



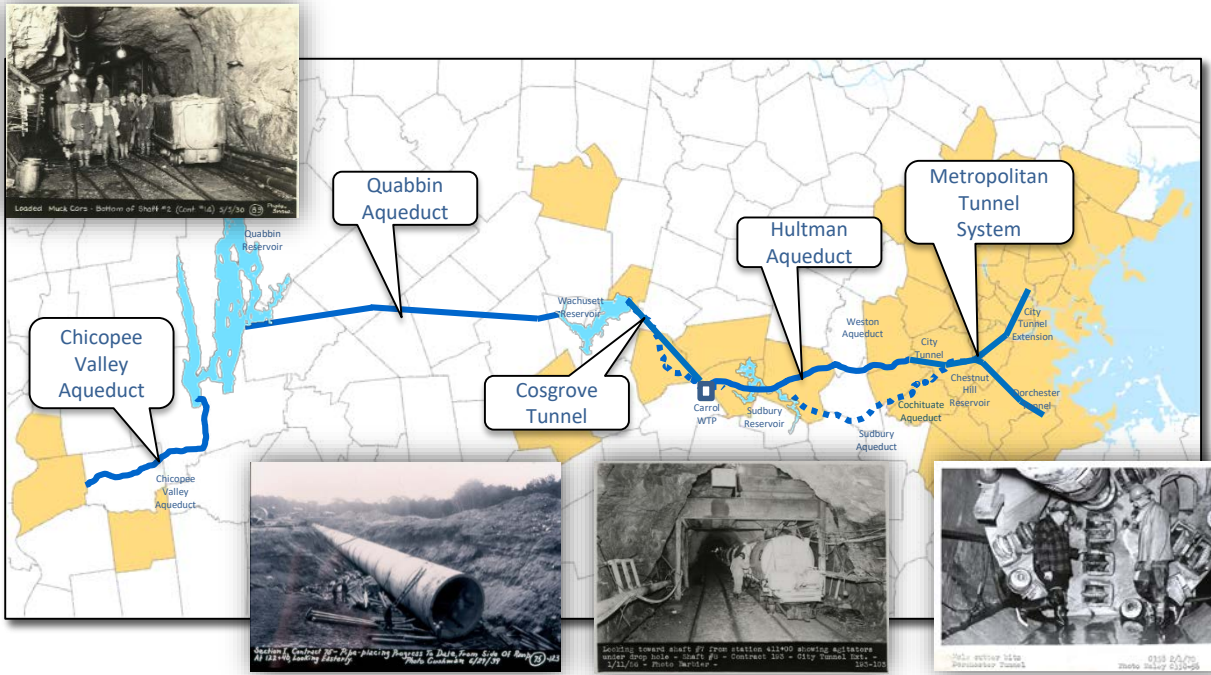
## *Metropolitan Tunnel Redundancy Program Update*

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Director, Tunnel Redundancy

June 4, 2019



# Pressure Aqueduct/Tunnel System (1939- 1976)

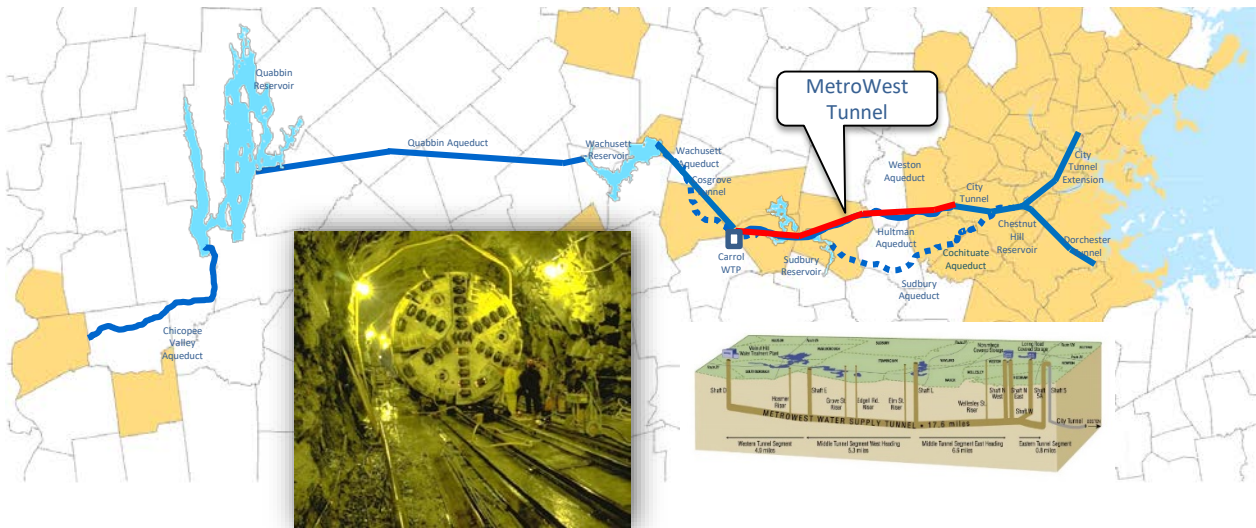




# MetroWest Water Supply Tunnel (2003)

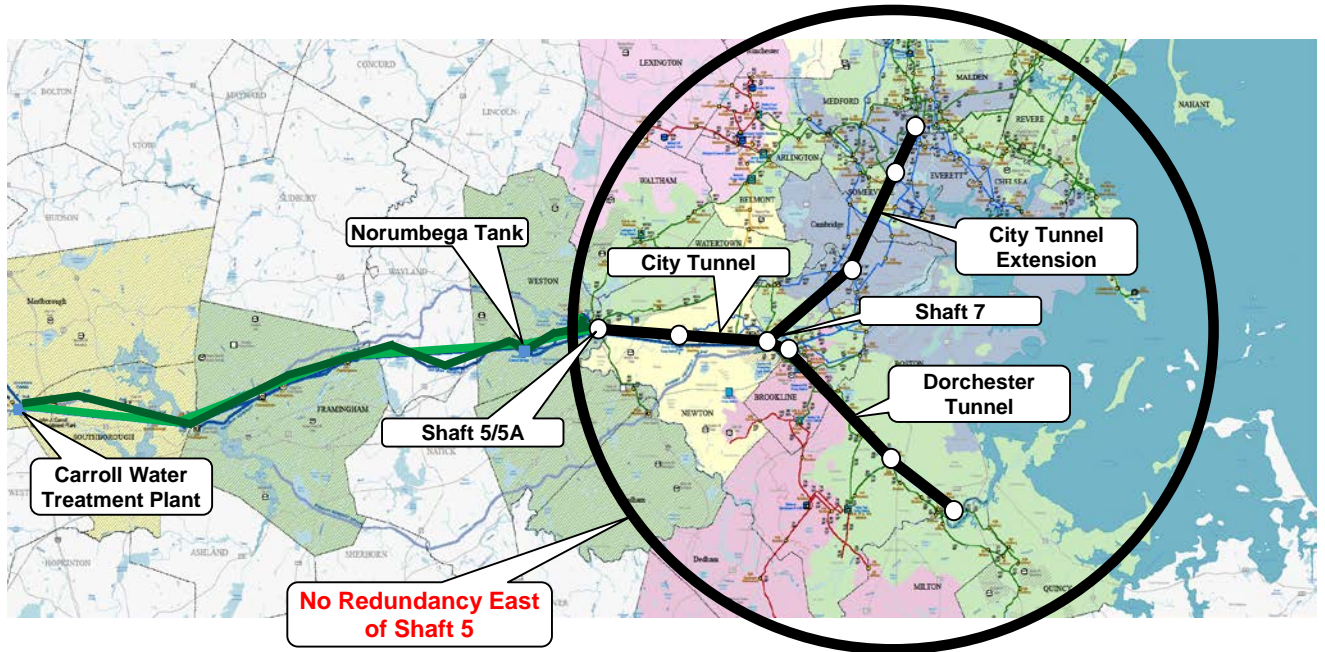
17.6 mile, 12 to 14 foot diameter, deep rock pressure tunnel was brought on-line in November 2003

Provides Redundancy to the Hultman Aqueduct





# Metropolitan Tunnel System





# Condition of the Metropolitan Tunnel System

- Tunnel system:
  - Concrete-lined deep rock pressure tunnels
  - Steel and concrete lined vertical shafts
  - Surface pipe, valves and appurtenances
- Little maintenance required for tunnels and shafts. Little risk of failure
- Pipe, valves and appurtenances need maintenance, rehabilitation, replacement





# Valve Reliability Concern

- Valves that don't work
- Valves we can't operate



Shaft 8 PRV Chamber



Shaft 8



Shaft 8  
8

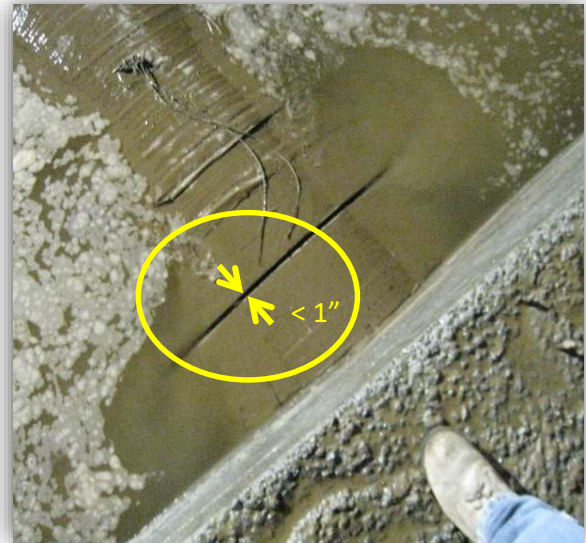


# The Great Water Main Break of May 2010

Small pipe failures can lead to big problems



250 MGD flow at Shaft 5 break....



...came from a small gap in the pipe



# Economic Impact of Water Supply Loss

- The estimated economic loss of water supply within the Boston Metropolitan area is:
  - ~\$208 million per day to businesses
  - ~\$102 million per day residents
  - total economic impact of ~ **\$310 M per day**
- If we do nothing, another failure will eventually occur
- We Need Redundancy!



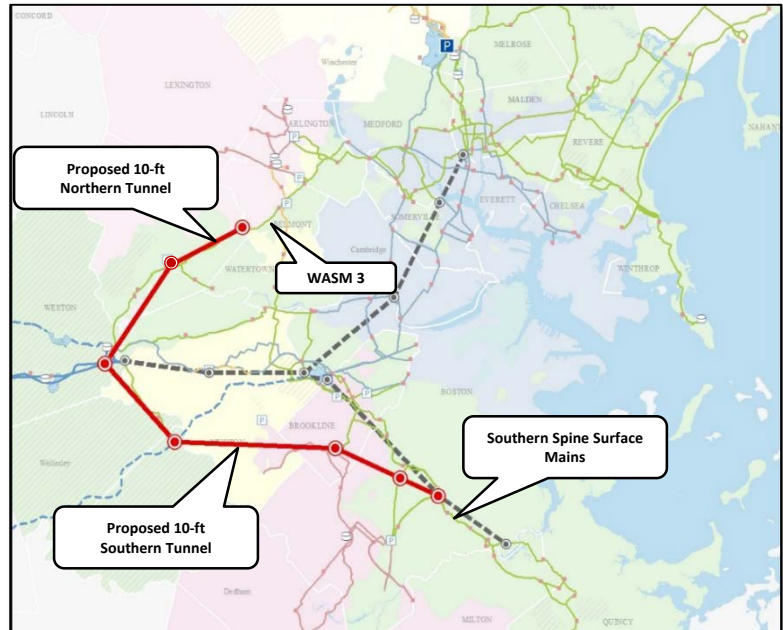




# Recommended Alternative

## Two Tunnels

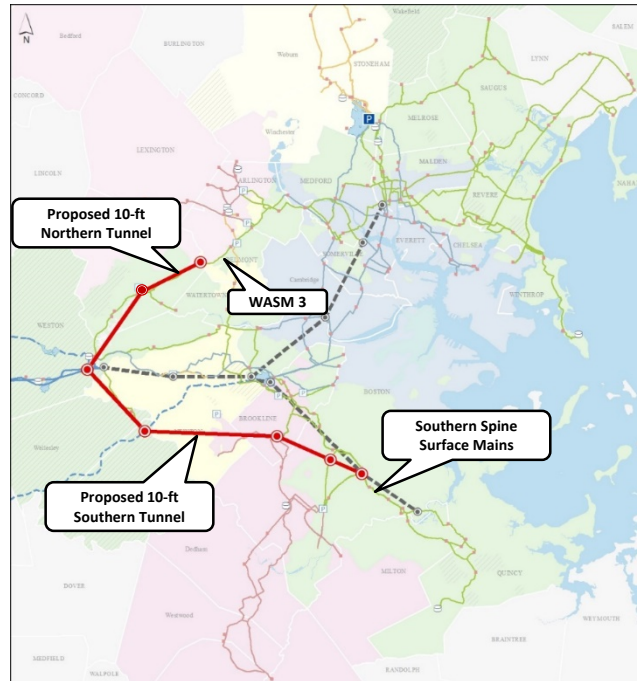
- Tunnels begin at Mass Pike/Route 128
  - Northern Tunnel - 4.5 miles, connects to mid-point of WASM 3 in Waltham/Belmont area
  - Southern Tunnel - 9.5 miles, connects to Shaft 7C and southern surface mains
- 10' finished diameter pressure tunnel
- 200' – 500' deep (rock)
- Mined using TBMs
- Number and locations of shafts TBD
- No consent decree (this is a water distribution redundancy program)





# Hydraulic Objectives for Proposed Tunnel

- Provides redundancy for entire metropolitan tunnel system
- Provides normal water service and fire protection if existing tunnel system is out of service
- Designed to meet high day demand. No seasonal restrictions
- Provides ability to perform maintenance on existing tunnels year-round
- Avoids activation of emergency reservoirs
- No boil order!





## Project Costs

- Midpoint of construction – Northern Tunnel: \$472 million
- Midpoint of construction – Southern Tunnel: \$1,003 million
- Midpoint of construction – both tunnels is \$1,475 million
- Estimated time to completion of 17 – 23 years
- 30% contingency and 4% annual construction cost escalation



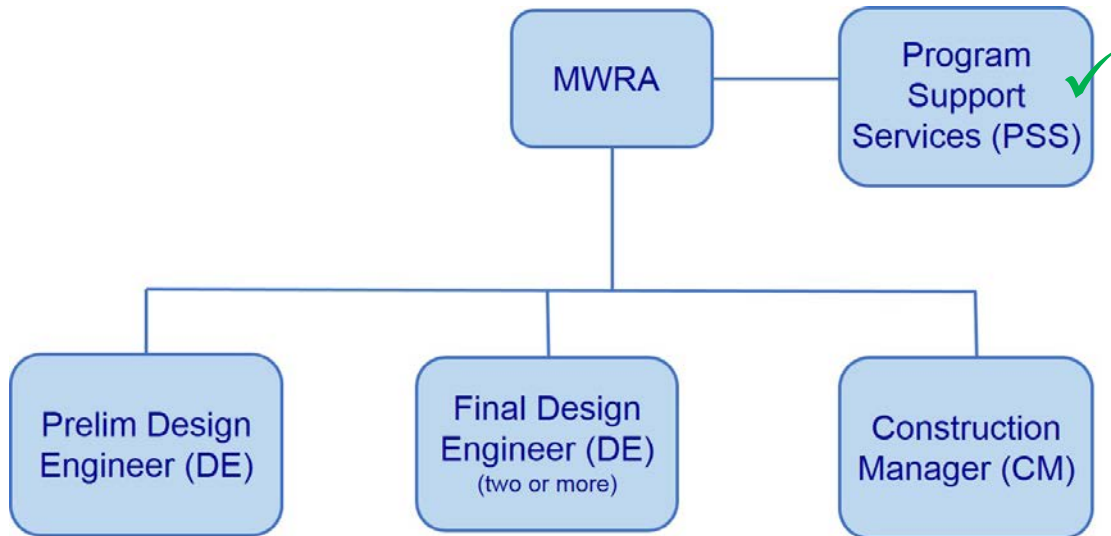
# Metropolitan Tunnel Redundancy Program Outlook

- The Program is managed by the MWRA Tunnel Redundancy Department (similar to PMD for BHP)
- The Program is funded in our Capital Improvement Plan
- DRAFT FY20 CIP Budget includes....
  - Program-Wide Support Services ✓
  - Preliminary Design/Phase 1 Geotech/MEPA Review
  - Final Design(s)
  - Construction Management(s)
  - Tunnel Constructions
  - Surface Connections Constructions
  - Administration, Legal and Public Outreach





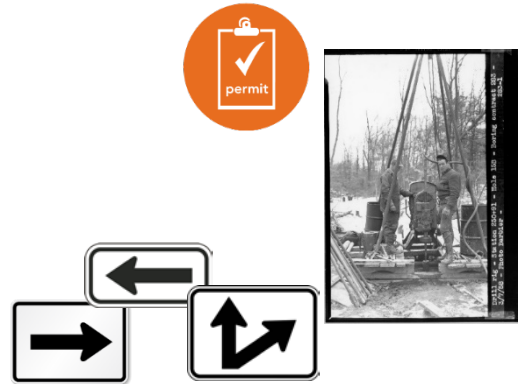
# Program Organization





# Preliminary Design Engineering

- Preliminary geotechnical investigation, route and shaft site evaluations, identify environmental permits needed and prepare required MEPA review
- Produce significant project documents
  - Preliminary Geotechnical Data & Design Report
  - Environmental Impact Reports
  - Alternatives Evaluation & Preliminary Design Report
  - Preliminary Design Drawings
- It is expected this work can be accomplished within 3 – 3.5 years





# Planned Schedule

- Program Support Services
  - Awarded in March 2019 ✓
- Preliminary Design/Phase 1 Geotech/MEPA Review
  - Issue RFQ: Summer/Fall 2019
  - Notice to Proceed: first half of 2020
  - Estimate Completed: late 2023
- Final Design
  - Start 2024-ish
- Construction
  - Start 2027-ish (D-B-B)





# The Metropolitan Tunnel Redundancy Program



**Thank You!**