Projects on Behalf of the Department of Conservation and Recreation Water Supply Protection Division

October 16, 2019
## FY2020 Capital Improvement Program Budget

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Contract #</th>
<th>Notice to Proceed</th>
<th>Substantial Completion</th>
<th>Total Contract Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quabbin Admin Bldg. Rehab</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>QAB Concept Design Report</td>
<td>7569</td>
<td>Oct-20</td>
<td>Oct-21</td>
<td>$200,000</td>
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<tr>
<td>Quabbin Admin Bldg. Rehab Des CA\RI</td>
<td>7564</td>
<td>Mar-22</td>
<td>Mar-27</td>
<td>$2,800,000</td>
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<tr>
<td>Quabbin Admin Bldg. Rehab Construction</td>
<td>7565</td>
<td>Mar-24</td>
<td>Mar-26</td>
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<tr>
<td><strong>Maintenance Building</strong></td>
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<tr>
<td>Maintenance Garage/Wash Bay/Storage Bldg. Design/CA/RI</td>
<td>7677</td>
<td>Oct-19</td>
<td>Oct-23</td>
<td>$1,000,000</td>
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<tr>
<td><strong>River Rd Improvement -Wachusetts (funded from FY19 Watershed Protection budget surplus)</strong></td>
<td>7701</td>
<td>Oct-20</td>
<td>Oct-21</td>
<td>$2,000,000</td>
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<tr>
<td><strong>Land Acquisition</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7069</td>
<td>Apr-06</td>
<td>Jun-23</td>
<td>$29,000,000</td>
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<tr>
<td><strong>Dam Improvements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Dam Permits</td>
<td>7346</td>
<td>Jul-18</td>
<td>Dec-21</td>
<td>$1,000</td>
</tr>
<tr>
<td>Quinapoxet Dam Removal - Design/ESDC/RI</td>
<td>7347</td>
<td>Jul-20</td>
<td>Dec-23</td>
<td>$200,000 *</td>
</tr>
<tr>
<td>Quinapoxet Dam Removal - Construction</td>
<td>7348</td>
<td>Jul-21</td>
<td>Dec-22</td>
<td>$600,000</td>
</tr>
<tr>
<td>Quinapoxet Dam Removal REI</td>
<td>7690</td>
<td>Jul-21</td>
<td>Feb-23</td>
<td>$100,000 *</td>
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<tr>
<td>Sudbury/Foss Dam Design/CA/RI</td>
<td>7614</td>
<td>Mar-19</td>
<td>Jun-23</td>
<td>$432,029</td>
</tr>
<tr>
<td>Sudbury/Foss Dam Construction</td>
<td>7615</td>
<td>Jul-20</td>
<td>Jun-22</td>
<td>$1,600,000</td>
</tr>
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</table>
## FY2020 Current Expense Budget

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Watershed Protection Indirect Expense</strong></td>
<td></td>
</tr>
<tr>
<td>Clinton Crew Headquarters</td>
<td>$1,100,000</td>
</tr>
<tr>
<td>Quabbin/Ware road and drainage reconstruction</td>
<td>$125,000</td>
</tr>
<tr>
<td>Quabbin Admin Building interim roof repairs</td>
<td>$105,000</td>
</tr>
<tr>
<td>Quabbin Admin Building interim water system corrosion control</td>
<td>$150,000</td>
</tr>
<tr>
<td>New Salem restoration (gas tank &amp; garage design)</td>
<td>$75,000</td>
</tr>
<tr>
<td><strong>Maintenance Budget</strong></td>
<td></td>
</tr>
<tr>
<td>Quabbin Park Cemetery water spigot / irrigation</td>
<td>$15,000</td>
</tr>
<tr>
<td>Quabbin Park Cemetery lead abatement</td>
<td>$45,000</td>
</tr>
</tbody>
</table>
Quabbin Maintenance Building
• Replace existing West Garage facility
• Provide approximately 11,000 ft² of floor area
• Vehicle fleet maintenance staff and equipment
• Accommodate oversized vehicles and heavy equipment
• Include vehicle wash bay
• MWRA to procure and manage design and construction services
• Rehabilitation of utilities and support systems, including power and water
• Most of system components exhibiting signs of deterioration:
  – Wiring
  – Plumbing
  – Heating
• Building Code Upgrades:
  – Environmental safeguards (ventilation and hazard abatement)
  – Fire alarms and fire protection
  – Accessible access routes
• Structural Upgrades
• Water supply and septic system replacement
Quabbin Park Cemetery

• Recommend lead abatement and repairs
Quabbin Park Cemetery

- Recommend demolishing buildings
• Administration building and maintenance garage
  – MWRA to procure lead abatement
  – DCR staff repairs
• MWRA to procure demolition of well pump house and storage shed
• MWRA currently procuring contract to drill well into cemetery
• MWRA will procure contract to install piping to watering connection points by Spring 2020
• Capital Improvements by MWRA since 2005

• Over $20 million of work completed to date

• Sudbury/Foss Dam Improvements and Repairs
  – Design underway

• Quinapoxet Dam Removal
  – Design contract recently awarded
River Road Improvements

• Primary access road to Wachusett Lower Gatehouse
• Road has experienced two landslides:
  – One in 2008 required substantial repair
  – Recent landslide in November 2018
• Design underway
Other Projects

- Clinton Crew Headquarters construction
- Quabbin Administration Building
  - Interim roof repairs
- New Salem facility restoration
- Quabbin road and drainage reconstruction
MWRA’s Outfall Monitoring Overview
2018 Results

October 16, 2019
MWRA Ambient Monitoring

- Moving discharge from Boston Harbor initially caused environmental concerns

- Comprehensive baseline monitoring required by regulators (1992-2000)

- Ambient monitoring required by Deer Island Permit (2000+)

- Major programmatic reviews in 2003 and 2009-10 led to reduced Ambient Monitoring requirements

- Monitoring focuses on studies of effluent, receiving water, sediment quality, and fish and shellfish
• Effluent quality (Platinum 12 award!)

• Outfall Monitoring
  – Water quality good year-round;
  – Sediment animal communities were healthy;
  – Flounder health good; and
  – Fish and shellfish tissue contaminant concentrations were below levels of concern.
2018 Was A Wet Year With Almost No Blending

Average flow at Deer Island, 1999-2018

- Secondary flows
- Primary-blended flows

Million gallons per day
Total Solids Discharged (Tons/Day), 1990-2018

- Sludge
- Nut Island
- Deer Island

Tons per day

Years: 1990-2018
Effluent Nitrogen Levels

![Bar chart showing effluent nitrogen levels over years from 1996 to 2018. The chart indicates Ammonium, Nitrate/nitrite, Other nitrogen species, Caution level, and Warning level.]
2019 Update: Nitrogen loads

• Nitrogen loads to date in 2019 trending high, exceedance of Caution level Contingency Plan threshold may occur.
• Contingency Plan warning threshold set at 14,000 metric tons/yr.
• Caution threshold of 12,500 metric tons/yr arbitrarily set at about 90% of the warning level.
• Actual loads have been below the warning level projections.
• Water quality modeling projects that loads of 15,000 metric tons/year, or even doubling the current nitrogen loads would have minimal environmental impacts.
• Applying the Buzzards Bay Eutrophication index to Massachusetts Bay indicates current loads are nowhere near levels of concern.
No evidence of adverse outfall impact
Plankton communities in 2018 were normal, with no large phytoplankton blooms observed
Dissolved oxygen levels remained normal
A red tide bloom did occur earlier this year (2019)
A hypoxic event occurred in southern Cape Cod Bay this fall
- *Alexandrium* is the algae responsible for red tide and paralytic shellfish poisoning in New England waters.
- Outside scientists projected a mild bloom in 2019, with low cell abundance and unlikely to cause closures in Massachusetts shellfish beds.
- The actual bloom was much stronger, causing closures from NH border to Plymouth.
- Analysis so far indicates high regional nutrients and strong coastal rivers flows may explain regional intensity of bloom.
- Indications are bloom was transported into the Bay from northern waters, as previously observed.
Sediment Monitoring, 2018

• Animal communities living in the sediments near MWRA’s outfall remained healthy in 2018.
• Oxygen penetration into Mass. Bay sediments remained deeper than before the discharge moved offshore.
• Rocky sea-floor communities remained diverse and lush in 2017, even on an active outfall riser.
• No Contingency Plan thresholds were exceeded.
Sediment Oxygen Penetration In 2018 Was Among The Deepest Measured.

- Concerns existed that organic material in effluent would add oxygen demand to nearby sediments or smother seafloor organisms.
- A decrease in the depth of oxygen penetration (RPD) would result.
- Results document that the reverse has occurred, RPDs have deepened in recent years.
- Analyses suggest the deepening may result from long-term increases in storminess in Massachusetts Bay.
• Diseased flounder were one cause of Boston Harbor being termed “Dirtiest in the Nation”;
• Liver tumors were last observed in 2004;
• Prevalence of liver tumor precursors has decreased substantially in Boston Harbor; and
• Tumor precursors are decreasing near outfall as well.
• Sampling conducted every third year, including 2018.
• No Contingency Plan exceedances in 2018.
• Concentrations of most contaminants decreasing in Boston Harbor, staying stable or decreasing near outfall.
• Pesticides decreasing in flounder, lobster, and deployed mussels at all sites.
• All available data show recovery in Boston Harbor with no indications of degradation in Massachusetts Bay.
Evaluation Of Long-Term Trends In Monitoring Results

- MWRA’s monitoring is longer and more comprehensive than most.
- Can identify long-term trends other studies could not.
- Temperature in Mass. Bay has increased > 1° F since 1991.
- Results also document small (< 0.1 ppm) long-term decreases in Dissolved Oxygen, which may be related to warming.
- Other long-term monitoring data show increases in storm wind and wave intensity.
The Outfall Monitoring Science Advisory Panel (OMSAP) advises regulators on monitoring, supported by the Public Interest Advisory Committee (PIAC).

Consensus during November 2018 Symposium that the outfall has not adversely impacted the Bay.

OMSAP is reviewing and identifying revisions for the monitoring program, together with DEP, EPA, PIAC and MWRA.

MWRA is engaged in several special studies to investigate PFAS/PFOS compounds, CEC’s, and microplastics.
City of Cambridge Proposal for Partial Sewer Separation

October 16, 2019
The City of Cambridge has proposed to continue to discharge to MWRA’s sewer system a portion of separate stormwater, as part of their plan to construct a stormwater outfall to also discharge stormwater to the Charles River.
Cambridge Proposal for Partial Sewer Separation

- Consistent with Plans to Meet Goals in MWRA’s CSO Long Term Control Plan
- Proposal Presented to Advisory Board Operation Subcommittee on October 1, 2019
- Proposal Presented to DEP and EPA on October 9, 2019, who have both provided support of proposal
- Proposal Presented to Advisory Board Executive Committee on October 11, 2019
  - Vote of support for trial proposal, on condition that it provides a clear benefit to MWRA, Results in No Future Cost, and is implemented at a location currently discharging combined flows to MWRA’s system
- Asking Board of Directors for vote of approval for Trial Evaluation Period of 12 months

The following slides are from Cambridge’s presentation on the Partial Sewer Separation Request
Cambridge combined sewer community (45%). MWRA and Cambridge are collectively in the stormwater business.

Sewer Separation – traditional approach.

Partial Sewer Separation (stormwater overflow) focus on larger storm flows.

This map shows the areas of Cambridge’s sewer system that are separated and are not separated and the active city-owned outfall locations. The City is 55% separated and 45% not yet separated.
How does combined sewer system currently work during larger storms?

All sewage and stormwater is combined and goes to the MWRA system until there is a CSO activation.

(During CSO Event)

Before

Combined

Interceptor

Treatment

River

CSO
Full Sewer Separation

All stormwater goes to the receiving water bodies.

Reduces CSOs.

Increases phosphorous and other nutrients.

Not consistent with Phosphorous TMDL in the Charles River and impaired status of Alewife Brook.
How would system work with partial sewer separation?

During smaller storm events the stormwater stays connected to the MWRA system; reducing the impact of phosphorous and other nutrients on the river.

During larger storm events, stormwater is diverted to the river; reducing the frequency and volume of CSOs.
Cambridgeport – Talbot Street Outfall

Consistently identified by the MWRA as critical to reducing the CSO volumes at Cottage Farm to under the LTCP of 6.30 MG. But the MWRA has not committed funding to this project.

The $12M to $15M+ partial sewer separation in the Cambridgeport area (Talbot Street outfall) is being constructed with no MWRA Funding.

With Partial Sewer Separation – stormwater during larger CSO storm events is directed to the Charles River, which is why the typical year CSO activations are the same under full sewer separation and partial sewer separation.
Analysis from March 1, 2019 Letter from the City of Cambridge to the MWRA, includes Cottage / Lopez improvements (using 2017 Cambridge Model).

Summary of Total Phosphorous (TP) Reduction for Talbot Street Outfall (Using MWRA Typical Year)

<table>
<thead>
<tr>
<th>Z-Underflows</th>
<th>Total TP in Stormwater</th>
<th>Total TP Removed</th>
<th>Total Volume Existing</th>
<th>Total Volume To MWRA</th>
<th>Total Volume To River</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-inch</td>
<td>549 kg</td>
<td>94 kg</td>
<td>355 MG</td>
<td>128 MG</td>
<td>48 MG</td>
</tr>
</tbody>
</table>

Summary of I/I Removal for Talbot Street Outfall (Using 1-year 8-hour storms)

<table>
<thead>
<tr>
<th>Condition</th>
<th>I/I Removed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Sewer Separation</td>
<td>4.45 MG</td>
</tr>
<tr>
<td>Partial Sewer Separation</td>
<td>3.68 MG (80%)</td>
</tr>
</tbody>
</table>

Summary of Typical Year CSO Activations for Talbot Street Outfall (Using MWRA Typical Year)

<table>
<thead>
<tr>
<th>Condition</th>
<th>CAM 005 Activations / Volume</th>
<th>CAM 007 Activations / Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Conditions</td>
<td>5 / 0.05 MG</td>
<td>1 / 0.03 MG</td>
</tr>
<tr>
<td>Full Sewer Separation</td>
<td>2 / 0.48 MG</td>
<td>1 / 0.13 MG</td>
</tr>
<tr>
<td>Partial Sewer Separation</td>
<td>2 / 0.11 MG</td>
<td>1 / 0.03 MG</td>
</tr>
</tbody>
</table>

The project reduces the existing 10” and 18” connections from the Cambridge drainage system to the MWRA sewer system to 2 - 6” connections (shown in orange in the map above).

This project is critical for the MWRA to meet the level of CSO control required at Cottage Farm.

- Existing Conditions – 7.29 MG
- Long Term Control Plan – 6.30 MG
- Full Sewer Separation – 4.71 MG
- Partial Sewer Separation – 4.71 MG
Partial Sewer Separation Request

Reduces stormwater going to the MWRA system and is for **combined sewer areas only**.

Critical to the MWRA meeting the Long Term Control Plan and continuing to improve the level of CSO control, however, sewer separation cannot continue without considering and mitigating the water quality impacts of sending additional stormwater to the receiving waters.

Develop designs that reduce CSOs and improve water quality (phosphorous) controls.

These projects **significantly benefit the MWRA system** by reducing flows to the system and reducing CSO activations and volumes.

No cost to the MWRA and will result in a **better performing MWRA system for all communities**.
Charles River Valley Sewer Rehabilitation
Sections 191 and 192

MWRA Contract 7643

October 16, 2019
Charles River Valley Sewer Rehabilitation - Sections 191 and 192
Section 192

Previously rehabilitated section due to collapsed sewer in 1990

Section 192 CIPP liner

Previously rehabilitated section due to collapsed sewer in 1990
Section 191

Section 191 CIPP liner
Cracking At Crowns Of Section 191 and 192

Section 191 Crown Crack

Section 191 Crown Crack

Section 192 Crown Crack and Missing Brick

Section 192 Crown Crack
Bid Results

- Bids Opened October 2, 2019

<table>
<thead>
<tr>
<th>Bidders</th>
<th>Bid Amount</th>
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<tbody>
<tr>
<td>Green Mountain Pipeline Services</td>
<td>$1,619,380</td>
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<tr>
<td>RJV Construction Corp.</td>
<td>$1,764,000</td>
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<tr>
<td>Engineer’s Estimate</td>
<td>$1,900,000</td>
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Deer Island Treatment Plant
Pump Refurbishment
Contract S581, Change Order 1

October 16, 2019
Pumping: 30% of Deer Island’s energy demand
NMPS: 10-150 MGD Pumps (3,500 hp each)
Station Capacity 788 MGD

Electric Motors that drive the wastewater pumps in NMPS.

North Main Pump Station
Ward Street Headworks
Columbus Park Headworks
Boston Main Drainage Tunnel
Facilities prior to Station
Chelsea Creek Headworks
Conveyance Tunnel
North Metropolitan Relief Tunnel

Four operating units will handle design peak flow conditions from BMDT.
Four operating units will handle design peak flow conditions from NMRT.

Contract S581, NMPS Pump 9 Refurbishment

NMPS Pumping - Flow, MGD (Bus A)
NMPS Pumping - Flow, MGD (Bus B)

Pumping: 30% of Deer Island’s energy demand
NMPS: 10-150 MGD Pumps (3,500 hp each)
Station Capacity 788 MGD

Electric Motors that drive the wastewater pumps in NMPS.
• 11% efficiency gain expected from refurbishment
• Expected savings - 235,820 kWh or $20,045 savings annually
Similar Repairs: Winthrop 1 Before / After

Pump Volute

Before:

After:

Pump Impellor
<table>
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<tr>
<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
<td>Original Contract:</td>
<td>$98,976</td>
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<tr>
<td>Change Order:</td>
<td>Not to exceed $77,814</td>
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<tr>
<td>Adjusted Contract:</td>
<td>Not to exceed $176,790</td>
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<tr>
<td>Eversource Incentive:</td>
<td>$58,955</td>
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<tr>
<td>Net cost:</td>
<td>Not to Exceed $117,835</td>
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<tr>
<td>Annual Energy Savings:</td>
<td>$20,045</td>
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<tr>
<td>Payback:</td>
<td>3-5.8 years</td>
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</table>
Metropolitan Tunnel Redundancy Program Update

October 16, 2019
• Issued Request for Qualifications 10/2/2019
• Qualifications Statements Due 11/1/2019
• Issue Request for Proposals to Finalists 12/2/2019
• Proposals Due 2/14/2020
• Recommend Award to Board April 2020
• Notice to Proceed May 2020

• Contract Duration: 3.5 years
Major Tasks Associated with the Preliminary Design and Engineering Contract

• Project Management, Regulatory Agency, and Stakeholder Coordination

• Evaluation of Alternatives - Massachusetts Environmental Policy Act
  - Review Existing Information
  - Alternatives Screening Report - Environmental Notification Form
  - Tunnel Alignment Alternatives Evaluation – Draft Environmental Impact Report

• Environmental Impact Report – Massachusetts Environmental Policy Act
  - Environmental Analysis
  - Section 61 Findings
  - Wetlands Delineations
Major Tasks Associated with the Preliminary Design and Engineering Contract

• Geotechnical and Hazardous Materials Investigation and Evaluation
  - Subsurface investigation
  - Geotechnical Database
  - Geotechnical Material Storage Management

• Base Mapping and Survey
  - Base Map Technical Memorandum
  - Easement and Records Research
  - Geotechnical Borings

• Preliminary Design
  - Hydraulic analysis of preferred alternative
  - Preliminary Design report and drawings
  - Program guide specifications
Average Day Water Use Projections - East of Norumbega

- **Population (Millions)**
- **Demand (MGD)**
- **New Tunnels**
- **Online +/-**
- **UMass Donahue (2018)**
- **ProximityOne**
- **Tunnel Construction**
- **Tunnel Rehab**

**Census MWRA Service Area Population**
**Actual Average Day Demand (MGD)**
**Projected MWRA Service Area Population**
High Day Water Use Projections - East of Norumbega

- High Projection: WRC Method
- Medium Projection: Existing Efficiency
- Low Projection: Existing Users: 10% more efficient thru 2040

New Tunnels Online +/-
New Construction: 20% more efficient thru 2040

Tunnel Construction
Tunnel Rehab

Actual High Day Demand (MGD)
Potential Future Tunnel Extensions

- Potential Future Northern Extension
- Potential Future Southern Extension

- Proposed 10-ft Northern Tunnel
- Proposed 10-ft Southern Tunnel
- WASM 3
- Southern Spine Surface Mains
Water Age Analysis from Carroll Treatment Plant

Average Day Demand

<table>
<thead>
<tr>
<th>Location</th>
<th>Days</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gillis PS</td>
<td>3.0 days</td>
<td>5 hrs, 7%</td>
</tr>
<tr>
<td>Spring Street PS</td>
<td>2.8 days</td>
<td>4 hrs, 7%</td>
</tr>
<tr>
<td>Newton Street PS</td>
<td>2.3 days</td>
<td>0 hrs, 0%</td>
</tr>
<tr>
<td>Hyde Park PS</td>
<td>2.7 days</td>
<td>5 hrs, 8%</td>
</tr>
<tr>
<td>Brookline, Meter 98</td>
<td>2.6 days</td>
<td>2 hrs, 16%</td>
</tr>
<tr>
<td>Boston, Meter 101</td>
<td>2.4 days</td>
<td>2 hrs, 4%</td>
</tr>
<tr>
<td>Boston, Meter 60</td>
<td>3.2 days</td>
<td>1 hrs, 1%</td>
</tr>
<tr>
<td>Boston, Meter 7</td>
<td>2.6 days</td>
<td>6 hrs, 1%</td>
</tr>
<tr>
<td>Shaft 9A</td>
<td>2.6 days</td>
<td>4 hrs, 6%</td>
</tr>
<tr>
<td>Shaft 7D</td>
<td>3.7 days</td>
<td>23 hrs, 35%</td>
</tr>
<tr>
<td>Spot Pond Storage Facility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swampscott, Meter 115</td>
<td>4.1 days</td>
<td>6 hrs, 7%</td>
</tr>
<tr>
<td>Somerville, Meter 35</td>
<td>3.2 days</td>
<td>3 hrs, 5%</td>
</tr>
<tr>
<td>Revere, Meter 93</td>
<td>3.1 days</td>
<td>6 hrs, 9%</td>
</tr>
<tr>
<td>Milton, Meter 107</td>
<td>3.8 days</td>
<td>20 hrs, 28%</td>
</tr>
<tr>
<td>Boston, Meter 101</td>
<td>2.6 days</td>
<td>6 hrs, 11%</td>
</tr>
<tr>
<td>Medford, Meter 24</td>
<td>2.9 days</td>
<td>3 hrs, 5%</td>
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<td>4 hrs, 6%</td>
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</table>

Water Age Analysis Locations

Potential Tunnel Connection Shafts
- Proposed Tunnel
- Existing Shafts
- Existing Tunnels

Water Distribution Pipes

- Low Service
- High Service

Pressure Zones

- Low / 180-200º
- High and Low (approx. boundary)
- High / 280º
- Northern Intermediate High / 330º
- Intermediate High / 320º
- Western Intermediate High / 305º
- Northern Extra High / 443º
- Southern Extra High / 440º
Water Age Analysis from Carroll Treatment Plant

Average Day Demand

<table>
<thead>
<tr>
<th>Location</th>
<th>Days</th>
<th>Increase</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Spring Street PS</td>
<td>2.8</td>
<td>4 hrs</td>
<td>7%</td>
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<tr>
<td>Gillis PS</td>
<td>3.0</td>
<td>5 hrs</td>
<td>7%</td>
</tr>
<tr>
<td>Newton Street PS</td>
<td>2.3</td>
<td>0 hrs</td>
<td>0%</td>
</tr>
<tr>
<td>Boston, Meter 101</td>
<td>2.4</td>
<td>2 hrs</td>
<td>4%</td>
</tr>
<tr>
<td>Boston, Meter 60</td>
<td>3.2</td>
<td>1 hrs</td>
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<tr>
<td>Brookline, Meter 98</td>
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<td>16%</td>
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Spot Pond Storage Facility

Water Age Analysis Locations

Potential Tunnel Connection Shafts
- Proposed Tunnel
- Existing Shafts
- Existing Tunnels

Water Distribution Pipes
- Low Service
- High Service

Pressure Zones
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- Western Intermediate High / 305°
- Northern Extra High / 443°
- Southern Extra High / 440°
Water Age Analysis from Carroll Treatment Plant

Average Day Demand

- **Spring Street PS**
  - 2.8 days
  - Increase = 4 hrs, 7%

- **Gillis PS**
  - 3.0 days
  - Increase = 5 hrs, 7%

- **Newton Street PS**
  - 2.3 days
  - Increase = 0 hrs, 0%

- **Hyde Park PS**
  - 2.7 days
  - Increase = 5 hrs, 8%

- **Milton, Meter 107**
  - 3.8 days
  - Increase = 20 hrs, 28%

- **Shaft 7D**
  - 3.7 days
  - Increase = 23 hrs, 35%

- **Shaft 9A**
  - 2.6 days
  - Increase = 4 hrs, 6%

- **Somerville, Meter 35**
  - 3.2 days
  - Increase = 3 hrs, 5%

- **Somerville, Meter 91**
  - 5.8 days
  - Increase = 6 hrs, 9%

- **Shaft 7D**
  - 3.7 days
  - Increase = 23 hrs, 35%

- **Revere, Meter 93**
  - 3.1 days
  - Increase = 6 hrs, 9%

- **Swampscott, Meter 115**
  - 4.1 days
  - Increase = 6 hrs, 7%

Water Age Analysis Locations

- **Spot Pond Storage Facility**

Potential Tunnel Connection Shafts

- Proposed Tunnel
- Existing Shafts
- Existing Tunnels

Water Distribution Pipes

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Pressure Zones

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### Water Age Analysis from Carroll Treatment Plant

#### Average Day Demand

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- Revere, Meter 93: 3.1 days, Increase = 6 hrs, 9%
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- Spot Pond Storage Facility
- Water Age Analysis Locations

#### Potential Tunnel Connections
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- Existing Shafts
- Existing Tunnels

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Expert Review Panel

- Risk Mitigation
- Communications
- Program Management
- Tunnel Design and Construction
- National and Local Experts
- Panel Workshops at Key Program Milestones
Expert Review Panel

• Richard Fox – Owner, Mega Program Management, MWRA
  – Adjunct Faculty, Merrimack College
  – CDM Smith
  – MWRA

• Michael McBride – Tunnel Construction Management, MWRA, Owner
  – Gilbane
  – HDR
  – Allston Development Group
  – MWRA

• Erika Moonin – Owner, Mega Tunnel Program Management
  – Project Manager – Lake Mead Intake No. 3, Southern Nevada Water Authority

• Gary Brierley – Tunnel Boring Machine / Local Geology
  – “Dr. Mole”
  – Brierley Associates
  – Haley & Aldrich

• Gayln Rippentrop – Underground Construction / Tunnel Contractor
  – Frontier-Kemper
  – Kewit
Northern Intermediate High Project

October 16, 2019
Contract 7067 South Street Drain Line
• Over 32,000 linear feet of new pipeline installed through Woburn, Reading, Wakefield and Stoneham.
• 13,200 LF of 48-inch diameter DI pipe on 7067 project.
• Pipeline portion was completed last week.
• Substantial Completion June 2020
Crossing Montvale Avenue
Ledge Requiring Blasting

- Drilling, Dynamite & Blasting