MUDDY RIVER FLOOD RISK MANAGEMENT – PHASE II

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Date: 27 FEB 2020

Kenmore Station Flooded up to the Signs 1996
MUDDY RIVER THE HEART OF OLMSTED PARK

- 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.

AUTHORIZED

APPROPRIATION

Recommended Plan
MUDDY RIVER – FLOOD RISK MANAGEMENT PLAN

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

**Phase 2**
- Improved channel capacity (dredging/excavation)
- Flood proofing Boston Fire Dept. Control Center
- Riparian & wetland Restoration
MUDDY RIVER – PHASE 1 COMPLETE
• Looking upstream from new Fens culvert

Phase 1
- Daylight 700 linear feet river
- Installation of larger culverts
- Improved channel capacity (dredging/excavation)
- Riparian & wetland restoration
• Looking downstream toward new Fens culvert
MUDDY RIVER – FLOOD RISK MANAGEMENT PLAN

**Phase 1**
- Daylight 700 linear feet river
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**Phase 2**
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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.
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.
PHASE 2 WHAT TO EXPECT – DURING CONSTRUCTION

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 CONSTRUCTION

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

LOUD NOISES!!!
PHASE 2 WHAT TO EXPECT – DURING CONSTRUCTION

In the Dry Dewatering
PHASE 2 WHAT TO EXPECT – DURING CONSTRUCTION

In the Dry Using Cofferdams
PHASE 2 WHAT TO EXPECT – DURING CONSTRUCTION

In the Wet

Marsh Buggy

Long Reach Excavator

https://www.youtube.com/watch?v=nXN__c_dwVI
PHASE 2 WHAT TO EXPECT – DURING CONSTRUCTION

Stockpile, Direct Loading & Transport
PHASE 2 WHAT TO EXPECT – DURING CONSTRUCTION

Wildlife Monitoring and Relocation

Scientific Collection Permit
FISH
PHASE 2 WHAT TO EXPECT – DURING CONSTRUCTION

Some Tree Removal and Tree Protection
PHASE 2 WHAT TO EXPECT – DURING CONSTRUCTION

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
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
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