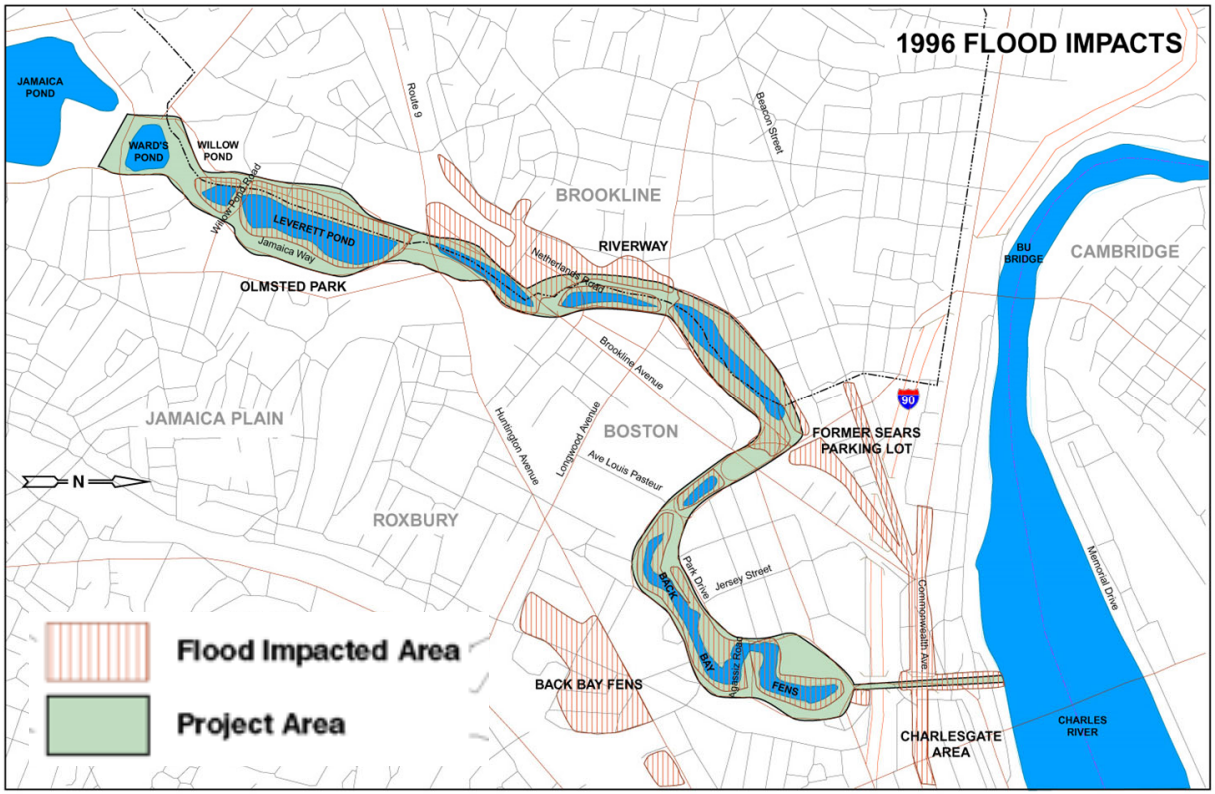




- Typical elevations influenced by water level in Charles River and runoff
- Highly urbanized watershed, reduction of floodplain, impervious surface, stormwater drainage and hydraulic restrictions have led to flooding

MUDDY RIVER – 1996 FLOODING

Boston received 10.8 inches of rain
A month's worth in one day



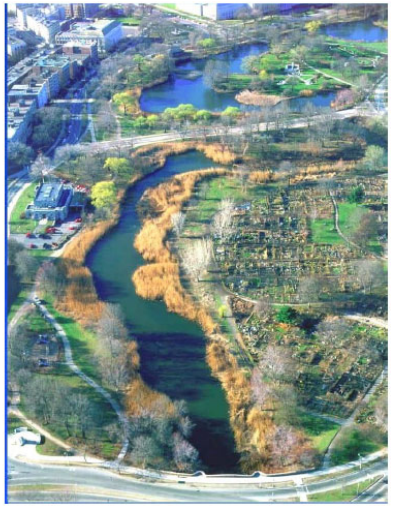
- Extensive damage to MBTA in Kenmore Square
- Over $60M in damages to MBTA

MUDDY RIVER – ADDITIONAL FLOODING EVENTS

- June 1998, March 2001, March 2010 (6” over 2 days with water levels 2.5 feet higher than normal)

MUDDY RIVER – COMPREHENSIVE PLAN

- A comprehensive plan was developed to address
  - Flooding
  - Accumulated sediment
  - Reduced aquatic habitat quality (high SOD, low DO)
  - Contaminated sediments (metals, PCBs, PAHs)
  - Invasive species (*Phragmites*) impacting biodiversity & reduction of open water
- Corps completed Decision Document and Environmental Assessment
  - Muddy River Flood Control and Ecosystem Restoration, September 2003

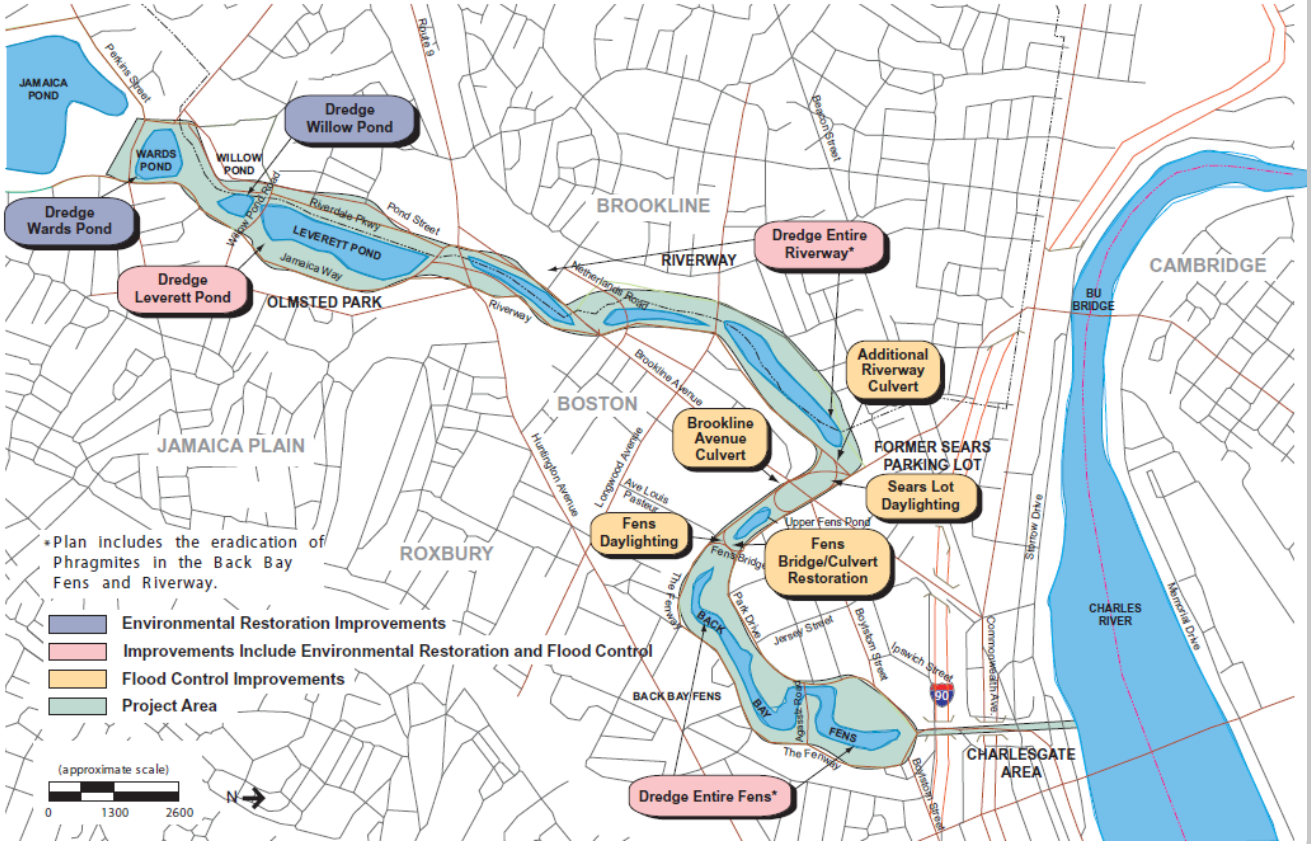


MUDDY RIVER – COMPREHENSIVE PLAN

- Decision Document approved – Director's Report December 2003
- Review by ASA office – costs of ecosystem restoration features are prohibitive on a per acre basis.
- OMB concurs with ASA recommendation NOT to fund ecosystem restoration components.

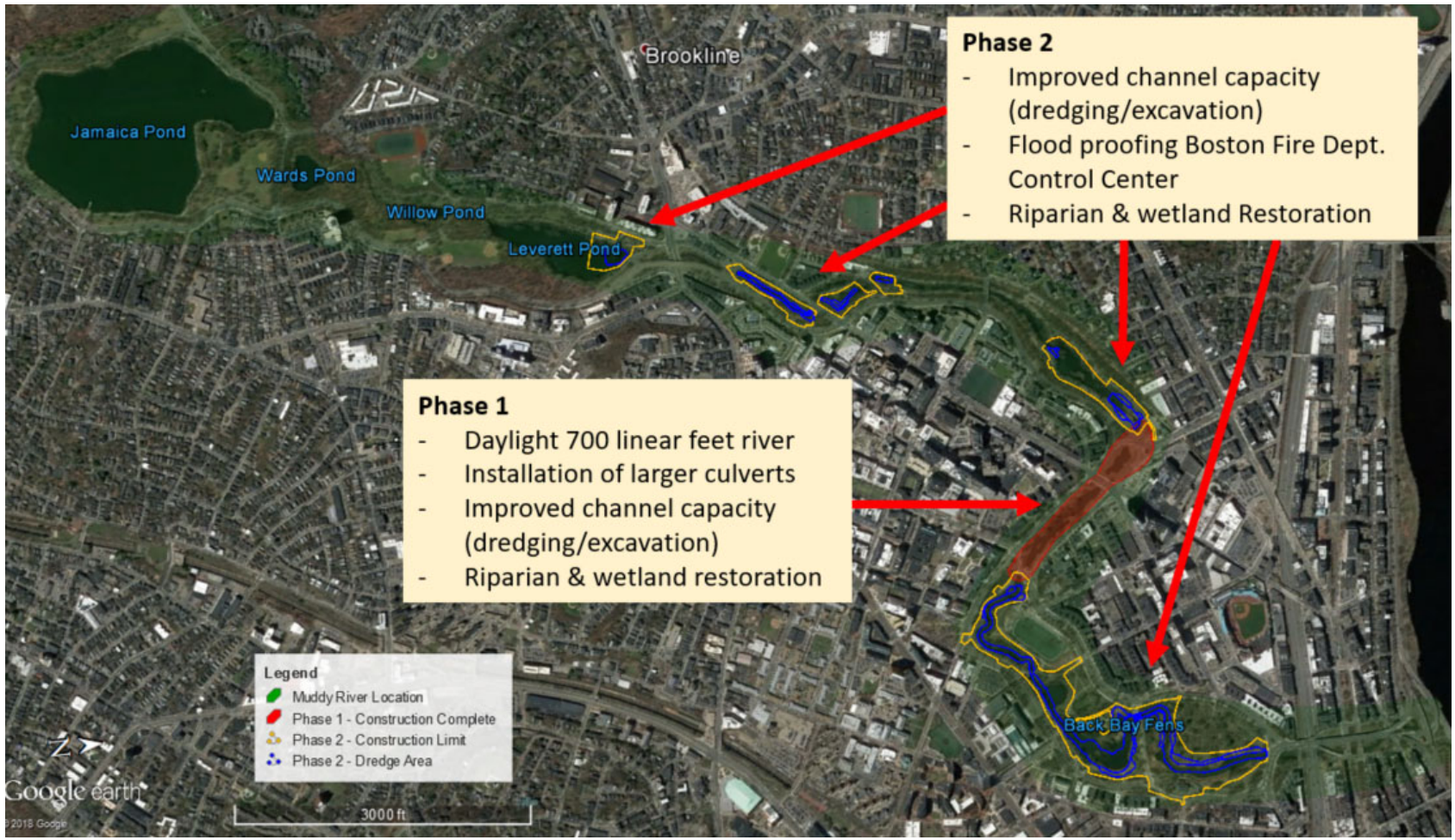
AUTHORIZATION ☑

APPROPRIATION ½ ☑



Recommended Plan

MUDDY RIVER – FLOOD RISK MANAGEMENT PLAN



2001

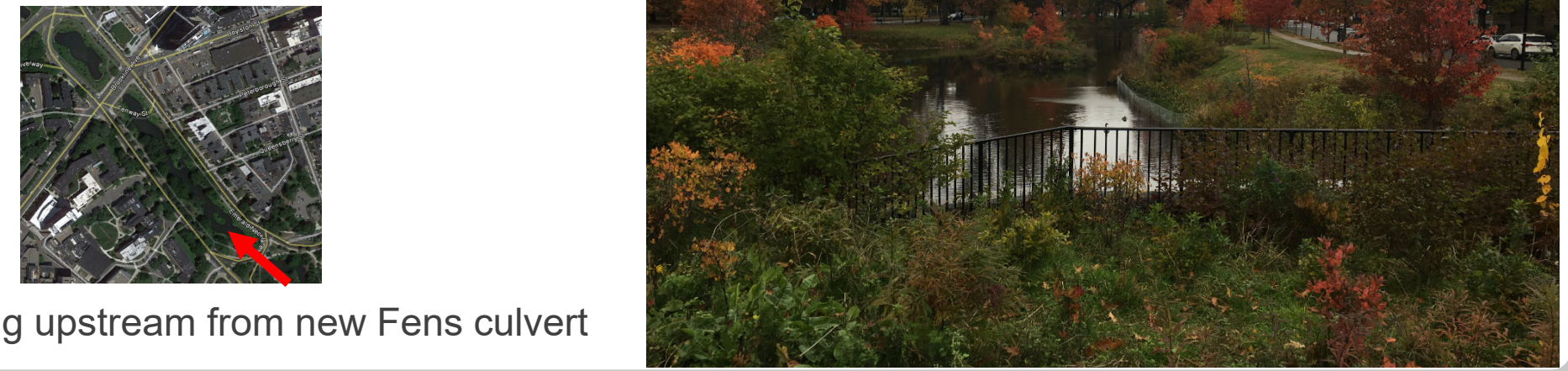
Phase 1

- Daylight 700 linear feet river

2019

MUDDY RIVER – PHASE 1 COMPLETE

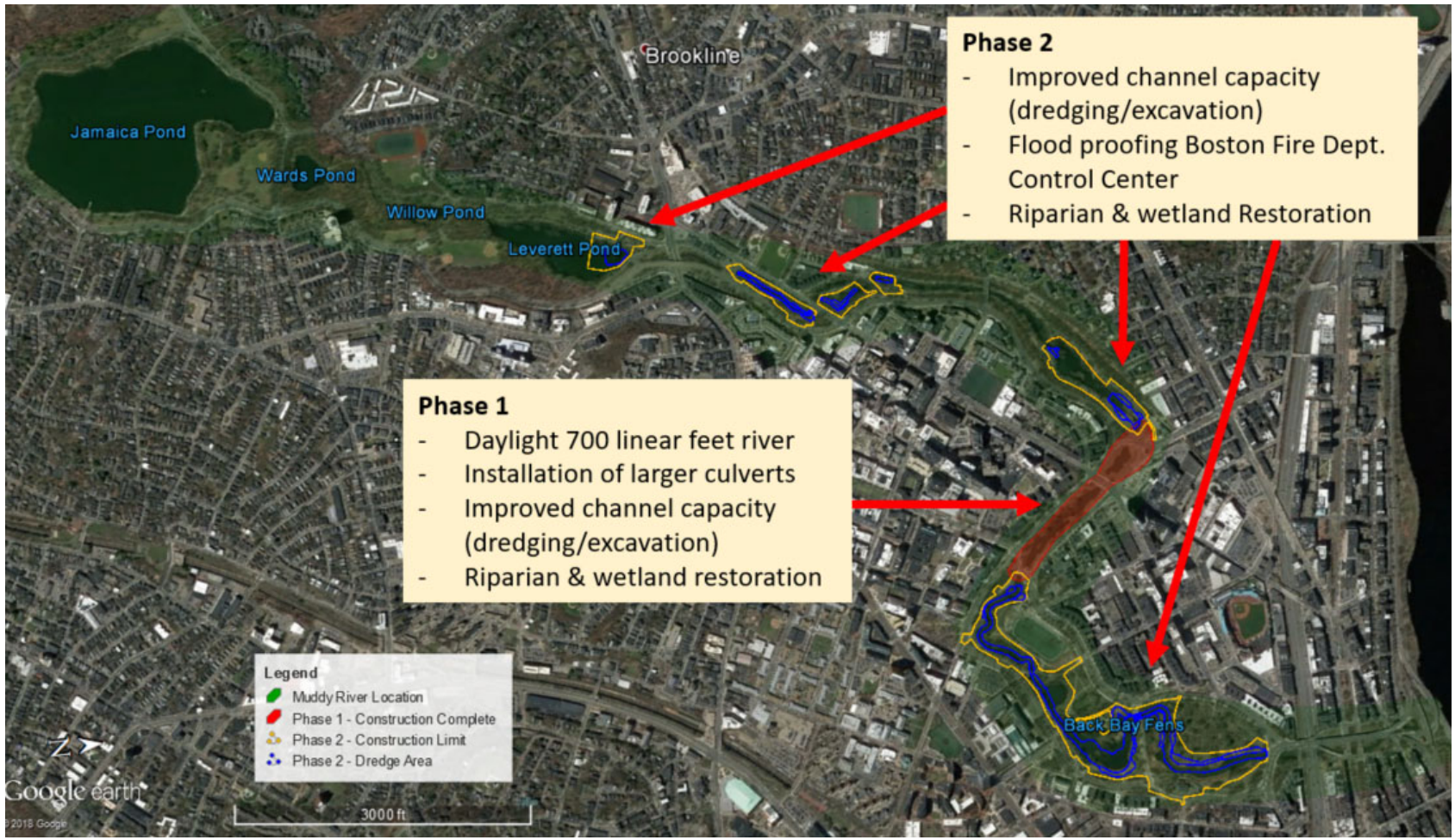
Phase 1
- Daylight 700 linear feet river
- Installation of larger culverts
- Improved channel capacity (dredging/excavation)
- Riparian & wetland restoration



- Looking upstream from new Fens culvert

- Looking downstream toward new Fens culvert

MUDDY RIVER – FLOOD RISK MANAGEMENT PLAN

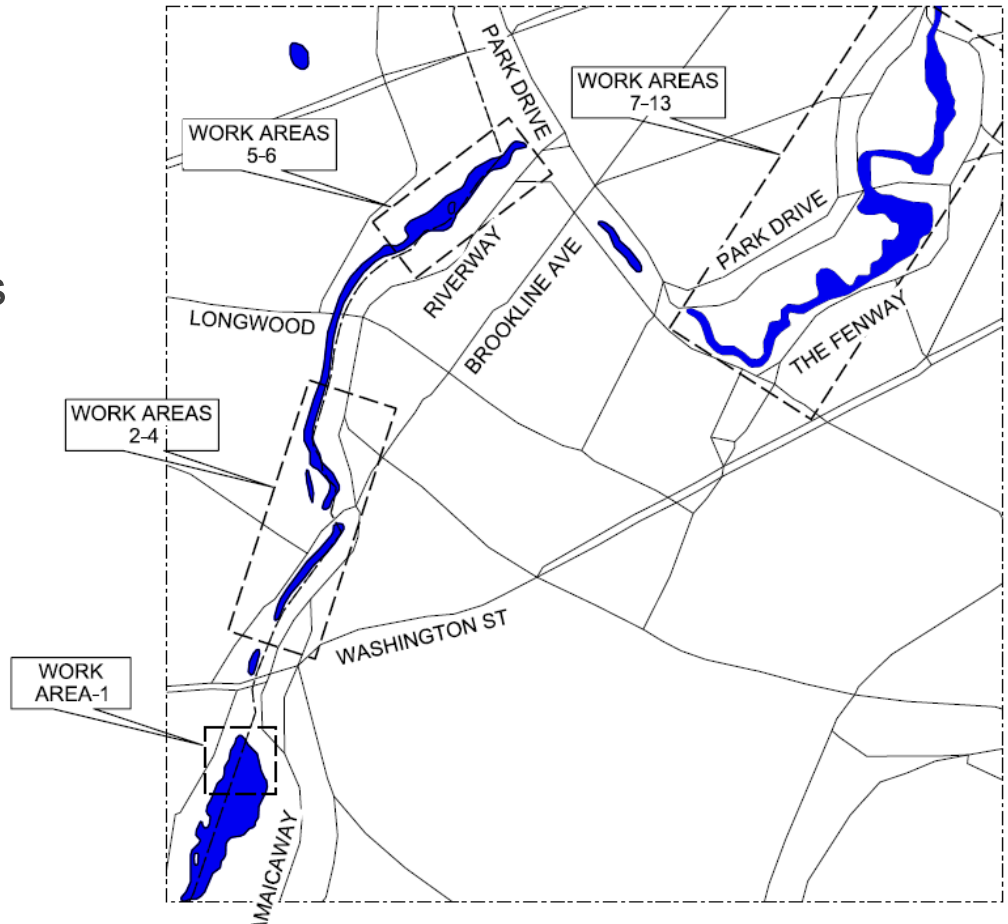


MUDDY RIVER – PHASE 2

13 Work Areas

EXCAVATION

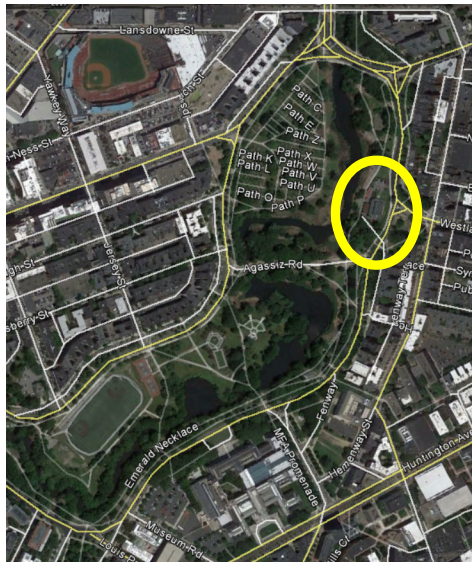
- Excavate the river in the Back Bay Fens area to allow for increased flows and reduce flood damage
- Excavate five stretches of the Riverway section of the river to allow for increased flows and reduce flood damage.
- Excavate the sandbar and island at Leverett Pond to allow for increased flows and reduce flood damage.
- Excavate deepened channel sections to delay need for maintenance dredging.

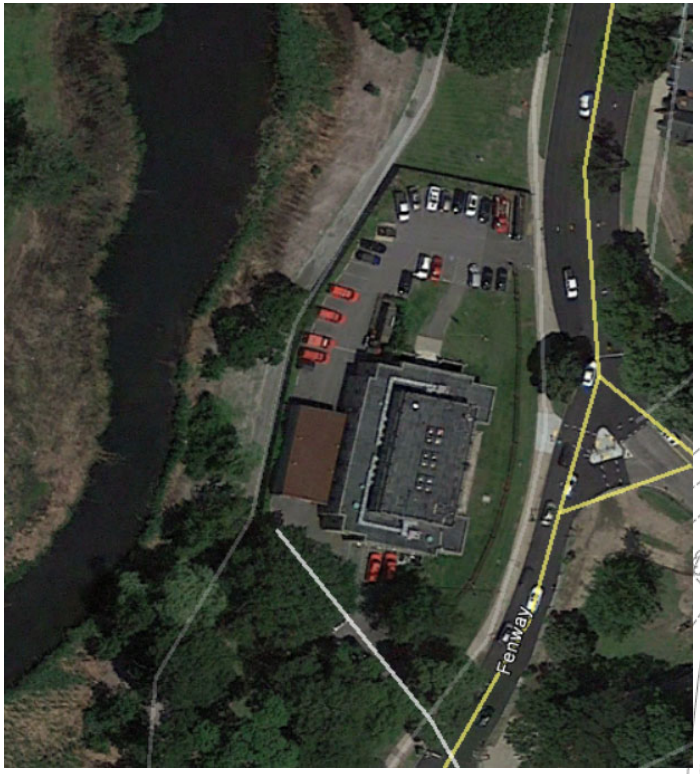


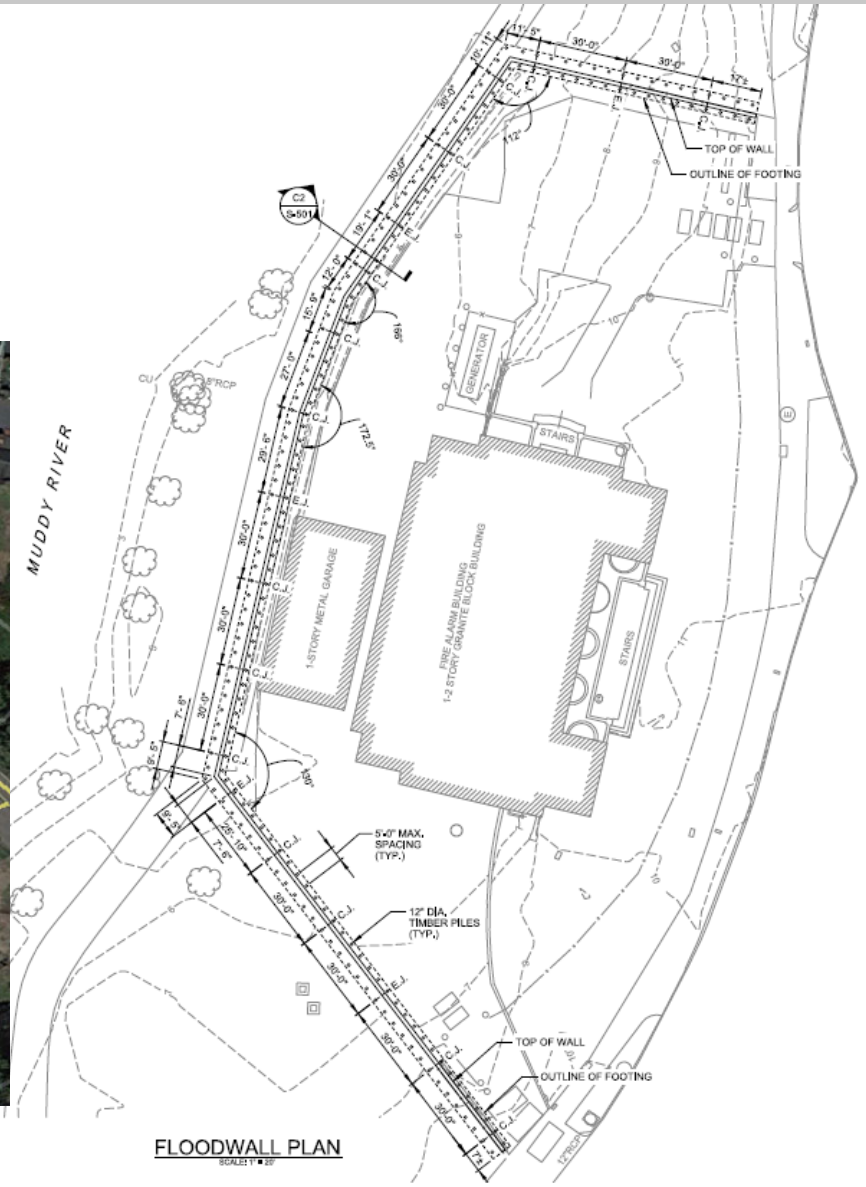
VICINITY MAP
SCALE: 1"= 500'

MUDDY RIVER – PHASE 2

- Provide additional flood proofing at the Boston Fire Department Fire Control Center in the Back Bay Fens.







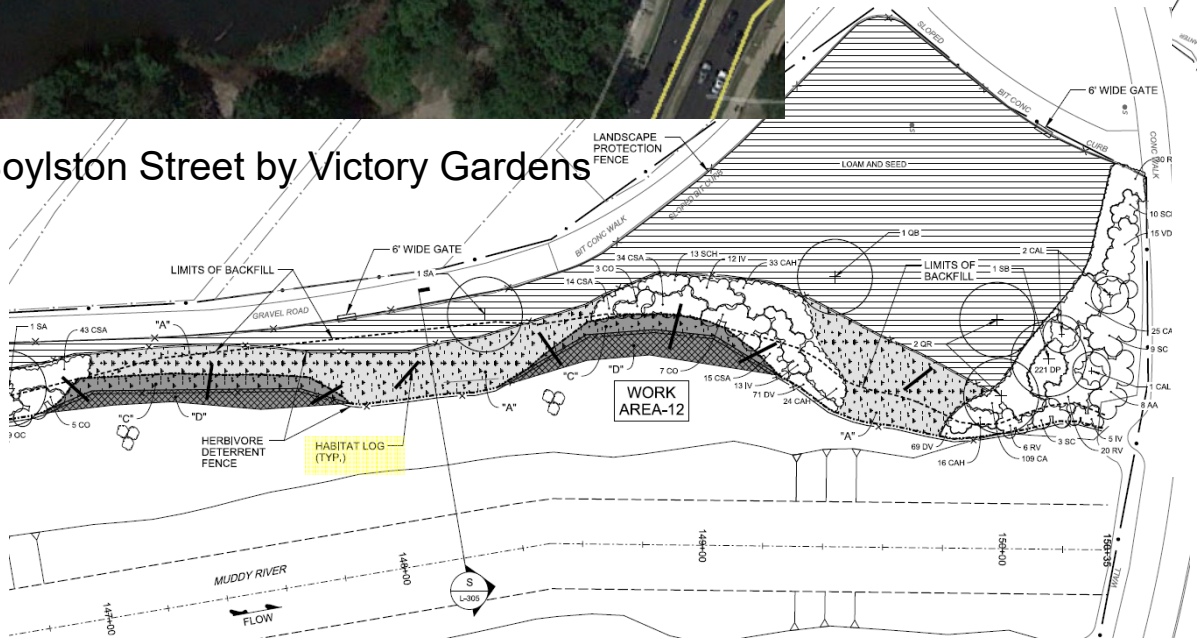
MUDDY RIVER – PHASE 2

- Manage *Phragmites* in the Back Bay Fens and Riverway areas where necessary to achieve and maintain flood damage reduction and improve ecological habitat quality.
- Restore wetland vegetation in dredged areas by seeding or planting appropriate wet meadow and emergent wetland plants.
- Restore riparian vegetation in upland areas where *Phragmites* or oriental knotweed are eradicated by planting grass, trees and shrubs.

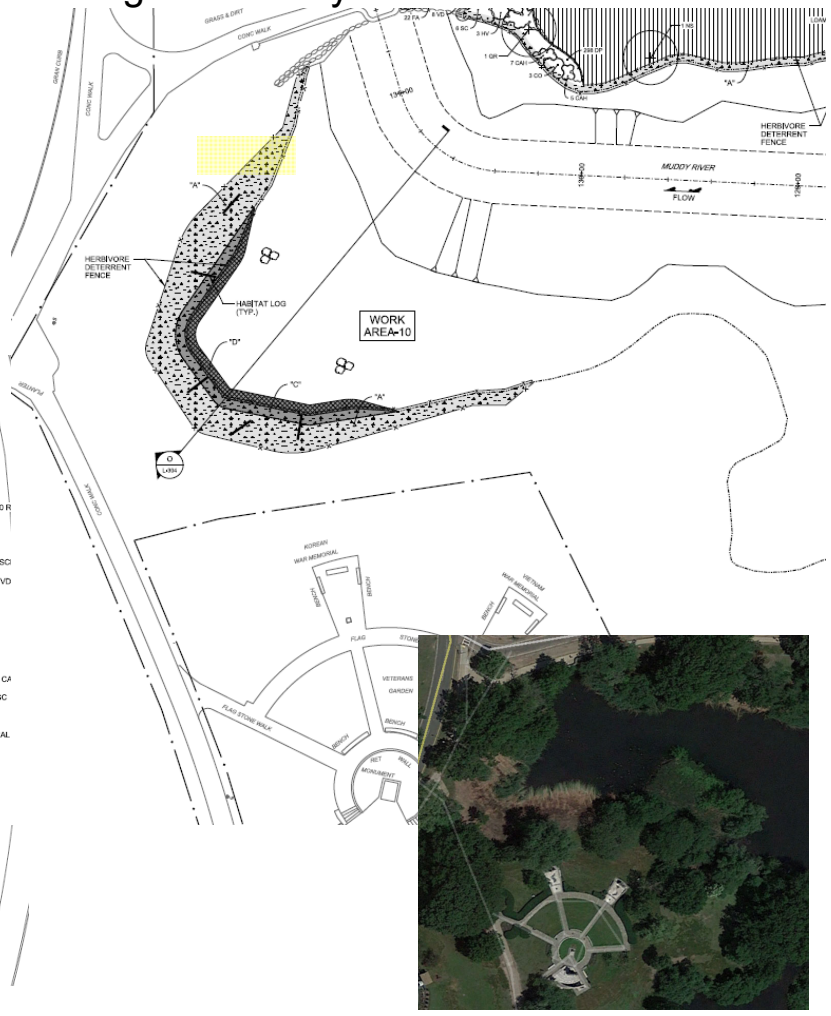
PHASE 2

- Install habitat logs for fish and turtles.

Boylston Street by Victory Gardens

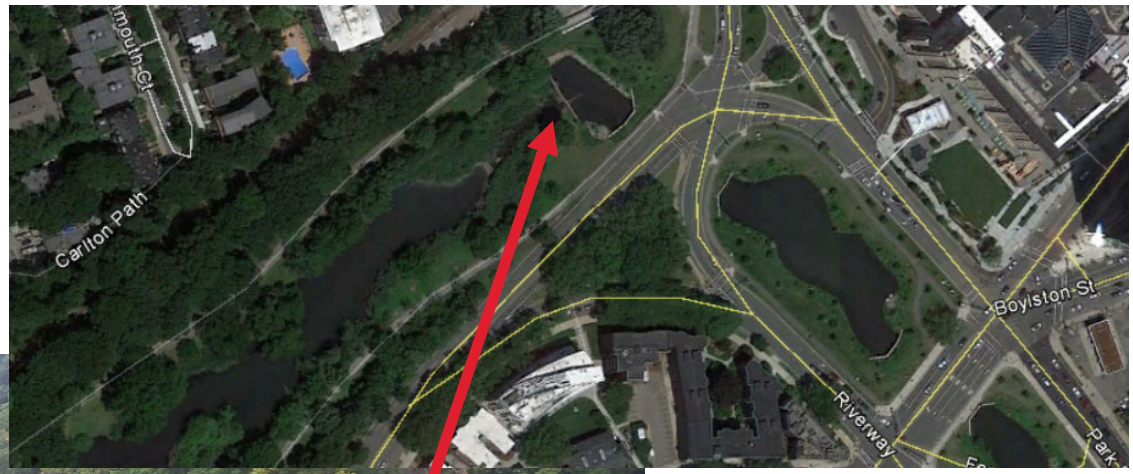


Agassiz Rd by Veterans Garden



MUDDY RIVER – PHASE 2

- Remove the temporary flow restriction control structure upstream of Phase 1 @ Riverway



MUDDY RIVER – PHASE 2

- Restore vegetation/landscape features following removal of temporary access roads & staging areas
- Post construction vegetation monitoring and invasive species control.

Area E August, 2017

Area E 24 may, 2018

October 2016 – former Sears Parking Lot – looking upstream

June 2017 – former Sears Parking Lot – looking upstream

PHASE 2 WHAT TO EXPECT – DURING CONSTUCTION

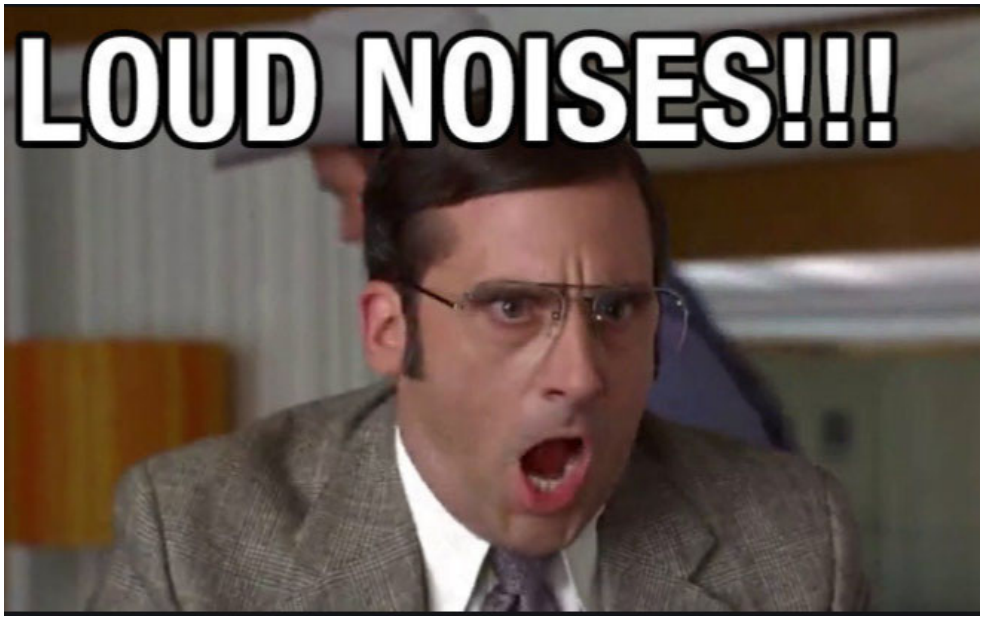
Anticipated Schedule:

- Notice to Proceed Mid March 2020
- Mobilize May 2020
- Construction Complete 2023
- Monitoring through 2025

Limited access
Fencing

PHASE 2 WHAT TO EXPECT – DURING CONSTUCTION

Movement of heavy equipment
Minor disruption in traffic
(no traffic rerouting expected)

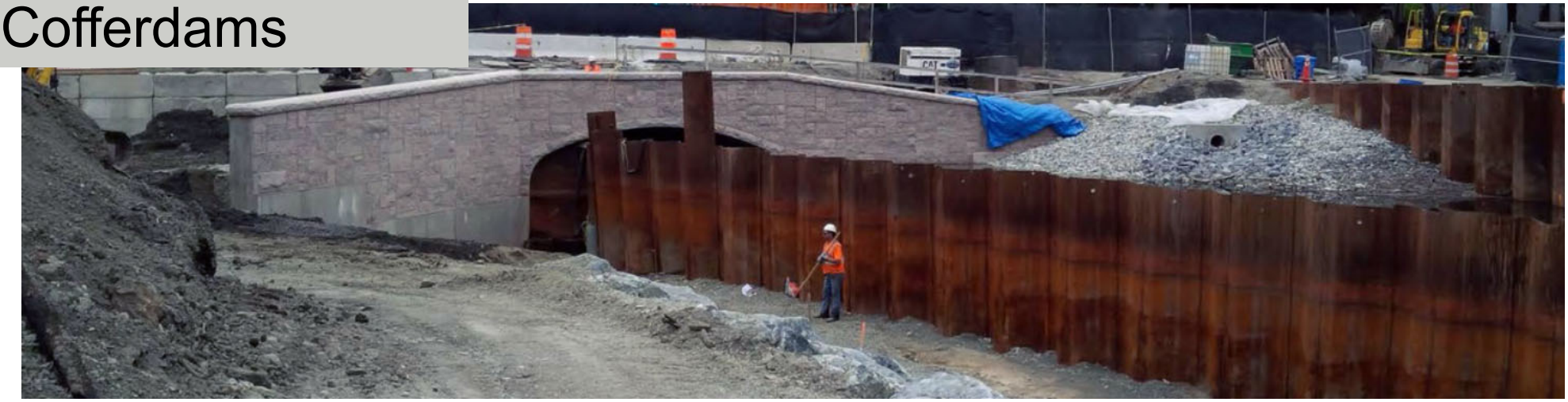


PHASE 2 WHAT TO EXPECT – DURING CONSTUCTION

In the Dry Dewatering

PHASE 2 WHAT TO EXPECT – DURING CONSTUCTION

In the Dry Using Cofferdams



PHASE 2 WHAT TO EXPECT – DURING CONSTUCTION

Marsh Buggy

In the Wet

Long Reach Excavator

PHASE 2 WHAT TO EXPECT – DURING CONSTUCTION

Stockpile, Direct Loading & Transport

PHASE 2 WHAT TO EXPECT – DURING CONSTUCTION

Wildlife Monitoring and Relocation

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

MassWildlife

Wayne F. MacCallum, *Director*

Scientific Collection Permit

FISH

Subpermitee(s):

is (are) hereby authorized, in accordance with the provisions of Section 4, Chapter 131 and 131A of the Massachusetts General Laws, to remove from the wild within the Commonwealth, subject to conditions set forth below, the following species and numbers:

MAY CAPTURE ALL FISH SPECIES FROM UPPER FENS POND IN BOSTON FOR RELOCATION UPSTREAM OF CAPTURE SITE PRIOR TO DEWATERING DURING CONSTRUCTION ACTIVITIES. ANY THREE SPINED STICKLEBACKS CAPTURED DURING THESE OPERATIONS MUST BE REPORTED THE DIVISION OF FISHERIES AND WILDLIFE BY THE NEXT BUSINESS DAY.

RARE STATE-LISTED SPECIES ENCOUNTERED IN THE FIELD MUST BE REPORTED TO NHESP ON RARE ANIMAL OBSERVATION FORMS.

PHASE 2 WHAT TO EXPECT – DURING CONSTUCTION

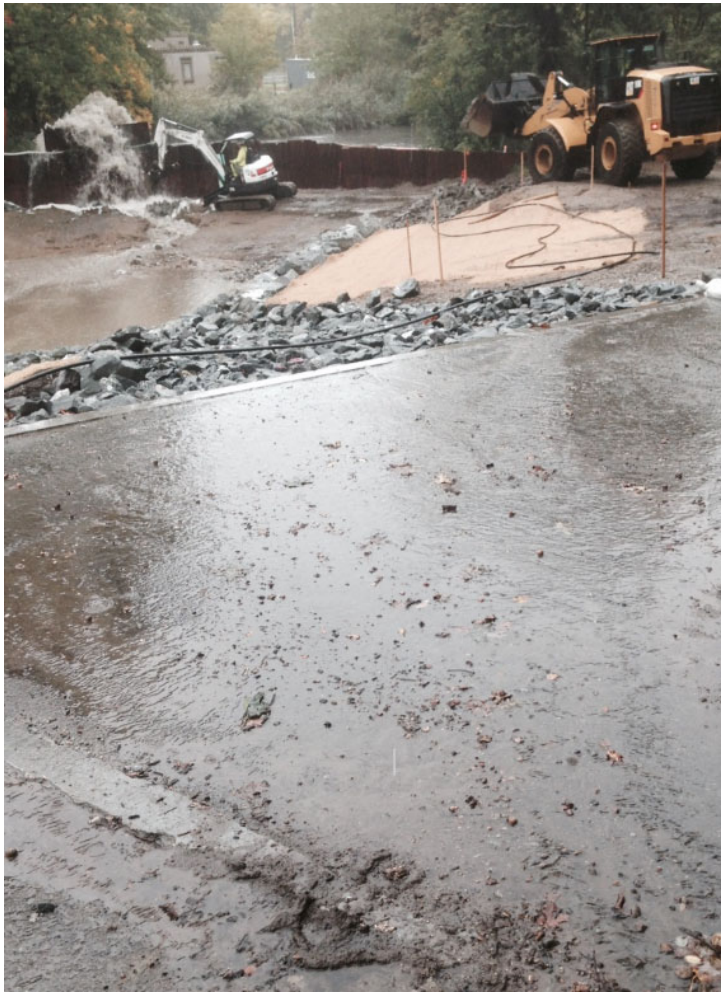
Some Tree Removal and Tree Protection

PHASE 2 WHAT TO EXPECT – DURING CONSTUCTION

Shoreline Restoration Planting

PHASE 2 WHAT TO EXPECT – CHALLENGES

Controlling Water



PHASE 2 WHAT TO EXPECT – CHALLENGES

Establishing Vegetation

Rabbits, waterfowl & fish

PHASE 2 WHAT TO EXPECT – CHALLENGES

- Water level fluctuation
- Velocity
- Turbidity

PHASE 2 WHAT TO EXPECT – AFTER COMPLETION

Maintenance is a must!

- The river is in a urban environment and has been altered from its natural state
- Stormwater inputs must be controlled and maintained
- Accumulated sediment in river must be removed
- Culverts are to be kept unobstructed
- Erosion areas are to be stabilized and replanted if necessary
- *Phragmites* and other non-native invasive species must be controlled

PHASE 2 WHAT TO EXPECT – AFTER COMPLETION

Improved water conveyance

- Water will move through the system faster
- Charles River water level still strongly influences Muddy River water level
- Dry periods may be longer
- Designed for “20-year storm”; doesn’t mean it comes around every 20 years = in any given year there is a 5% chance of a occurring

PHASE 2 WHAT TO EXPECT – AFTER COMPLETION

Restored River Bank

- Stabilized river bank reducing erosion and improving water clarity
- Removal of poor quality sediment quality
- Increased aquatic habitat quantity and quality
- Increased plant diversity
- Partial restoration of Olmsted's vision

Contact

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