# FISCAL YEAR 2020

# Capital Improvement Program

## MASSACHUSETTS WATER RESOURCES AUTHORITY

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August 2019

Louis M. Taverna, Chairman
MWRA Advisory Board
100 First Avenue
Boston, MA 02129

Dear Chairman Taverna:

This letter transmits to the Advisory Board the MWRA's Capital Improvement Program (CIP) for Fiscal Year 2020. The MWRA Board of Directors approved the FY20 CIP at its June 19, 2019 meeting. The FY20 CIP represents an update to the FY19 CIP approved by the Board in June 2018 and includes the latest spending estimates and project schedules. The FY20 CIP spending falls within the FY19-23 approved spending cap of $984.8 million.

The FY20 Capital Improvement Program projects $199.5 million in spending for FY20, of which $122.5 million supports Wastewater System Improvements, $64.2 million supports Waterworks System Improvements, and $12.8 million is for Business and Operations Support. The projects with significant spending include Chelsea Creek Headworks Upgrades, Deer Island Clarifier Rehabilitation Phase 2, Nut Island Odor Control and HVAC Improvements, Prison Point CSO Facility Rehabilitation, and Southern Extra High Redundancy.

Asset Protection accounts for the largest share of capital expenditures for the FY19-23 period. The FY20 CIP includes $794.7 million for asset protection initiatives, representing over 73% of total MWRA spending in this timeframe. Water System Redundancy projects totals $228.4 million in the same FY19-23 period, accounting for 21% of total spending.

The FY20 CIP reaffirms MWRA's commitment to the community financing assistance programs on both the water and wastewater sides.

A copy of the CIP document is available on-line at www.mwra.com. Questions or comments on this document should be directed to the MWRA Budget Department at (617)788-2206.

Thank you for your continued support, comments and recommendations on the capital budget.

Sincerely,

Frederick A. Laskey
Executive Director

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# MWRA AT A GLANCE

**Purpose**

Provide wholesale water and sewer services to customer communities, funded primarily through rates and charges

**Legal Status**

Massachusetts public authority established by an enabling act in 1984 – Chapter 372 of the Acts of 1984 as most recently amended January 2019

**Management**

- 11-member Board of Directors (3 Governor appointees, 3 Mayor of Boston appointees, 1 City of Quincy appointee, 1 Town of Winthrop appointee, and 3 Advisory Board appointees)
- 1 Executive Director (5 divisions: Office of the Executive Director, Operations, Finance, Administration, Law)

**Advisory Board**

Established by the enabling act to make recommendations to the MWRA on the MWRA budget and programs and to serve as liaison to the customer communities

**Service Area**

- 61 customer communities (43 sewerage, 51 water)
- 3.0 million people (44% of MA population)
- 5,500 businesses

**FY20 Operating Budget ($ in millions)**

| | |
|---|---|
| Direct Expenses | $248.3 |
| Indirect Expenses | $50.9 |
| Capital Finance | $493.1 |
| Total Operating Budget | $792.3 |
| Revenues* | $792.3 |

**96.2% of Revenues raised from rate assessments*

**Bond Ratings - General Revenue Bonds (senior/subordinate)**

| | |
|---|---|
| Moody's - | Aa1/Aa2 |
| S&P - | AA+/AA |
| Fitch - | AA+/AA |

**Capital Improvement Program**

- Total CIP spending: $8.5 billion since 1984
- Total Current Indebtedness $5.07 billion
- FY20 CIP Budget: $199.5 million

**Water System**

- 2 protected reservoirs
  - Quabbin
  - Wachusett
- 2 water treatment facilities
  - John J. Carroll
  - William A. Brutsch
- 350 miles of distribution infrastructure including aqueducts, deep rock tunnels, and pipeline
- 14 active storage reservoirs and standpipes
- 11 active pumping stations
- Average Daily flow: 200 mgd
- Safe yield: 300 mgd
- Treatment Capacity: 405 mgd
- Percentage of capacity utilized: 67%*

  **based on safe yield*

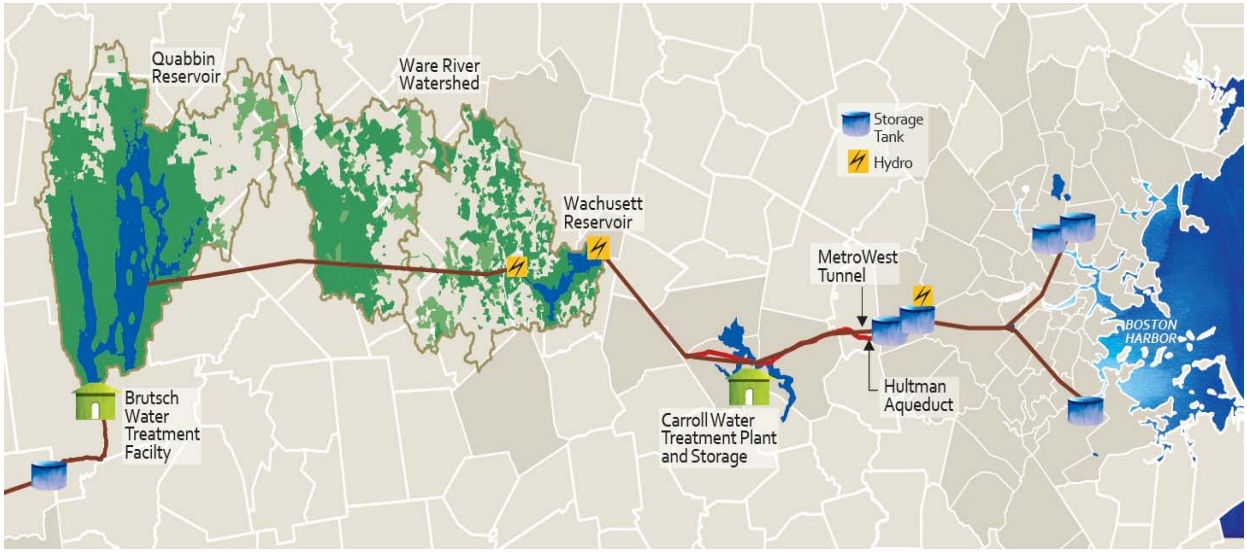
**Wastewater System**

- 240 miles of sewer pipelines and cross-harbor tunnels
- 13 pump stations
- 1 screening facility
- 1 gate house
- 6 CSO treatment/storage facilities
- 2 wastewater treatment plants
  - Deer Island Treatment Plant
  - Clinton Wastewater Treatment Plant
- 4 remote headworks
- 1 Pellet Plant for residuals processing
- Average daily flow: 365 mgd
- Peak wet weather capacity: 1,270 mgd
- Percentage of capacity utilized on average: 30%

**Renewable Energy**

Approximately 27% of MWRA's energy requirement was self-generated from renewable sources (biomass, hydro, wind, & solar assets) in FY19.

# MWRA AT A GLANCE




MWRA's water comes from the Quabbin Reservoir, 65 miles west of Boston, and the Wachusett Reservoir, 35 miles west of Boston. The Quabbin alone holds a 4-year supply of water.

The reservoirs are filled naturally. Rain and snow fall onto watersheds (protected land around the reservoirs) and eventually turn into streams that flow into the reservoirs. This water comes into contact with soil, rock, plants and other material as it follows its path. This process helps to clean the water.

The Quabbin and Wachusett Reservoirs are protected. Over 85% of the watershed lands that surround the reservoirs are covered in forest and wetlands. About 75% of the total watershed land cannot be built on. The natural undeveloped watersheds help to keep MWRA water clean and clear. Because they are well-protected, the water in the Quabbin and Wachusett Reservoirs is of very high quality. The MWRA has won numerous awards for quality, taste, and sustainability.

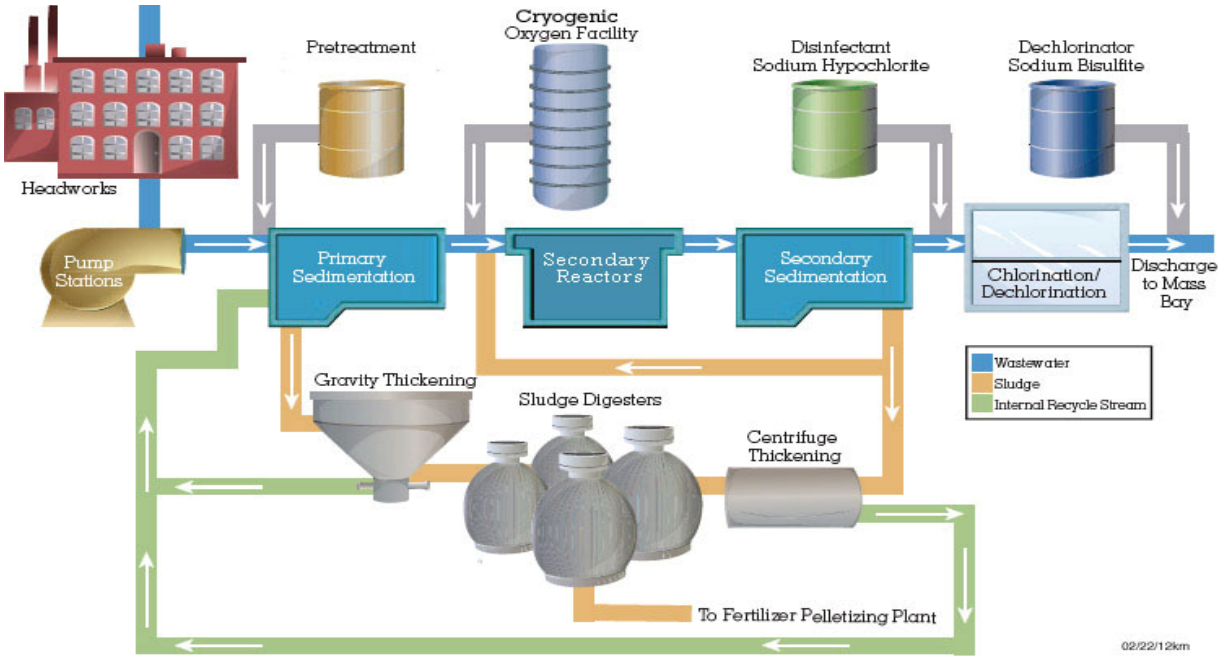
Water for most MWRA communities is treated at the Carroll Water Treatment Plant in Marlborough, Massachusetts. Water from the Quabbin and Wachusett Reservoirs enters the plant through the Cosgrove or Wachusett Aqueduct. The treated water leaves the plant through the MetroWest Water Supply Tunnel and the Hultman Aqueduct. Water from the Quabbin Reservoir for Chicopee, South Hadley Fire District #1 and Wilbraham is treated at the Brutsch Water Treatment Facility in Ware, Massachusetts, and leaves the plant through the Chicopee Valley Aqueduct.

For MetroWest and Metro Boston communities**,** treated water is sent through the MetroWest Water Supply Tunnel and the Hultman Aqueduct and is stored in covered tanks. From there it is drawn into distribution mains and many smaller community pipes. For Chicopee Valley Area Communities, treated water is sent through the Chicopee Valley Aqueduct to the local distribution mains and smaller community pipes. Water meters log the water entering each community.

Local pipes serve each street in the customer communities and eventually carry water into buildings. Meters installed by the local communities measure the amount of water delivered to each home or business.

To maintain and measure water quality, MWRA tests over 1,600 water samples per month, from the reservoirs all the way to household taps.

# MWRA AT A GLANCE – Wastewater System




Water is flushed through a building's pipes into customer community sewers. These 5,100 miles of local sewers transport the wastewater into 227 miles of MWRA interceptor sewers. The interceptor sewers, ranging from 8 inches to 11 feet in diameter, carry the region's wastewater to two MWRA treatment plants. Most communities' wastewater flows to the Deer Island Treatment Plant with the Clinton Wastewater Treatment Plant serving the town of Clinton and the Lancaster Sewer District.

The following describes the Deer Island treatment process:

Collection and Pumping: Sewage is piped to headworks where bricks, logs and other large objects are screened out. Pumps draw the screened sewage through deep-rock tunnels under Boston Harbor to Deer Island.

Preliminary Treatment: Mud and sand settle in a tank called a grit chamber. This material, known as grit and screenings, is taken to a landfill for environmentally safe disposal.

Primary Treatment**:** The sewage then flows to primary settling tanks where up to 60% of the solids in the waste stream settle out as a mixture of sludge and water.

Secondary Treatment: Plant oxygen is added to the wastewater to speed up the growth of micro-organisms. These microbes then consume the wastes and settle to the bottom of the secondary settling tanks. After secondary treatment, 80-90% of human waste and other solids have been removed.

The treated wastewater is disinfected before it is discharged to the Massachusetts Bay. The treated wastewater, known as effluent, travels through a 9.5-mile Outfall Tunnel bored through solid rock more than 250 feet below the ocean floor. The tunnel's last mile and a quarter include 55 separate release points known as "diffusers." With water depths up to 120 feet, this outfall provides a much higher rate of mixing and/or dilution than possible with discharges into the shallow waters of Boston Harbor.

Sludge from primary and secondary treatment is processed further in sludge digesters, where it is mixed and heated to reduce its volume and kill disease-causing bacteria. It is then transported through the Inter-Island Tunnel to the pelletizing plant in Quincy, Massachusetts where it is dewatered, heat-dried and converted to a pellet fertilizer for use in agriculture, forestry and land reclamation.

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## MWRA Capital Improvement Program Overview

In 1984, legislation was enacted to create the Massachusetts Water Resources Authority, an independent agency with the ability to raise its revenues from ratepayers, bond sales and grants. The primary mission was to modernize the area's water and sewer systems and clean up Boston Harbor. Since its establishment, the MWRA has invested over $8.4 billion to improve the wastewater and waterworks systems serving its 61 customer communities. The system serves 3.0 million people and more than 5,500 businesses.

Since 1985, MWRA has been subject to a Clean Water Act enforcement action to end years of wastewater pollution of Boston Harbor and its tributaries from the old Deer Island and Nut Island treatment plants and combined sewer overflows (CSOs). The enforcement case was initiated by the Conservation Law Foundation in 1983 and taken up by the U.S. Environmental Protection Agency in 1985. The Commonwealth of Massachusetts, the Boston Water and Sewer Commission, the City of Quincy and the Town of Winthrop are also parties to the case.

The Orders of the Court set forth the schedules of activities to be undertaken to achieve compliance with the law. Since 1985, MWRA has complied with 420 milestones which include the completion of extensive new wastewater treatment facilities at Deer Island in Boston and Nut Island in Quincy, a residuals facility in Quincy, and 35 CSO control projects in Boston, Cambridge, Chelsea and Somerville which comprise the long-term CSO control plan, the last of which were completed in December 2015.

As part of compliance with the Court's Orders, MWRA was required to file monthly compliance and progress reports on its ongoing activities through December 15, 2000 and quarterly compliance and progress reports through December 2016. MWRA is currently required to submit bi-annual compliance and progress reports through December 2020.

During the same time, MWRA complied with regulatory mandates to improve waterworks facilities. The mandated waterworks projects included the MetroWest Water Supply Tunnel, the Carroll Water Treatment Plant, and several covered water storage facilities.

The mandated projects account for most of the Capital Improvement Program (CIP) spending. The five initiatives below account for over $6.0 billion or 72% of spending to date:

- Boston Harbor Project - $3.8 billion
- Combined Sewer Overflow - $911 million
- MetroWest Tunnel - $697 million
- Carroll Water Treatment Plant - $423 million
- Covered Storage Facilities - $239 million

As the MWRA reaches maturity as an agency, the infrastructure modernization and new facilities construction phase is nearing completion, and, barring new mandates, most of the Authority's

future capital budget will be designated for Asset Protection, Water System Redundancy, Pipeline Replacement and Rehabilitation, and Business System Support.

Asset Protection focuses on the preservation of the Authority's building facilities. Water System Redundancy aims to reduce the risks of service interruption and allow for planned maintenance of the water system assets. Long-term water redundancy will be the largest future CIP initiative with estimated spending in excess of $1.4 billion over 17 years. Pipeline Replacement and Rehabilitation focuses on the maintenance and replacement of water and sewer pipelines. Business System Support provides for the continuing improvement and modernization of technology and security systems.

The FY20 Final CIP reaffirms MWRA's commitment to the community financial assistance programs on both the water and wastewater side.

Capital initiatives to date have been primarily funded through long-term borrowings, and the debt service on these outstanding bonds represents a significant and growing portion of the Authority's operating budget. As of December 31, 2018, MWRA's total debt was $4.9 billion. The Authority's capital finance (debt service) obligation as a percent of total expenses has increased from 36% in 1990 to 62.8% in the Final FY19 Current Expense Budget.

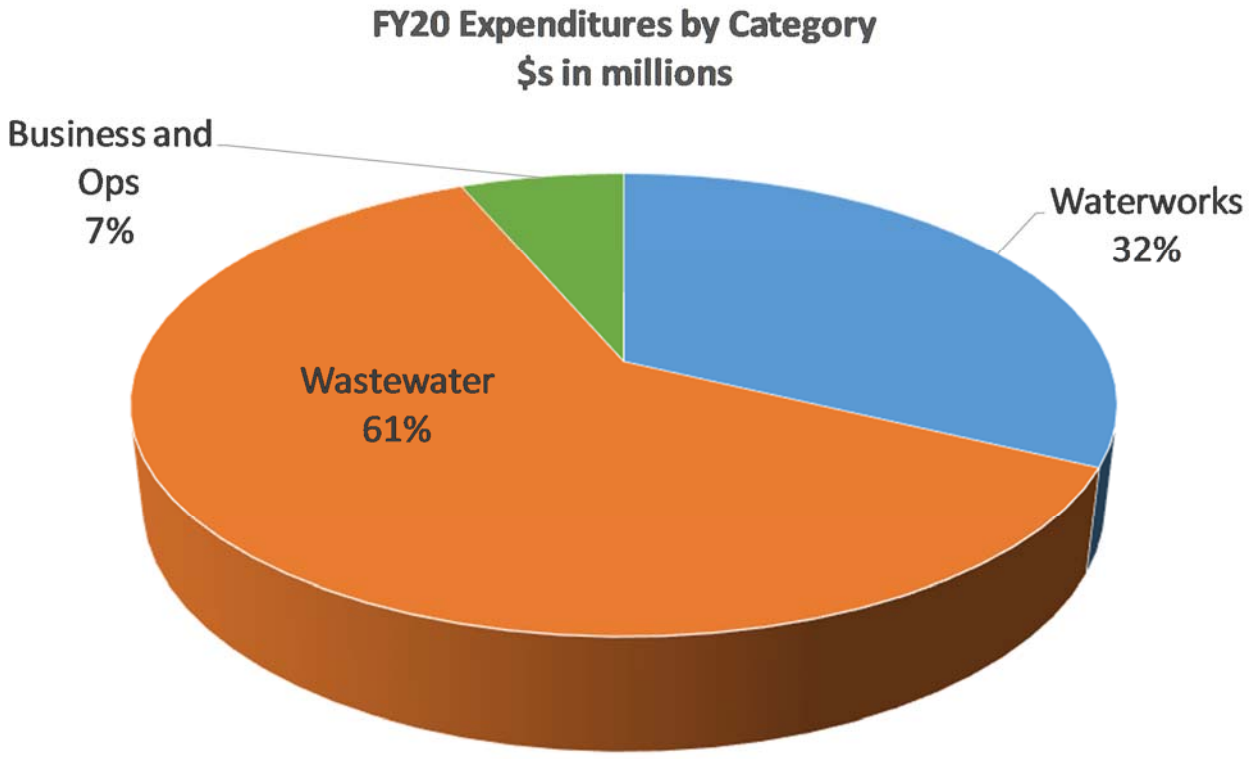
The MWRA's credit ratings of Aa1 from Moody's, AA+ from S&P, and AA+ from Fitch, reflect strong management of financial performance, application of operating surpluses to early debt defeasance, satisfactory debt service coverage ratios, well maintained facilities, comprehensive long-term planning of both operating and capital needs, and the strong credit quality of its member service communities.

To arrive at the FY20 Final CIP, the Authority identified the needs of the capital programs taking into account the recommendations of the Master Plan. The long-term strategy for capital work is identified in the Authority's Master Plan which was published in 2006, updated in 2013, and in 2019. The Master Plan serves as a road map for inclusion of projects in the CIP in every budget cycle.

The FY20 Final CIP represents an update to the FY19 CIP approved by the MWRA Board in June 2018. The spending projections are the result of prioritizing the projects, establishing realistic estimates based on the latest information, striking a balance between maintenance and infrastructure improvements, and ensuring that there is adequate support for MWRA's core operations to meet all regulatory operating permit requirements.

## FY20 Spending

The FY20 Final Capital Improvement Program projects $199.5 million spending for FY20, of which $122.5 million supports Wastewater System Improvements, $64.2 million supports Waterworks System Improvements, and $12.8 million is for Business and Operations Support.

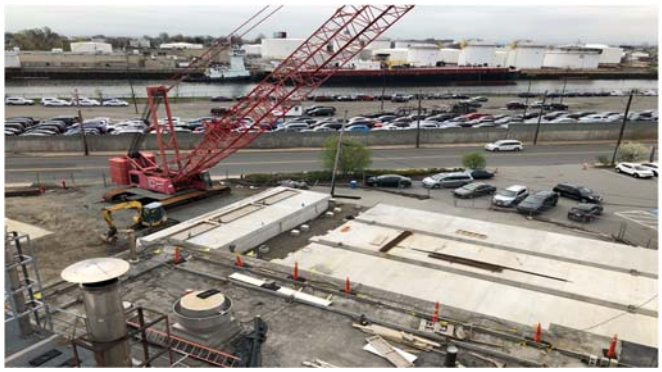



The FY20 CIP includes $35.4 million for community assistance programs, which are a combination of loan and partial grant programs, with net expenditures of $25.7 million for the local Infiltration/Inflow program and net expenditures of $9.7 million for the local water pipeline program.

Project contracts with spending greater than approximately $6 million in FY20, excluding local community assistance programs, total $78.0 million and account for 39.1% of the total annual spending.

| Project | Contract | Projected FY20 Expenditures $s in millions |
|---|---|---|
| Facility Asset Protection | Chelsea Creek Upgrades - Construction | $21.8 |
| Local Water System Assistance Program | Phase 2 Loan Distributions | $16.0 |
| DI Treatment Plant Asset Protection | Clarifier Rehab Phase 2 - Construction | $12.1 |
| Local Water System Assistance Program | Phase 3 Loan Distributions | $12.0 |
| SEH Redundancy & Storage | Redundancy Pipeline Sect 111 - Construction 3 | $9.3 |
| Corrosion & Odor Control | Nut Island Odor Control HVAC Improvement Construction Ph 2 | $8.0 |
| Facility Asset Protection | Prison Point Rehabilitation Construction | $7.5 |
| I/I Local Financial Assistance | Phase IX Grants | $7.5 |
| I/I Local Financial Assistance | Phase X Grants | $7.5 |
| NIH Redundancy & Storage | Sections 89 & 29 Redundancy Construction Phase 2 | $6.8 |
| DI Treatment Plant Asset Protection | Gravity Thickener Rehabilitation | $6.3 |
| Residuals Asset Protection | Residuals Electrical/Mechanical/Drum Dryer Replacement | $6.2 |
| I/I Local Financial Assistance | Phase XI Grants | $6.0 |
| | **Total Contracts > $6.0 million** | **$127.0** |
| | **% of FY20 Spending** | **63.7%** |
| | **Excluding Community Loan Programs** | **$78.0** |
| | **% of FY20 Spending** | **39.1%** |
| | **Total Projected FY20 Spending** | **$199.5** |

**Chelsea Creek Headworks Upgrade Construction** - $21.8 million ($82.5 million total construction cost). This major rehabilitation project includes replacement/upgrade to the screens, grit collection system, grit and handling systems, odor control systems, HVAC, mechanical, plumbing and instrumentation. Solids handling systems are being automated and the building's egress and fire suppressions systems are also being upgraded.



**Southern Extra High Redundancy Section 111 Phase 3 Construction** - $9.3 million ($19.1 million total construction cost). This is a redundancy project for MWRA's Southern Extra High service area. This project will provide redundancy to Sections 77 and 88 serving Boston, Norwood, Stoughton, and Dedham-Westwood through construction of a redundant pipeline. Phase 1 was substantially complete in September 2018. Phase 2 and Phase 3 began in October 2017 and August 2018, respectively.

**Nut Island Odor Control and HVAC Improvements - Construction Phase 2** - $8.0 million ($45.0 million total construction cost). Improvements to the Nut Island Headworks odor control, HVAC and energy management systems. These are the long-term improvement projects that arose following the January 2016 fire and the odor control, HVAC and energy management systems evaluation contract completed in February 2017.

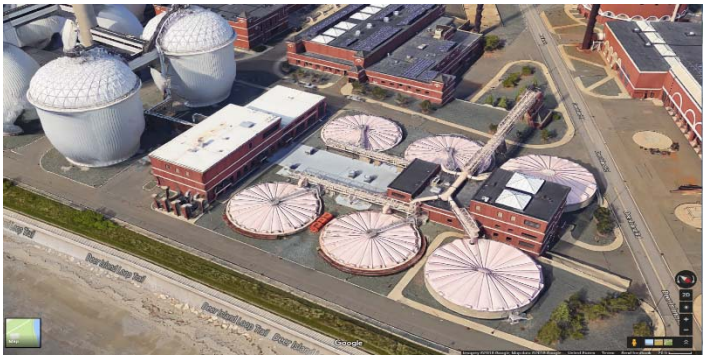
**Prison Point Rehabilitation Construction** - $7.5 million ($36.1 million total construction cost). This rehabilitation will include upgrades to the facility including replacement of diesel pump engines, dry weather screens, wet weather screens, sluice gates, chemical tanks, updating of other facility equipment including electrical distribution and chemical disinfection systems, and repair/replacement of miscellaneous equipment. Improvement/installation of systems as appropriate for energy efficiencies, security, and fire alarm will also be included.

**Northern Intermediate High Section 89 & 29 Redundancy Construction Phase 2** - $6.8 million ($24.8 million total construction cost). This project includes constructing a redundant pipeline (section 110) in Stoneham. This contract commenced in September 2017 and is the last of four contracts. Phase 1A, 1B, and 1C were all completed. This project will provide uninterrupted water supply to the service area in the event of failure of the existing single supply pipe and will allow the existing pipe to be removed from service for inspection, maintenance, and repair until pipeline is replaced with construction commencing in July 2020.

**Deer Island Wastewater Treatment Plant Asset Protection and Residuals:**

**Clarifier Rehabilitation Phase 2 Construction** - $12.1 million ($135.0 million total construction cost). This project will rehabilitate the sludge removal system in the primary tanks and the aeration/recirculation systems in the secondary tanks. The influent gates, effluent launders and aeration systems, and concrete corrosion in primary clarifiers will also be addressed and repaired.

**Gravity Thickener Rehabilitation** - $6.3 million ($19.6 million total construction cost). This project involves installing catwalks around the perimeter of several tanks, removing concrete blocks in the effluent channels, and modifying the sludge thickener roofing to improve staff access and operating efficiency.



**Residuals Electrical/Mechanical/Drum Dryer Replacement** - $6.2 million ($10.1 million total construction cost). This project includes mechanical and electrical improvements to the Residuals Facility. Also, includes drum dryer replacement.

**Total MWRA Future Spending**

Every year, the MWRA updates its anticipated future spending. The FY20 Final CIP projects total MWRA future spending of $3.9 billion. This is an increase of $185.0 million over the FY19 Final CIP transmitted to the Board of Directors in June 2019, with most of the additional spending in years beyond FY19.

Incremental Change in FY20 Final CIP
*($s in millions)*

| Division | FY19 Final CIP Future Spending (FY19-Beyond FY28) | FY20 Final CIP Future Spending (FY19-Beyond FY29) | $ Change | % Change |
|---|---|---|---|---|
| Wastewater | $ 1,533.5 | $ 1,658.1 | $ 124.6 | 8.1% |
| Water | $ 2,141.6 | $ 2,188.3 | $ 46.7 | 2.2% |
| Business & Operations Support | $ 50.3 | $ 64.0 | $ 13.7 | 27.2% |
| | | | | |
| Total MWRA | $ 3,725.4 | $ 3,910.4 | $ 185.0 | 5.0% |

Of the $185.0 million added to the CIP, a net of $95.2 million is due to revised construction cost estimates following completion of studies or engineering designs for the projects. Increased cost estimates may be due to updated cost estimates, such as $10.0 million for Deer Island HVAC Equipment Replacement Construction, $8.1 million for Hayes Pumping Station Rehabilitation contracts, $6.8 million for Nut Island Odor Control & HVAC Improvements Construction, $6.4 million for Northern Low Service Sections 50 & 57 Water and Sections 21/20/19 Sewer Construction, $6.2 million for Waltham Water Pipeline Connection Construction, $5.9 million for Siphon Structure Rehabilitation contracts, $7.2 million for Section 101 Waltham Connection Contracts, $5.9 million for Siphon Structure Rehabilitation contracts, $5.5 million for DI Digester Storage Tank Rehabilitation, $5.4 million for Ward Street Headworks Upgrade Construction, and $5.1 million for DI Clarifier Rehabilitation Phase 2 Construction. Cost estimates may also decrease. The largest decrease was $15.2 million for Peabody Pipeline Construction as well as $9.0 million for Chestnut Hill Emergency Pumping Station Generator Construction which are not moving forward. Also, reduction in scope of $5.9 million for Chestnut Hill Emergency Pumping Station Construction Improvements and $5.3 million for Weston Aqueduct/Spot Pond Supply Mains Pressure Reducing Valves Construction.

There were $53.2 million in new projects added in the FY20 CIP, which are described in the next section. The remaining increase is primarily due to projected inflation on unawarded contracts and schedule changes.

Information on individual project budgets and detail of changes is provided in Appendix 2.

**FY20 New Projects**

The FY20 CIP adds $53.2 million in new projects of which $45.8 million are for Wastewater projects, $2.4 million are for Waterworks projects, and $5.0 million are for Business and Operations Support.

**$ in millions**

| Project | Total Contract Amount | FY19-23 Spending |
|---|---|---|
| Wastewater | $ 45.8 | $ 1.5 |
| Waterworks | $ 2.4 | $ 2.4 |
| Business & Operations Support | $ 5.0 | $ 5.0 |
| **Total New Projects** | **$ 53.2** | **$ 8.9** |

The following table shows new projects added by major programs:

**$ in millions**

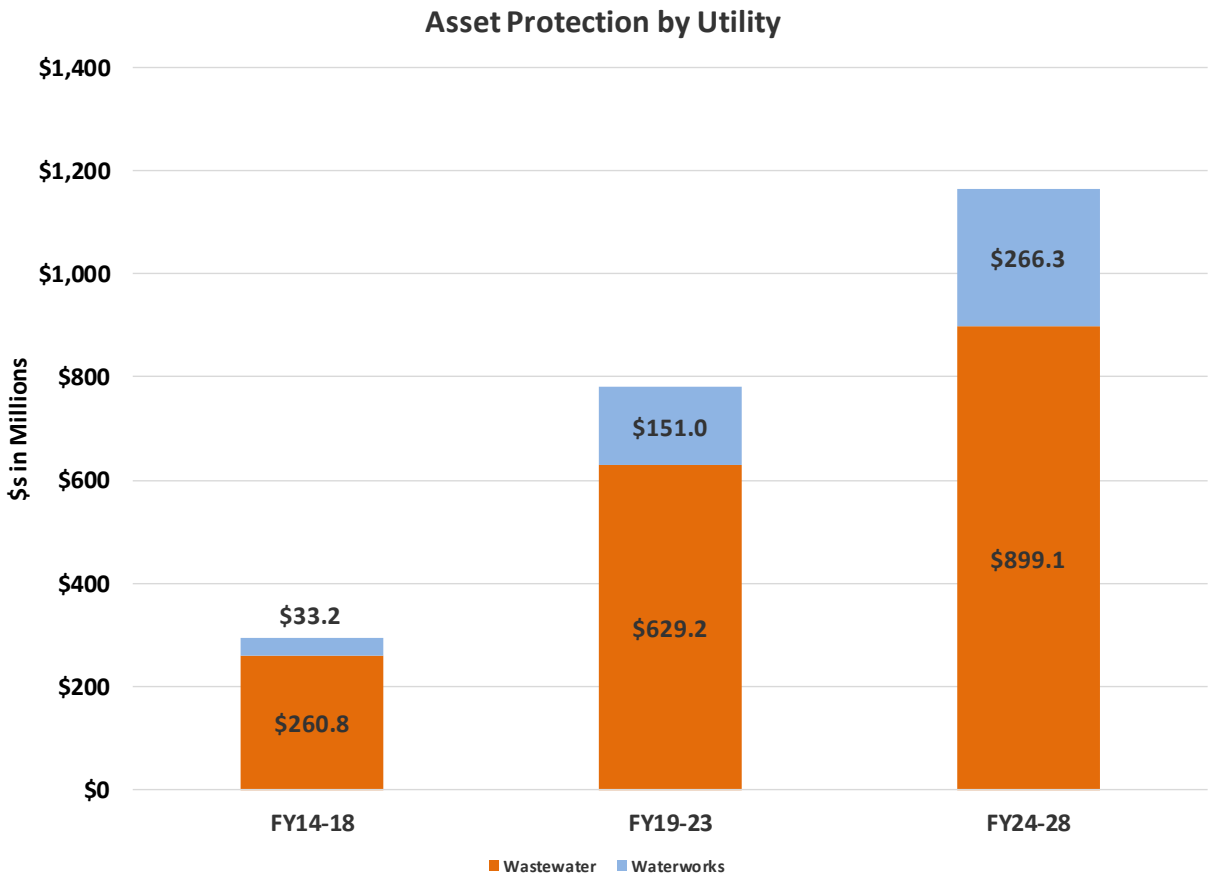
| Project | Total Contract Amount | FY19-23 |
|---|---|---|
| Section 191 & 192 Charles River Valley Sewer | $ 0.5 | $ 0.5 |
| Pump Stations & CSO Facility Rehabilitation Design/CA/REI | $ 7.5 | $ 0.7 |
| Pump Stations & CSO Facility Rehabilitation Construction | $ 37.5 | $ - |
| Clinton Equipment & Supplies Storage Building | $ 0.3 | $ 0.3 |
| Carroll Water Treatment Plant Emergency Generator #1 Replacement (Electric Portion) | $ 0.4 | $ 0.4 |
| River Road Improvements Wachusett | $ 2.0 | $ 2.0 |
| As-Needed Design Contract 18 | $ 2.5 | $ 2.5 |
| As-Needed Design Contract 19 | $ 2.5 | $ 2.5 |
| **Total New Projects** | **$ 53.2** | **$ 8.9** |

The largest project added is the Pumping Station and CSO Facility Rehabilitation - $45.0 million upgrades to DeLauri, Hingham, and Hough's Neck Pumping Stations and the Somerville Marginal CSO Facility. At pumping stations and CSO facilities, operability of mechanical equipment and maintenance of electric/standby power systems are key elements to minimize risk of facility failure.

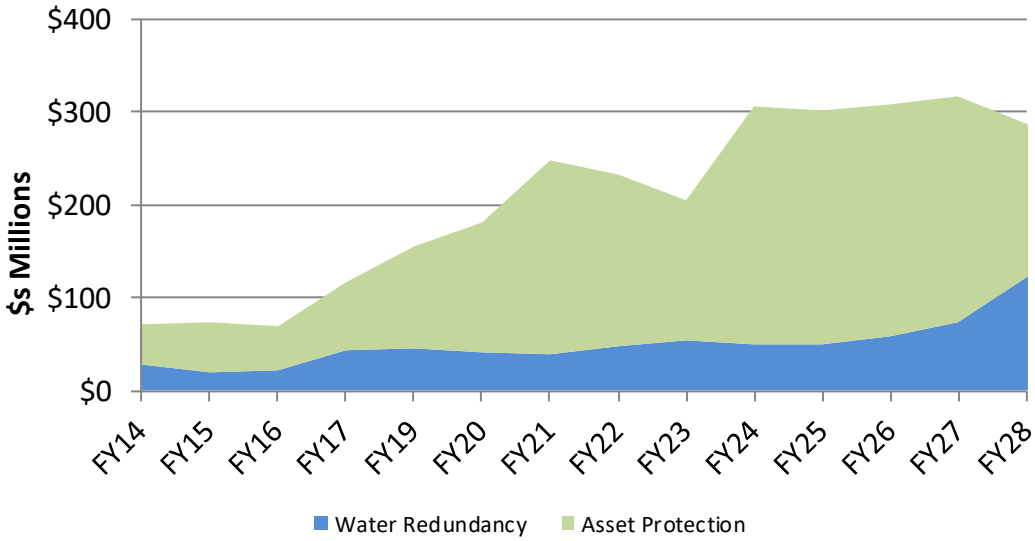
A complete list of new projects with cash flows and descriptions can be found in Appendix 3.

**Asset Protection and Water System Redundancy**

Asset Protection accounts for the largest share of capital expenditures for the FY19-23 period, nearly tripling the expenditure level of the FY14-18 spending period.



As illustrated by the following graph, the next two waves of spending over the FY19-23 Cap period and the FY24-28 Cap period will be for asset protection and water redundancy. This reflects MWRA's commitment to maintaining its physical plant and addressing the need for water system redundancy in some critical service areas. Total asset protection spending for FY19-23 is projected at $794.7 million or 73.1% of projected spending. Similarly, water redundancy spending for FY19-23 is projected at $228.4 million or 21% of projected FY19-23 spending.




**Future Spending**

Asset Protection accounts for the largest share of capital expenditures for the FY19-23 period. The FY20 CIP includes $794.7 million for asset protection initiatives, representing over 73% of total MWRA spending in this timeframe. Wastewater and Waterworks Asset Protection are $629.2 million and $151.0 million, respectively. Deer Island Treatment Plant Asset Protection accounts for over $273 million in spending. Spending for water system redundancy projects totals $228.4 million in the same FY19-23 period, accounting for 21% of total spending.

**Changing nature of the CIP by Category**
**($s in millions)**

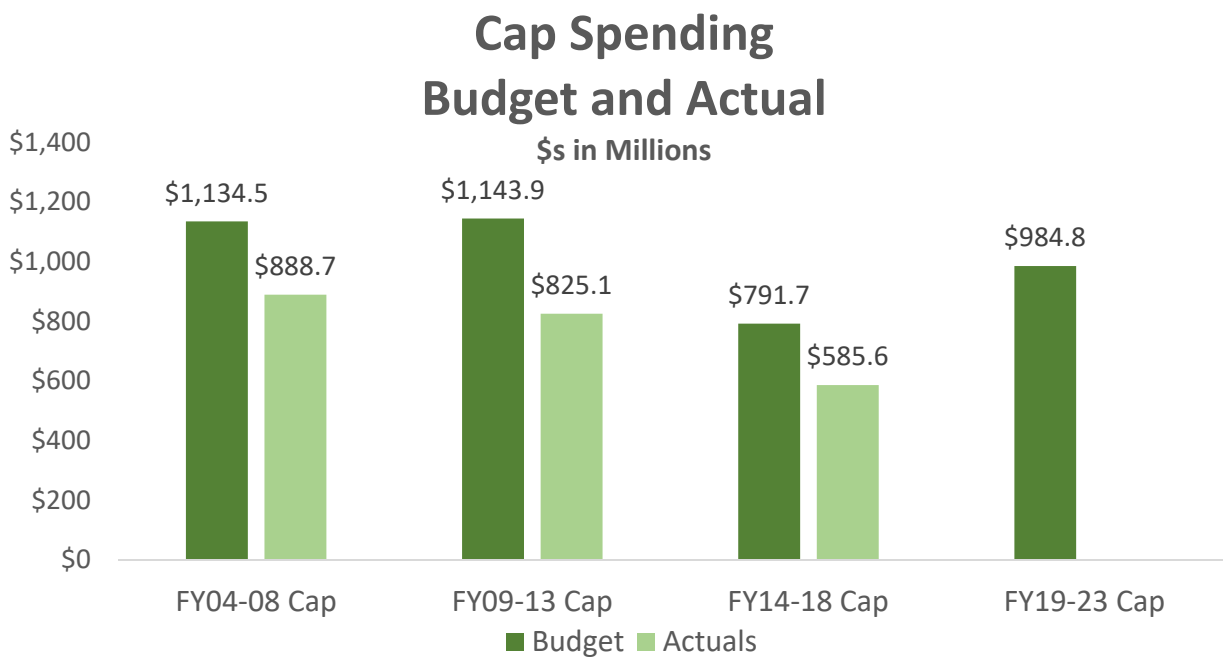
| Project Category | Total Contract | FY19-23 | FY24-28 |
|---|---|---|---|
| Asset Protection | $3,216.2 | $794.7 | $1,165.4 |
| Water Redundancy | $3,019.9 | 228.4 | $355.5 |
| CSO | $886.4 | 8.7 | $0.0 |
| Other | $1,061.7 | 55.0 | $90.3 |
| **Total** | **$8,184.2** | **$1,086.8** | **$1,611.2** |
| | | | |
| **Asset Protection** | **39.3%** | **73.1%** | **72.3%** |
| **Water Redundancy** | **36.9%** | **21.0%** | **22.1%** |
| CSO | 10.8% | 0.8% | 0.0% |
| Other | 13.0% | 5.1% | 5.6% |
| **Total** | **100.0%** | **100.0%** | **100.0%** |

**FY19-23 Five-Year Spending Cap**

**The Five-Year Spending Cap**

The concept of a five-year spending Cap was first introduced at the Advisory Board's recommendation in 2003 for the FY04-08 period. The Cap represents targeted spending levels to ensure adequate capital program funding and to serve as a guide for long-term planning estimates and community assessments. The graph below describes the history of the past three five-year caps and the Final FY19-23 Cap, both in terms of the Cap budget levels and actual spending.

The most recent Cap (FY19-23) of $984.8 million is significantly higher than the prior Cap (FY14-18) of $791.7 million for a variety of reasons including increased spending on asset protection and the initial phases of the long-term redundancy program.

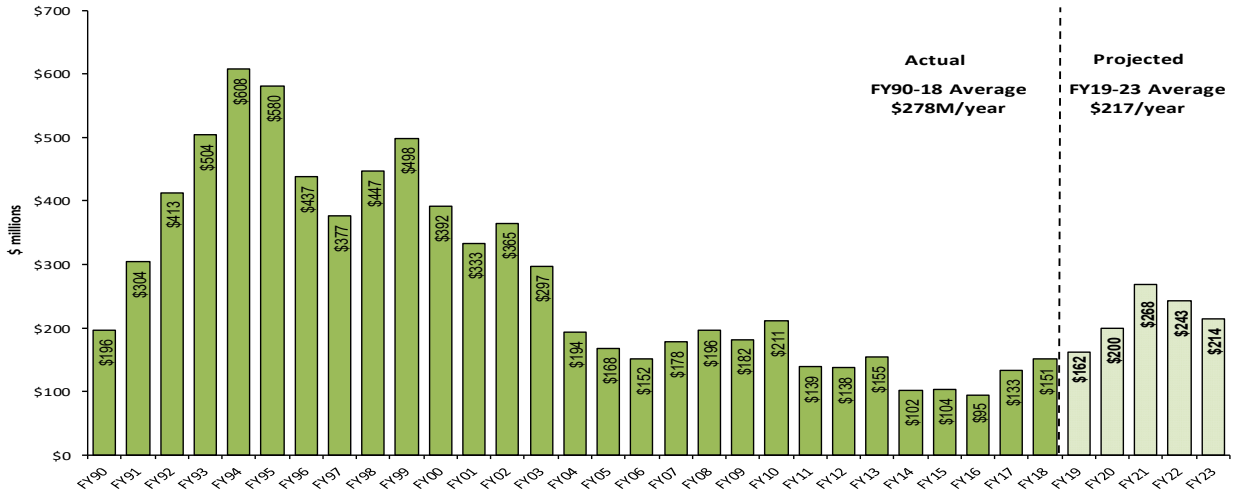



Today, the Authority is better positioned to reinvest in rehabilitation and replacement of aging facilities as result of conservative fiscal management which includes judicious control of expenses, and the fact that MWRA has implemented the practice of utilizing available funds resulting from positive current expense budget variances for defeasances resulting in the reduction of future fiscal years debt service expense. MWRA projects an overall reduction in outstanding principal of debt during the FY19-23 cap period.

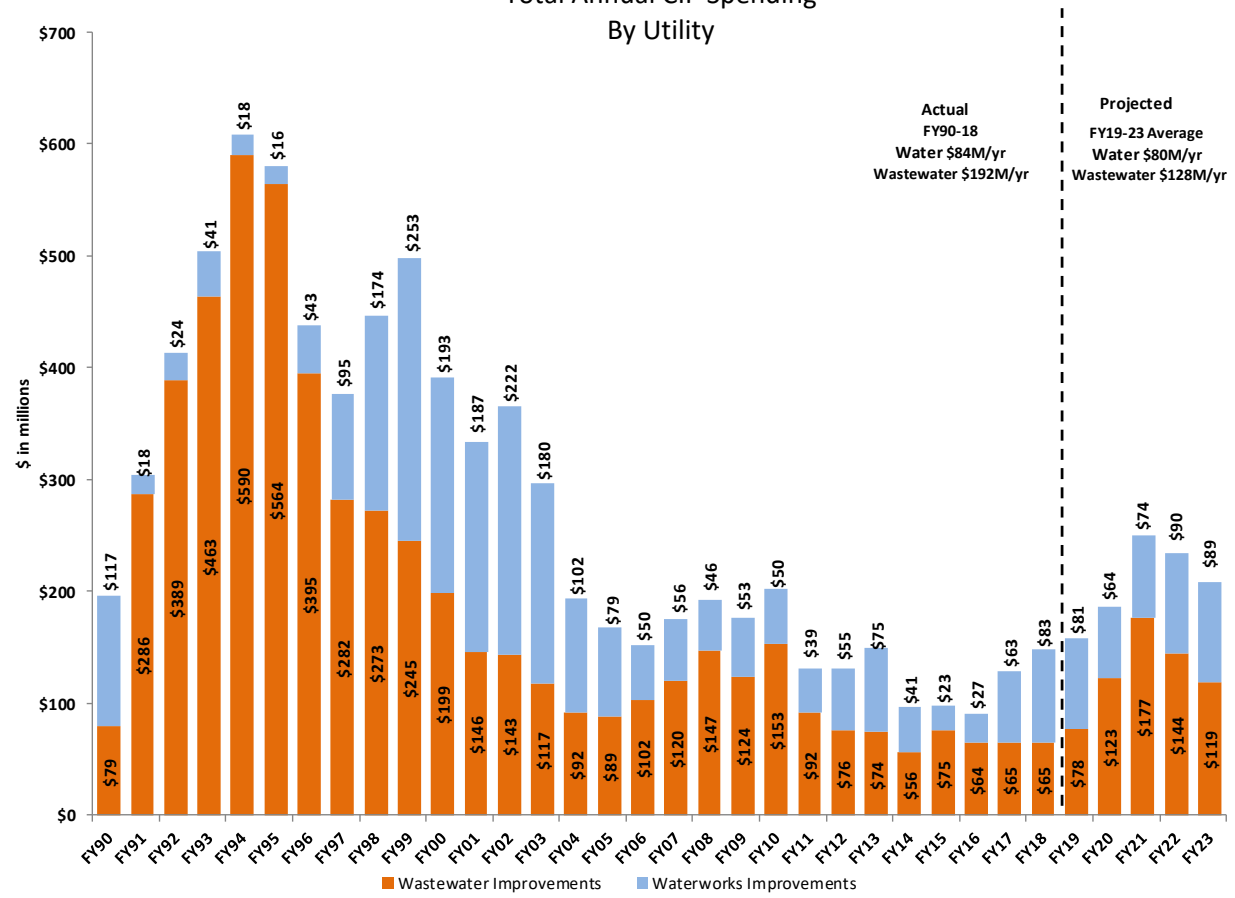
It is important to note that the spending on capital programs is largely determined by the nature, magnitude, and number of upcoming projects. In the prior five-year Caps, specifically FY04-08 and FY09-13, the majority of spending was driven by court-mandated projects and building new facilities. During the FY14-18 Cap, the Authority reached substantial completion on its court-mandated CSO Control Plan at an approximate total cost of $910.0 million. The Authority's main focus going forward is asset protection and water system redundancy. The FY20 Final CIP includes approximately $1.0 billion in future expenditures for asset protection and continues to fund the critical redundancy for the Metropolitan Tunnels System at approximately $1.4 billion over a seventeen-year period. However, the FY19-23 period includes only $24.3 million related to the tunnels.

The following two charts below capture the historical CIP spending through FY18 and projects spending through FY23 based on the FY20 Proposed CIP both overall at the MWRA level and by utility. Average total annual CIP spending through FY18 was $278 million. Average annual CIP spending for the proposed FY19-23 Cap is projected to be $217 million. Average annual CIP spending through FY18 was $84 million for Waterworks and $192 million for Wastewater. Average annual CIP spending for the proposed FY19-23 Cap is projected to be $80 million for Waterworks and $128 million for Wastewater.

## Total Annual CIP Spending




## Total Annual CIP Spending By Utility



The FY20 Final CIP includes approximately $2.0 billion in future expenditures for asset protection and continues to fund the critical redundancy for the Metropolitan Tunnels System at approximately $1.4 billion over a seventeen-year period.

| | Total FY19-23 | Total FY24-28 |
|---|---|---|
| **Wastewater System Improvements** | **$640.5** | **$906.3** |
| Interception & Pumping | 195.3 | 337.1 |
| Treatment | 279.0 | 425.0 |
| Residuals | 15.2 | 31.3 |
| CSO | 8.7 | - |
| Other Wastewater | 142.3 | 112.9 |
| | | |
| **Waterworks System Improvements** | **$398.4** | **$688.9** |
| Drinking Water Quality Improvements | 12.8 | 13.1 |
| Transmission | 150.2 | 337.7 |
| Distribution & Pumping | 161.3 | 297.5 |
| Other Waterworks | 74.0 | 40.5 |
| | | |
| **Business & Operations Suppport** | **47.9** | 16.0 |
| | | |
| **Total MWRA** | **$1,086.8** | **$1,611.2** |

The table to the left depicts CIP projected spending for the FY19-23 Cap period and FY24-28 Cap period by major program categories for Wastewater Systems Improvements, Waterworks System Improvements and Business and Operations Support. The Metropolitan Tunnels Redundancy projects accounts for the increase in Transmission spending for Waterworks in the FY24-28 Cap period.

Spending during the FY19-23 timeframe is planned to be $1.1 billion, including local community spending of $142.3 million for the I/I loan and grant program and $37.5 for the water pipeline loan program.

Annual cash flows for the proposed Cap period are shown below in millions:

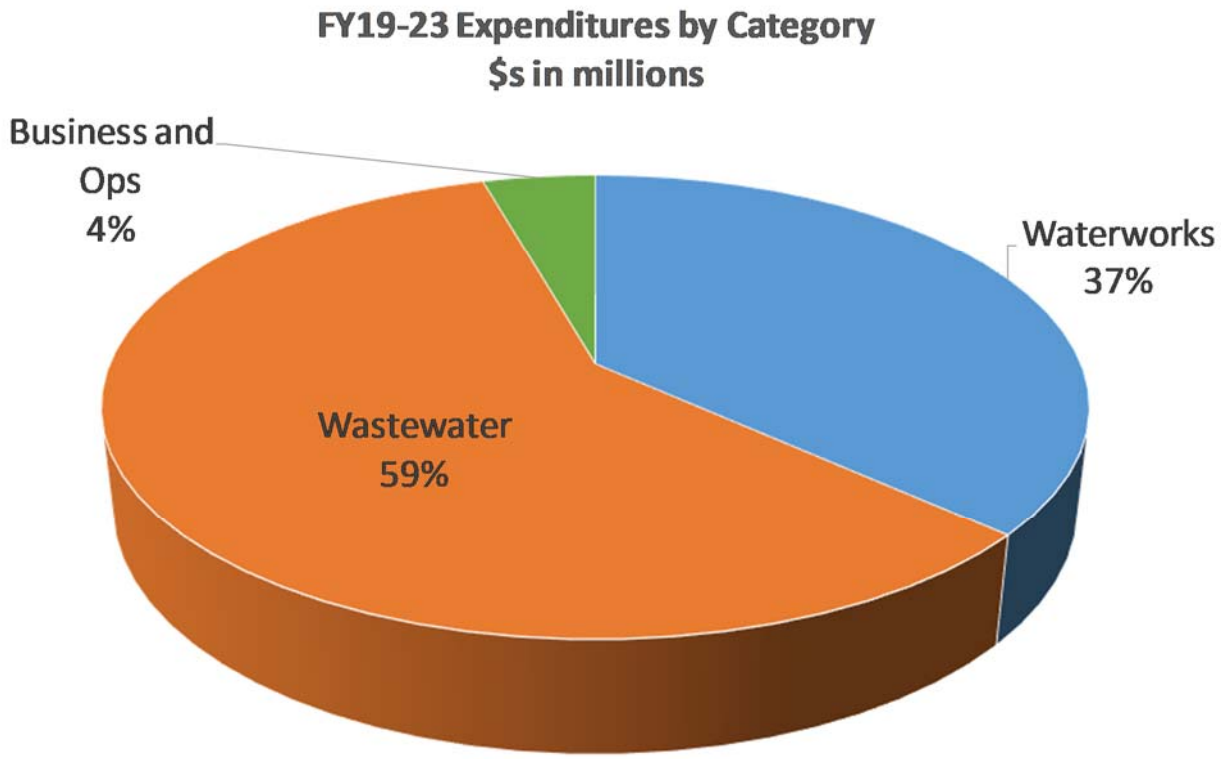
| | | FY19 | FY20 | FY21 | FY22 | FY23 | Total FY19-23 |
|---|---|---|---|---|---|---|---|
| FY20 Final | Projected Expenditures | $161.5 | $199.5 | $268.4 | $243.0 | $214.3 | $1,086.8 |
| | I/I Program | (36.5) | (25.7) | (25.0) | (28.2) | (26.9) | (142.3) |
| | Water Loan Program | (22.4) | (9.7) | (5.2) | (4.4) | 4.2 | (37.5) |
| | **MWRA Spending** | **102.7** | **164.1** | **238.3** | **210.4** | **191.6** | **$907.0** |
| | Contingency | 0.0 | 10.3 | 15.3 | 14.2 | 12.9 | 52.7 |
| | Inflation on Unawarded Construction | 0.0 | 0.9 | 5.2 | 8.3 | 9.8 | 24.2 |
| | Chicopee Valley Aqueduct Projects | (0.0) | 0.0 | 0.0 | 0.0 | 0.0 | (0.0) |
| | **FY20 Final FY9-23 Spending** | **$102.7** | **$175.4** | **$258.8** | **$232.8** | **$214.3** | **$983.9** |

The format of the Cap table has changed to account separately for MWRA spending, which excludes the local I/I grant and loan program and the local water pipeline loan spending which are both outside of MWRA's control. As in past Caps, contingency for each fiscal year is incorporated into the CIP to fund the uncertainties inherent to construction. The contingency budget is calculated as a percentage of budgeted expenditure outlays. Specifically, contingency

is 7% for non-tunnel projects and 15% for tunnel projects. Inflation is added for unawarded construction contracts. Finally, the Cap excludes Chicopee Valley Aqueduct system projects.

The final FY19-23 cap cash flow totals $983.9 million, falling within the approved Cap of $984.8 million.

Total Projected Expenditures for the Final FY19-23 Cap period by category, including community loan and grant programs, is illustrated in the pie chart below:



Breaking down the expenditures further, yearly projected spending for the FY19-23 Cap period by program, including community loan and grant programs, are shown below in millions:

| | FY19 | FY20 | FY21 | FY22 | FY23 | Total FY19-23 |
|---|---|---|---|---|---|---|
| **Wastewater System Improvements** | **$77.6** | **$122.5** | **$176.6** | **$144.4** | **$119.3** | **$640.5** |
| Interception & Pumping | 27.6 | 50.1 | 60.8 | 37.2 | 19.6 | 195.3 |
| Treatment | 11.6 | 34.1 | 83.1 | 78.3 | 71.9 | 279.0 |
| Residuals | 0.5 | 8.1 | 5.1 | 0.6 | 0.9 | 15.2 |
| CSO | 1.5 | 4.5 | 2.7 | 0.1 | 0.0 | 8.7 |
| Other Wastewater | 36.5 | 25.7 | 25.0 | 28.2 | 26.9 | 142.3 |
| | | | | | | |
| **Waterworks System Improvements** | **$80.6** | **$64.2** | **$74.1** | **$90.3** | **$89.3** | **$398.4** |
| Drinking Water Quality Improvements | 1.0 | 3.0 | 3.3 | 4.1 | 1.4 | 12.8 |
| Transmission | 10.6 | 15.1 | 37.2 | 39.5 | 47.8 | 150.2 |
| Distribution & Pumping | 40.4 | 31.5 | 20.4 | 34.5 | 34.6 | 161.3 |
| Other Waterworks | 28.5 | 14.6 | 13.2 | 12.2 | 5.5 | 74.0 |
| | | | | | | |
| **Business & Operations Support** | **3.3** | **12.9** | **17.8** | **8.3** | **5.7** | **47.9** |
| **Total MWRA** | **$161.5** | **$199.5** | **$268.4** | **$243.0** | **$214.3** | **$1,086.8** |

It is important to emphasize that the majority of spending within the Wastewater and Waterworks programs is concentrated in several larger projects with significant spending in the FY19-23 timeframe. Project contracts with expenditures greater than $15 million for the FY19-23 Cap total $670.0 million, including local community assistance programs, accounts for 61.6% of spending.

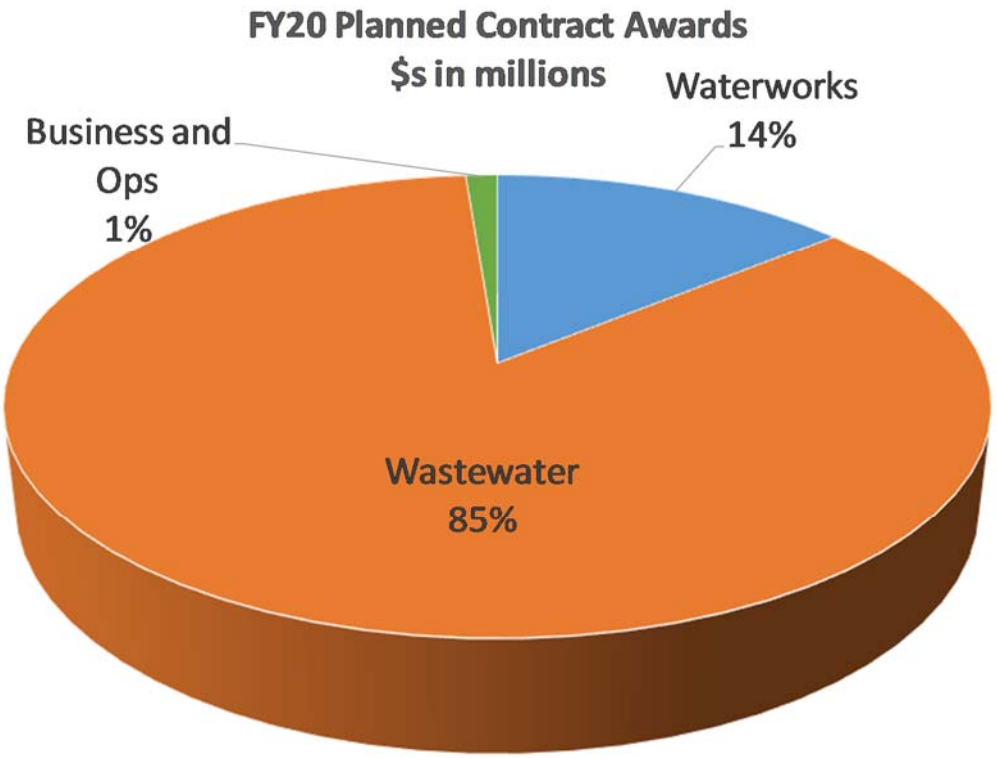
| Project | Contract | Projected FY19-23 Expenditures $s in millions |
|---|---|---|
| DI Treatment Plant Asset Protection | Clarifier Rehabilitation Phase 2 - Construction | $104.0 |
| Local Water Pipeline Improvement | Phase 3 Loans - Distributions | $85.3 |
| Local Water Pipeline Improvement | Phase 2 Loans - Distributions | $59.9 |
| Facility Asset Protection | Chelsea Creek Headworks Upgrades - Construction | $51.0 |
| I/I Local Financial Assistance | Phase XI Grants | $40.7 |
| Corrosion & Odor Control | Nut Island Odor Control HVAC Improvements - Construction | $38.9 |
| DI Treatment Plant Asset Protection | HVAC Equipment Replacement - Construction | $38.2 |
| Facility Asset Protection | Prison Point Rehabilitation - Construction | $36.1 |
| I/I Local Financial Assistance | Phase X Grants | $36.0 |
| I/I Local Financial Assistance | Phase IX Grants | $26.3 |
| Local Water Pipeline Improvement | Lead Service Line Replacement Loans | $24.0 |
| I/I Local Financial Assistance | Phase XII Grants | $21.0 |
| Metro Redundancy Interim Improvements | WASM 3 Construction 1 | $19.4 |
| DI Treatment Plant Asset Protection | Gravity Thickener Rehabilitation | $19.3 |
| NIH Redundancy & Storage | Section 89 & 29 Redundancy - Construction 2 | $19.3 |
| SEH Redundancy and Storage | Redundancy Pipeline Sect 111 - Construction 3 | $19.1 |
| Metropolitan Tunnal Redundancy | Preliminary Design & MEPA Review | $16.0 |
| DI Treatment Plant Asset Protection | Fire Alarm System Replacement - Construction | $15.5 |
| | **Total Contracts > $15.0 million** | **$670.0** |
| | **% of FY19-23 Spending** | **61.6%** |
| | **Excluding Community Loan Programs** | **$376.8** |
| | **% of FY20 Spending** | **34.7%** |
| | **Total Projected FY19-23 Spending** | **$1,086.8** |

The FY19-23 timeframe is dominated by several large projects with the top five construction projects totaling nearly $268.2 million and accounting for 24.7% of FY19-23 spending. Large initiatives include the Clarifier Rehabilitation at Deer Island and Chelsea Creek Upgrades at $104.0 and $51.0 million, respectively.

**FY20 Anticipated Contract Awards**

In Fiscal Year 2020, 63 contracts totaling $437.0 million are projected to be awarded. The largest ten projected contract awards total $351.7 million and account for 80% of expected awards and are presented in the following table.

| Project | Subphase | Notice to Proceed | Total Contract Amount ($ in millions) |
|---|---|---|---|
| DI Treatment Plant Asset Protection | Clarifier Rehabilitation Phase 2 - Construction | Aug-19 | $135.0 |
| DI Treatment Plant Asset Protection | HVAC Equipment Replacement - Construction | Mar-20 | $50.2 |
| Corrosion & Odor Control | NI Odor Control HVAC Improvements Construction | Sep-19 | $45.0 |
| Facility Asset Protection | Prison Point Rehabilitation - Construction | Nov-19 | $36.1 |
| DI Treatment Plant Asset Protection | Fire Alarm System Replacement - Construction | Feb-20 | $25.0 |
| Metropolitan Tunnel Redundancy | Preliminary Design & Massachustts Environmental Policy Act Review | Apr-20 | $16.0 |
| New Connect Mains-Shaft 7 to WASM 3 | CP3-Sect 23,24,47, Rehabilitation | Sep-19 | $14.3 |
| Facility Asset Protection | Ward St & Columbus Park Headworks Design/Construction Administration | Feb-20 | $11.4 |
| DI Treatment Plant Asset Protection | Motor Control Center & Switchgear Replacement Construction | Aug-19 | $10.6 |
| DI Treatment Plant Asset Protection | Chemical Tank and Digester Pipe | Jul-19 | $8.0 |
| | | | |
| **Top Ten Contract Awards** | | | **$351.7** |



**Community Loan Programs**

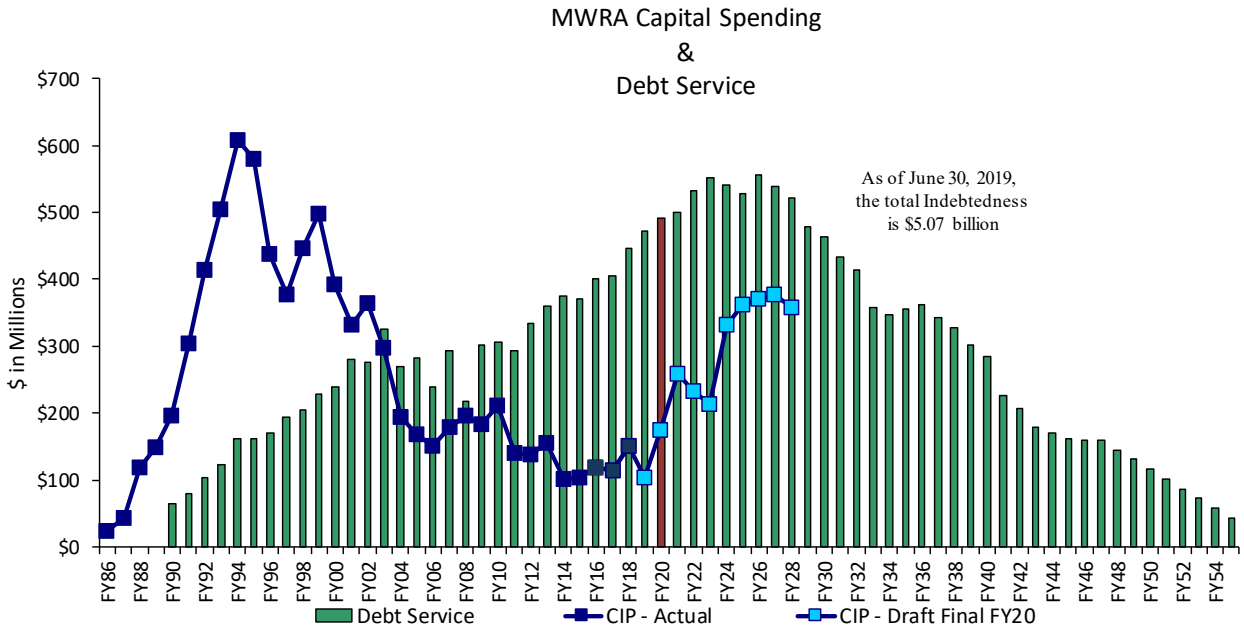
The MWRA offers its water and wastewater communities loan and grant opportunities for infrastructure preservation. Community loans are interest-free and repaid to MWRA over a 5-year or a 10-year period. On the water side, the program's goal is to improve local water system pipeline conditions to help maintain high water quality distribution from MWRA's treatment plant through local pipelines to customers' taps. The water loan program was established in 1988 and over 546 miles of pipeline have been improved. Similarly, on the wastewater side, the local financial assistance program provides MWRA sewer communities funding to perform local infiltration and inflow "I/I" reduction and sewer rehabilitation. The I/I program was established in 1993 and funds are currently approved for distribution through Fiscal Year 2025. Unlike the water loan program, the I/I program is a partial grant program.

Over the FY19-23 timeframe $142.3 million in funding is projected to be distributed to MWRA wastewater communities and $37.5 million is projected to be distributed to MWRA water communities.

| | FY19 | FY20 | FY21 | FY22 | FY23 | FY19-23 |
|---|---|---|---|---|---|---|
| I/I Financial Assistance (net of repayments) | $36.5 | $25.7 | $25.0 | $28.2 | $26.9 | $142.3 |
| | | | | | | |
| Local Water System Assistance (net of repayments) | $22.4 | $9.7 | $5.2 | $4.4 | ($4.2) | $37.5 |

**MWRA Capital Improvement Spending and Debt Service**

As of June 30, 2019, MWRA's total debt is $5.07 billion, which is $30 million less than the MWRA's total debt as of June 30, 2018. While total outstanding debt is decreasing, debt service obligations continue to rise and are projected to increase in coming years.



**Project Level Budget Summaries and Detail of Changes**

Information on individual project budgets and detail of changes is provided in the supplemental appendices attached to this document.

# Capital Improvement Program

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# FINAL
# FISCAL YEAR 2020

# APPENDICES

**MASSACHUSETTS WATER RESOURCES AUTHORITY**

# APPENDIX 1

# Project Budget Summaries and Detail of Changes

## Project Budget Summaries and Detail of Changes
### Project Index

**Wastewater System Improvements**

## Project Budget Summaries and Detail of Changes
### Project Index

# Wastewater System Improvements

Deer Island Wastewater Treatment Plan

# S. 104 Braintree-Weymouth Relief Facilities

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Fulfills a regulatory requirement*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*In accordance with a DEP administrative consent order, construction of relief facilities and the resulting reduction in community infiltration and inflow will provide capacity for peak sewage flow from Braintree, Hingham, Holbrook, Randolph, Weymouth, and sections of Quincy. This project will reduce surcharging in Braintree and Weymouth, and reduce frequent overflows into the Weymouth Fore River during wet weather.*

**Project History and Background**

The Braintree-Weymouth interceptor system and pump station serves Braintree, Hingham, Holbrook, Randolph, Weymouth, and sections of Quincy. Because of population increases, the sewerage system could not handle the volume of sewage received and sewage overflows were frequent along the Weymouth Fore River during wet weather.

Interim rehabilitation work was required to ensure continued operation of the existing Braintree-Weymouth Pump Station during the long-term design and construction period. After initially proceeding with a dual track design approach for part of this project, MWRA decided to construct a deep rock tunnel rather than a marine pipeline from the new pump station to the Nut Island shaft of the Inter-Island Tunnel to Deer Island. Construction of the Emergency Mill Cove Siphon was completed in June 1998. Construction of the deep rock tunnel was completed in September 2003, and the North Weymouth Relief Intercept was completed in June 2002. The Intermediate Pump Station and sludge pumping facilities at Deer Island were completed in April 2005. The Fore River Siphons construction contract was completed in May 2005. Construction of the Replacement Pump Station was completed in April 2008. Rehabilitation of Section 624 was completed in December 2010. Remaining phases include Braintree-Weymouth Improvements.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Design 1/CS/RI – Tunnel & IPS | Design of the tunnel and Intermediate Pump Station (IPS). Includes completion of design modifications for sludge pumping facilities at Deer Island and residuals filtrate facilities at Fore River. | Completed |
| Sediment Tests | Tests required as part of the evaluation of marine pipeline option. | Completed |
| Design 2/CS/RI – Surface | Design of remaining construction including siphons and replacement pump station. | Completed |
| Tunnel Construction & Rescue | Construction of a 2.9-mile, 12-feet diameter tunnel beginning at the Nut Island shaft of the Inter-Island Tunnel and ending at the Fore River Staging Area. Two 14-inch sludge pipelines within the tunnel will convey Deer Island sludge from the Inter-Island Tunnel to the pelletizing plant. 0.4 miles of twin 12-inch pipelines within the tunnel will convey filtrate from the pelletizing plant to the Intermediate Pump Station. 2.5 miles of 42-inch force main will carry flows and filtrate to the Inter-Island Tunnel. Also includes a MOA with Quincy, Braintree, and Weymouth for tunnel rescue and fire support services. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Intermediate Pump Station Construction | Construction of a 45-mgd pump station and headworks in North Weymouth. Also includes modifications to the sludge pumping facilities at Deer Island and the filtrate facilities at Fore River. | Completed |
| No. Weymouth Relief Interceptor Construction | Construction of 2,000 linear feet of 60-inch gravity sewer running from the Intermediate Pump Station and along the Exelon Energy site. | Completed |
| Fore River Siphons Construction | Construction of 36-inch, 3,900-feet long twin siphons beneath the Fore River from the Idlewell section of Weymouth to the southeast corner of the Exelon Energy site in North Weymouth. Constructing 1,000 linear feet of 36-inch to 54-inch new sewers in Idlewell. | Completed |
| B-W Replacement Pump Station | Construction of a new 28-mgd Braintree-Weymouth Pump Station which will handle flows from Hingham, Weymouth, and portions of Quincy. | Completed |
| Rehab Section 624 | Rehabilitation of 2,000 feet of Section 624 in North Weymouth. | Completed |
| Mill Cove Siphon Construction | Installation of 1,700 linear feet of 42-inch siphon pipe between Newell Playground and Aspinwall Street in North Weymouth to act as second barrel of existing Mill Cove Siphon. | |
| Construction –Rehab | Interim rehabilitation of the existing Braintree-Weymouth Pump Station. | Completed |
| Community Tech Assistance | Technical assistance for the Town of Weymouth for hydraulic modeling of its sewer system, leak detection for the water system, and mitigation. | Completed |
| Geotechnical Consultant | Consulting services related to the tunnel shaft excavation. | Completed |
| Communication System | Radio systems for the intermediate and replacement pump stations. | Completed |
| Mill Cove Sluice Gates Design and Construction | Install a single gate to provide for system flushing to reduce sediment deposition and to control odors at the Braintree-Weymouth Pump Station. | Future |
| Braintree-Weymouth Improvements Design CS (7435), Construction (7366), and REI (7683) | Design/ESDC services for modifications needed to improve facility safety, reliability, and performance. Design and construction improvements are required to address deficiencies in odor control, monitoring/instrumentation systems, solids screenings/handling, and pumping operations. | Active |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $240,104 | $227,705 | 12,400 | $164 | $417 | $1,832 | $10,568 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 94.9% | Status as % is approximation based on project budget and expenditures. Braintree-Weymouth Improvements Design/Construction Services commenced in December 2018 |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $239,378 | $240,104 | $726 | Apr-26 | Apr-26 | None | $1,814 | $1,832 | $18 |

**Explanation of Changes**

- Project cost and spending changed due to updated cost estimate for Braintree Weymouth Improvements Design due to actual award amount and Resident Engineering Inspection contract was added.

**CEB Impacts**

- None identified at this time.

# S. 130 Siphon Structure Rehabilitation

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

***Master Plan Project ☑ 2009 Priority Rating 2 (see Appendix 3)***

*Design and construction of improvements to headhouses and structures.*

**Project History and Background**

Siphon chambers are located at the upstream and downstream ends of depressed sewers. Depressed sewers are constructed to avoid obstructions in sewer alignments such as rivers and subsurface utilities. Upstream siphon chambers allow attainment of proper water elevation so that the depressed sewer flows under pressure. Downstream chambers provide transitions between depressed sewers and downstream gravity sewers.

Connecting structures are facilities at which flows from sewers are redirected to converge with or receive flows from other sewers.

There are 92 siphon chambers and 111 connecting structures in the MWRA wastewater system. Wastewater flows through many of these siphon chambers and connecting structures can be impacted by irregular maintenance due to the inaccessibility of many structures. Inadequate or reduced hydraulic capacity could in turn contribute to significant surcharges or overflows. Odor problems have also been identified at some siphon chambers and connecting structures due to hydraulic transitions.

MWRA completed a study in 1998 to evaluate rehabilitation of these structures in order to permit greater accessibility to provide regular maintenance to alleviate the above problems. 83 siphon chambers and 63 connecting structures were included in the study which recommended rehabilitation and improvements to 127 of these structures. MWRA has prioritized the design and construction of improvements to these structures. Phase 1 will provide access improvements and rehabilitation of structures at locations that are subject to inundation from potential surface flooding and are in greatest need of access and/or repair.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Planning | Identification of methods to improve accessibility and structures. Inspection of the siphon chambers and diversion structures along with recommendations for rehabilitation. | Completed |
| Phase 1 Design/CS/RI and Construction | Design, Construction Services and Resident Inspection for improvements at high priority siphon locations. Scope included 41 structures | Future |
| Phase 2 Design/CS/RI and Construction | Design, Construction Services and Resident Inspection for improvements at high priority siphon locations. Scope includes 40 structures | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $12,127 | $940 | $11,187 | $0 | $290 | $4,478 | $6,709 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 7.7% | Status as % is approximation based on project budget and expenditures. Initial Planning subphase was completed in 1998. Design is expected to begin in September 2019. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $6,168 | 12,127 | $5,959 | Dec-21 | Dec-26 | 60 mos. | $5,228 | 4,478 | ($750) |

**Explanation of Changes**

- Project cost and spending changed due to updated design and construction cost estimates.
- Schedule changed due to repackaging design and construction contract into two phases.

**CEB Impacts**

- None identified at this time.

# S. 132 Corrosion and Odor Control

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*High sulfide levels in the Framingham Extension System cause corrosion and odors in that system and downstream in the Wellesley Extension Sewer System and West Roxbury Tunnel. A study has identified the causes of corrosion and odors and recommended corrective measures. Completion of corrosion control measures will extend the useful life of these assets and minimize the impact on the existing wastewater conveyance infrastructure. Improved odor control will mitigate the impact on surrounding areas.*

**Project History and Background**

Hydrogen sulfide produces sewer odors and is highly corrosive to pipes and pump stations. Collapses in the Framingham Extension Sewer (FES) have alerted MWRA to problems in that area. Odor complaints have been received from residents abutting both the Framingham Extension Relief Sewer (FERS) and the Wellesley Extension Sewer (WES) systems resulting in legal claims totaling several hundred thousand dollars. Severe corrosion has occurred in the drop chamber leading to the West Roxbury Tunnel as well as documented corrosion in the tunnel itself.

While MWRA attempts to minimize odor and corrosion impacts through chemical intervention and sealing locations where odors escape, a more permanent solution is being sought. MWRA awarded a Planning/Study contract in January 1997. The consultant completed inspections in Ashland, Framingham, and Natick and drafted a report identifying, locating, and categorizing the sources and the extent of odor and corrosion problems. The Odor and Corrosion report indicated that significant levels of sulfides are discharged into the FES from Ashland and Framingham. These sulfide levels where documented to increase as the wastewater flows through the FES/FERS system. The report recommends a combination of MWRA and community actions, such as modifications to industrial discharge limits and municipal permits, chemical addition at community pump stations and the FES, and air treatment. The final planning/inspection report was completed in December 1998.

Following the Planning/Study the MWRA began the Interim Corrosion Control project. This design project included modifications to the FERS pump station, FES Tunnel, and air treatment systems. The design project was discontinued in June 2005, leaving the different project components a various level of design. At the time, a decision was made to allow other recommendations made during the Planning/Study phase to be further implemented (i.e., modifications to community collection systems, industrial discharge limits, municipal permit modifications). This decision has proven to be prudent give the significant reduction in hydrogen sulfide over the past decade. However, the high hydrogen sulfide levels are still prevalent enough to require chemical addition during the seasonal high period of the year to maintain hydrogen sulfide levels in an acceptable range for both corrosion control and to help reduce nuisance odors.

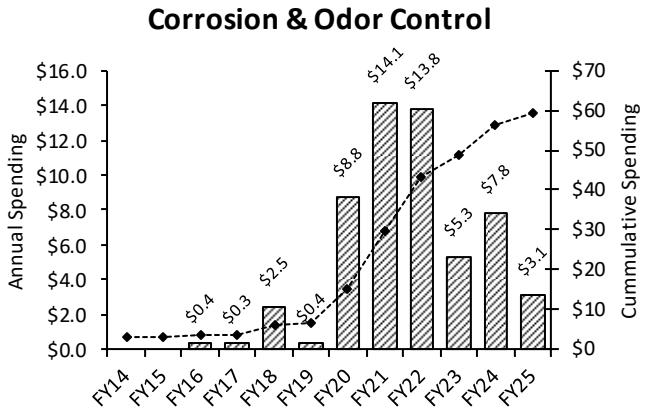
The Corrosion and Odor Control program has recently been expanded to include odor control and mechanical/ electrical modification to the downstream Nut Island Headworks.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Planning | Identification of causes and sources of odors; collection of local sewer system information in Ashland, Natick, and Framingham; recommendations for long-term corrective measures. | Completed |
| Design/CS/RI | Design, construction services, and resident inspection for FERS Pump Station, FES tunnel, and air treatment systems. By June 2005, the FERS Pump Station achieved 50% Design status, the FES tunnel achieved 30% Design status and the air treatment systems achieved 100% Design status. | Completed |
| Interim Corrosion Control | Implementation of chemical addition program at the FERS Pump Station. The program includes the addition of potassium permanganate, and monitoring of the wastewater flows and hydrogen sulfide levels downstream. | Completed |
| FES/FERS Biofilters Design & Construction | FES/FERS Corrosion Control (Biofilters) is a design and construction project to make improvements in the MWRA sewers. Three air treatment systems (biofilters) are recommended to remove and treat hydrogen sulfide in the FES, FERS, WESR and WERS sewer systems. Rehabilitation of hydrogen sulfide meters will be included. | Future |
| Nut Island Mechanical and Electrical Upgrades Design CA, REI and Construction | This project provides design, ESDC/REI and construction for replacement/upgrades to the mechanical, electrical, instrumentation, and support systems at the Nut Island Headworks Facility. | Future |
| System-wide Odor Control Study | The prevalence of Hydrogen Sulfide gas in the collection system has been responsible for system wide odor complaints and infrastructure deterioration. This project will evaluate the system, identify the critical needs, and provide solutions. | Future |
| NI Headworks Odor Control and HVAC Improvements Evaluation, Design, ESDC, REI and Construction Phase 2 | Design ESDC/REI and construction for improvements for the Nut Island Headworks Odor Control and HVAC systems and energy management system. This is the long term improvements project following the January 25-26, 2016 fire and following the Contract 7494 Odor Control, HVAC and Energy Management System Evaluation completed in February 2017. Failure of the odor control system would result in odors being released to surrounding areas and the discharge limits of the facility's air permit would be exceeded. | Active |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $84,132 | $6,180 | $77,952 | $410 | $8,758 | $42,407 | $34,705 | $840 |




| | | |
|---|---|---|
| Project Status 5/19 | 7.6% | Status as % is approximation based on project budget and expenditures. Odor Control Evaluation was completed in February 2017. NI Odor Control & HVAC Design CA/REI commenced in March 2017. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $76,754 | $84,132 | $7,378 | Nov-27 | Nov-27 | None | $41,502 | $42,407 | $905 |

**Explanation of Changes**

- Project cost change primarily due to updated cost estimates for Nut Island Headworks Odor Control and HVAC Improvements Construction, amendment for Nut Island Headworks Odor Control and HVACl Design CA/REI, and inflation adjustments on unawarded contracts

- Project spending changed primarily due to updated cost estimate s for Nut Island Headworks Odor Control and HVAC Improvements Construction and amendment listed above.

**CEB Impacts**

- None identified at this time.

# S. 136 West Roxbury Tunnel

***Project Purpose and Benefits***

*☑Contributes to improved public health ☑Provides environmental benefit ☑Extends current asset life ☑Improves system operability and reliability*

***Master Plan Project ☑Priority Rating 1 (See Appendix 3)***

*Investigation and rehabilitation of the West Roxbury Tunnel sewer. This sewer, built in 1964, transports flows from the Wellesley Extension Relief Sewer System through the West Roxbury portion of Boston to the High Level Sewer. A structural failure could result in surcharging and overflows.*

**Project History and Background**

During construction of the Wellesley Extension Replacement Sewer and inspection of the tunnel in 1999, visual observations indicated that severe corrosion due to hydrogen sulfide had occurred in a portion of the sewer directly upstream of the West Roxbury Tunnel (WRT), and that the tunnel entrance structure had lost cement lining, exposing the reinforcing steel. Manholes and other structures had been affected more severely.

A structural failure of the WRT would affect the tributary communities of Ashland, Brookline, Dedham, Framingham, Natick, Needham, Newton, Wellesley, and the Hyde Park and West Roxbury portions of Boston. Local failure of the tunnel could result in the discharge of 53 to 128 mgd of raw sewage into the Charles River until emergency repairs could be made, back-up of sewage into local residences and businesses, and the interruption of service to as many as 125,000 people. Section 138 is immediately upstream of the tunnel and crosses beneath the VFW Parkway in West Roxbury. Structural failure beneath this major transportation corridor would result in a severe public safety hazard.

Design for structural repairs to Section 138 and the West Portal of the tunnel were completed in June 2001. Construction of these repairs, Contract 6569, repairs to Sections 137 & 138, including the slipline of Section 138, were completed in June 2002. The design contract to rehabilitate the tunnel was awarded in February 2009 and ended in June 2011. The tunnel was inspected in August 2010 and there has been negligible deterioration since the 1999 inspection. Based on these findings and the significant reduction in hydrogen sulfide levels in the tributary sewers over the past decade, it was determined that the tunnel is not in need of immediate repair. In lieu of immediate repair, a tunnel inspection program will be implemented to monitor the conditions of the tunnel.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Inspection | Inspection of Section 137 of the West Roxbury Tunnel, which includes 12,500 linear feet of 84-inch reinforced and unreinforced concrete tunnel. Initial inspection completed in 1999. | Completed |
| Design/CS/RI | Design, construction services, resident inspection for corrective actions to repair/rehabilitate 1,000 feet of Section 138 and the West Portal, and a conceptual design report for the rehabilitation of the tunnel. Design/construction completed in June 2002. | Completed |
| Construction | Rehabilitation of 1,000 feet of Section 138 and the West Portal. Completed in June 2002. | Completed |

| | | |
|---|---|---|
| Tunnel Inspection | Inspection contract to monitor the conditions of the tunnel in 10 years | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $11,314 | $10,314 | $1,000 | $0 | $0 | $0 | $1,000 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 91.2% | Status as % is approximation based on project budget and expenditures. Tunnel Inspection is expected to begin in FY24. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $11,314 | $11,314 | $0 | Jun-24 | Jun-24 | None | $0 | $0 | $0 |

**Explanation of Changes**

- N/A.

**CEB Impacts**

- None identified at this time.

# S. 137 Wastewater Central Monitoring

**Project Purpose and Benefits**

☑ *Extends current asset life.*
☑ *Results in a net reduction in operating costs*
☑ *Improves system operability and reliability*

*To study, define, design, and implement a centralized monitoring and control system most appropriate for MWRA's wastewater transport system. Through facility automation and remote monitoring and control, SCADA implementation will result in cost savings and improve wastewater system operation and maintenance.*

**Project History and Background**

MWRA has implemented automation and central monitoring and control of its water and wastewater systems and facilities. Substantial investments have been made in implementing such systems for the Deer Island Wastewater Treatment Plant, and Supervisory Control and Data Acquisition System (SCADA) implementation is fully operational at the wastewater transport facilities and the water conveyance and treatment system.

The SCADA Master Plan, which was completed in July 1999, recommended expansion of the automated control concepts developed for water system operation and identified long-term savings related to staffing reductions and optimization of operations and maintenance. Following the master planning recommendations, a detailed scope of services was prepared to procure professional services contract to provide design, integration, training, construction administration and resident inspection services for various SCADA improvements. Camp Dresser & McKee, Inc. (CDM) was awarded this contract in June 2002. The construction effort on the first and most complex of two construction packages began in March 2006 and reached substantial completion in January 2008. This construction addressed SCADA needs at most pumping and CSO facilities, as well as establishing overall data communications improvements. The second construction package provided for SCADA needs at the remote headworks facilities, taking into consideration future CIP improvements at Chelsea, Columbus Park, and Ward Street Headworks facilities. This contract reached substantial completion in July 2009.

Additional CIP sub-phases have been added and are being implemented to replace existing SCADA equipment that is nearing the end of its useful life or is no longer supported by the manufacturer. Additional efforts will be performed to enhance SCADA communications and improve on computer graphics used by operators to monitor and control facilities (Human Machine Interfaces) and PLC related systems to improve upon cyber security and maintainability.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Planning | Development of a plan for a monitoring and control system for the MWRA wastewater transport system. | Completed |
| Design and Integration Services | Includes design, integration (PLC programming, operator graphics development, MIS/CMMS data transfer), and development and implementation of training. Also covers preparation of documentation and manuals for automating equipment and systems and for remote monitoring and control of the wastewater transport systems and facilities. Includes construction administration, engineering services during and after construction, and resident inspection. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Construction 1 (CP1) | Construction and installation of SCADA equipment and systems at seven pumping facilities, three CSOs and one screen house. Also covers Operation Control Center improvements. Facilities include Alewife, Caruso, Hingham, New Neponset, Hayes, Delauri, Houghs Neck, Chelsea Screen House, Cottage Farm, Prison Point, and Somerville Marginal. This construction package included the major components of the SCADA communications infrastructure (microwave radios, routers, etc.). | Completed |
| Construction 2 (CP2) | Construction and installation of SCADA instrumentation and control equipment at the three older headworks facilities and Nut Island Headworks. OCC improvements were also made to support these additional facilities. | Completed |
| Equipment Pre-purchase | Purchase SCADA system components including computer hardware to ensure consistency with MWRA MIS infrastructure through existing Commonwealth of MA blanket contracts and low cost small quantity system components (ex. fuel tank monitoring units and interfaces, Prison Point Flow meter, CSU/DSUs), and additional instrumentation and control equipment at the Arthur St. Pump Station to ensure consistency and/or compatibility with installed systems. | Completed |
| Technical Assistance | Technical assistance work to support all subphases. | Completed |
| Wastewater Redundant Communications | To study and implement redundant communications alternatives for Wastewater facilities, with an emphasis on wireless options. It is critical to have alternative communication if an important facility alarm does not reach the Operations Control Center. | Future |
| Wastewater SCADA/PLC Upgrades Design and Programming Services, Construction, and Equipment Hardware | Replacement of existing SCADA PLCs nearing their end of useful life with an updated PLC platform. New PLC platforms further provide increased security capabilities, improved programming functionality and maintainability enhancements. Secondary goals include standardizing PLC logic and HMI graphics, and upgrading aging field instrumentation. Project includes Design and Programming Services, Construction, and Equipment Hardware. During FY19 a contract was issued to provide programming to upgrade BOS019 and Framingham SCADA systems. Hardware will be purchased in FY20 with the project to be complete prior to the end of the year. | Active |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $27,482 | $19,782 | $7,700 | $137 | $448 | $1,926 | $5,774 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 72.0% | Status as % is approximation based on project budget and expenditures. Construction 1 contract was substantially complete in December 2007. Construction 2 contract was substantially complete in July 2009. Wastewater SCADA/PLC Upgrades Design and Programming Services began in April 2018. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $27,482 | $27,482 | $0 | Oct-31 | Oct-31 | None | $2,200 | $1,926 | ($274) |

**Explanation of Changes**

- Spending changed primarily due to updated schedule for Wastewater Redundant Communications contract.

**CEB Impacts**

- None identified at this time.

# S. 139 South System Relief Project

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To protect public health and property from sanitary system overflows and back-ups into homes and businesses during extreme wet weather events. Completion of the project will also extend the useful life of system assets and potentially avoid extraordinary costs resulting from system failures.*

**Project History and Background**

*Archdale Road Diversion Structure*

On October 20, 1996 a 100-year rainstorm caused the MWRA High Level Sewer (HLS) (Section 70) to overflow in the area of Archdale Road in Boston. Following this overflow event, MWRA established a task force to recommend action to mitigate and/or prevent future overflows. The task force developed an emergency response plan and examined several relief alternatives. The first component of the recommended relief plan consisted of construction of a diversion structure that includes two 30-inch by 60-inch sluice gates connecting the HLS to BWSC's Stony Brook drainage conduit. The diversion structure is located at the end of Bradeen Street in Roslindale. If, based on monitoring results, it appears that the High Level Sewer is about to overflow in the Archdale Road area due to an extraordinary storm event, the overflow volume is diverted to the Stony Brook Conduit through the sluice gates. This eliminates the need to deploy large emergency response crews to build temporary sandbag dikes. Construction of the diversion structure was completed in August 1999.

*High Level Sewer Repair*

Subsequent to the October 1996 storm, MWRA initiated some short-term modifications to the sewer system to reduce overflows. However, during a June 1998 storm, these modifications actually pressurized the HLS. As a result, MWRA began an emergency evaluation of the HLS in June 1998 to analyze its hydraulic capacity and structural integrity. The evaluation, which was completed in January 1999, discovered cracking at a 77-degree bend in the sewer in the Archdale Road area that required immediate attention. Inspection also indicated that approximately 40 feet of the HLS, located in the Arnold Arboretum, needed repair. A construction contract notice-to-proceed was issued in June 1999 and construction was completed in October 1999.

*Outfall 023 Cleaning and Structural Improvements*

Following the October 1996 storm, the City of Boston engaged a consultant to review the events and recommend remedial actions to prevent future flooding under similar conditions. One recommendation was to clean sediment and debris from the Stony Brook Conduit. Boston Water & Sewer Commission (BWSC) has cleaned the upstream portion of the conduit and MWRA has cleaned the outfall from the Metropolitan District Commission (MDC) gatehouse at Charlesgate to the Charles River. This part of the project also covers structural modifications to Outfall 023 to permit access points and diversion capabilities for future cleaning. This portion of the project has been moved out to fiscal year 2024 after a 2019 inspection discovered acceptable sedimentation levels. Staff will continue to periodically inspect the outfall for increased sedimentation levels and report if schedule modification need to be made.

*Milton Financial Assistance*

Two residential areas in the Town of Milton have experienced sewage backups into homes during wet weather events and periods of prolonged wet weather. One area affected is a direct tributary of MWRA's High Level Sewer and the other is a tributary to MWRA's New Neponset Valley Sewer. In September 1999, MWRA and Milton entered into a financial assistance agreement to fund design and construction of new sewers, rehabilitation of an existing pump station, and construction of a new pump station to mitigate downstream impacts from high flow conditions in the improved High Level Sewer.

*Pump Station Feasibility*

MWRA considered investigating the feasibility of constructing a small pump station to convey wastewater from a small area of Quincy away from the Braintree Howard Street Pump Station. The flow would be re-routed back to the Quincy collection system. The City of Quincy would own and operate the pump station. Upon further evaluation, MWRA has decided to delete this project and instead, will continue an MOU with Braintree to pay the town annually for use of 25 percent capacity of Braintree's Howard Street Pump Station.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Archdale Des/CS/RI and Construction | Design, construction services, and resident inspection for the Archdale Road Diversion Structure. Construction of an underground diversion structure that houses two 30-inch by 60-inch horizontal sluice gates on the sidewall of the HLS. This structure controls flow into BWSC's Stony Brook Conduit. | Completed |
| Sections 70 and 71 HLS Evaluation/Construction | Initial evaluation and construction of recommended improvements. | Completed |
| Milton Financial Assistance | Payment to the Town of Milton for local projects to mitigate downstream impacts from high flow conditions. | Completed |
| Construction and Improvements for Outfall 023 | Removal and disposal of sediment and debris from Outfall 023 as well as continuation of structural improvements to enable future cleaning operations. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $4,939 | $3,439 | $1,500 | $0 | $0 | $0 | $1,500 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 69.6% | Status as % is approximation based on project budget and expenditures. All sub-phases are complete except for Outfall 023 Structural Improvements which is scheduled to commence in FY24. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $4,939 | $4,939 | $0 | Dec-25 | Dec-25 | None | $0 | $0 | $0 |

**Explanation of Changes**

- N/A.

**CEB Impacts**

- None identified at this time.

# S. 141 Wastewater Process Optimization

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To optimize wastewater system operating procedures and make system improvements and modifications to ensure maximum wastewater treatment, minimum operating and maintenance costs, and extension of the useful life of system assets.*

**Project History and Background**

This project was established to support MWRA Business Plan strategies, which recommend the development of a wastewater process optimization plan, central monitoring facilities for the sewerage system, rehabilitation of wastewater interceptors, and the utilization of automation and new technology to increase efficiency.

The completed planning phase included the development of an updated hydrologic and hydraulic model (InfoWorks CS) and the evaluation of optimization alternatives under typical and extreme storm events. MWRA has evaluated several of the alternatives and has been using hydraulic information gained during this phase to develop facility control logic under the Wastewater Transport SCADA Implementation Project. Two alternatives, which include pipeline modifications, will be taken further as defined below. The model developed under this project continues to be used by MWRA staff for in-house system evaluation and NPDES reporting requirements and by outside consultants to support CSO-related and collection system improvement projects.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Planning | Evaluate collection system and facility modification alternatives to maximize wastewater treatment and minimize operating and maintenance costs. | Completed |
| Somerville Sewer | Design and construct a connection between the upstream end of the Somerville Medford Branch Sewer and the North Metropolitan Relief Sewer to reduce surcharge and divert flow away from the Cambridge Branch Sewer and Delauri Pump Station. | Future |
| North System Hydraulic Study | Review the frequency and extent of sanitary sewer overflows (SSOs) in the area tributary to Chelsea Creek Headworks and to evaluate and recommend alternatives to optimize the performance of the collection system and to eliminate or reduce SSOs or relocate them to minimize potential human health risks or environmental impacts. | Completed |
| Siphon Planning | Further evaluate the benefits of constructing a redundant siphon crossing the Mystic River from the Cambridge Branch Sewer to the DeLauri Pump Station to assist in frequency of CSO discharges. A planning level evaluation was performed under the Cambridge Branch Sewer Study completed in December 2017. | Completed |

| | | |
|---|---|---|
| Hydraulic Modeling Engineering Design and Construction | Model impacts of outfall on Mass Bay which is required under the NPDES permit using the Bay Eutrophication Model. Also, phase will be for future implementation of system optimization measures or more significant system modifications which were identified during the North System study. Additional follow-up analysis or project implementation may be done under this phase. | Active/Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $10,327 | $1,502 | $8,825 | $44 | $219 | $702 | 6,546 | $1,577 |

| | | |
|---|---|---|
| Project Status 5/19 | 14.4% | Status as % is approximation based on project budget and expenditures. The Notice-to-Proceed for the North System Hydraulic Study was completed in June 2015. Modeling Massachusetts Bay Water Quality contract Notice to Proceed was issued in May 2019. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $10,306 | $10,327 | $21 | Jun-31 | Jun-31 | None | $0 | $702 | $702 |

**Explanation of Changes**

- Project cost changed due to inflation adjustment for the Somerville Sewer Construction contract.
- Project spending changed due to award of the Massachusetts Bay Eutrophication Model contract.

**CEB Impacts**

- None identified at this time.

# S. 142 Wastewater Metering System – Equipment Replacement Project

**Project Purpose and Benefits**

☑ *Replace Existing Permanent Wastewater Metering System*
☑ *Evaluate and Update Community's Flow Metering Methodologies*
☑ *Continue providing the most accurate and reliable Wastewater metering data for rates*
☑ *Improves system operability and reliability*

*The Wastewater metering system primary purpose has been to quantify wastewater flow from each of the 43 MWRA wastewater member communities for use in the formulation of sewer charges. The existing metering system is 12 years old, it was designed with a life expectancy of 7 to 10 years; it is still running reasonably and MWRA's staff has taken great care to ensure that the accuracy and reliability of meter data is not affected and the metering data is based upon sound engineering and business practices for rate purposes. The project will include planning, design, and Resident Engineering/Inspector (REI) services for the replacement of the wastewater metering system, conduct wastewater flow measurements in unmetered areas and incorporate them in the evaluation of existing community metering methodologies*

**Project History and Background**

The MWRA's permanent wastewater metering system was initially constructed in 1994. The primary purpose has been to quantify wastewater flow from each of the 43 MWRA wastewater member communities for use in the formulation of sewer charges, which includes a flow-based component. Other uses of the data include collection and treatment system analysis and planning, infiltration and inflow quantification in member communities, use in hydraulic models and to a limited extent, operations support.

In 2005 the first wastewater metering system replacement project was completed, the existing MWRA wastewater meters were installed with wireless phone communication and data collection system. Currently the wastewater metering system consist of 212 metering sites located throughout the 43 wastewater member communities, 189 are rate meters and 23 non rate meters. Of the 212 meters, 187 are located inside of sewer manholes and 25 Remote Terminal Units (RTU) are installed inside of MWRA and community facilities. The majority of the meters are installed in gravity sewer lines, owned and operated by the Authority or its member communities. These sewer lines have various pipe shapes, ranging in size from 8 inches to 150 x 138 inches, with manhole depths ranging from 5 feet to over 40 feet deep. The metering sites are located in residential, commercial and industrial areas.

Contract 6739 is comprised of two phases. Phase One includes the evaluation, planning and design of the wastewater metering system of approximately 225 permanent meter sites. Phase Two consists of the metering system replacement installation which includes Resident Engineering and Resident Inspection Services to oversee meter equipment installation and acceptance.

Under Phase One of this project, the flows from all unmetered areas will be updated, using temporary meters, weirs and instantaneous depth of flow and velocity measurements, to account for any changes in flow from those areas over time. The metered areas and meter locations will be evaluated and recommendations to improve the percentage of metered flow above the 85% threshold will be considered where is reasonably feasible bearing in mind the benefits of adding meters versus associated capital and operational/maintenance cost. All existing and any proposed new metering sites will be evaluated and for each meter location the most suitable meter type to provide flow data with a high degree of accuracy and reliability will be recommended.

Phase One also includes the evaluation of the most current and emerging wastewater metering, wireless communication, data collection and analysis software technologies, including reviews of similar systems currently

in use elsewhere in the country. The metering system replacement design documents (plans and specifications) for public bidding will be prepared for Contract 7191 and title Permanent Metering System Equipment Purchase and Installation.

Phase Two will include Resident Engineering and Resident Inspection Services to oversee meter equipment installation and acceptance plus the one-year warranty period. The purchase and installation of the meters will be a separate contract overseen by the Phase 2 services.

The wastewater metering system evaluation (including field evaluation and measurement of currently unmetered areas), planning, design and bidding services for purchasing a replacement meter system and equipment is estimated to take 26 months from Notice to Proceed. Phase Two meter installation and acceptance is estimated to take 15 months, followed by a 12-month warranty period.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Planning/Design/REI | Development of a long-term plan to upgrade or replace the existing wastewater metering system (technology, hardware, software, telemetry). Conduct Wastewater flow measurements in unmetered areas, evaluate and update Community Flow Formulas (CFF). Oversee purchase of metering system and perform REI services during meter installation. | Active |
| Equipment Purchase/Installation | Purchase and installation of equipment. | Completed |
| Wastewater Metering Asset Protection/Equipment Purchase | Rehabilitation, replacement and upgrades (planning, design and construction) for the Wastewater Metering System to be required every 10 years over the 40 year planning period. Includes meter purchases and installation. Also, under this phase the Authority will purchase and replace 182 Telog RU-35 data loggers with pre-installed 4-G LTE compatible wireless modems, 4G antennas and interface cables. | Future |
| Meter Power Install REI and Construction | The project objective is to be able to obtain continuous data at key metering sites (major system legs, potential SSO locations, etc.) within the Wastewater collection system to monitor the system conditions, optimize conveyance, and make real time operational decision during wet weather conditions. Approximately 30 metering sites were selected to support this objective. Given improved battery technology and anticipated cost to provide utility power to these sites, further analysis is being performed in-house prior to moving into Construction phase. | Active |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $22,628 | $5,724 | $16,904 | $1,455 | $2,577 | $7,662 | $0 | $9,242 |

| | | |
|---|---|---|
| Project Status 5/19 | 29.5% | Status as % is approximation on project budget and expenditures. The purchase and installation of 2nd generation of meters is complete. Planning/Design/REI contract was awarded in June 2017. Metering Equipment Purchases and Installation is expected to commence in FY20 Quarter 3. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $28,733 | $22,628 | ($6,105) | Dec-30 | Dec-30 | None | $13,679 | $7,662 | ($6,017) |

**Explanation of Changes**

- Project cost changed due to updated cost estimate reflecting a reduction of scope for Meter Construction, Meter Design work deleted since work will be performed in-house or with a technical assistance contract, and Meter Modems/Antenna Replacements deleted since work will be done in the Current Expense Budget.

- Project spending changed primarily due to updated cost estimates and deleted contracts listed above.

**CEB Impacts**

- Potential cost savings associated with this project have yet to be be quantified.

# S. 145 Interception and Pumping Facility Asset Protection

**Project Purpose and Benefits**

☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To protect the investment of MWRA ratepayers by ensuring timely replacement of equipment and systems.*

**Project History and Background**

This project was developed to ensure that MWRA maintains ongoing service while optimizing operations in its wastewater facilities. This project, in its current form, addresses immediate critical facility and equipment issues. This project will eventually include five areas:

1. Equipment replacement (pumps, HVAC equipment, blowers, etc.).
2. Architectural projects (concrete corrosion, etc.).
3. Utilities projects (water, sewer, drainage, electrical wiring, heating system, etc.).
4. Support Projects (process control system upgrades, etc.).
5. Specialty Projects (instrumentation upgrades, fuel storage tanks, etc.).

The Interception and Pumping Asset Protection project will be ongoing throughout the useful life of the facilities.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Rehabilitation of Section 93A Lexington | Rehabilitation of 4,000 linear feet of pipeline in Lexington (Section 93A). Completed in April 2004. | Completed |
| Sections 80 and 83 | Evaluation of the condition of Sections 80 and 83 and design and construct repairs to damaged portions. TV inspection revealed numerous cracks and holes, which impair the structural integrity of the pipe. Contract completed in September 2007. | Completed |
| Section 160 | Rehabilitation of 11,000 linear feet of Section 160 of the Mystic Valley Sewer in Winchester due to extensive deterioration of the brick and concrete sewer. Rehabilitation of sewer completed. | Completed |
| 93A Force Main Replacement | Replacement of 1,100 feet of 24-inch ductile iron force main due to extensive corrosion from hydrogen sulfide. Contract was substantially complete in January 2007. | Completed |
| Mill Brook Valley Sewer Sections 79 & 92 | Rehabilitation of a portion of Section 79 pipeline in Arlington. Under MOU trust agreement, MWRA to absorb 50% of total cost of rehabilitation. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Prison Point HVAC Upgrades, Design & Construction | The HVAC system improvements are complete and included the replacement of components for the HVAC system as well as the ductwork, air handling equipment, dampers, louvers, and odor control were in need of upgrade. The conversion of the control system for the HVAC to electronic digital control was completed in FY05/FY06 under the CEB. The diesel engine fuel system modifications at this facility were completed under the SCADA contract and included the fuel oil delivery feed to the system boiler. | Completed |
| Chelsea Screenhouse Upgrades and ESDC/REI | The Chelsea Screenhouse has four climber screens and seven hydraulic gates and was built to screen sewerage upstream of the Chelsea Creek Siphons and Caruso Pump Station, and to provide screening of flows diverted from the Chelsea Creek Headworks during wet weather events. Most of the operating equipment has passed its useful lifespan. A preliminary evaluation of the gates in 2007 identified maintenance and operational issues. In November 2011, a conceptual design report for the facility was performed within the Remote Headworks Upgrades Design contract, with recommendations for replacements and upgrades to equipment at the facility. A task order, under the As-Needed Technical Assistance contract, was executed in August 2012 to perform final design of the upgrades. ESDC/REI was performed under a separate contract. | Completed |
| Remote Headworks Heating System Upgrades | Existing boilers at each of the remote headworks require significant maintenance and consume substantial fuel. A preliminary design report was completed and alternative energy-saving systems are recommended to replace the existing heating systems. The replacement of the existing heating system at the Chelsea Creek Headworks was completed. The systems at Ward Street and Columbus Park will be replaced under the Remote Headworks Upgrade Project. | Completed |
| Remote Headworks Concept Design | A Concept Design was performed to identify the needs of the three remote headworks facilities to recommend equipment replacement and upgrades for further design and construction. The Concept Design included a Condition Assessment of all equipment and non-equipment assets to establish a basis for improvements and upgrades to meet business goals and objectives. | Completed |
| Hingham Pump Station Isolation Gate Construction | The Hingham Pump Station was built without an influent gate. The station services the Town of Hingham and had no direct means to isolate the flow to this station. Labor intensive and inefficient means using stop logs, sand bags, sewer plugs and pumps were required to isolate and divert flow. This project included the design and installation of a sluice gate in a diversion chamber, to isolate the station and bypass flow allowing maintenance to take place in the station without interruption of service. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Study Cambridge Branch 27,26,25, 25.5, 24,23 | The Cambridge Branch Sewer was completed between 1892 and 1895. The study will evaluate rehabilitation needs, feasibility, and scope. | Completed |
| Melrose Sewer | Design and construct an 18-inch diameter sewer extension of an existing MWRA sewer on Melrose St. to reduce MWRA sewer overflows at the Roosevelt School. The construction contract was awarded in January 2010 and completed in September 2010. | Completed |
| Nut Island Headworks Fire Alarm/Wire Conduit | This project will replace the existing obsolete and problematic fire alarm system and faulty wiring at Nut Island Headworks. There have been significant repair costs over the past several years to keep the system functional and to correct deteriorated connections and ground faults. An engineering task order was used to design upgrades to the system and upgrades and replacements were completed in FY10. | Completed |
| Nut Island Headworks Electrical & Grit/Screenings Conveyance System Design CA/RI & Construction | This subphase includes the design and construction of improvements to the electrical system, which is subject to groundwater infiltration, and to the grit and screenings conveyance system which have alignment and operations problems, at the Nut Island Headworks. Based on final preliminary design reports completed in July and August 2011, recommendations were made to improve or replace these systems. Design recommendations were included in one construction contract. | Completed |
| Cottage Farm Fuel System Upgrade | Replacement of existing fuel oil system to meet current code requirements, ensure reliable operation, and provide safeguards against accidental oil spills. | Completed |
| Somerville/Marginal Influent Gates and Stop-Log Replacement | The Somerville Marginal facility has two 5'X6' sluice gates that were installed in 1987. These 22-year old gates are used to hold wastewater in the upstream combined sewer system until the level reaches a predetermined elevation, at which point the sluice gates are opened and the facility is activated (chemicals added, screenings removed). The treated CSO is conveyed to the MWRA permitted CSO discharges MWR205 or MWR205A, upstream and downstream of the dam on the Mystic River. During October of 2009, MWRA staff discovered non-continuous, wet weather gate leakage. Repairs to the gates were made and an air barrier was created using stop planks and temporary sump pumps upstream of the gates to minimize gate leakage. However, given the age and frequent problems with these gates and need to create a more permanent and effective barrier between the CSO system and downstream receiving waters, this project was initiated. The project will replace the facility gate, as well as upstream and downstream stop planks and install permanent sump pumps downstream of the gates to create an air void to ensure CSO does not enter the receiving waters until a facility activation is required. Project design was completed under Task Order 20 (contract 7070) and construction was substantially complete in November 2011. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Caruso Pump Station Improvements Design, CA/RI (7037), and Construction (7362) | This project will replace the existing standby generator, HVAC system, fire detection/suppression system and security system at the Caruso Pump Station. The standby generator is 25 years old and is a one of a kind of this type of generator. The manufacturer is no longer making spare parts and there is only a limited quantity of available spare parts. The generator is being replaced with a newer model with readily available parts to ensure reliable back-up power and increased to 1,000 kW to provide power for the full design capacity of the station. The HVAC system is in need of improvement as is the fire detection/ suppression system and security system. Construction contract 7362 was awarded with an NTP dated March 24, 2016. Project substantial completion achieved June 9, 2017. | Completed |
| Prison Point/Cottage Farm Facilities Diesel Engine Upgrades/Pump and Gearbox Rebuilds ESDC and Construction | Refurbishment of the Prison Point CSO Gearboxes and pumps based on an inspection report performed in May 2010. It is critical during major wet-weather events to have all four pumps operational to provide maximum station capacity and provide redundancy at this critical CSO facility. Also, MWRA non-emergency generator upgrades required by EPA National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations for Prison Point and Cottage Farm CSO facilities. | Completed |
| Section 156 Design/Build | Rehabilitation of sewer Section 156 and a portion of adjacent Sections 17 and 19, and associated structures/manholes located between Air Force Road and the Malden River in the City of Everett. The sewer is a 120-year old, 61-inch by 56-inch rounded horseshoe brick sewer, which conveys flows of up to 40 million gallons per day from Wakefield, Stoneham, Woburn, Winchester, and parts of Medford. The sewer is 1,800 feet long of which 125 feet was repaired in 2001. The design/build contract, including Cured-in-Place lining was completed. | Completed |
| Design/ESDC/REI and Construction Cambridge Branch 1 Sections 27, 26 | Design and construction of the Rehabilitation of Cambridge Branch Sewer Sections 27 and 26 in Charlestown, Somerville, and Cambridge. | Future |
| Prison Point Piping Rehabilitation | As a recommendation of the Prison Point/Cottage Farm CSO Preliminary Design/Study, this project will repair weak spots, replace pipe saddle supports, and install an erosion/corrosion liner in the discharge piping. | Completed |
| Quincy/Hingham Pump Station Fuel Storage Upgrades Construction | Project to improve diesel fuel storage capacity at Quincy and Hingham pump stations. Hingham's underground tank failed and will be replaced with an above ground tank. Quincy tank storage to be increased from 1 day to 5 days of storage with the addition of an above ground tank. | Completed |
| Design/ESDC/REI and Construction Cambridge Branch 2 Everett Sections 23 and 24 | Design and Construction of the Rehabilitation of Cambridge Branch Sewer Sections 23 and 24 in Everett and Charlestown. Rehabilitation of Sections 25 and 25.5 to be determined. | Future |
| Interceptor Renewal 7 Malden & Melrose Study/Design/CA/REI and Construction | Rehabilitation of Melrose, Malden Sections 41,42,49,54 and 65. | Future |

| Sub-phase | Scope | Status |
|---|---|---|
| Interceptor Renewal No. 6 Chelsea Sections 12/14/15/62 Design CA/REI and Construction | Rehabilitation of portions of Sections 12/14/15/62 in Chelsea. | Future |
| Columbus Park and Ward St. Headworks Upgrades Design/CA and REI and Ward Street Headworks Construction and Columbus Park Headworks Construction | The recommendations from the Remote Headworks Preliminary Design include replacement/upgrades to the screens, grit and screenings collection and conveyance systems, odor control, HVAC, mechanical, plumbing, instrumentation, and electrical systems, as well as antenna towers for the Columbus Park and Ward St. Headworks. | Future |
| Hayes Pump Station Rehab Design, Construction, and REI | Design and construction of upgrades to the Hayes Pumping Station, including mechanical and electrical equipment. | Future |
| **Pump Stations & CSO Facility Rehab Design/CA/REI and Construction** | **Design & construction of upgrades to DeLauri, Hingham, and Hough's Neck Pump Stations & Somerville Marginal CSO Facility. At pump stations and CSO facilities, operability of mechanical equipment and maintenance of electric/standby power systems are key elements to minimize risk of facility failure. Malfunction of mechanical equipment may impact sewer service. Replacement of aging equipment will reduce emergency and corrective maintenance requirements** | **Future** |
| Cottage Farm Rehabilitation Design CA/RI and Construction | The Cottage Farm CSO Facility was constructed in 1971. Cottage Farm Rehabilitation to include updating of facility equipment including pumps, sluice gates, gearboxes for coarse screens, electrical distribution and chemical disinfection systems and repair/replacement of miscellaneous equipment and structures as identified in the 2012 Cottage Farm CSO Planning Report. Improvement/installation of systems as appropriate for energy efficiencies, security, and fire alarm will also be included. Also, remediation of PCB containing paint by removal and encapsulation where appropriate in accordance with the PCB abatement plan for Cottage Farm. | Future |
| System Relief & Contingency Planning Study | This project will investigate what can be done to avoid serious flooding issues. Increased capacity or controlled relief points must be identified in order to address flooding issues that occur during emergency scenarios. Project will be designed to create increased capacity within the collection system in order to decrease SSO discharges. Scope may also include facility specific plans for a failure at MWRA facilities. | Future |
| Fuel Oil Tank Replacements at Various Facilities Construction Phases 1,2, and 3 | Fuel tank replacement at all facilities (water and wastewater) to avoid tank failures. Phase 1 includes two tanks at Gillis Pump Station (one is out of service), one tank at Lexington Street Pumping Station, and one tank at Hayes Pumping Station. For Phase 2, vehicle fuel dispensing systems to be replaced at all vehicle fueling facilities, as well as five tanks. For Phase 3, four tanks will be replaced at four facilities. | Future |
| Interceptor Renewal No. 3 Dorchester Interceptor Sewer Design CA/RI and Construction | Rehabilitation of Dorchester Interceptor Sewer Sections 240, 241, and 242. | Active |

| Sub-phase | Scope | Status |
|---|---|---|
| Interceptor Renewal No. 5 New Neponset Valley Sewer Sections 607/608/609/610 Design/CA/REI and Construction | Rehabilitation of 15,000 linear feet of New Neponset Valley Sewer in Milton. | Future |
| Interceptor Renewal No. 1 Reading Extension & Metropolitan Sewer Design CA/RI (7163) & Construction (7164) | Reading Extension Sewer (Sections 75, 74, and 73), rehabilitation of 12,400 linear feet of 15, 18, 20-inch Vitrified Clay (V.C.) pipe, primarily in Stoneham, with short reaches in Wakefield and Woburn. Approximately 1,400 linear feet of Reading Extension Sewer Section 74 were CIPP lined in the mid 1990's. Also, included is rehabilitation of 2,280 linear feet of 15-inch V.C. pipe of the Metropolitan Sewer Section 46 in Stoneham. Construction contract 7164 was issued a NTP in August 2017. Project substantial completion achieved on December 10, 2018. | Completed |
| Alewife Brook Pump Station Rehabilitation Design CA/RI and Construction | The Alewife Brook Pump Station was built in 1951. The wet weather pumps are original equipment. The rehabilitation includes replacing the three wet weather pumps, motors, and piping, replacing the influent screens and grinders, updating the HVAC system, upgrading the electrical system, remediating PCB-containing paints, and modifying the building interior to meet current building codes, energy efficiency improvements, flood protection measures, and security improvements. | Completed |
| Headworks and DI Shafts Study, Design CA/REI and Construction | At each of the four remote Headworks, Chelsea Creek, Ward Street, Columbus Park and Nut Island, the wastewater is discharged into a vertical shaft connected to a tunnel that conveys the sewage to the Deer Island Treatment Plant. A past inspection of the shaft at Chelsea Creek indicated that the walls of the shaft are severely deteriorated. Failure of a shaft could incapacitate the Headworks facility. There is concern this may cause additional problems at Deer Island. To-date, there have been no reported issues but it is suggested that deterioration of the interior surfaces could be detrimental to pumps or other wastewater equipment. This study will provide a detailed inspection and evaluation of the four headworks shafts as well as the three shafts receiving flow at the DITP. This study's recommendations will be carried forward into the design & construction phase as part of the Remote Headworks Upgrade projects for Ward St. and Columbus Park. Study recommendation for the remaining five (5) shafts will be carried forward under this CIP subphase. | Active |

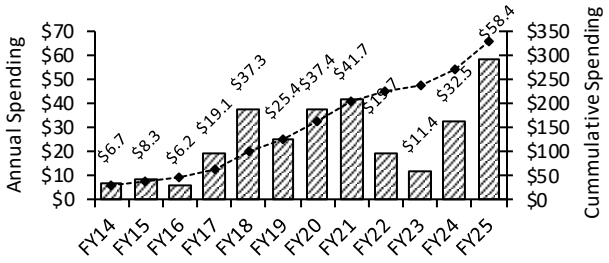
| Sub-phase | Scope | Status |
|---|---|---|
| Remote Headworks Upgrades Design CA/ESDC/REI and Construction | The Remote Headworks Preliminary Design proposed recommendations to upgrade the Chelsea Creek, Columbus Park, and Ward Street Headworks, which will be included in final design and construction documents. The recommendations include replacement/upgrades to the screens, grit and screenings collection and conveyance systems, odor control, HVAC, mechanical, plumbing, instrumentation, PCB removal, and electrical systems, as well as antenna towers. Chelsea Creek Headworks Upgrade construction is ongoing, and will be followed by design and construction contracts for Ward Street and Columbus Park Headworks. Chelsea Creek Headworks REI is being performed under a separate contract. | Active |
| Prison Point Rehabilitation Design/CA/RI and Construction | The Prison Point CSO Facility was constructed in 1981. This rehabilitation will include upgrades to the facility including replacement of diesel pump engines, dry weather screen, wet weather screens, sluice gates, chemical tanks, updating of other facility equipment including electrical distribution and chemical disinfection systems, and repair/replacement of miscellaneous equipment as identified in the 2012 Prison Point CSO Planning Report. Improvement/installation of systems as appropriate for energy efficiencies, security, and fire suppression and alarming systems will also be included. | Active |
| Study and Rehabilitation of Sections 186, 4, 5, and 6 Design CA/RI and Construction | Rehabilitation projects in 1991 and 1997 lined Sections 4,5, and 6 with silica/shotcrete covered with epoxy. Emergency removal of delaminated plastic liner from Section 186 was performed in June 2011. A Preliminary Engineering Report, completed in April 2018, included a manned inspection which identified rehabilitation needs, feasibility, and scope. Scope development for the design of the recommended rehabilitation improvements is on hold pending decision on construction packaging to minimize community impacts. | Active |
| DeLauri Pump Station Screens & Security | This project replaces the existing catenary bar screens and will install security upgrades. Design was developed in-house with the security improvements reviewed by an outside consultant. The security improvements include motion detectors, door switches, small security items in the main building and emergency generator room. This includes work associated with bringing signals underground into underground conduit to run sensor lines for SCADA. The Construction contract was awarded in January 2018. Substantial completion was achieved in February 2019. | Completed |
| Wiggins Terminal Pump Station Replacement Design CA/RI and Construction | The Wiggins Terminal Pump Station services a small seasonal flow from Castle Island and Conley Terminal. The Station is in need of rehabilitation and updating of remote operational control. The facility is located within Conley Terminal and requires MassPort security clearance to access. | Future |

| Sub-phase | Scope | Status |
|---|---|---|
| **Section 191 & 192 Rehabilitation (Charles River Valley Sewer)** | **Section 192 of Charles River Valley Sewer is approximately 4,500-ft in length and is located in the City of Newton. Section 191 of Charles River Valley Sewer, located immediately downstream of Section 192, is approximately 3,738-ft in length. Inspections performed by MWRA found crown cracks in portions of both Sections 192 and 191. Due to these structural deficiencies of both Section 192 and 191, the affected sections require rehabilitation. A cured in place pipe system is being designed by in-house engineering staff to rehabilitation the sewers, which will be constructed under this CIP sub-phase.** | **Future** |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $543,832 | $95,051 | $4478,781 | $25,391 | $37,381 | $135,633 | $265,309 | $46,839 |

## I&P Asset Protection




| | | |
|---|---|---|
| Project Status 5/19 | 21.1% | Status as % is approximation based on project budget and expenditures. Chelsea Creek Headworks Upgrades Construction commenced in November 2016. Quincy/Hingham PS Fuel Storage Upgrades was substantially complete in March 2018. Reading Extension Sewer was substantially complete in December 2018. DeLauri Pump Station Screens and Security Upgrades was substantially complete in February 2019. Alewife Brook Pump Station Rehabilitation was substantially complete in May 2019 |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $472,970 | $542,832 | $69,862 | Sep-29 | Nov-30 | 14 mos. | $123,582 | $135,633 | $12,051 |

**Explanation of Changes**

- Project cost and schedule changed primarily due to new projects for Pump Stations and CSO Facility and Sections 191 and 192 Charles River Valley Sewer Rehabilitation and updated cost estimates for Hayes Pump Station Rehabilitation, Ward Street Headworks Construction, Prison Point Rehabilitation Construction, Interceptor Renewal 7 Malden & Melrose Construction, Sections 4 ,5, 6, 186 Design and Construction, and Wiggins Terminal Pump Station. Also, amendments and change orders for Chelsea Creek Upgrades, award greater than budget for Remote Headworks and Deer Island Shaft Study, as well as inflation adjustments on unawarded contracts.

- Spending change primarily due to new projects, updated cost estimates and change orders and amendments listed above, rescheduled Notice-to-Proceed dates for Sections 4, 5, 6, and 186 Design CA/RI and Construction, Cottage Farm Rehabilitation Design/CA/REI and updated cash flows for Alewife Brook Pump Station Rehabilitation, Interceptor Renewal 1 Reading Extension Sewer, Ward St Headworks Upgrades Construction, and Fuel Oil Tank Construction 3.

**CEB Impacts**

- None identified at this time.

# S. 146 Inspection of Deer Island Cross Harbor Tunnels

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Extends current asset life*
☑ *Results in a net reduction in operating costs*
☑ *Improves system operability and reliability*

***Master Plan Project ☑ 2008 Priority Rating 2 (see Appendix 3)***

To inspect, design, and repair MWRA deep rock tunnels to ensure proper wastewater system operation.

**Project History and Background**

The MWRA sewer system includes three deep rock tunnels that carry wastewater from the headworks to the DITP. The MWRA currently does not have the technology and capability of inspecting deep rock tunnels.

**Scope**

| Sub-phase | Scope | status |
|---|---|---|
| Tunnel Inspection and Condition Assessment | The MWRA sewer system includes three deep rock tunnels that carry wastewater from the headworks to the DITP. The MWRA currently does not have the technology and capability of inspecting deep rock tunnels. This subphase includes inspection and condition assessment. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $5,000 | $0 | $5,000 | $0 | $0 | $0 | $5,000 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 0.0% | Status as % is approximation based on project budget and expenditures. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $5,000 | $5,000 | $0 | Jun-29 | Jun-29 | None | $0 | $0 | $0 |

**Explanation of Changes**

- N/A.

**CEB Impacts**

- None identified at this time.

# S. 147 Randolph Trunk Sewer Relief

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Extends current asset life*
☑ *Results in a net reduction in operating costs*
☑ *Improves system operability and reliability*

***Master Plan Project ☑ 2009 Priority Rating 3 (see Appendix 3)***

*To identify system improvements to reduce sanitary sewer overflows that occur at MWRA's Sewer section 628 and Pearl Street siphon.*

**Project History and Background**

The Randolph Trunk Sewer was constructed in 1958 and consists of three sections: 627, 628 and 628A. Section 628 is a 42-inch diameter reinforced concrete sewer located in Braintree. During extreme wet weather events, Section 628 experiences overflows, particularly at a 50-foot long double-barrel siphon located at Pearl Street next to residential property. A study will be performed to determine the best method of reducing excessive wet weather flows or to provide hydraulic relief to this section of the Randolph Trunk Sewer.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Study | Study to identify system improvements at Sewer Section 628 and Pearl Street Siphon. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $698 | $0 | $698 | $0 | $0 | $698 | $0 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 0.0% | Status as % is approximation based on project budget and expenditures. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $698 | $698 | $0 | Jun-22 | Jun-22 | None | $698 | $698 | $0 |

**Explanation of Changes**

- N/A.

**CEB Impacts**

- None identified at this time.

# S. 206 Deer Island Treatment Plant Asset Protection

***Project Purpose and Benefits***

*☑ Contributes to improved public health*
*☑ Fulfills a regulatory requirement*
*☑ Extends current asset life*
*☑ Improves system operability and reliability*

*To protect the investment of MWRA ratepayers in the Deer Island Treatment Plant by ensuring timely replacement of DI's systems, which contain more than 60,000 pieces of equipment with an approximate value of $1 billion. Based on the Master Plan developed in 2006, most recently updated in 2013, MWRA expects to sequentially replace equipment and structures in the facility as they reach the end of their useful life. Upon completion of the 2018 Master Plan update, additional changes may be incorporated in FY20 for future projects, beyond FY27.*

*Construction of the Deer Island Treatment Plant was one of the largest wastewater projects ever undertaken in the United States. DITP construction was a 12-year, $3.8 billion effort (not including the cost of off-island residuals facilities) started in 1988. MWRA commenced primary treatment in 1995 and secondary treatment in 1997. With the Effluent Outfall Tunnel completion in September 2000, the plant discharges treated effluent 9.5 miles offshore into the Massachusetts Bay through 55 diffusers spaced along the last 1.25 miles of the tunnel.*

**Project History and Background**

At an expansive and complex facility like the Deer Island Treatment Plant (DITP), unanticipated equipment and system failures can cause operational and/or maintenance crises. It is prudent industry practice to take a proactive approach by establishing programs to anticipate when equipment and systems are near the end of their reliable service lives, and then overhaul, upgrade, or replace the equipment, systems, and structures as needed.

DITP staff implemented a "reliability-centered maintenance" (RCM) program to monitor, evaluate, and maintain all of the equipment and major systems within the facility. RCM includes using non-invasive methods of assessing the operational condition of equipment through programs such as vibration monitoring, lubricant and oil testing, thermography, and ultrasonics (audible sound). These programs involve developing a "base line" for equipment when it is relatively new or rehabbed, then comparing future test results to determine if there is a change in the base line which warrants invasive action or other maintenance procedures to mitigate the problems. In addition to RCM, staff follows original equipment manufacturer (OEM) maintenance protocols when appropriate. To assist staff in keeping all of the historic data; storing OEM maintenance instructions; monitoring costs associated with maintaining the equipment; providing work orders as needed, etc. - the maintenance software program MAXIMO was implemented at DITP and other Authority locations.

To augment the DITP maintenance program, contracts are issued to obtain the services of factory-authorized technicians with the expertise to maintain specialized equipment and systems, such as electricity-generating turbines (hydro, wind, steam and combustion-driven), the oxygen generation facility, Thermal Power Plant equipment, etc. Recommendations to add capital projects to the budget also come from staff managing these maintenance programs and service contracts.

The DITP Asset Protection project encompasses the following major functional categories:

1. Equipment Replacement (chains, pumps, motors, control systems, discrete process equipment, etc.).
2. Architectural projects (expansion joint replacements, concrete corrosion, etc.).
3. Utilities projects (water, sewer, drainage, piping, electrical wiring, heating systems, etc.).
4. Support projects (Technical Information Center projects, security projects, etc.).
5. Specialty projects (chemical pipelines and storage tanks, fuels storage tanks, etc.).

**Scope**

| **Sub-phase**<br>*Equipment Replacement:* | **Scope** | **Status** |
|---|---|---|
| Equipment Condition Monitoring | Installed temperature & vibration-monitoring equipment in NMPS and Winthrop Terminal Facility. Complete January 2005. | Completed |
| CEMS Equipment Replacement | Replaced data collection computers, upgraded software, and added PLCs to the Continuous Emissions Monitoring Systems on the two high-pressure Zurn boilers. Complete March 2006. | Completed |
| Pump Packing Replacement | Replace pump packing seals with mechanical seals in the North Main, South System, and Winthrop Terminal pump stations. Purchases completed in FY08, installations completed in FY09. | Completed |
| Cathodic Protection Construction (Designed under Digester & Storage Tank Rehab project) | Construction project to repair DI's cathodic protection system as needed. Design will be done under Digester & Storage Tank Rehab Design in FY20, construction in FY23-25. | Future |
| Digester Chiller Replacement | Replaced the refrigeration-based digester gas chiller with a chilled water system that performs better at low operational loads. Completed in May 2006. | Completed |
| Dystor Tank Membrane Replacement | Emergency replacement of a torn gas membrane on one digester storage tank, and preventive replacement on the second. Completed both by October 2005. | Completed |
| Dystor Membrane Replacements | Periodic replacement of the two gas & sludge storage tank membranes in the digester complex. Replaced both in 2005; expect a 12-15 year life cycle. After a condition assessment in October 2015, the next phase is scheduled for FY21. | Future |
| Digested Sludge Pump Replacement Design & Construction (Phase 1) | The three positive displacement Abel pumps caused pipe vibration and required extensive maintenance. In Phase 1, one centrifugal pump and a flushing pump were installed in 2011, and tested to ensure they worked well before the three remaining pumps were replaced. (See Phase 2, below). | Completed |
| Digested Sludge Pump Replacement (Phase 2) | Sub-phase added in FY14, to complete replacement of the Abel pumps. Centrifugal pumps with higher flow rates were installed to minimize grit settlement in the pipes. Completed July 2017. | Completed |
| Centrifuge Back-drive Replacements | Replaced the centrifuge back-drives, which had become obsolete. Completed March 2015. | Completed |
| Grit & East/West Odor Ctrl Air Handler Unit (AHU) Replacements | Replaced deteriorated air handlers in FY09-16, then every 15 years. Grit AHU replacement completed in June 2010. The E/W Odor Control AHU Replacements are now in the HVAC Equipment Replacement project, below. | Completed |
| Fire Alarm System Replacement – Design & Construction and REI | To replace obsolete fire alarm monitoring & control systems. Design awarded October 2015; replace in FY20-23 and approximately every 20 years thereafter. | Active |
| Bidirectional Radio Repeater System Upgrade 1 and 2 | Install a bidirectional radio amplification system in DITP galleries to ensure emergency radio communications can be sent and received to meet current safety code. Award by purchase order in September 2018 for needed equipment. Phase 2 to begin later in FY20. | Active |

| **Sub-phase**<br>*Equipment Replacement:* | **Scope** | **Status** |
|---|---|---|
| HVAC Equipment Replacement – Design/ESDC, Construction and REI | Replace two obsolete HVAC control systems with one manufacturer's system, reducing replacement parts and improving automation. Design began in FY14; replace in FY20-24 and then every 15 years. Includes central lab fume hoods and East/West Odor Control Air Handler replacements. | Active |
| Centrifuge Replacements – Design & Construction | Replace the sludge centrifuges when they are too worn to repair, or after catastrophic failure. Units have a 25 to 30-year life but were exposed to a lot of grit after start-up in 1996. Begin design in FY24. Centrifuges thicken secondary waste sludge before it goes to the digesters. | Future |
| Cryogenics Plant Equipment Replacement – Design & Construction | Design and construction to replace pumps, valves, motors, sensors, switches, programmable controllers and other obsolete equipment as needed. Replacement of 3 chillers was done in FY16; see below. Remaining plant overhaul work to commence in FY22-27 with future rehab and upgrade work occurring every 15 years. An annual maintenance contract keeps this facility in good operating condition, since it is critical to secondary treatment. | Future |
| Cryogenics Chillers Replacement | Replaced failing air chillers that required frequent maintenance in the oxygen generation plant. Completed in September 2016. | Completed |
| Digester Modules 1 & 2 Pipe Replacement Design & Construction | During digester cleaning in 2007, deterioration of the glass lining was noted. This project was completed by August 2014. Scope included plug valve replacements. A project for additional digester storage tank rehab work was added in FY13; see the DITP Digester & Storage Tank Rehab project under "Specialties". | Completed |
| Butterfly Valve Replacements, North Main Pump Station (NMPS) & Winthrop Terminal Facility (WTF) | There are twenty 60-inch butterfly valves in NMPS and eight 36-inch plug valves in WTF, for isolating the pumps when maintenance is required. One valve in NMPS was replaced; several others began to leak (gaskets and seals were failing). Scope revisions in FY10 added replacement of the magnetic flow meters, replacement of PSL piping and Eight (8) hydraulic actuators for the SSPS pump check valves. Work began in June 2014 and was completed in September 2017. | Completed |
| Gas Protection Systems Replacement | Replace gas detection devices in 13 DITP locations: pump stations (NMPS, SSPS, Winthrop Terminal), odor control (East/West, Residuals, Winthrop Terminal) and process areas (Thermal Power Plant, Digesters, gas handling, primary & secondary galleries, disinfection, Grit Facility, and gravity thickeners). These detectors measure levels of oxygen, hydrogen sulfide, sulfur dioxide, chlorine, and other combustible gases. They are integral to ensuring the health & safety of employees and contractors. Scheduled to begin in FY20 in two phases; reach substantial completion in FY23. | Future |

| **Sub-phase**<br>*Architectural:* | **Scope** | **Status** |
|---|---|---|
| Expansion Joint Repairs | Replace failed expansion joints in the concrete clarifier decks and/or various retaining walls. Phase 1 complete November 2003; phase 2 November 2013, phase 3 is scheduled for FY20-22. | Future |
| Eastern Seawall Design/ESDC/REI & Construction | Design and construction of repairs to the base of the seawall from tidal damage, exposing rebar. Wall condition is assessed annually. Design to begin in FY20, construction scheduled for FY21-23. | Future |
| Roof Replacement Phase 1 | Added in FY10, based on decision to capitalize these costs. Replaced the rubber membrane roof at Winthrop Terminal, the Admin./Warehouse building, the Cryogenics Facility, and the lower roofs on the Digester Modules. Completed March 2010. | Completed |
| DITP Roof Replacements Phase 2 | Added in FY10 to replace roof membranes at the North & South Main Pump Stations; East & West Odor Control; the Grit Facility; and the Centrifuge Thickener building. Completed July 2011. | Completed |
| Personnel Dock Rehabilitation | Rehabilitate the floating docks at Deer Island. To improve the safety, appearance, and reliability of the floating docks. Awarded in FY17, completed in mid-FY18. | Completed |
| Barge Berth and Facility Replacement Design/ESDC and Construction | Major rehabs of the barge berth & pier facilities due to damage and/or normal wear. Added per the Master Plan. Barge berth/facility work in FY23-28, then on a 20-year repeat cycle. | Future |
| Rip-rap Material | Purchased 6,400 tons of rip-rap to reduce and prevent ocean wave soil erosion along the northeast and eastern shoreline at Deer Island. Placement completed by staff in June 2017. | Completed |
| DITP Roof Replacement Phase 3 | New roofing was needed at the Grit Facility, North Main Pump Station, Main Switchgear Building, and the gravity thickeners to protect the equipment in the buildings. Completed in July 2014. | Completed |

| **Sub-phase**<br>*Utilities:* | **Scope** | **Status** |
|---|---|---|
| Outfall Modifications | Inspection of the old outfall tunnels (decommissioned after startup of the new outfall tunnel). Inspection completed in July 2002. | Completed |
| Electrical Equipment Upgrades (EEU) including future cycles from the Master Plan | Replace substation components and bus ducts. Bus duct 2 &22 replacement completed October 2001, and EEU - 2 completed by March 2007. EEU–3 completed by August 2011. EEU-4 completed by June 2016; EEU -5 design is scheduled to start in FY23, and EEU-6 is scheduled to start in FY28. | Future |
| VFD Replacements | Replace obsolete variable frequency drives (VFDs) in the North Main Pump Station (in FY12-16); South System Pump Station in FY07-08, with the next cycle to start in FY20 (South System Pump Station Lube System Replacement was added to the scope in the FY19; Winthrop Terminal Facility (FY16-20); and miscellaneous smaller VFDs throughout the plant (on-going). Future replacements every 12-15 years. | Future |
| Power System Improvement Design & Constr. (Contracts 7061, 7061A, 7061B, 7061C, 7061D) | For modifications to DITP's electrical system as recommended in the consultant report after an FY04 power outage. Design completed in FY09-11. Completing the construction in a series of projects in FY09-14; added 7061C, dump condenser replacement and 7061D for NMPS fuel tank removal in FY11. Two awarded in FY09, two in FY11. The last, 7061A, Thermal Power Plant Fuel System Upgrade was substantially completed by May 2017. | Completed |
| TPP Boiler Control Replacement | Replaced boiler controls in the Thermal Power Plant that were obsolete. Completed by November 2016. | Completed |
| Switchgear Replacements Design/ESDC/REI and Construction including future cycles added per the Master Plan | On-going program to replace obsolete electrical switchgear. Several buildings scheduled for FY20-22, others in FY26-27. Future cycles beyond that time are not currently funded. | Future |
| Transformer Replacements | Approximately 42 electrical substations and 87 transformers have been in service since DITP start-up. Sub-phase eliminated in FY14; replacements are now done in Electrical Equipment Upgrades. | Completed |
| PICS Replacement including future cycles from the Master Plan | Replace or upgrade the Process Information Control System (PICS) including keypads, consoles, and software when obsolete. Completed in FY16; may need to be repeated every 10-12 years. | Completed |
| PICS Fiber Loop Replacement | Replace the PICS system "backbone", the fiber optic loop. Scheduled for FY23-25. | Future |
| Chemical Tank & Pipe REI and Construction (to include Gravity Thickener Overflow Pipe Replacement) | Strip and reline three of the four Sodium Hypochlorite Tanks and the two Sodium Bisulfite Tanks, which are in fair condition on the outside (shows staining, rusting, and corrosion). If one bisulfite tank fails, there is no longer any back-up. Start in FY19 (tanks have been in service for 24 years; Hypo tanks 1 & 3 were relined in 2007, tanks 2 & 4 in 2008). Added Gravity Thickener overflow pipe replacement to scope in FY19. | Future |
| Chemical Pipe Replacement Design and Construction | Planned periodic replacement of the various chemical pipelines in the odor control and disinfection facilities due to deterioration from corrosion. Scheduled for FY23-25. | Future |

| **Sub-phase**<br>*Utilities:* | **Scope** | **Status** |
|---|---|---|
| Heat Loop Pipe Replacement Construction | Rerouted heat loop piping into galleries to reduce underground corrosion and improve accessibility. Phase 1 complete Dec. 2005, Phase 2 complete February 2008. Phase 3 complete June 2011. Includes periodic valve replacements. Another project phase needs to be added to provide redundancy to the heat loop. | Completed |
| Fuel Pipe Abandonment | Cleaned and cemented the existing fuel pipeline in place instead of removing it. Completed December 2012. | Completed |
| North Main Pump Station Motor Control Center (MCC) Construction | Replaced MCC equipment that had become obsolete and unreliable. Designed by As-Needed Design task order, construction completed in two phases in FY12-13. See Phase 2 below. | Completed |
| Motor Control Center (MCC) and Switchgear Replacement Design ESDC/REI and Construction | Sub-phase pulled from the project above, second phase being done FY17-22. In FY17, the design scope was revised to include replacement of switchgear in the Admin/Lab building. Construction is scheduled for FY20-FY222. | Active |
| Combustion Turbine Generator (CTG) Rebuilds | Rebuilds of the combustion turbines in the Thermal Power Plant. Scheduled for FY24-26 with repeat cycles every 15 years. With the addition of the "Combined Heat & Power" facility, this work may eventually be eliminated. | Future |
| STG System Modifications Design & Construction | Added equipment to the steam turbine generator to increase electricity output by using the current steam production more efficiently. Helps the MWRA meet energy goals set out by executive order. Completed in February 2011. Added Pressure Reducing Valve to maximize electrical generation by July 2014. | Completed |
| DI Digester Flare No. 4 Design and Construction | Install a fourth gas flare to reduce the potential for air permit violations when an existing flare is out of service and/or the boilers have to be taken off-line. Construction scheduled for FY25-26. | Future |
| Hydroturbine Replacements Design and Construction | There are two 1.1 megawatt hydroturbine generators (HTGs) at Deer Island. Electricity is generated using the force of plant effluent as it drops from the disinfection basins into the intake channel beneath each HTG. This facility came on line in July 2001. The HTGs have reached the end of their useful life, and repairs are costly. Begin design in FY21, construction in late FY22. | Future |

| Sub-phase<br>Support: | Scope | Status |
|---|---|---|
| DISC Application | Hardware, software, and contract services to implement a plant-wide computerized database of all plant utility systems. Existing programs deemed sufficient, project removed in FY14. | Completed |
| Document Format Conversion | Convert DITP construction documents into electronic format and develop a document-reference database. Work is in process, and has several phases. Expect completion by the end of FY19. | Active |
| As-Needed Design Phases 5, 6, 7, 8 and 9 | On-going technical design services and/or construction support to supplement existing engineering resources for specialized or complex engineering issues. Initially, two contracts were issued and ran for two years each. For Phase 6, contract length was extended to three years each. Phases 6-1 and 6-2 ended by October 2012, phase 7-1, 7-2, and 7-3 (at $1.6M each, end April 2016). Phases 8-1, 8-2, and 8-3 were awarded in FY16 at $1.6M each, for FY17-FY19. Phase 9 Phases 9-1, 9-2, 9-3 were added in FY20 at $2.8M each. | Active |
| Deer Island As-Needed Technical Design | A placeholder used to continue the technical design services as described above. Each series of new contracts will be deducted from this placeholder. In FY19, cost estimates for each 3-year contract were increased, funding now runs from FY20 to FY29 (previously it was funded through FY26). | Future |

| Sub-phase<br>*Specialties:* | Scope | Status |
|---|---|---|
| Sodium Hypochlorite Tank Liner Removal | Removed the failed lining in tank #1 of the four sodium hypochlorite storage tanks. Completed in September 2006. | Completed |
| Hypochlorite Tanks 1&3 Reline | Renamed the "Sodium Hypo Tank Repair 1" sub-phase. Included stripping, repairs and relining tank 3. Completed November 2007. | Completed |
| Hypochlorite Tanks 2 & 4 Reline | Strip & reline the two remaining sodium hypochlorite storage tanks. Scope included removing ladders and replacing safety railings on the tanks. Completed in October 2008. | Completed |
| Sodium Hypochlorite and Bisulfite Tanks Replacement | Based on condition, expect to start replacing one tank per year beginning in FY23. | Future |
| Primary & Secondary Clarifier Rehab – Design (ESDC/REI) | ESDC/REI Services during the Primary & Secondary Clarifier Rehab Constr., below (design by As-Needed Design consultant). Included secondary clarifiers due to deterioration in the longitudinal chains and scum collection systems. Completed September 2013. | Completed |
| Primary & Secondary Clarifier Rehab Construction | Replace longitudinal & cross collector chains and sprockets, chain drives, wear shoes; modify tip tubes, replace hose bibs; repair wall expansion joints, add more drop boxes, etc. Added secondary clarifier work in FY09, specified a higher-grade stainless steel which increased the cost by $30M. Separated out the gravity thickener scope due to the need for separate, distinct schedules. Project awarded at $59.4M; completed February 2012. | Completed |

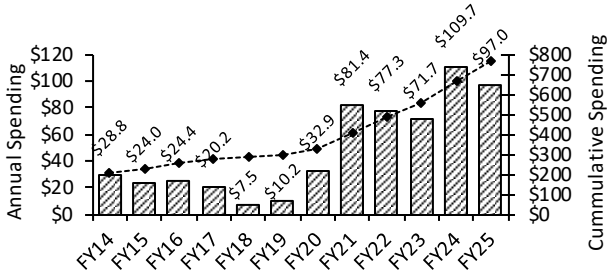
| **Sub-phase**<br>*Specialties:* | **Scope** | **Status** |
|---|---|---|
| Gravity Thickener Rehabilitation - Design | Designing gravity thickener improvements, as discussed further below. Project staff determined that a separate design phase is not needed, dropped this subphase in FY14. | Completed |
| Gravity Thickener Improvements - Construction | This subphase was eliminated in FY08, and the scope was included with the Primary Clarifier Rehab work above. Made a stand-alone project again in FY09. The first phase (6966) involved replacing failed fiberglass covers in FY10-12. 6966A, B, and C were added for emergency repairs to center columns in three tanks in FY11. Project completed in June 2012. | Completed |
| Gravity Thickener Rehabilitation | Sub-phase pulled from the project above. This phase involves installing catwalks around the perimeter of several tanks, removing concrete blocks in the effluent channels, and modifying the sludge thickener roofing to improve staff access and the operating efficiency. Awarded in FY18. | Active |
| Gravity Thickener Center Column Replacement | Complete replacement of the center columns in all 4 tanks with a higher grade steel, due to the failures experienced in FY11. Contract awarded in FY13, completed by January 2014. | Completed |
| Odor Control Rehabilitation Design/ESDC, Construction and REI | Dropped the Preliminary Design phase and added ESDC/REI to the scope in FY11. The project involves modifications to the plant-wide odor control systems, including the digester gas systems and wet scrubber improvements. Design begins in FY21, construction currently scheduled for FY25-28. | Future |
| Clarifier W3H Flushing System | Replaced deteriorated water flushing lines in the clarifier batteries, completed July 2013. | Completed |
| Clarifier Rehabilitation Phase 2 Design/ESDC, REI and Construction | Project to correct deficiencies noted during the first Primary & Secondary Clarifier project. Influent gates not sealing off tanks adequately; effluent launders and aeration systems need repair; and concrete corrosion in primary clarifiers above the water line needs repair and coating to prevent future corrosion. The sludge removal system in primary tanks and aeration/recirculation systems in secondary tanks need to be rehabilitated as well. Design/ESDC contract began in FY15, and construction is currently scheduled for FY20-24. | Active |
| Scum Skimmer (Clarifier Tip Tube) Replacement | Scum tip tubes not working properly results in scum build-up in clarifiers that has to be manually collected and transported to the gravity thickeners. Secondary tip tubes replacement was added to the scope, greatly increasing the cost. Done Oct-13 to Oct-16. | Completed |
| Digester and Storage Tank Design/ESDC/REI and Rehabilitation Phase 2 | The DITP residuals facility includes twelve digesters and two gas handling/sludge storage tanks. During Digester Mods Pipe Replacement (7055), it was noted that additional digester work was needed. Issues with plugged digester recirculation pipes, mixer failures, and overflow box deterioration resulted in increasing the scope needed to correct all deficiencies. Some steel plates in the digesters may also need repair or replacement, and the interior of the digesters needs to be coated. Begin design in FY21, construction and REI scheduled for FY23 to FY26. | Future |

| Sub-phase<br>*Specialties:* | Scope | Status |
|---|---|---|
| Combined Heat & Power (CHP) Study, Design and Construction | A system review was done to determine possible options for optimizing the use of methane gas produced from the existing sludge processing system. One option is to construct a CHP facility containing more efficient gas-fired turbines to increase electrical self-generation, and ensure beneficial re-use of all methane gas in the summer while still meeting all plant heat requirements. The CHP facility would be designed to handle the increased methane gas produced by co-digestion, if that project becomes feasible. Depending on the CHP facility design, portions of the 17-year old Thermal Power Plant will be modified or eliminated. A detailed energy alternatives project is began in FY19, followed by design in FY21 and construction in FY24. | Active |
| Co-Digestion Design/ESDC/REI and Construction | Co-digestion construction is for the addition of piping and a receiving tank for the liquid food waste to be delivered to Deer Island. Food waste would be barged to the plant, pumped into the receiving tank, and from there pumped into the digesters. Since this option is not currently economically feasible, the schedule has been pushed out to FY24-25. | Future |
| Co-Digestion Temporary Facility | Moved from the Residuals CIP to DITP in FY16. The budget was reduced to actual costs incurred since this project is not likely to be continued. | Completed |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $993,149 | $252,359 | $740,789 | $10,161 | $32,874 | $273,449 | $418,081 | $49,259 |

**DI Asset Protection**



| | | |
|---|---|---|
| Project Status 5/19 | 26.1% | Status as % is approximation based on project budget and expenditures. Several previously completed phases for this project are included in the Completed Project list. Additional contracts recently completed include: Thermal Plant Fuel System Modifications; Digester Sludge Pump Phase 2; Butterfly and Plug Valve Replacements in NMPS and Winthrop Terminal; and Personnel Dock Rehab. Contracts in process include the following: As-Needed Design Phase 8-1, 8-2, and 8-3; NMPS and WTF Valve & Piping Replacement REI/ESDC, Clarifier Phase 2 Design, HVAC Equipment Replacement Design, Fire Alarm System Replacement Design, DITP MCC & Switchgear Replacement Design, Bidirectional Radio Repeater Upgrade, Gravity Thickener Rehabilitation, Winthrop Terminal Facility VFD Replacement, and CHP Alternatives Analysis. Contracts scheduled to begin in FY20 are: Clarifier Rehabilitation Phase 2 Construction & REI; HVAC Equipment Replacement Construction; Eastern Seawall Design, Gas Protection System Replacement Phase 1, SSPS VFD Replacement Design, Chemical Storage Tanks Relining and Digester Piping. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $956,523 | $993,149 | $36,626 | Jun-48 | Jun-48 | None | $305,312 | $273,449 | ($31,863) |

**Explanation of Changes**

- Project cost change primarily due to updated cost estimates for HVAC Equipment Replacement Construction, Clarifier Rehab Phase 2 Construction, Chemical Tank and Digester Pipe, Fire Alarm Equipment Construction, As-Needed Design contracts, Gas Protection System Replacement Phase 2, Eastern Seawall Design and Construction. Also, inflation adjustments on unawarded contracts.

- Spending change primarily due to updated Notice-to-Proceed and Substantial Completion dates for several contracts including Clarifier Rehab Phase 2 Construction, Fire Alarm System Replacement Construction, South System Pump Station and VFD Replacement Construction. Digester/Storage Tank Rehab Construction, PICS Fiber Loop Replacement, and updated cash flows for Replace Hypochlorite and Bisulfite Tanks, Switchgear Relay Replacement Construction, Hydroturbine Replacement Construction, Winthrop Terminal Facility VFD Replacement Construction, and updated cost estimates listed above.

**CEB Impacts**

- The majority of the projects are required to replace obsolete equipment and systems. Some of the projects are expected to result in decreased maintenance and/or operating costs such as the HVAC equipment replacement. However, the potential benefits from most of the projects are not quantified at this time.

- Benefits of several energy-related projects have been estimated resulting in anticipated annual electrical savings. Some examples include: Winthrop Terminal Facility VFD Replacement ($30,000 in FY21), HVAC Equipment Replacement of $140,000 ($50,000 in FY25 and $90,000 in FY26), Future SSPS VFD Replacements ($120,000 beginning in FY25), and Hydroturbine Replacements ($100,000 in FY27). Any potential impacts of co-digestion and the combined heat and power facility have not yet been quantified or included in the planning estimates due to uncertainty regarding the scope and feasibility of the projects.

- Projects that are expected to reduce maintenance time and other resources are the Gravity Thickener Rehabilitation, Cryogenic Plant Equipment Replacement, Hydroturbine Replacement, and Clarifier Rehabilitation Phase 2.

# S. 210 Clinton Wastewater Treatment Plant

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

**Project History and Background**

The Clinton Wastewater Treatment Plant Rehabilitation was completed in 1992. The plant is generally in good condition. Some equipment rehabilitation and replacement projects were recommended in past CIP cycles. Operability of mechanical equipment and maintenance of electric/standby power systems are key elements to minimizing the risk of component failure. Any malfunction of mechanical equipment may impact wastewater treatment, particularly during large storm events that stress the hydraulic capacity of the facility. Key decision making to minimize risks includes the cost/benefit of when to replace aging equipment and which/how many spare parts to pre-purchase. Other uncertainties include technology upgrades to meet future regulatory requirements.

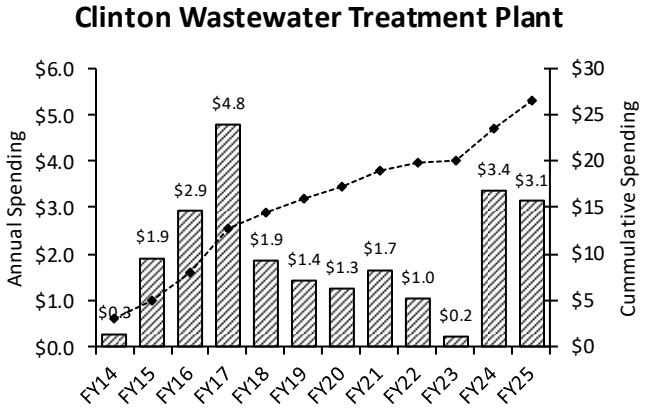
**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Clinton Soda Ash Replacement | The soda ash delivery system needed for pH control in the activated sludge process was replaced. Completed August 2008. | Completed |
| Clinton Permanent Standby Generator | Install a permanent standby generator at the Clinton Wastewater Treatment Plant. Completed November 2007. | Completed |
| Clinton Digester Cleaning & Rehabs (added concrete repairs and Influent Gates) | Clinton's two digesters were 20% filled with compacted grit, limiting their efficiency. The new discharge permit's phosphorus limits require both digesters to be used at all times. Therefore, the digesters needed to be emptied, cleaned, and rehabilitated. In FY12, the scope expanded to include installation of two 36-inch influent gates to control flow, to prevent flooding and protect plant assets. In FY14, plant-wide concrete repairs were added to the scope because rebar was exposed in walls, walkways and structural support beams across the primary clarifiers. All construction was completed in FY16; the warranty period ended in FY17. | Completed |
| Clinton Aeration Efficiency Improvement (and Auxiliary Pumps) | A study by FS&T recommended replacing mechanical mixers with fine bubble diffusers in three of the six secondary aeration tanks to improve the oxygen transfer and reduce electric costs. In FY12, the scope was expanded to include installation of four submersible auxiliary pumps to increase pumping capacity during high flow conditions. This avoids renting pumps, which was required four times in two prior years. Work completed February 2013. | Completed |
| Phosphorus Reduction Design/ESDC and Construction | The new NPDES permit requires compliance with lower phosphorus limits by April 2019 (18 months after the December 2017 start-up). New process equipment was installed to meet the set limit. Design began in FY14, construction in FY16 (which included adding a natural gas line for building heating, and a new electrical back-up generator) completed December 2017. The warranty extends to March 2019. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Clinton Roofing Rehabilitation | Replace the tar and gravel roofing on the Administration Building, Chemical Building, Headworks, Digester building, and the Dewatering and Maintenance Shop with EPDM rubber in FY19. | Future |
| Clinton Facilities Rehab Design/ESDC/REI and Construction | Rehabilitate or replace the grit removal facilities, two belt filter presses, and close Cell #1 of the landfill. To begin in FY23. | Future |
| NGRID Gas Line | Agreement with NGrid to construct a natural gas pipeline to convert the plant from oil to natural gas heating. Completed FY17. | Completed |
| Valves and Screw Pumps Replacement | There are fifty 4-inch to 8-inch return aerated sludge valves that need replacing, and six 48-inch screw pumps that are 25 years old. Design by As-Needed Consultant. Replace three plant influent screw pumps that are functioning poorly in FY19-FY20. The three intermediate screw pumps and the valves are scheduled to be replaced in FY21- FY23; timing of this work will be reviewed in the FY20 budget cycle. | Future |
| Digester Cover Replacement | The primary digester cover has reached it's useful life and needs to be replaced. Project broken out from the Clinton Facilities Rehab project. | Future |
| **Clinton Storage Facility** | **A new facility to be built for parts storage, (valves, pumps, motors, etc.) receiving freight deliveries, and PVC pipe storage.** | **Future** |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $26,712 | $14,265 | $12,447 | $1,430 | $1,252 | $5,574 | $6,873 | $0 |



| | | |
|---|---|---|
| Project Status 5/19 | 57.4% | Status as % is approximation based on project budget and expenditures. Phosphorus Reduction Construction completed by March 2018; design warranty period runs until March 2019 per Amendment 4. The Clinton Roofing Rehab work notice to proceed was issued in September 2018 and Screw Pumps Replacement Phase 1 will commence in FY20. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $26,364 | $26,712 | $348 | Mar-25 | Jun-25 | 3 mos. | $6,764 | $5,574 | ($1,190) |

**Explanation of Changes**

- Project cost change due to updated cost estimate for Valve and Screw Pumps Replacements, new project for Clinton Storage Facility, change orders for Phosphorus Reduction, partially offset by Clinton Roofing Rehabilitation being awarded less than budgeted.

- Project schedule changed due to updated Screw Pump Replacement Phase 2 Construction schedule.

- Spending changed due to updated schedule for Valve and Screw Pumps Replacements Phase 2 construction, new project and contract award listed above as well as repackaging Clinton Rehabilitation Construction by breaking out Digester Cover Replacements as a separate phase.

**CEB Impacts**

- The projects are required to replace obsolete equipment and systems. The aeration efficiency project resulted in decreased electricity usage at Clinton. The plant influent screw pump replacements, the concrete repair and digester rehab work may result in decreased maintenance and/or operating costs although the potential benefits have not been quantified at this time.

# S. 271 Residuals Asset Protection

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Extends current asset life*
☑ *Results in a net reduction in operating costs*
☑ *Improves system operability and reliability*

***Master Plan Project ☑ 2008 Priority Rating 1 (see Appendix 3)***

*To protect the investment of MWRA ratepayers by ensuring timely replacement of equipment and systems. MWRA expects to replace equipment and structures in the facility as they reach the end of their useful life.*

**Project History and Background**

The Residuals Asset Protection program was created in FY08 as part of the Master Plan. The program consists of the anticipated contracts for maintaining and improving the operations and infrastructure of the biosolids processing plant in the long term. MWRA's Biosolids Processing Facility (aka the "pellet plant") was built in 1991 and expanded in 2001. By 2019, most of the major pieces of processing equipment will be 30 years old. The facility is currently in good condition, but some reinvestment is planned in the FY18-22 timeframe, as discussed in more detail below. For this facility, operability of mechanical equipment and maintenance of electric/standby power systems are key elements to minimizing the risk of component failure. Key decisions to minimize risk hinge on the results from cost/benefit analyses, to determine when to replace equipment. The residuals pelletizing process is also currently energy-intensive; future uncertainties include long-term energy costs and supply.

Under the terms of the contract for operation of the biosolids processing facility, New England Fertilizer Company (NEFCO) was responsible for all facility operation and maintenance including any necessary capital improvements until December 2015. They were obligated to turn the facility back over to the MWRA in an operable condition. The Asset Protection phase is intended to provide a dual-track planning approach addressing: (1) the existing facility capital improvement needs beyond the year 2015, if the Authority continues with pelletization, and (2) the option of assessing alternative technologies prior to the current contract expiration date; which culminated in a decision point in FY15, and was performed as mentioned below.

A comprehensive Residuals Condition Assessment/Reliability Study begun in May 2009 was completed in July 2010. The study found the facility to generally be in good condition with only a few recommendations for improvement. A study to assess the latest technology and regulatory trends planned as a second phase started in FY13 and finished in FY14. The study was intended to narrow the list of viable options for the Authority to consider for long-term implementation. The study examined the feasibility of co-digestion which involves digestion of food wastes and/or fats, oils, and greases (in the digesters at Deer Island Treatment Plant (DITP) and Clinton Wastewater Treatment Plant) to generate additional methane, and determine if there are any changes in the sludge characteristics that may impact the pellet plant. This study also reviewed the adequacy of existing facility components and processes, to provide replacement recommendations based upon the latest existing or alternative technologies. Information developed by these projects will be used by MWRA to produce a prioritized list of recommended design and construction projects that will be scheduled over a 10-year period (FY19-28). Scheduling of upgrade projects will be based on equipment failure risk, construction sequencing to maintain facility operations, and capital expenditure planning.

The Technology and Regulatory Review study provided several major recommendations to the Authority. First, the study found co-digestion to be feasible and potentially beneficial and therefore recommended that the Authority proceeds with projects needed to further evaluate the benefits of that process. As a result, several projects were

added to the DITP CIP to achieve that goal. Throughout 2016, efforts were made to determine the best means to transport food waste to DITP. It was determined that barging food waste was the primary acceptable option, but the collection, transport, and delivery via barge was not economically feasible at this time, so co-digestion is currently on hold until the market becomes more developed and associated costs can be more accurately predicted.

Secondly, it was determined that the Authority should continue with pelletization and pursue a five-year extension to the NEFCO contract. Third, it was recommended that larger sludge dryers be installed for increased pelletization capacity at a lower energy cost per ton of sludge processed (further cost-benefit analysis is needed before proceeding). Funding for this element of the project (and other capital expenditures) were also to be points of negotiation with NEFCO.

After considering these recommendations, Authority staff decided to continue with pelletization and negotiated a five-year extension to the pellet plant operations contract with NEFCO. On March 11, 2015 the Board of Directors approved Amendment 1 to contract S345 with NEFCO, which extends the end date to December 31, 2020 and included a $7 million capital budget funding commitment by the Authority for potential capital projects identified as being necessary over the five- year extension. The projects deemed necessary are being separately bid by the MWRA, and awarded subject to Board approval. This extension will be followed by another long-term competitive procurement. The additional time in this extension allows for a potential increase in competition over the five-year extension; the Authority to better define the operating parameters which may potentially increase competition for the next long-term competitive bid.

For the residuals biosolids processing facility, proposed spending of $180.3 million on eighteen projects was identified in the 40-year master plan timeframe of FY07 through FY48. The projects identified were merely placeholders in recognition that some capital improvements will likely be required at DITP and/or the pellet plant. Fifteen projects (equaling $148.6M) out of the eighteen were included in the FY08 CIP. The other three (addressing the rehabilitation of the polymer system, building envelope, and thermal oxidizers) have a priority rating of 3, and therefore have not yet been included in the CIP.

In the FY14 Proposed CIP cycle, the conceptual plan for future design and construction projects was modified; the overall project cost estimate was reduced to $103.83 million and fewer sub-phases included funding to cover the potential construction projects, since the plan for the future would not be fully developed until after the technology study mentioned above was completed and the findings evaluated, which has been done.

**Scope**

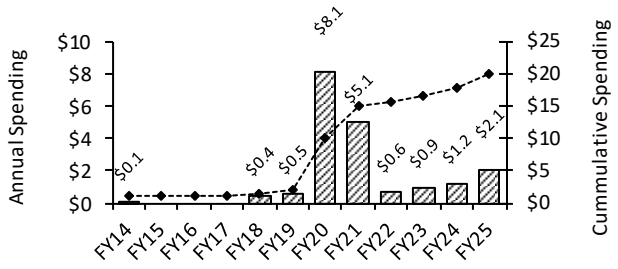
| Sub-phase | Scope | Status |
|---|---|---|
| Condition Assessment/ Reliability Study | Evaluate the condition of the entire facility at the mid-point of the current contract and then assess other residuals processing options and regulatory changes which may provide cost-saving opportunities. First phase work (present condition assessment) began in May 2009 and finished in July 2010. Work on implementing any short-term recommendations from this phase began in FY11. The 2nd phase, Technology & Regulatory review began in FY13 and finished in January 2014; recommendations were as discussed above. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Residuals Plant Facility Plan/EIR | The design and construction of improvements to the plant utilities infrastructure (electric, water, sanitary, and drainage) may be necessary. This CIP project will address issues and/or recommendations identified during the initial study. | Future |
| Residuals Plant Upgrades – Phase 1 Design & Construction (includes initial phases to repaint sludge storage tanks and silos; mechanical and electrical improvements as part of the $7M commitment to NEFCo). Dryer Drum Replacements was added to the scope. | The $7M included in the NEFCo agreement is under Construction Phase 1, as part of the 5-year NEFCo extension. Funding of $10.9M is allocated in the Final FY20 CIP for (repainting the sludge storage tanks and pellet storage silos; mechanical improvements and electrical improvements) as agreed to by MWRA and NEFCo. Dryer Drum Replacements was added to the scope and $3.3M were used from the Residuals Phase 2 Construction Phase. | Active and Future |
| Residuals Phase 2 Design and Construction | For selection of a consultant to design a series of equipment replacements funded at $15M for design/ESDC and $71.7M for various unspecified construction phases. Following approval of the five year extension with NEFCo, phase 2 design work was moved out to begin in FY24; first construction project in FY26. Late in FY18, NEFCo staff informed DITP management that 2 of the 8 dryer drums were no longer functional, and a third drum was nearing the point of failure. NEFCo needs 6 dryer drums to process delivered sludge over a 5-day work week. Failure of a third drum would require adding weekend operations, increasing processing costs. | Future |
| Residuals Pellet Conveyance Piping Relocation | Build a separate support system to relocate the pipes (that convey pellets to the "high silo system") that are currently attached to the wall of a building that the MWRA does not own. This project is now scheduled to start in FY20. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY23 |
|---|---|---|---|---|---|---|---|
| $103,982 | $1,236 | $102,746 | $509 | $8,130 | $15,212 | $31,338 | $56,197 |

**Residuals Asset Protection**




| | | |
|---|---|---|
| Project Status 5/19 | 1.9% | Status as % is approximation based on project budget and expenditures. The Residuals Plant Condition Assessment/Reliability Study was completed in July 2010. The Technology & Regulatory Review contract was completed in January 2014. Residuals Sludge Tank and Silo Coating was completed in September 2018. The Mechanical Improvements/Electrical/Drum Dryer Replacement contract began in June 2019. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $103,832 | $103,982 | $150 | Jun-48 | Jun-48 | None | $11,487 | $15,212 | $3,725 |

**Explanation of Changes**

- Project cost changed due to updated cost estimate for Pellet Pipe Relocation.
- Spending changed primarily due to consolidating Mechanical/Electrical/Drum Dryer Replacement into one contract with updated cost estimate and schedule.

**CEB Impacts**

- The majority of the projects are required to replace obsolete equipment and systems. Some of the projects are may result in decreased maintenance and/or operating costs, however the potential benefits are not quantified at this time.

# Introduction to Combined Sewer Overflow (CSO) Program

In 1987, MWRA entered a stipulation in the Federal District Court Order in the Boston Harbor Case ("First Stipulation") by which it accepted responsibility for developing and implementing a long-term CSO control plan for all combined sewer overflows hydraulically connected to MWRA's system, including the outfalls owned and operated by the communities of Boston (BWSC), Cambridge, Chelsea and Somerville (the "CSO communities"). In response to the First Stipulation, MWRA conducted site-specific and watershed based planning both to meet short-term CSO control requirements pursuant to federal regulations, including EPA Nine Minimum Controls ("NMC"), and to develop a long-term control plan to bring Boston area CSOs into compliance with the Federal Clean Water Act and Massachusetts Surface Water Quality Standards. MWRA developed these plans in conformance with federal and state CSO policies and associated guidance documents, which evolved during MWRA's nearly 20-year planning period, to 2006.

EPA's National CSO Policy (April 1994) requires CSO permitees to develop and implement a set of system optimization measures and reporting procedures intended to quantify and minimize CSO discharges in the short term, in part using detailed system characterization, easily implemented and less expensive system improvements and optimized operations and maintenance. In compliance with the policy, MWRA submitted its NMC compliance documentation by January 1, 1997, as required. While most of the reported compliance measures involve operations, maintenance and regulatory functions of MWRA that are funded through the Current Expense Budget, system characterization and hydraulic optimization measures described below were funded through the CIP.

The National Policy also requires permitees to develop and implement a long-term control plan in accordance with the provisions of the policy. In the CIP, MWRA undertook two major planning efforts: one in the period 1986 through 1990, which produced the 1990 CSO Facilities Plan primarily in accordance with the EPA CSO Strategy of 1989, and a second and final planning effort in 1992-1997, which produced a revised long-term plan for CSO control that MWRA recommended in July 1997. With subsequent modifications to the plan, MWRA attained full regulatory and court approval of the revised control plan in April 2006.

MWRA's CSO planning efforts were primarily conducted under the System Master Planning phase of the CIP and produced the following components of a broad plan to control CSO discharges and meet water quality standards:

- Through extensive inspections, system monitoring and modeling, MWRA developed a detailed, field-calibrated assessment of its planned collection and treatment system performance in advance of developing a long-term CSO control plan. The performance assessment incorporated major capital investments in the sewer system already underway or planned by MWRA, including upgrades to the transport system, pumping stations, headworks and Deer Island Treatment Plant. Together with MWRA's and the CSO communities' efforts in the late 1980's and the 1990's to operate and maintain their respective systems more efficiently, these improvements were shown to effectively maximize the system's capacity to control wet weather flows and markedly reduce CSO discharges system-wide. In the period 1988 through 1992, total annual CSO discharge predicted for the Typical Year Rainfall dropped from 3.3 billion gallons to 1.5 billion gallons, with approximately 51% of the remaining discharge treated at five MWRA CSO screening and disinfection facilities. The Charles River especially benefited from these improvements.

- In 1993-1994, MWRA presented a System Optimization Plan ("SOP"), which recommended approximately 160 low cost, easily implemented system modifications to maximize wet weather storage and conveyance. The SOP projects, which were fully implemented by MWRA and the CSO communities by 1997, further reduced CSO discharge by about 20 percent.

- MWRA recommended an extensive set of larger projects covering a range of control technologies to achieve long-term, site-specific CSO control goals using watershed-based assessments of receiving water impacts and uses. MWRA presented a conceptual plan of these improvements in 1994 and refined the recommendations in a facilities plan and environmental impact report it issued in 1997. The long-term plan received initial federal and state approvals in early 1998, allowing MWRA to move the projects into design and construction.

- As MWRA proceeded with implementation of the projects, it evaluated and recommended several adjustments and additions to the long-term plan in the period 1998 through 2006. These adjustments and additions

responded to regulatory inquiries seeking higher levels of control (Charles River) or to new information that raised concerns about construction requirements, cost or CSO control performance (North Dorchester Bay, Reserved Channel, East Boston, and Alewife Brook). A final, comprehensive long-term control plan was approved by EPA and DEP in March 2006 and accepted by the Federal Court in April 2006. This plan and its predicted level of CSO control for each outfall was formally amended in May 2008 to revise the long-term CSO discharges at the Prison Point Facility, based on hydraulic optimization MWRA incorporated into the operations of the facility pursuant to milestones in Schedule Seven. MWRA predicts that the long-term plan, scheduled to be completed in December 2015, will reduce total annual CSO discharge for the Typical Year Rainfall to 0.4 million gallons (an 88% reduction from the 1988 level), with 93% of the remaining discharge to be treated at four MWRA screening and disinfection/dechlorination facilities.

On April 27, 2006, Federal District Judge Richard G. Stearns approved a joint motion of the U.S. Department of Justice (DOJ), EPA, and MWRA that provides a comprehensive resolution of outstanding issues related to MWRA's CSO program. Under the approved motion, MWRA entered a Second CSO Stipulation by which it agreed to implement its previously recommended plans for Alewife Brook/Upper Mystic River and East Boston and to undertake additional work to further reduce CSO discharges to the Charles River from its Cottage Farm CSO Facility. The Cottage Farm facility had been the subject of discussions between EPA and MWRA and related investigations by MWRA since MWRA first issued its long-term control plan in 1997. The additional Charles River work is predicted to reduce CSO discharges from Cottage Farm to 2 activations and 6.3 million gallons in the Typical Year, from the previous goal of 6 activations and 23.6 million gallons. The scope, milestones and performance goals of other CSO projects remain unchanged.

The Federal Court ordered schedule had also contained three unmet milestones related to completion of the CSO control plans for Alewife Brook/Upper Mystic River, East Boston, and region-wide floatables control and outfall closings. The accepted joint motion and the revised court schedule ("Schedule Seven") that was created from it adjusted several previous project milestones and added milestones for the revised Charles River CSO control plan.

In exchange for MWRA agreeing to implement its revised long-term control plan, DEP agreed to issue a series of five (5), up to three-year extensions to the water quality variances for the Lower Charles River Basin and the Alewife Brook/Upper Mystic River through 2020. As they relate to MWRA, the terms and conditions of the variance extensions would be limited to the requirements of the Court Order (i.e. MWRA's responsibility is to implement the long-term control plan contained in the revised Schedule Seven). The most recent variance extensions were issued by DEP on August 31, 2016 for Alewife Brook/Upper Mystic River and for Lower Charles River Basin. These extensions are in effect through August 31, 2019. Pursuant to an agreement reached by MWRA, DEP and EPA in the spring of 2019, MWRA will perform water quality modeling of Alewife Brook/Upper Mystic River and Lower Charles River Basin as part of its CSO performance assessment, and DEP will issue 5-year variances for these water bodies, effective through August 31, 2024.

The Second CSO Stipulation (2006) replaces the stipulation entered in 1987 that established MWRA's responsibility to develop and implement a region-wide CSO long-term control plan. The Second CSO Stipulation states that once MWRA has implemented the recommended plan and demonstrated that it meets the specified goals for activation frequency and discharge volumes, each CSO community will be solely responsible for level of control and other regulatory requirements at the CSO outfalls it owns and operates in accordance with its NPDES discharge permit. These important conditions in the Second Stipulation provide much greater certainty to the MWRA and its ratepayers relative to the scope and cost of the CSO program through 2020. The elements of the final long-term CSO control plan and its numerical CSO discharge goals for each receiving water segment are presented in Table 1 on the following page.

The CSO project schedules in Schedule Seven are aggressive and reflect project-specific design, permitting and construction requirements. Cost risks include unforeseen subsurface conditions, utility conflicts and the need to manage traffic and community impacts in densely populated neighborhoods. MWRA entered into memoranda of understanding (MOU) and financial assistance agreements (FAA) with BWSC, City of Cambridge and Town of Brookline, by which each community implemented one or more of the 35 CSO projects and MWRA funded eligible engineering, construction and force account costs. The BWSC MOU/FAA (9 projects) ended on June 30, 2017. MWRA and BWSC entered into a new four-year financial assistance agreement for Dorchester Interceptor Inflow Removal (formerly part of the South Dorchester Bay sewer separation project) effective July 1, 2017. The Town of

Brookline MOU/FAA (1 project) ended on July 31, 2014, and the City of Cambridge MOU/FAA (5 projects) ended on June 30, 2018.

**Table 1: Approved CSO Control Plan and Capital Cost by Receiving Water Segment**

| Receiving Water | CSO Discharge Goals (Typical Year Rainfall) | | Projects* | Capital Cost* ($ millions) |
|---|---|---|---|---|
| | Activations | Volume (million gallons) | | |
| Alewife Brook/Upper Mystic River | 7 untreated<br>and 3 treated @ Somerville Marginal | 7.3<br>3.5 | • Cambridge/Alewife Sewer Separation<br>• MWR003 Gate and Rindge Siphon Relief<br>• Interceptor Connections/Floatables<br>• Connection/Floatables at Outfall SOM01A<br>• Somerville Baffle Manhole Separation<br>• Cambridge Floatables Control (portion) | 110.0 |
| Mystic River/Chelsea Creek Confluence and Chelsea Creek | 4 untreated<br>and 39 treated @ Somerville Marginal | 1.1<br>57.1 | • Somerville Marginal CSO Facility Upgrade<br>• Hydraulic Relief at BOS017<br>• BOS019 Storage Conduit<br>• Chelsea Trunk Sewer Replacement<br>• Chelsea Branch Sewer Relief<br>• CHE008 Outfall Repairs<br>• East Boston Branch Sewer Relief (portion) | 92.0 |
| Charles River (including Stony Brook and Back Bay Fens) | 3 untreated<br>and 2 treated @ Cottage Farm | 6.8<br>6.3 | • Cottage Farm CSO Facility Upgrade<br>• Stony Brook Sewer Separation<br>• Hydraulic Relief at CAM005<br>• Cottage Farm Brookline Connection and Inflow Controls<br>• Brookline Sewer Separation<br>• Bulfinch Triangle Sewer Separation<br>• MWRA Outfall Closings and Floatables Control<br>• Cambridge Floatables Control (portion) | 88.9 |
| Inner Harbor | 6 untreated<br>and 17 treated @ Prison Point | 9.1<br>243.0 | • Prison Point CSO Facility Upgrade<br>• Prison Point Optimization<br>• East Boston Branch Sewer Relief (portion) | 47.5 |
| Fort Point Channel | 3 untreated<br>and 17 treated @ Union Park | 2.5<br>71.4 | • Union Park Treatment Facility<br>• BOS072-073 Sewer Separation and System Optimization<br>• BWSC Floatables Control<br>• Lower Dorchester Brook Sewer Modifications | 62.0 |
| Constitution Beach | Eliminate | | • Constitution Beach Sewer Separation | 3.7 |
| North Dorchester Bay | Eliminate | | • N. Dorchester Bay Storage Tunnel and Related Facilities<br>• Pleasure Bay Storm Drain Improvements<br>• Morrissey Blvd Storm Drain | 253.7 |
| Reserved Channel | 3 untreated | 1.5 | • Reserved Channel Sewer Separation | 70.5 |
| South Dorchester Bay | Eliminate | | • Fox Point CSO Facility Upgrade (interim improvement)<br>• Commercial Pt. CSO Facility Upgrade (interim improvement)<br>• South Dorchester Bay Sewer Separation | 126.6 |
| Neponset River | Eliminate | | • Neponset River Sewer Separation | 2.4 |
| Regional | | | • Planning, Technical Support and Land Acquisition | 53.8 |
| **TOTAL**<br>**Treated** | | **410**<br>**381** | | **911.1** |

*Floatables controls are recommended at remaining outfalls and are included in the listed projects and capital budgets.

MWRA commenced implementation of the long-term CSO control plan in 1996. Project schedules, which reflect compliance with Federal Court milestones, are presented in Table 2 on the following page. By December 2015, MWRA and the CSO communities had completed all of the 35 projects in the plan. The completed CSO projects,

together with earlier improvements to MWRA's wastewater conveyance and treatment systems, including the upgraded Deer Island Treatment Plant and associated pump stations, are predicted and intended to reduce the total annual volume of CSO discharge in MWRA's federal and state regulatory-approved Typical Rainfall Year from 3.3 billion gallons in 1988 to 0.4 billion gallons, an 88% reduction, with 93% of the remaining overflow receiving treatment at MWRA's four long-term CSO facilities.

**Table 2: CSO Control Plan Project Schedules**

| Project | | Commence Design | Commence Construction | Complete Construction |
|---|---|---|---|---|
| North Dorchester Bay Storage Tunnel and Related Facilities | | Aug 97 | Aug 07 | May 11 |
| Pleasure Bay Storm Drain Improvements | | Sep 04 | Sep 05 | Mar 06 |
| Hydraulic Relief Projects | CAM005 Relief | Aug 97 | Jul 99 | May 00 |
| | BOS017 Relief | | Jul 99 | Aug 00 |
| East Boston Branch Sewer Relief | | Mar 00 | Mar 03 | Jul 10 |
| BOS019 CSO Storage Conduit | | Jul 02 | Mar 05 | Mar 07 |
| Chelsea Relief Sewers | Chelsea Trunk Sewer Relief | Jun 97 | Sep 99 | Aug 00 |
| | Chelsea Branch Sewer Relief | | Dec 99 | Jun 01 |
| | CHE008 Outfall Repairs | | Dec 99 | Jun 01 |
| Union Park Detention/Treatment Facility | | Dec 99 | Mar 03 | Apr 07 |
| CSO Facility Upgrades and MWRA Floatables Control | Cottage Farm Upgrade | Jun 96 | Mar 98 | Jan 00 |
| | Prison Point Upgrade | | May 99 | Sep 01 |
| | Commercial Point Upgrade | | Nov 99 | Sep 01 |
| | Fox Point Upgrade | | Nov 99 | Sep 01 |
| | Somerville-Marginal Upgrade | | Nov 99 | Sep 01 |
| | MWRA Floatables Control and Outfall Closings | | Mar 99 | Mar 00 |
| Brookline Connection and Cottage Farm Overflow Interconnection and Gate | | Sep 06 | Jun 08 | Jun 09 |
| Optimization Study of Prison Point CSO Facility | | Mar 06 | Mar 07 | Apr 08 |
| South Dorchester Bay Sewer Separation | | Jun 96 | Apr 99 | Jun 07 |
| Stony Brook Sewer Separation | | Jul 98 | Jul 00 | Sep 06 |
| Neponset River Sewer Separation | | | Apr 96 | Jun 00 |
| Constitution Beach Sewer Separation | | Jan 97 | Apr 99 | Oct 00 |
| Fort Pt Channel Conduit Sewer Separation and System Optimization | | Jul 02 | Mar 05 | Mar 07 |
| Morrissey Boulevard Storm Drain | | Jun 05 | Dec 06 | Jul 09 |
| Reserved Channel Sewer Separation | | Jul 06 | May 09 | Dec 15 |
| Bulfinch Triangle Sewer Separation | | Nov 06 | Sep 08 | Jul 10 |
| Brookline Sewer Separation | | Nov 06 | Nov 08 | Apr 13 |
| Somerville Baffle Manhole Separation | | | Apr 96 | Dec 96 |
| Cambridge/Alewife Brook Sewer Separation | CAM004 Stormwater Outfall and Detention Basin | | Apr 11 | Apr 13 |
| | CAM004 Sewer Separation | Jan 97 | Jul 98/Sep 12 | Dec 15 |
| | CAM400 Manhole Separation | Oct 08 | Jan 10 | Mar 11 |
| | Interceptor Connection Relief/Floatables Control at Outfalls CAM002, CAM401B and CAM001 | Oct 08 | Jan 10 | Oct 10 |
| | MWR003 Gate and Rindge Ave. Siphon Relief | Mar 12 | Aug 14 | Oct 15 |
| | Connection Relief/Floatables Control at SOM01A | Mar 12 | Sep 13 | Dec 13 |
| Region-wide Floatables Control and Outfall Closings | | Sep 96 | Mar 99 | Dec 07 |

MWRA's CSO program includes temporary flow metering and other efforts to collect and evaluate new data to track system performance. The performance of the sewerage system is continuously improving as CSO and non-CSO projects are completed. Updated assessments of the system's hydraulic performance and updated estimates of CSO discharges using actual field data and computer model simulations are essential to verify the predicted benefits of the CSO-related improvements as they are completed, to ensure that the system hydraulic model reflects updated conditions, and to support continuing CSO design efforts and long-term goal tracking.

MWRA's NPDES permit and the variances for the Charles River and Alewife Brook/Upper Mystic River require MWRA to estimate CSO discharges at each permitted outfall for all storm events on an annual basis. This is accomplished by MWRA staff using the InfoWorks collection system model and data from permanent and temporary meters located in the interceptor system, at CSO treatment facilities and at other CSO outfalls. In addition, the Federal Court schedule requires MWRA to conduct a system-wide performance assessment after completing the CSO projects. The court schedule requires MWRA to commence the performance assessment by January 2018 and submit a report on the assessment findings to EPA and DEP by December 2021. MWRA issued the Notice to Proceed with Contract 7572, CSO Post-Construction Monitoring and Performance Assessment on November 8, 2017, ahead of and in compliance with the January 2018 milestone.

Anticipated operating cost impacts of the CSO program are summarized below and will be further developed as part of the planning and design phases for individual projects.

**Program**

The following projects are court mandated, are recommended in MWRA's approved long-term CSO control plan, and are required to meet Massachusetts Surface Water Quality Standards.

| Project | Purpose |
|---|---|
| **MWRA Managed** | |
| North Dorchester Bay & Reserved Channel | Virtually eliminate CSO discharges (25-year storm control) and provide a 5-year storm level of separate stormwater control to minimize beach closings along North Dorchester Bay in South Boston. |
| Hydraulic Relief | Eliminate hydraulic restrictions between local and MWRA systems at two locations, in Boston (Outfall BOS017) and Cambridge (Outfall CAM005) to improve collection and conveyance of wet weather flows, thereby reducing CSO discharges into the Mystic and Charles Rivers, respectively. |
| East Boston Branch Sewer Relief | Increase hydraulic capacity and provide long-term structural integrity to MWRA's East Boston Branch Sewer through the replacement or rehabilitation of the existing sewers. Completion of this project will increase wet weather transport capacity and reduce CSO discharges along the East Boston shoreline, minimizing CSO impacts to the Mystic/Chelsea Confluence, Chelsea Creek and Boston Inner Harbor and facilitating the beneficial uses of these receiving water segments. |
| BOS019 Storage Conduit | Control CSO discharges at Outfall BOS019, which discharges to the Little Mystic Channel in Charlestown, by storing most of the overflows and pumping them back into the interceptor system after storms. |
| Chelsea Trunk Sewer Relief | Control CSO discharges at Outfalls CHE002, CHE003, CHE004, and CHE008, which discharge to the Mystic/Chelsea Confluence and Chelsea Creek, by relieving a local trunk sewer and the MWRA Chelsea Branch Sewer and by repairing Outfall CHE008. The Chelsea Branch Sewer relief project also provides relief to the lower portion of the Revere Extension Sewer to improve service and control surcharging. |
| Union Park Detention Treatment Facility | Reduce the frequency and impacts of CSO discharges from the BWSC Union Park Pumping Station, which discharges into the Fort Point Channel at Outfall BOS070, by providing fine screening, disinfection, dechlorination and a level of detention and solids removal. |

| Project | Purpose |
|---|---|
| Upgrade Existing CSO Facilities and MWRA Floatables Control | Minimize CSO impacts to the Lower Charles River, Upper Inner Harbor, Mystic/Chelsea Confluence and South Dorchester Bay receiving waters by upgrading five MWRA CSO treatment facilities (Fox Point, Commercial Point, Cottage Farm, Prison Point, and Somerville Marginal), and providing floatables control at MWRA CSO outfalls along the Lower Charles River Basin that are not associated with treatment facilities. |
| MWR003 Gate, Rindge Ave. Siphon Relief and SOM01A | Minimize CSO discharges to Alewife Brook as part of MWRA's Alewife Brook CSO control plan and provide sewer system flood control in extreme storms with a control gate at outfall MWR003 and relief of MWRA's Rindge Ave. Siphon. Upgrade local connection capacity and provide floatables control at the City of Somerville's Outfall SOM01A. |
| Charles River CSO Controls | Bring the MWRA's "Brookline Connection" into service and implement Cottage Farm influent gate controls and other facility inflow controls to minimize treated discharges to Lower Charles River Basin at the Cottage Farm facility. |
| **Community Managed** | |
| South Dorchester Bay Sewer Separation (Fox Point) | Eliminate CSO discharges to South Dorchester Bay by separating combined sewer systems in Dorchester. This project allows MWRA to decommission the Fox Point CSO Facility. |
| South Dorchester Bay Sewer Separation (Commercial Point) | Eliminate CSO discharges to South Dorchester Bay by separating combined sewer systems in Dorchester. This project allows MWRA to decommission the Commercial Point CSO Facility. |
| Stony Brook Sewer Separation | Minimize CSO discharges to Stony Brook Conduit and the Back Bay Fens, both of which drain to the Lower Charles River Basin, by separating combined sewer systems in parts of Roxbury and Jamaica Plain. Implementation of this project is intended to reduce the number of overflows to the Stony Brook Conduit from as many as 22 to 2 in the Typical Year and reduce annual CSO discharge volume by 99.7%. |
| Neponset River Sewer Separation | Eliminate CSO discharges to the Neponset River and protect water quality at downstream swimming areas in South Dorchester (primarily Tenean Beach) by separating combined sewer systems in the Neponset section of Dorchester and by permanently closing CSO regulators associated with Outfalls BOS093 and BOS095. |
| Constitution Beach Sewer Separation | Eliminate CSO discharges at the Constitution Beach CSO Facility, allowing decommissioning of the facility, by separating combined sewer systems in parts of East Boston. |
| Cambridge Alewife Brook Sewer Separation | Minimize CSO discharges to Alewife Brook by separating combined sewer systems in parts of Cambridge and upgrading local system connections to MWRA's Alewife interceptors. Close certain outfalls. |
| BWSC Floatables Control | Limit the discharge of floatable materials from five BWSC combined sewer outfalls along Boston Inner Harbor and Fort Point Channel. |
| Cambridge Floatables Control | Limit the discharge of floatable materials from Cambridge CSO outfalls that will remain following completion of MWRA's CSO control plan. |
| Fort Point Channel Sewer Separation | Minimize CSO discharges to Fort Point Channel by separating sewer systems tributary to Outfalls BOS072 and BOS073. Implementation of the recommended sewer separation plan will reduce the number of overflows from these outfalls from as many as 23 to zero in the Typical Year. Also, relocate a CSO regulator and perform limited sewer separation to reduce CSO discharges from the Lower Dorchester Brook Sewer to Fort Point Channel with a MWRA funding cap of $2.03 million to BWSC. |

| Project | Purpose |
|---|---|
| Morrissey Boulevard Drain | Reroute stormwater away from the Outfall BOS087 tributary area and the North Dorchester Bay storage tunnel to Savin Hill Cove in large storms, to increase the level of stormwater control along the South Boston beaches provided by the tunnel. |
| Reserved Channel Sewer Separation | Minimize CSO discharges to Reserved Channel by separating combined sewer systems in a portion of South Boston. Implementation of the recommended sewer separation plan will reduce the number of overflows to Reserved Channel from as many as 37 to 3 in the Typical Year. |
| Brookline Sewer Separation | Separate several areas of Brookline, totaling 72 acres, where there are remaining combined sewers tributary to MWRA's Charles River Valley Sewer. The project is intended to reduce treated CSO discharges to the Lower Charles River Basin at the Cottage Farm Facility. |
| Bulfinch Triangle Sewer Separation | Separate the combined sewers in a 61-acre area of Boston bounded by North Station, Haymarket Station, North Washington St., and Cambridge St. The project is intended to reduce CSO discharges to the Lower Charles River Basin and Upper Inner Harbor, reduce overflows to the Prison Point CSO Facility, and close outfall BOS049. |
| **CSO Support** | |
| CSO Planning and Support | The goals of the CSO Program are to minimize CSO discharges, greatly reduce beach closings following wet weather events, and maximize the beneficial use of CSO receiving waters, in compliance with state water quality standards. This project includes CSO conceptual planning, system master planning, and facilities planning/environmental review that support these goals. It also includes directly related watershed planning activities, development of short-term CSO control measures (known as System Optimization Plans, or SOPs), various as-needed technical support and system performance assessments, including the court-mandated CSO performance assessment in the period 2018-2021, and acquisition of land, easements and construction permits required for CSO project implementation. |

**Expenditure Forecast (in $000s) and Program Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $911,052 | $902,396 | $8,656 | $1,465 | $4,458 | $8,656 | $0 | $0 |

| | | |
|---|---|---|
| Program Status 5/19 | 99.2% | Status as % is approximation based on project budget and expenditures. MWRA and the CSO communities completed the remaining CSO projects in December 2015 in compliance with Schedule Seven. (See individual project status and background information). |

**Changes to Program Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $910,118 | $911,052 | $934 | Dec-15 | Dec-15 | None | $7,711 | $8,656 | $945 |

**Explanation of Changes**

- Project cost and spending changed primarily due to updated costs for CSO Performance Assessment for amendment for receiving water quality modeling for the Lower Charles River and the Alewife Brook/Upper Mystic Rivers, extend temporary overflow metering at thirty six CSO regulators, and purchase flow meters associated with MWRA outfalls.

**CEB Impacts**

- $350,000 for inspection of the North Dorchester Bay Tunnel in FY20 and every five years after.

# S. 341 South Dorchester Bay Sewer Separation (Commercial Point)

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Fulfills a regulatory requirement*

*This project, together with sewer separation at Fox Point, will eliminate CSO discharges to South Dorchester Bay by separating combined sewer systems in Dorchester. The project is court mandated, is in accordance with MWRA's approved long-term CSO control plan, and is required to meet DEP water quality standards.*

**Project History and Background**

This project involves the construction of new storm drains and appurtenant structures, relocation of storm runoff connections from the existing combined sewers to the new storm drains, and rehabilitation of the existing combined sewers for use as sanitary sewers. The plan calls for construction of approximately 65,000 feet of new storm drains. BWSC is implementing the project with MWRA funds.

A contract for design services was executed by Boston Water & Sewer Commission (BWSC) in June 1996, and a preliminary design report was submitted in December 1997. BWSC executed a separate contract for construction management services in December 1998 and commenced construction in April 1999. BWSC completed all of the sewer separation contracts and closed all of the CSO regulators tributary to South Dorchester Bay by June 2007, and MWRA decommissioned the Commercial Point CSO Facility in November 2007. BWSC is conducting flow monitoring and hydraulics model evaluations to verify that sufficient inflow has been removed from the sewer system and the project performance objectives for the sewer system have been achieved. Downspout disconnection and inflow removal are expected to continue through June 2021.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Design | Design services for construction contracts to be bid, awarded, and managed by BWSC. | Completed |
| Construction | Construction of 65,000 feet of new storm drains and appurtenant structures, managed by BWSC. Relocation of storm runoff connections from the existing combined sewers to the new storm drains, rehabilitation of the existing combined sewers for use as sanitary sewers, individual building downspout removal and street paving are also included. | Completed |
| Dorchester Interceptor Inflow Removal Construction | Phase to address Dorchester Interceptor Inflow Removal work. Previously, work was included in Construction phase listed above. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $63,625 | $59,862 | $3,763 | $0 | $1,882 | $3,763 | $0 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 94.1% | Status as % is approximation based on project budget and expenditures. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY19** | **Chge.** |
| $63,619 | $ 63,625 | $6 | Jun-21 | Jun-21 | None | $3,758 | $3,763 | $6 |

**Explanation of Changes**

- Project cost and spending changed to reflect updated cost estimates for final eligible work.

**CEB Impacts**

- No impacts identified at this time.

# S. 346 Cambridge Sewer Separation

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Fulfills a regulatory requirement*

*To minimize CSO discharges to Alewife Brook by separating combined sewer systems in parts of Cambridge and upgrading local connections to MWRA's interceptors. This project is court mandated, is in accordance with MWRA's approved long-term CSO control plan, and is required to meet DEP water quality standards.*

**Project History and Background**

The City of Cambridge is managing the separation work with MWRA funds and oversight. The City of Cambridge executed a contract for design services in January 1997, and completed the first four, early construction contracts in 2002.

As reported to the court in 1999, information gathered by the City of Cambridge during the design phase of this project indicated that the physical configurations of the Cambridge sewer and storm drain systems, including the degree to which these systems are interconnected, was significantly different from conditions shown on the city's base plans and older design plans. Both sets of plans were used by MWRA to develop the conceptual plan for the project. As a result, extensive additional work to separate sewers is required to meet CSO control goals. While construction began in 1998 on schedule, completion of construction has been delayed.

MWRA responded to the significant increase in estimated project costs by instructing Cambridge to suspend remaining final design efforts and award of any construction contracts not yet approved, until MWRA and Cambridge could complete a thorough reassessment of project costs and alternatives. At that time, Cambridge had received approval from MWRA to commence four of the ten proposed construction contracts that comprised the original scope.

Based upon an evaluation conducted by MWRA and Cambridge of alternatives that considered cost, performance, and non-monetary factors, the revised recommended plan for controlling CSO discharges to Alewife Brook, like the original plan, is a partial sewer separation alternative that includes the following components:

- Completion of sewer separation in the CAM004 tributary area (similar to the original CSO control plan, but with expanded scope).
- Separation of common manholes in the CAM400 tributary area (new).
- Relief of dry weather flow connections at CAM002, CAM401B, and SOM01A (new).
- Relief of an existing siphon and installation of a flow control gate at MWR003 (new).
- No further sewer separation in the CAM002 tributary area. (Although this work was included in the original plan and a small, related construction contract was completed by Cambridge in 1999, the revised plan recommends not completing separation in this area.
- No additional CSO control recommended for the recently discovered outfall at CAM401B.
- Floatables control at remaining CSO outfalls.

On May 24, 2000, the Board of Directors approved the revised CSO Control Plan for Alewife Brook. This budget reflects MWRA's estimate of the cost and MWRA's share of the revised plan. The federal court schedule milestone for completion of construction of sewer separation was January 2000. MWRA previously informed the court and court parties that MWRA would be unable to meet this milestone due to the increased scope of the project. In April 2006, the court schedule was amended to incorporate milestones for each of the components of the revised recommended plan.

Cambridge submitted a Second Supplemental Preliminary Design Report (SSPDR) for the final recommended plan as presented in the Final Variance Report for the Alewife Brook/Upper Mystic River. However, Cambridge was unable to move forward with construction of the new stormwater outfall and constructed stormwater wetland of Contract 12 due to delays in obtaining relief from the citizens' appeal of the Superseding Order of Conditions that

was issued by Massachusetts Department of Environmental Protection ("DEP") in March, 2005, pursuant to the Wetlands Protection Act. The stormwater outfall and constructed stormwater wetland are critical early components of the long-term CSO control plan for the Alewife Brook and are necessary to support planned sewer separation in the CAM004 area and the closing of the CAM004 regulator. Administrative law decisions were issued in the spring of 2007, allowing DEP to issue a final superseding order of conditions. On June 1, 2007, the Acting DEP Commissioner issued a final decision sustaining the earlier superseding order DEP had issued. On June 12, 2007, the citizens group that had appealed the earlier orders filed a request for reconsideration of the DEP final decision, but DEP formally declined this request on October 16, 2007. On November 14, 2007, the appellants appealed this final DEP decision to Superior Court. Notwithstanding the Superior Court filing, the City of Cambridge now has wetlands approval to construct Contract 12. Design and construction activities related to the revised Alewife Brook CSO control plan were delayed by at least 27 months beyond the Schedule Seven milestones due to the wetlands appeals.

On July 16, 2008, MWRA's Board of Director's approved full funding of MWRA's then-estimated cost share for the Alewife Brook (CAM002-004) Sewer Separation project and Cambridge Floatables Control at $60 million and authorized the City of Cambridge to move forward with design and construction. In October 2008, the City of Cambridge resumed design of the CAM004 stormwater basin and outfall, commenced design of CAM400 manhole separation, and commenced design of the interconnections relief and floatables control work. The City of Cambridge commenced construction of the CAM400 manhole separation project and the interconnections relief and floatables project in one construction contract in January 2010 and completed all work in March 2011. Cambridge issued notice to proceed with Contract 12, stormwater basin and outfall in April 2011 and completed construction of CSO related components in April 2013 in compliance with Schedule Seven. In September 2012, Cambridge issued the notice to proceed with the first (Contract 8A) of four construction contracts (8A, 8B, 9, and Concord Lane) to complete the CAM004 sewer separation project, in compliance with Schedule Seven. Cambridge issued the notices to proceed with Contract 8B in September 2013, Contract 9 in February 2014 and Concord Lane in March 2015. By November 2015, Cambridge had attained substantial completion of contracts 8A, 8B and Concord Lane, and on December 23, 2015, in compliance with Schedule Seven, Cambridge attained substantial completion of Contract 9. Cambridge substantially completed related surface restoration work in the CAM004 sewer separation area in December 2017.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Design CS/RI | Design services. | Completed |
| Construction | Four early construction contracts for CAM004 sewer separation work were completed in 2004. The remaining construction scope of work for this project is outlined above. | Completed |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $104,552 | $104,552 | $0 | $0 | $0 | $0 | $0 | $0 |

| | | |
|---|---|---|
| Project Status 12/18 | 100% | Status as % is approximation based on project budget and expenditures. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $104,552 | $104,552 | $0 | Dec-15 | Dec-15 | None | $0 | $0 | $0 |

**Explanation of Changes**

- N/A

**CEB Impacts**

- No impacts identified at this time.

# S. 324 CSO Planning and Support

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Fulfills a regulatory requirement*

*The goals of the CSO Program are to minimize CSO discharges and their impacts, eliminate beach closings caused by CSOs, and maximize the beneficial use of CSO receiving waters, in accordance with national and state CSO policies and in compliance with state water quality standards. This project includes CSO conceptual planning, system master planning, and facilities planning/environmental review. It also includes directly related watershed planning activities, development of short-term CSO control measures (known as System Optimization Plans or SOPs), various as-needed technical support activities, and acquisition of land and easements required for CSO control plan implementation.*

**Project History and Background**

MWRA CSO planning work began in 1986. A revised Final Conceptual Plan and System Master Plan were completed in 1994, and a Final CSO Facilities Plan and Environmental Impact Report were filed with MEPA in August 1997. A MEPA certificate was issued in October 1997. In December 1997, DEP issued water quality determinations that were necessary for final CSO plan approval by DEP and EPA. DEP issued a two-year variance for the Charles River in October 1998 and has extended this variance several times. DEP issued a three-year variance for Alewife Brook and Upper Mystic CSOs in March 1999 and has extended the term of the variance several times. Consultant services have included assistance to MWRA in satisfying variance conditions.

As part of CSO Planning and Support, MWRA provided financial and technical assistance to the Charles River Watershed Association in its watershed planning efforts for the Charles River in the 1990s, known as the IM3 Study. MWRA also funded a portion of the costs of a U.S. Geological Survey (USGS) water quality study of the Charles River Basin. Results of these studies will provide additional technical information to support the reassessment of the appropriateness of the recommended Charles River controls in MWRA's CSO plan. To comply with its requirements under the Charles River CSO variance, in 1999 MWRA began funding USGS efforts to collect updated information on Charles River water quality. Final payments to the Charles River Watershed Association and USGS were made in the fall of 1998 and the fall of 2001, respectively.

The federal court order in the Boston Harbor Case required MWRA to develop, by June 1993, a plan for optimizing the existing combined sewer systems to maximize transport and in-system storage capacities, thereby minimizing CSO discharges prior to developing and implementing a long-term control plan. In June 1993, MWRA completed a report entitled System Optimization Plans (SOP) for CSO Control, which recommended more than 100 relatively low cost and easily implemented projects to optimize operation of existing systems. The projects were designed and constructed primarily by the CSO communities, pursuant to SOP financial assistance agreements executed between MWRA and each CSO community. Under the agreements, MWRA reimbursed the communities for design and construction costs. SOP work also includes two projects that are part of the long-term plan: Somerville Baffle Manhole Separation and Somerville Floatables Control. Short-term plans for CSO SOPs were completed in 1997 and MWRA obtained regulatory approvals for its long-term plan in 1997 and 1998.

Various CSO plan reevaluations and systems assessments have been performed under amendments to the CSO Master Planning contract. These include: reevaluation of the Alewife Brook sewer separation plan; assessment of Cottage Farm CSO Facility performance: reevaluation of the need for the Dorchester Brook In-line Storage Project (not included in the CSO Plan or the CIP); reevaluation of the feasibility of closing MWR010; reassessment of CSO discharges from the Boston Marginal Conduit to reevaluate the need for floatables control; and reevaluation of the cost-effectiveness of the East Boston Branch Sewer Relief project in light of cost increases.

By amendment to the Master Planning contract MWRA also added system modeling services to estimate and report actual CSO discharges on an annual basis (through 2003), in compliance with provisions in MWRA's renewed NPDES permit. Since 2004, the annual modeling activities have been conducted by MWRA staff.

The performance of the sewerage system is constantly improving as CSO and non-CSO projects are completed and as maintenance efforts continue to increase the system's capacity. Updated assessments of the system's hydraulic performance and estimates of CSO discharges based on actual field data are essential to verify the predicted benefits of various CSO-related improvements, to recalibrate the system hydraulic model to reflect updated conditions, and to provide up-to-date information to support CSO planning and design efforts. This project provides for temporary flow metering and other efforts to gather and evaluate new data and track system performance. It also includes technical support and system assessments to support the CSO performance assessment required by Schedule Seven.

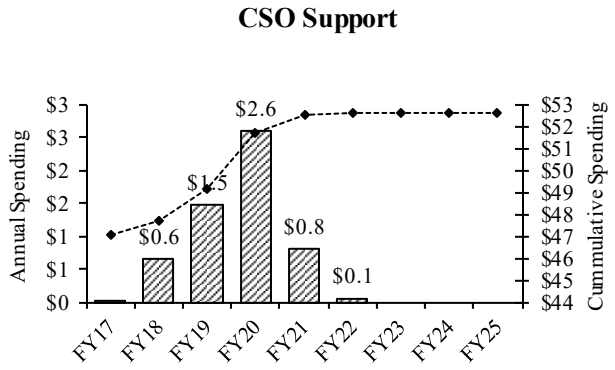
This project has also supported land and easement acquisitions and funded permit costs for all MWRA managed projects in the long-term CSO Control Plan.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Technical Assistance | Preliminary planning services prior to and in support of the 1988-90 Facilities Planning/EIR efforts. | Completed |
| Planning/EIR | Facilities planning and environmental review of CSO control alternatives (1990 Recommended CSO Control Plan). | Completed |
| Master Planning | System inspections, flow monitoring, water quality monitoring, and performance assessments to improve MWRA's understanding of the combined sewer and regional wastewater systems, optimize the performance of the existing systems, and reassess CSO control needs in the context of evolving EPA policy and a system master plan. Development of the 1997 Facilities Plan/EIR and subsequent reassessments of, and revisions to, that plan. | Completed |
| Watershed Planning | External watershed planning efforts that may affect CSO control needs, including the Charles River Watershed Association IM3 Study and ongoing USGS water quality studies. | Completed |
| Modeling | Receiving water quality modeling support to the Master Planning efforts. | Completed |
| SOP Program | Development and implementation of System Optimization Plans for short-term CSO control. Implemented by CSO communities. Also includes funding for Somerville Baffle Manhole Separation in the long-term control plan. | Completed |
| System Assessment | Temporary flow metering and other efforts to gather and evaluate new data on system performance. | Active |
| Technical Review | Technical assistance for the entire CSO control plan including affordability analysis. | Active |
| CSO Performance Assessment | Study to assess the performance of completed CSO projects to verify whether CSO control goals are met. | Active |
| Land/Easements | Acquisition of land and easements for construction of MWRA-implemented projects. Also, permits not covered in design and construction contracts. | Active |
| Somerville Marginal In-System Storage | Memorandum of Agreement between MWRA and the City of Somerville approved on September 14, 2016 and executed on August 29, 2018. MWRA agreed to share the cost of the CIPP liner rehabilitation which is estimated at $4.2 million since MWRA's CSO control plan utilizes both the in-line storage and conveyance capacity of the current brick sewer to control and reduce the CSO volume discharged to the Mystic River from the Somerville Marginal CSO treatment facility. | Active |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $53,738 | $48,845 | $4,893 | $1,465 | $2,576 | $4,893 | $0 | $0 |




| | | |
|---|---|---|
| Project Status 5/19 | 93.0% | Status as % is approximation based on project budget and expenditures. Master Planning was substantially complete in September 2004. On September 14, 2005, the MWRA Board of Directors approved an MOU with Massport that governs the Authority's construction and long-term operation on land owned by Massport, including the North Dorchester Bay tunnel mining shaft and dewatering pump station. Payments to Massport for temporary and permanent easements are complete. Schedule Seven requires MWRA to complete a CSO performance assessment in the period 2018-2021. MWRA issued the Notice to Proceed for Contract 7572, CSO Post-Construction Monitoring and Performance Assessment, on November 8, 2017, ahead of and in compliance with the January 2018 milestone. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $52,810 | $53,738 | $928 | Jun-21 | Apr-22 | 10 mos. | $3,954 | $4,893 | $939 |

**Explanation of Changes**

- Project cost, schedule, and spending changed due to CSO Performance Assessment amendment.

**CEB Impacts**

- No impacts identified at this time.

# S. 128 Infiltration/Inflow (I/I) Local Financial Assistance Program

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Fulfills a regulatory requirement*

*Infiltration and inflow (I/I), groundwater and storm water that enter the collection system, contributes significantly to the total wastewater flow treated by MWRA. This depletes capacity that would otherwise be available to transmit sanitary flows, resulting in sewer surcharging, overflows of untreated sewage, more frequent combined sewage overflows, and higher pumping and treatment costs. The I/I Local Financial Assistance Program provides funding assistance for communities to rehabilitate their collection systems with the goal of structurally reducing I/I flows. Funding assistance for local projects complements other MWRA strategies for regional I/I reduction including wastewater metering to support flow based rates, provision of I/I estimates to communities, technical assistance to communities on local projects, regional coordination of I/I policy issues, and interaction with DEP and EPA.*

**Project History and Background**

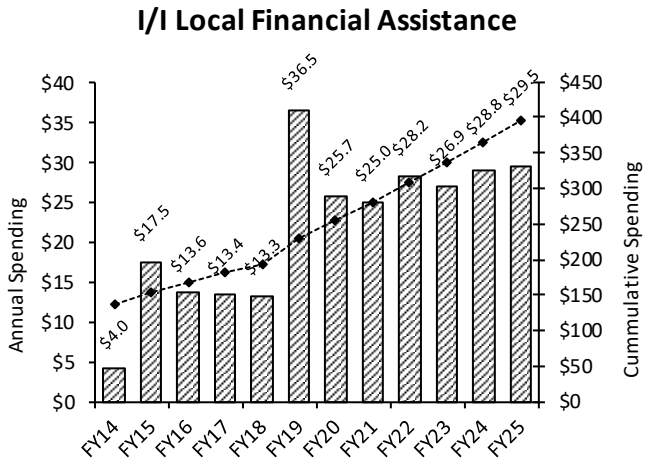
MWRA's Deer Island Wastewater Treatment Plant receives flow from 43 communities. The collection system encompasses 230 miles of MWRA interceptors and over 5,300 miles of community sewers. These sewers are of varying size, shape, age, material, depth, and conditions. All contribute some quantity of infiltration and inflow.

In August 1992, the Board of Directors approved $25 million to fund the initial phase of the I/I Local Financial Assistance Program. In June 1995, the Board approved $38.8 million to fund a second phase of the program. Both Phase1 and 2 funds were distributed as 25% grants and 75% interest-free loans. The Board approved $37 million to fund a third phase of the program in June 1998, an additional $40 million for Phase 4 in June 2001, an additional $40 million for Phase 5 in June 2004, an additional $40 million for Phase 6 in June 2006, an additional $40 million for Phase 7 and an additional $40 million for Phase 8 in June 2009. The grant/loan ratio was revised for Phases 3 through 8 to 45% grants and 55% interest-free loans. During the FY15 Final CIP development in June 2014, Phases 9 and 10 were added to the CIP at $80 million each to be distributed as 75% grants and 25% interest-free loans Payback period for Phases 9 and 10 loans was also extended from 5 years to 10 years**.** During the FY19 Final CIP development, Phases 11 and 12 were added at $100 million each to be distributed as 75% grants and 25% interest-free loans. During the FY19 Final CIP, $100 million in Phase 13 I/I Loans only was also added. All program funds are allocated to the 43 member communities based on their share of MWRA's wholesale sewer assessment. Binding commitments for funds are issued by MWRA in the form of Financial Assistance Agreements. Distribution of funds is authorized through FY2030.

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $392,585 | $190,036 | $202,549 | $36,470 | $25,700 | $142,251 | $112,938 | ($52,640) |

| | | |
|---|---|---|
| Project Distribution Status 5/19 | 52.3% | Through May 2019, MWRA has distributed $197.3 million in grants and $200.9 million in interest-free loans to fund 574 separate projects in 43 communities under the I/I Local Financial Assistance Program. |




| | | |
|---|---|---|
| Project Repayment Status 5/19 | 46.4% | Through May 2019, a total of $170.7 million has been repaid by member communities receiving interest-free loans. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $392,585 | $392,585 | $0 | Jun-40 | Jun-40 | None | $123,223 | $142,251 | $19,028 |

**Explanation of Changes**

- Project spending changed primarily due to updated cash flows for Phases 6, and Phases 8 -11.

**CEB Impacts**

- No impacts identified at this time.

# Waterworks System Improvements

Wachusett Reservoir

# Integrated Water Supply Improvement Program

MWRA's Integrated Water Supply Improvement Program is an initiative consisting of a series of projects to protect reservoir watersheds, build new water treatment and transmission facilities, upgrade distribution storage and MWRA and community pipelines and interim improvements to the Metropolitan Tunnel system redundancy. The program improves each aspect of the water system from the watersheds to the consumer to ensure that high quality water reliably reaches MWRA customers' taps. The program began in 1995 with the initial components which were completed by 2005 and the program remains active as the scope was expanded to continue to improve the water system. The main program components are as follows:

**Watershed Protection** The watershed areas around Quabbin and Wachusett Reservoirs are pristine areas with 85% of the land covered in forest or wetlands and about 75% protected from development by direct ownership or development restrictions. MWRA works in partnership with the Department of Conservation and Recreation (DCR) to manage and protect the watersheds. MWRA also finances all the operating and capital expenses for the watershed activities of DCR and on-going land acquisition activities.

**MetroWest Water Supply Tunnel** The 17-mile-long 14-foot diameter tunnel connects the new Carroll Water Treatment Plant at Walnut Hill in Marlborough to the greater Boston area. It is now working in parallel with the rehabilitated Hultman Aqueduct to move water into the metropolitan Boston area. Construction began on the tunnel in 1996 and the completed tunnel was placed in service in October 2003.

**Carroll Water Treatment Plant** The water treatment plant in Marlborough began operating in July 2005 and it has a maximum day capacity of 405 million gallons per day. This project consolidates all treatment steps into one plant which uses ozone for primary disinfection because ozone is a strong disinfection agent against pathogens such as Giardia and viruses while reducing levels of chlorine disinfection byproducts. Ultraviolet light treatment was added in 2014 as a second primary disinfection process for Cryptosporidium inactivation. The plant also provides corrosion control by adding carbon dioxide and sodium carbonate to raise the water's pH and alkalinity and thus control lead leaching from home plumbing fixtures. The treatment process concludes with fluoridation and residual disinfection with chloramines. A 45 million gallon storage tank on the site allows for daily variation in demand and flexibility in plant operation.

**Water Storage Tanks** As required by Massachusetts Department of Environmental Protection (DEP) rules, MWRA is building covered storage tanks to replace open distribution storage reservoirs near cities and towns to lessen the risk that contaminants will get into the tap water. A 20 million gallon tank in Stoneham replaced the open Fells Reservoir, two 12.5 million gallon circular tanks in Ludlow replaced the Nash Hill Reservoir and the 20 million gallon Loring Road tank replaced the Weston Reservoir. The largest tank, the 115 million gallon Norumbega Covered Storage Facility replaced the open Norumbega Reservoir in Weston and was placed in full service in 2004. In 2009, MWRA completed construction of a 20 million gallon tank to replace the currently off-line Blue Hills Reservoir in Quincy. The 20 million gallon Spot Pond Storage Facility to replace the off-line Spot Pond Reservoir in Stoneham was put in service in 2015.

**Pipeline Rehabilitation** An important component of the overall Integrated Water Supply Improvement Program is focus on the long-term rehabilitation of older, unlined cast iron and steel water mains in the MWRA and community systems. Water in direct contact with the metal surface corrodes through both biological and chemical processes resulting in tuberculation, thus narrowing the pipes and providing surfaces for bacteria growth. These processes also often result in consumer complaints about rusty water. To reap the full value of the other investments in the water system, MWRA decided to replace or rehabilitate the poor quality pipe particularly given that as of 1993, more than 80 percent of MWRA pipes were unlined. Since then, MWRA has been proceeding with a program of replacing or rehabilitating (normally through cleaning and lining) unlined cast iron and steel mains. Furthermore, in 1998, almost half (47%) of community pipes were unlined. In 1999, MWRA created a $250 million zero-interest loan program to encourage and facilitate rehabilitation of local mains. An additional $210 million was

added in FY11 for the Phase 2 program known as Local Water System Assistance Program of which $10 million is allocated among the Chicopee Valley Aqueduct (CVA) communities. The Local Water System Assistance Program was expanded beginning in FY17 to include $100 million in interest-free loans to communities solely for efforts to fully replace lead service lines. In FY18 Local Water Assistance Program Phase 3 was added in the amount of $278 million and Phase 3 CVA for $14 million. The Local Water System Assistance Program was expanded beginning in FY17 to include $100 million in interest-free loans to communities solely for efforts to fully replace lead service lines. The Lead Service Lone Replacement Loan Program is budgeted over twenty years.

**Metropolitan Tunnel System Redundancy – Interim Improvements** Plans for interim improvements to reduce the risk of failure and improve system operating conditions in the event that an emergency occurs are underway. The projects include the Top of Shafts Interim Improvements, Chestnut Hill Emergency Pump Station improvements, Chestnut Hill Emergency Generator, WASM/SPSM PRV Improvements and rehabilitation of WASM 3. These projects will be completed while the proposed tunnel redundancy project goes through environmental review, design, and construction.

**Metropolitan Tunnel System Redundancy** The Metropolitan Tunnel System includes the City Tunnel (1950), the City Tunnel Extension (1963), and the Dorchester Tunnel (1976). Together, these tunnels carry approximately 60% of the total system daily demand with no redundancy. The tunnels and shafts represent a low risk of failure. However, many of the valves and piping at the surface are in need of repair or replacement. Failure of some valves could cut off a majority of the system's capacity to supply water and have not been exercised for fear of failing in a closed position. These valves should be, but cannot be, replaced because shut down of the City Tunnel would be required. The Metropolitan Tunnel Redundancy program consists of two deep rock tunnels beginning at the same location in Weston near the Massachusetts Turnpike/Route 128 interchange. The 4.5-mile Northern Tunnel generally follows the route of MWRA's existing Weston Aqueduct Supply Main (WASM) 3 transmission main to a point about midway along the pipeline near the Waltham/Belmont border, which will allow flow in WASM 3 in both directions. The 9.5-mile Southern Tunnel runs east to southeast to tie into the surface connections at Shaft 7C of the Dorchester Tunnel. After the tunnels are constructed, the existing tunnels can be removed from service for rehabilitation. The Metropolitan Tunnel Redundancy Program is currently at the very early stages of planning and design. The organizational framework to manage the program within MWRA is in place in the form of the Tunnel Redundancy Department. Program Support Services contract was awarded and procurement for Preliminary Engineering is underway.

# S. 542 Carroll Water Treatment Plant

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Fulfills a regulatory requirement*

*To provide high quality drinking water to MWRA customers and to ensure that the water delivered from the Wachusett Reservoir meets the drinking water quality standards established by the federal Safe Drinking Water Act (SDWA). Part of this objective was met by constructing a 405 million-gallon per day (maximum) water ozonation/chloramination treatment plant primarily in Marlborough with portions of the facility located in Southborough and Northborough. Ultraviolet light disinfection facilities were added in 2014 to comply with new drinking water regulations.*

**Project History and Background**

MWRA provides drinking water to 2.3 million people in 42 metropolitan Boston communities. The source water supply comes from the Quabbin and Wachusett reservoirs; two large, high quality water bodies in Central Massachusetts. About 50% of the water flowing from the Wachusett Reservoir comes first from the Quabbin Reservoir, the larger reservoir to the west. MWRA received a waiver from filtration requirements for the Quabbin Reservoir in 1991 from the Massachusetts Department of Environmental Protection (Mass DEP), the agency granted primacy to enforce the Safe Drinking Water Act (SDWA) by the United States Environmental Protection Agency (USEPA) in Massachusetts.

In June 1993, MWRA negotiated an administrative consent order with DEP setting forth the steps needed to comply with the Surface Water Treatment Rule (SWTR). The consent order required MWRA to find a site, design a filtration plant, and build it, unless MWRA along with MDC could demonstrate to Massachusetts DEP no later than 1998 that the system met the criteria for avoiding filtration and therefore that filtration was not required. After an extensive research and decision-making process, the MWRA Board of Directors voted in October 1998 to request a waiver of the filtration requirements from Mass DEP and to build a new water treatment facility using ozonation with chloramination for the water from Wachusett Reservoir as part of the Integrated Water Supply Improvement Program. The decision recognized that an ozonation/chloramination plant would provide appropriate treatment of the MWRA water supply from Wachusett Reservoir and that adding filtration components costing $180 million to the new plant would not provide as much additional benefit as using funds to rehabilitate old, unlined cast iron pipes in the MWRA and local distribution systems. As part of the treatment technology decision, MWRA's Board also made a commitment to an expanded program of public health surveillance, financial incentives for communities to target rehabilitation of community pipes, and a full review of the need for further treatment including filtration when the plant was complete.

Mass DEP agreed with the MWRA approach in December 1998 and determined that filtration was not required for the MWRA system. Through the Department of Justice, USEPA sued under its SDWA “overfiling” rights, seeking to require MWRA to build a filtration plant and contending that the SDWA allowed no other option. After an extended trial, on May 5, 2000 Judge Stearns issued his decision that MWRA currently complies with all 11 federal criteria for avoiding filtration under the Surface Water Treatment Rule of the Safe Drinking Water Act. He evaluated the current quality of MWRA water and found MWRA’s integrated drinking water improvement program including ozonation treatment technology the better approach to “preserving its safety.” He found EPA failed to show that filtration of MWRA water was required either as a matter of cost-benefit or scientific necessity. The judge denied EPA’s request for injunctive relief but ordered MWRA to give the Court notice of any future violations of the avoidance criteria to allow the consideration of whether the type of relief requested by USEPA

might be necessary. No other order was issued. On July 16, 2001, the U.S. Court of Appeals for the First Circuit affirmed Judge Stearns ruling.

The Carroll Water Treatment Plant (formerly Walnut Hill Treatment Plant) was placed in service in July 2005. It provides treatment necessary to fully comply with all current drinking water regulations. EPA issued new regulations in January 2006 for microbial protection (Long Term 2 Enhanced Surface Water Treatment Rule) and disinfection byproduct control (Stage 2 Disinfectants/Disinfection Byproducts Rule). MWRA will not need to make changes to comply with the Stage 2 D/DBP rule. The LT2ESWT rule required a second primary disinfectant and a somewhat more stringent inactivation of cryptosporidium than the plant's current design. This project included the addition of an ultraviolet light disinfection treatment process at the plant to meet requirements of the LT2ESWT rule. The UV system was placed in service in February 2014.

**Scope**

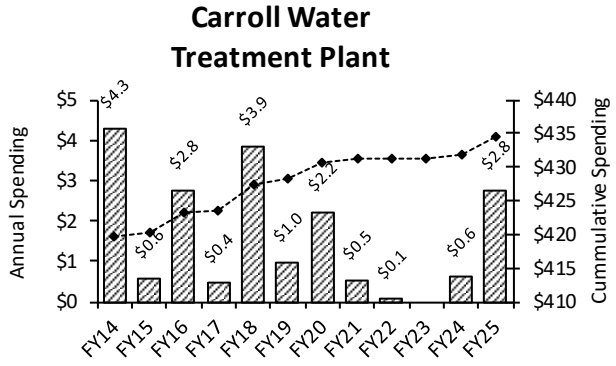
| Sub-phase | Scope | Status |
|---|---|---|
| Study 1 | Investigation of the potential impacts of SDWA amendments on the MWRA system and evaluation of the need, feasibility, and benefits of improved treatment processes. | Completed |
| Study 2 | Evaluation of alternative filtration, disinfection, and corrosion control processes to determine the most appropriate for MWRA source waters. Construction and operation of a pilot plant at the Wachusett Reservoir to allow testing of various treatment technique combinations. Identification of potential locations for treatment facilities. | Completed |
| AWWARF Red Water Control Strategy Study | Evaluation of treatment options for eliminating discolored water caused by unlined cast-iron pipe. Also investigation of the fundamental aspects of iron chemistry and corrosion using unlined cast-iron pipe from the MWRA community distribution system. | Completed |
| Emergency Distribution Reservoir Water Management Study | Investigation of potential impacts on the emergency distribution reservoirs resulting from their replacement by new covered distribution reservoirs, and study of ways to maintain their water quality for emergency supply. Norumbega, Weston, Spot Pond, Fells, and Blue Hills Reservoirs have been studied. A pilot study was conducted to evaluate in-reservoir algae treatment for Wachusett Reservoir. | Completed |
| *Cryptosporidium* Inactivation Study | Determination of the site-specific efficacy of inactivating *Cryptosporidium* in Wachusett Reservoir source water using disinfectant alternatives (chlorine/chloramine and ozone/chloramine), and then development of design criteria for the full-scale disinfection contacting system. | Completed |
| Construction: Cosgrove Disinfection Facility Phases I and II | Construction of the Cosgrove Disinfection Facility. Free chlorine is applied at the Cosgrove Aqueduct to utilize travel time to achieve primary disinfection prior to corrosion control treatment and secondary disinfection. | Completed |
| Immediate Disinfection-MECo | Massachusetts Electric Co. power line installation to support the disinfection process at the Cosgrove Disinfection Facility. | Completed |
| Distribution Water Consultant | To provide technical assistance related to distribution system management. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| EIR/Conceptual Design | Environmental reviews, data collection and analyses, and facility designs to support the dual track compliance approach, evaluation of design criteria, site plans, plant hydraulics, and construction of a small-scale demonstration water treatment plant. | Completed |
| Design/CS/RI: Walnut Hill WTP | Design and Engineering Services During Construction for the water treatment plant and associated components. | Completed |
| WHCP1: Wachusett and Cosgrove Intakes | Upgrade of the Cosgrove Intake and powerhouse to allow automatic, unstaffed operation of the facility. Replacement of the valves and piping in the Wachusett Intake is required to allow this facility to serve as a backup water supply. | Completed |
| WHCP2: Interim Aqueduct Rehabilitation | Shotcrete lining of the Wachusett Aqueduct to ensure supply of water continues to greater Boston during modifications to Shaft C and to enable it to serve as a backup to the Cosgrove Tunnel. | Completed |
| WHCP3: Site Work and Storage Tank | Includes clearing and excavation, site access roads, yard piping, and construction of a 45-million gallon storage tank. | Completed |
| WHCP4: Treatment Facilities | Construction of ozonation, corrosion control, chloramination operations and emergency generator buildings, modifications to Shafts B and C, and installation of system wide instrumentation from Wachusett Reservoir to Norumbega Reservoir. | Completed |
| WHCP6: Late Site Work | Final grading, landscaping, and paving of treatment facility site. | Completed |
| Design & Construction WHCP7: Existing Facilities Modifications | Modification to and conversion of the Interim Corrosion Control Facility, Cosgrove Disinfection Facility, Transmission Maintenance Facility. These buildings will be converted from water treatment/quality uses to expanded maintenance shops and SCADA technicians shop facilities for the new water treatment plant. In addition, the project includes demolition of old electrical building, some miscellaneous items at Cosgrove Intake Building, conversion of Cosgrove Disinfection Facility to a Boat Storage Facility and replacement of the roof, lab improvements and HVAC system for Water Quality Lab at Southboro. Also, buildings rehab will incorporate achievable LEED (Leadership on Energy & Environmental Design) goals. | Active |
| Design Management Support | Professional services and value engineering support to MWRA in review of the water treatment plant design. | Completed |
| Construction Management/RI | Construction management and resident inspection during construction of the water treatment plant. | Completed |
| Cosgrove Disinfection Facility Underwater Improvements | Installation of underwater piping needed to apply sodium hypochlorite at Shaft A. | Completed |
| Community Chlorine Analyzers | Purchase of free chlorine residual analyzers for eight communities to work in association with interim chloramination facilities. | Completed |
| OCIP | Owner Controlled Insurance Program, providing pollution liability, workers' compensation, general liability, and excess loss coverage during construction of the CWTP. | Completed |
| Professional Services | As needed legal, insurance, design, and construction specialty services for the Carroll Water Treatment Plant. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Marlborough MOA | Agreement to mitigate the impacts of the construction of the Carroll Water Treatment Plant on Marlborough. | Completed |
| WHWTP – MECo | Relocation of electric power lines. | Completed |
| Site Security Services | Site security services at the Carroll Water Treatment Plant. | Completed |
| CSX Crossing | Railroad track improvements adjacent to CWTP. | Completed |
| Wachusett Algae Design and Construction | Design and Construction of automated chemical dispensing system for algae control. | Future |
| Public Health Research | With the assistance of public health agencies and researchers, evaluation of the public health impact of the water treatment changes that occurred in 2004. | Completed |
| Security Equipment | Design and installation of card access, improved motion and intrusion alarm systems, video surveillance, and monitoring equipment for MWRA facilities. | Completed |
| WHCP8– Cosgrove Screens Design/CS/RI and Construction | Replace existing manual screens with finer automatically controlled traveling screens. | Completed |
| AWWARF-Evaluation Ozone and UV | Study of the effects of ozone and ultraviolet treatment on cryptosporidium to ensure inactivation in Wachusett Reservoir. | Completed |
| Fitout/Construction | Non-construction related items for start-up and operation of the new water treatment plant including furnishings, shop and maintenance equipment, audio/visual supplies, laboratory equipment, and miscellaneous consumable supplies. | Active |
| Carroll Ultra Violet Disinfection Design, and Construction | Design and construction programs to add Ultra Violet (UV) to the CWTP. UV system placed into service in February 2014. | Completed |
| As-Needed Technical Assistance No. 1 and No. 2 | As-needed design services to support the start-up of the CWTP including electrical engineering, HVAC engineering, mechanical engineering, civil engineering and a variety of geotechnical, environmental, and architectural technical assistance. | Completed |
| Ancillary Modifications Construction 1 | Follow-up construction from the As-Needed Technical Assistance contracts. | Completed |
| Ancillary Modifications Construction 2 | Address improvements in reliability, optimization of plant performance and/or reduce plant operating costs. | Active |
| Ancillary Mods Design 3 and 4 | Additional As-Needed design services as a follow-up for additional improvements at the Carroll Water Treatment Plant. | Completed |
| Technical Assistance No. 5 and #6 | Continuation of as-needed engineering technical assistance for ancillary modifications design and plant optimization. | Completed |
| Carroll Water Treatment Plant Storage Tank Roof Drainage System Repair | Design and construct a solution that addresses trench drainage system's poor performance. Poor roof drainage could possibly result in water quality problems. | Future |
| Technical Assistance No. 7 and No. 8 | The next two phases of as-needed engineering technical assistance for ancillary modifications design and plant optimization. | Completed |
| Technical Assistance No. 9 and No. 10 | The next two phases of as-needed engineering technical assistance for ancillary modifications design and plant optimization. | Active |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY23 |
|---|---|---|---|---|---|---|---|
| $436,138 | $423,116 | $13,022 | $971 | $2,223 | $3,772 | $9,250 | $0 |




| | | |
|---|---|---|
| Project Status 5/19 | 97.2% | Status as % is approximate based on project budget and expenditures. Closed Loop Cooling System, a contract of Ancillary Modifications Construction 2 subphase, was substantially complete in April 2010. Second Gaseous Oxygen Line was substantially complete in May 2012. Wachusett Emergency Connection Valves reached substantial completion in August 2013. Carroll Ultraviolet Disinfection Facility Construction reached substantial completion in February 2014. Existing Facilities Modifications CP-7 Southborough Water Quality Laboratory Upgrades was substantially complete in November 2016 and Marlborough Maintenance Facility was substantially complete in July 2018. Technical Assistance 7 was completed in November 2015. Technical Assistance 8 was completed in June 2018 and 9 and 10 commenced in July 2018. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $435,675 | $436,138 | $463 | Dec-26 | Dec-26 | None | $3,374 | $3,772 | $398 |

**Explanation of Changes**

- Project cost and spending changed primarily due to updated cost estimate for boat cove storage work in the CP-7 Existing Facility Modifications contract.

**CEB Impact**

- Expect $100,000 in FY29 for utilities for the Wachusett Algae Facility.

# S. 550 Spot Pond Covered Storage Facility

**Project Purpose and Benefits**

☑ *Contributes to improved public health* ☑ *Improves system operability and reliability*

***Master Plan Project ☑ 2008 Priority Rating 2 (see Appendix 3)***

*A new storage facility is required to meet the state and federal drinking water guidelines and MWRA's goal of providing a one-day supply of storage. With the Weston and Spot Pond Reservoirs removed from service, MWRA no longer meets the one-day supply goal.*

**Project History and Background**

The Low Service System, which supplies 25% of the total metropolitan area demand, formerly had Weston Reservoir at its western end, where water was introduced into the system, and Spot Pond as its terminal reservoir at the northeast extremity. Due to transmission problems caused by old, corroded pipe with significantly reduced carrying capacity, this system gradually ceased to function properly and it became necessary, as a makeshift measure, to break this system into segments and transfer water from high service in order to serve large portions of the Low Service area.

The principal low service mains (Weston Aqueduct Supply Mains (WASM), Boston Low, and East and West Spot Pond Supply Mains) have been rehabilitated and their capacity has been restored to as-new condition. The new Weston Covered Storage Facility at Loring Road (constructed as part of the MetroWest Tunnel project) replaced the open Weston Reservoir. The Spot Pond Storage Facility replaced Spot Pond Reservoir in Stoneham.

The new Spot Pond Storage Facility is supplied through a pressure reducing valve on WASM 4 via the West Spot Pond Supply Main. During peak demand periods of the day, water flows into the Low Service System from both Loring Road and Spot Pond storage tanks.

At 20 million gallon capacity, the Spot Pond Storage Facility, comprised of two buried 10 million gallon storage tanks, is the same size as that at Loring Road. Just as pressure reducing valves allow the tanks at Loring Road to be supplied from the high service Norumbega Covered Storage, the Spot Pond Storage tank is supplied with water reduced in pressure from WASM 4.

The Spot Pond Storage Facility also includes a partially buried pump station to provide redundancy to the Gillis Pump Station supplying the Northern High and Northern Intermediate High service areas.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Environmental Reviews and Conceptual Design (6455/6456) | Preliminary engineering for tank siting, environmental reviews and conceptual design. | Completed |
| Design/Build (6457) | Design and construction by a single contractor of a 20 million gallon water storage tank and pump station. | Completed |
| Owner's Representative (7233) | Provision of technical program management for the design/build contract procurement, monitoring, and administration. | Completed |
| Easements/Land Acquisition (6868) | To provide adequate land for construction of the water storage tank. | Completed |
| Early Construction Water Connection (7314) | Construction of piping and meter connection to replace existing water supply to be removed as part of tank construction. | Completed |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $60,126 | $60,126 | $0 | $0 | $0 | $0 | $0 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 100% | Status as % is approximation based on project budget and expenditures. Design/ Build contract was awarded in October 2011 and the NTP was issued in November 2011. Early Construction Water Connection was substantially complete in February 2012. The facility was placed into service in December 2015. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $60,262 | $60,126 | ($146) | Dec-15 | Dec-15 | None | $0 | $0 | $0 |

**Explanation of Changes**

- Project cost changed primarily due to updated final cost for the Owners Representative contract.

**CEB Impact**

- None identified at this time.

# S. 555 Carroll Water Treatment Plant Asset Protection

*Project Purpose and Benefits*

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*
☑ *Fulfills a regulatory requirement*

*To protect the investment of MWRA ratepayers by ensuring timely replacement of equipment and systems.*

**Project History and Background**

The John J. Carroll Water Treatment Plant has been in service since 2005. Some components of the plant are approaching the end of their service lives while others will need replacement in the future. This project was developed to ensure that MWRA maintains ongoing service while optimizing operations in its water facilities. This project in its current form addresses immediate critical facility and equipment issues.

While the current schedule indicates a completion date of 2034 for construction, the CWTP Facility Asset Protection project will be ongoing throughout the useful life of the facilities.

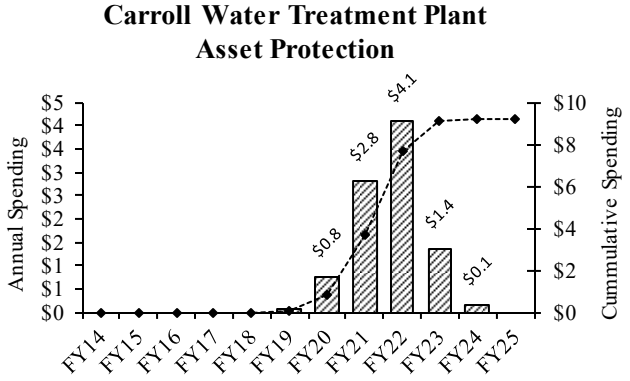
**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Carroll Water Treatment Plant Asset Protection Study (7593) | A consultant's evaluation of CWTP's capital assets and recommendations for upgrades or modifications to ensure operational efficiency of these assets. | Future |
| LOX Yard Redundancy (7594) | Provide new piping, valves, vaporizer and/or additional liquid oxygen storage to eliminate single points of failure in the CWTP Liquid Oxygen Yard. | Future |
| Carroll Water Treatment Plant Water Pump Variable Frequency Drives Replacement (7595) | The variable frequency drives on the CWTP Plant Water System are 13 years old and should be replaced in the near future. The normal life of VFDs is shorter than the pumps they control. It is unlikely that the existing VFDs will be operable until 2030 when the plant water pumps are scheduled to be replaced. | Future |
| Ozone Generator Re-Build (7596) | Periodic re-building of the ozone generators, including cleaning and gasket replacement, is necessary to maintain proper operation. | Future |

| Sub-phase | Scope | Status |
|---|---|---|
| Post Treatment Building Soda Ash Equipment Replacement (7598) | Replace the existing soda ash feed equipment to maintain operability. | Future |
| Carroll Water Treatment Plant Chemical System Pipe Pumps, and Tank Replacement (7597) | The condition of the plant chemical system components varies. There have been leaks in the hypochlorite pipes and tanks. The ammonia, bisulfite and fluoride feed systems are aging. This project will rehabilitate these systems as needed. | Future |
| HVAC Equipment Replacement (7605) | The HVAC equipment at CWTP is over 10 years old. The refrigerant used in this equipment (R-22) is being phased out. The existing equipment will not function with the new refrigerant. Replacement of this equipment will be necessary. | Future |
| Water Pump Replacement (7606) | The plant water pumps will need to be replaced in the future as they approach the end of their useful life. The current schedule is to replace these pumps by 2030. | Future |
| Ozone Generator Replacement (7607) | The ozone generators are currently scheduled to be rebuilt in 2022. Eventually spare parts will no longer be available. The current schedule is to replace the ozone generators by 2030. | Future |
| Ultra Violet Reactor Replacement (7608) | Replacement of the UV reactors will likely be required by 2034 as spare parts for the existing units may no longer be available then. | Future |
| Carroll Water Treatment Plant Control Room Fire Suppression System (7592) | Replace the existing wet fire sprinkler system in the CWTP Control Room, Communications Room, Electrical Room and Emergency Operations Center with a clean agent type system that does not use water to suppress a fire. | Future |
| **CWTP Emergency Generator No. 1 Replacement** | **Replace the generator/alternator on emergency generator No. 1 due to failure.** | **Active** |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $41,208 | $0 | $41,208 | $65 | $750 | $9,062 | $3,875 | $28,271 |




| | | |
|---|---|---|
| Project Status 5/19 | 0.1% | Status as % is approximation based on project budget and expenditures. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $40,791 | $41,208 | $417 | Oct-34 | Oct-34 | None | $4,741 | $9,062 | $4,321 |

**Explanation of Changes**

- Project cost changed due to new project that was added for Emergency Generator No. 1 Replacement.
- Spending changed primarily due to accelerated schedule for Chemical System Pipe Pumps Replacement and new project added for Emergency Generator No. 1 Replacement.

**CEB Impacts**

- None identified at this time.

# S. 597 Winsor Station/Pipeline Improvements

**Project Purpose and Benefits**

☑ *Extends current asset life* ☑ *Results in a net reduction in operating costs*

***Master Plan Project ☑ 2008 Priority Rating 1 (See Appendix 3)***

*Rehabilitation of the water supply infrastructure at the Winsor Station in Belchertown. Design and construct station piping improvements which would allow water to go to the Swift River without going through the isolation valve. Design and construct means to control flow in the Quabbin Aqueduct. Quabbin Release Pipeline work is also included.*

**Project History and Background**

Winsor Dam impounds the Quabbin Reservoir. At the dam, an intake feeds two conduits that are interconnected at a powerhouse below the dam. One conduit discharges to the Chicopee Valley Aqueduct; the other conduit feeds a now inoperative hydroelectric turbine/generator unit. A bypass valve at the Winsor Station house also allows flow to be discharged directly to the Swift River.

The water supply infrastructure within the Winsor Station is in need of major repair and upgrade as much of it is over 75 years old. Several other sub-phases are needed to address the extensive work on the Quabbin Transmission System and the Swift River bypasses. These sub-phases include:

- Winsor Station Chapman Valve Repair & Purchase of Sleeve Valves - Immediate replacement of the existing damaged Chapman Valve with sleeve valves.
- Pipeline Replacement Phase 1 – To repair and upgrade large-diameter piping and valving in the basement of the Winsor Station including the bypasses.
- Quabbin Aqueduct – To replace the antiquated and unreliable shutter system at Shaft 12 with a gate to control flow in the Quabbin Aqueduct and inspect the Quabbin Tunnel and recommend maintenance or repairs. Make building repairs to the Shaft 12 building and Shaft 2.
- Winsor Power Station Upgrades -. Rehabilitate Winsor Power Station and the CVA Intake Structure,
- Hatchery Pipeline- To convey cold, well-oxygenated hypolimnetic water from Quabbin Reservoir to the downstream trout hatchery, a hydro turbine is located in a vault near the connection of the pipeline to the CVA that captures some of the hydraulic energy contained in the pipeline as the water is conveyed to the hatchery. The power generated is sold back to the grid.

**Scope**

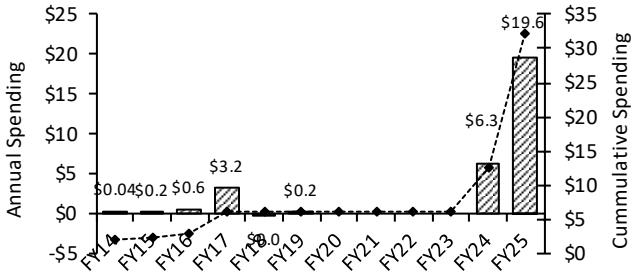
| Sub-phase | Scope | Status |
|---|---|---|
| Quabbin Aqueduct & Winsor Power Station Preliminary Design (7114) | Preliminary design of improvements at Shafts 1, 2, 9 and 12 of the Quabbin Aqueduct and the Winsor Power Station. | Completed |
| Shaft 12 Isolation Gate Design CA/RI (7509) and Construction (7197) | Installation of a gate to control flow at Shaft 12, the intake to the Quabbin Aqueduct, thereby improving safety and reliability of the transmission system. | Future |

| Sub-phase | Scope | Status |
|---|---|---|
| Quabbin Aqueduct Inspection (6277) | TV inspection of the Quabbin Aqueduct. | Future |
| Winsor Power Station Upgrades and Quabbin Buildings Rehabilitation Design CA/RI (7460) and Construction (7115) | Design and Construction to address piping improvements and building rehabilitation for water supply and Swift River discharge. Will also include improvements to the CVA Intake Structure and include Shaft 2 structural improvements, and Shaft 12 intake and service building electrical, plumbing, and building improvements. | Future |
| Hatchery Pipeline Design (7017) and Construction (7235) | Design and construction of approximately 5,000 feet of pipeline to convey 6 MGD of water from the CVA to the downstream trout hatchery. The project would provide a consistent and reliable source of high quality cold water to the hatchery, as well as supplement flows to the Swift River. The project will also include a hydro turbine that would capture some of the hydraulic energy contained in the pipeline as the water is conveyed to the hatchery which will be sold back to the grid. The hydro turbine portion is funded under the Alternative Energy Initiatives project and Massachusetts Leading by Example Program. | Completed |
| Winsor Station Chapman Valve Repair (7212) | Construction of replacement valving for the existing 36" Chapman Butterfly Valve (design by Technical Assistance consultant). | Completed |
| Purchase of Sleeve Valves (7234) | For replacing the damaged Chapman Butterfly Valve. | Completed |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $49,559 | $5,734 | $43,826 | $204 | $0 | $204 | $42,969 | $653 |

**Winsor Station/Pipeline Improvements**



| | | |
|---|---|---|
| Project Status 5/19 | 12.0% | Status as % is approximation based on project budget and expenditures. Winsor Station Chapman Valve Repair was completed in November 2009. Shaft 12 isolation gate Design CA/RI notice to proceed was issued in March 2017. Preliminary design was completed and final design was subsequently cancelled. Hatchery Pipeline Design/ESDC/RI commenced in August 2013 and construction was substantially complete in September 2017. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $48,640 | $49,559 | $919 | Jan-26 | Jan-26 | None | $149 | $204 | $55 |

**Explanation of Changes**

- Project cost change primarily due to updated cost estimates for Shaft 12 Isolation Gate Construction and inflation adjustment for Quabbin Aqueduct and Winsor Power Station Construction, partially offset by updated cost for Shaft 12 Design.

- Spending changed primarily due to updated costs for Shaft 12 Isolation Gate Design CA/RI which was cancelled due to high construction cost estimate.

**CEB Impacts**

- None identified at this time.

# S. 604 MetroWest Water Supply Tunnel

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Fulfills a regulatory requirement*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To provide transmission redundancy for the Hultman Aqueduct ensuring reliable water delivery and providing sufficient hydraulic capacity to support the John J. Carroll Water Treatment Plant and covered storage distribution facilities. This project consists of construction of a 17.6-mile deep rock tunnel from Shaft D in Marlborough to Shaft 5 of the City Tunnel in Weston, and to Shaft W in Weston, as well as the construction of a covered storage facility at Loring Road in Weston. Also included construction of shafts and valve chambers for connections of Shaft 4 in Southborough and to the Norumbega Covered Storage facility.*

**Project History and Background**

Adequate transmission capacity is a critical component of MWRA's Integrated Water Supply Improvement Program. MWRA's water delivery depends on a system of tunnels and aqueducts that transport water from the Quabbin and Wachusett Reservoirs to the distribution reservoirs in metropolitan Boston. The existing tunnels and aqueducts were deficient in several respects. First, the transmission system was unable to supply sufficient hydraulic capacity during peak flow periods, leading to pressure deficiencies in all high service areas during the summer months. Second, key sections of the transmission system, such as the Hultman Aqueduct and the Southborough Tunnel, relied on a single conduit. In the event of failure of any of the major transmission sections, the remaining waterworks system could not meet the demand for water.

Construction of the MetroWest Water Supply Tunnel and its extension to the Weston Aqueduct Terminal Chamber has provided the critically needed minimum level of transmission redundancy for the Hultman Aqueduct. Enhancements and improvements to the reliability of the City Tunnel and the City Tunnel Extension are being planned as part of the Long-Term Redundancy project. This will also enhance system maintenance by allowing each major supply conduit to be taken out of service for inspection, cleaning, and repair.

In June 1989, MWRA began engineering work on reconstruction of the Sudbury Aqueduct. In May 1990, the Board of Directors directed staff to put minimum effort into further study of the Sudbury Aqueduct reconstruction alternatives and maximum effort into study of the all-tunnel alternative. The advantages of tunneling included a large reduction in surface activities resulting in a reduced environmental impact, and the potential to obtain a large increase in water transmission capacity to enable the tunnel to supplant the Weston Aqueduct as well as provide redundancy to the Hultman Aqueduct. Other advantages included a higher pressure rating by constructing a tunnel deeper into rock, and the ability to construct along a straight line, reducing the overall length of the project by three miles.

In November 1990, the Board of Directors directed staff to eliminate the planned tunnel from Norumbega Reservoir to the Chestnut Hill Reservoir in favor of connecting to Shaft 5 of the City Tunnel and to the eastern end of the Weston Aqueduct. The connection allowed the Weston Aqueduct and Weston Reservoir to be taken off-line and used only for emergency supply as required by the Safe Drinking Water Act.

In December 1995, the Board of Directors authorized solicitation of bids on the first major construction contract of the MetroWest Tunnel project. In June 1996, a notice to proceed was issued on this contract, beginning the transition from design to construction of the project. In November 2003, the tunnel was placed in service.

In September 2005, the Board of Directors authorized an engineering services contract to rehabilitate the existing Hultman Aqueduct and to interconnect the MetroWest Tunnel with the Hultman Aqueduct. In the interim, Valve Chamber E-3 at Southborough was constructed in order to facilitate system operations and the demolition of an existing chlorine building was completed in preparation for construction of the interconnections.

In May 2013 construction was substantially complete on Contract CP6A to interconnect the MetroWest Tunnel with the Hultman Aqueduct and to rehabilitate the Hultman Aqueduct from Shaft 4 in Southborough to Shaft 5 of the City Tunnels and to Shaft W of the MetroWest Tunnel in Weston. A second construction contract (CP6B) was substantially complete to rehabilitate the remainder of the Hultman Aqueduct from Shaft C of the Cosgrove Tunnel to Shaft l of the Southborough Tunnel, and to rehabilitate the top-of-shaft facilities at Shaft 4 of the Southborough Tunnel in Southborough.

**Program Elements**

The MetroWest Tunnel is 17.6 miles long with a 14-foot finished diameter. The first segment of the tunnel extends from the water treatment plant site at Walnut Hill on the Marlborough/Southborough line to Shaft 4 of the Hultman Aqueduct in Southborough. From there, the tunnel continues to a "WYE" connection east of Norumbega Reservoir, and continues east from the "WYE" to Shaft 5 of the City Tunnel and northward to the Weston Aqueduct Terminal Chamber. The tunnel depth varies from 200 to 500 feet below ground surface along the alignment.

After the MetroWest Tunnel and the John Carroll Water Treatment Plant were in service, the Hultman Aqueduct was inspected and rehabilitated. Surface distribution facilities, including piping, valve chambers, and risers connect the tunnel to the Hultman Aqueduct and local community services. Intermediate connections between the MetroWest Tunnel and the Hultman Aqueduct permit operation of segments of either the aqueduct or the tunnel interchangeably, allowing flexibility in the maintenance of the two conduits.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Study | Study of the aqueduct/tunnel system to determine the best alternative to improve hydraulic capacity and create redundancy. | Completed |
| Construction-Sudbury Pipe Bridge | Rehabilitation of the Siphon Pipe Bridge at the Weston Aqueduct which experienced significant leakage. | Completed |
| Design/EIR-Tunnel-Engineering Services During Construction | Environmental impact report (EIR) process and design of the 17.6-mile long, 14-feet diameter tunnel. Construction support services, including environmental and safety compliance, claims assistance, contract administration, quality assurance testing, and community relations. | Completed |
| Construction: Western Tunnel Segment – CP1 | Construction of the western portion of the tunnel and associated surface facilities. Shaft E was constructed at the Sudbury Dam and a tunnel was excavated 4.9 miles to Shaft D, located adjacent to the clear well of the Walnut Hill Water Treatment Plant (WHWTP). A riser shaft has been excavated to connect the tunnel to Southborough's Hosmer Pump Station and includes the surface piping facilities necessary to bring water from the Wachusett Reservoir. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Construction: Middle Tunnel Segment – CP2 | Construction of approximately 11.9 miles of tunnel between Southborough and Weston. Construction was staged from Shaft L, located at a sand and gravel pit in Framingham, where a permanent connection to the Hultman will be constructed. Along the alignment, four small-diameter shafts have been constructed for community connections to Framingham and Weston. The western reach of the Middle Tunnel Segment portion of the tunnel terminates at Shaft E. The eastern reach terminates at the "WYE" where it meets the East Tunnel Segment. Shafts NE and NW will be constructed on the northwest side of Norumbega Reservoir where surface work included construction of valve chambers and surface piping to allow connections to the Hultman Aqueduct and Norumbega Reservoir. The design at Shaft N included provisions for connections to the Norumbega Covered Storage Facility and the proposed Metropolitan Tunnel Loop. | Completed |
| Construction: Shaft 5A-CP3 | Shaft 5A was excavated near the intersection of Route 128 and the Massachusetts Turnpike. | Completed |
| Construction: Eastern Tunnel Segment – CP3A | Construction of the eastern portion of the tunnel. An approximately 4,400-feet long, 12-feet finished diameter tunnel was constructed from the Shaft 5A bottom through the “WYE” where it meets the Middle Tunnel Segment and on to Shaft W where a shaft connection to the Loring Road storage tanks was made. | Completed |
| Construction: MHD Salt Sheds – CP5 | Massachusetts Highway Department (MHD) salt storage operations were relocated from the Shaft 5A site to a new, nearby location on MHD property on Recreation Road in Weston. This allowed demolition of the MHD salt sheds at the Shaft 5A site. | Completed |
| Testing and Disinfection – CP7 | Pressure testing of the MWWST from Shaft E (west) to Shaft W and 5A, and disinfection and dechlorination of the entire tunnel from Shaft D to Shafts W and 5A, and final disinfection of the Norumbega Covered Storage tanks. Also included the disinfection and dechlorination of the Wachusett Aqueduct and the piping connections through Walnut Hill to MetroWest Shaft D. | Completed |
| Construction: Loring Road Covered Storage-CP8 | Construction of surface facilities at the Shaft W site included a 20 million-gallon storage facility that replaced the function of the existing Weston Aqueduct/Weston Reservoir system, allowing the system to be taken off-line and placed on emergency stand-by status. The storage facility has been constructed as two concrete tanks partially buried in a hillside adjacent to Shaft W. Connections were made under this contract at Shaft W to two WASM (1 and 2) low service mains and the WASM 4 high service main, as well as to the 7-feet diameter branch of the Hultman Aqueduct. Also included rehabilitation of 4,100 linear feet of 60-inch diameter pipe and four master meters. | Completed |
| Construction Management/RI | Full inspection of all construction activity, as well as provision of construction support services including environmental and safety compliance, claims assistance, contract administration, quality assurance testing, community relations, labor relations, engineering services during construction, and provision of technical assistance. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Hultman Study | Risk analyses to determine which leaks should be repaired now and a monitoring plan for leaks which presently do not threaten the integrity of the aqueduct. | Completed |
| Hultman Leak Repair | Test pit excavation and leak repair on the Hultman Aqueduct. | Completed |
| Hultman Repair Bands | Purchase of external repair bands to be installed as part of Hultman investigation and repair. | Completed |
| Hultman Investigation and Repair | Evaluation of various segments of the Hultman Aqueduct and installation of repair bands at major leak sites. | Completed |
| Land Acquisition | Easements along the 17.6-mile tunnel construction route, as well as land at the Shaft W and Shaft L sites. | Completed |
| Professional Services | Services such as construction safety, contractor audit, legal services, risk management consulting services, and other miscellaneous services. | Completed |
| Framingham MOU | Agreement to mitigate the impacts of the construction on the Town of Framingham. | Completed |
| Weston MOU | Agreement to mitigate the impacts of the construction on the Town of Weston. | Completed |
| Southborough MOU | Agreement to mitigate the impacts of the construction on the Town of Southborough. | Completed |
| Local Water Supply Contingency Design/CA/RI and Construction | Design and implementation of a Water Supply Contingency Plan including the installation of new local mains where residential well supplies could be affected by tunnel construction. | Completed |
| Community Technical Assistance | Funds to assist communities with the redesign of utility plans. | Completed |
| Owner Controlled Insurance | Owner controlled insurance program providing workers' compensation, general liability, and pollution liability insurance for MetroWest Water Supply Tunnel construction. | Completed |
| Design CA/RI Hultman Interconnect CP6 | Design CA/RI of the interconnections between the MetroWest Water Supply Tunnel and the Hultman Aqueduct as well as inspection of the Southboro Tunnel and rehabilitation of the Hultman Aqueduct. | Completed |
| Construction: Hultman CP9 | Construction of Valve Chamber E-3. | Completed |
| Interim Disinfection | Temporary disinfection related to CP-7 sub-phase. | Completed |
| Equipment Prepurchase | Pre-purchased one 10-foot diameter butterfly valve for installation in Valve Chamber E3. | Completed |
| Construction CP6A Lower Hultman Rehab. and 6B Upper Hultman Rehab. | Construction of interconnections between Metrowest Tunnel and the Hultman Aqueduct, and rehabilitation of Hultman Aqueduct including replacement or repair of air relief structures, blow off valves, culverts beneath the aqueduct; replacement of existing valves; and additional items to restore the aqueduct to safe and efficient operation after more than 70 years of service without an overhaul. | Completed |
| Construction 6A Demolition | Demolition of existing chlorine storage building to allow for construction of a new valve chamber on the Hultman Aqueduct. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| CP6 Easements | Easements for CP-6 Contract. | Completed |
| Valve Chamber and Storage Tank Access Improvements Design (7283) and Construction (7476) | Design and construction to provide better and safer access to valve chambers for Water Quality and Maintenance personnel. Provide secure hatches at Loring Road Tanks. | Future |
| Shafts 5A/5 Surface Piping Cathodic Protection Construction (7477) | Construction to replace cathodic protection systems. | Completed |
| Hultman Shaft 5A Leak | Repair Hultman Leak at Shaft 5A. | Completed |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $700,184 | $697,182 | $3,002 | $0 | $0 | $0 | $3,002 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 99.6% | Status as % is approximation based on project budget and expenditures. CP6A Lower Hultman Rehab was substantially complete in May 2013. Upper Hultman CP6B contract was substantially complete in June 2013. Shaft 5A/5 Surface Pipe Cathodic Protection was substantially complete in June 2017. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $700,184 | $700,184 | $0 | Mar-27 | Mar-27 | None | $0 | $0 | $0 |

**Explanation of Changes**

- N/A.

**CEB Impact**

- None identified at this time.

# S. 616 Quabbin Transmission Rehabilitation

**Project Purpose and Benefits**

☑ *Provides environmental benefits*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To ensure continued reliable delivery of high quality water to MWRA customer communities through inspection, evaluations, and rehabilitation of the aging transmission system. Many of the transmission facilities and structures were constructed in the 1930s and 1940s and are in need of repair, routine maintenance, updating, and modifications for code compliance, health and safety, and security. Based on the findings and recommendations of this inspection phase, MWRA has and will continue to add design and construction phases to the CIP.*

**Project History and Background**

This project provided an engineering assessment of key water transmission facilities, structures, and operations. Many of the 44 facilities were constructed in the 1930s and 1940s and are in need of repairs, routine maintenance, and modifications for code compliance, health and safety, and security. The facilities and structures include dams and spillways, structures on tops of shafts, hydraulic diversion facilities, gatehouses, intake buildings, service buildings, and garages. The facilities are spread over a large geographic area ranging from Quabbin Reservoir eastward to the Boston Metropolitan area.

The engineering assessment utilized existing information and site visits to inventory the condition of each facility. The work yielded a facility report that identifies existing conditions and provides recommendations for needed improvements, rehabilitation, and repairs. The project resulted in the development of a conceptual design for each facility including alternatives, basic design criteria, cost estimates, required permits, and schedules. MWRA uses the final conceptual design reports to develop a detailed scope of work for the future procurement of engineering services for subsequent design, construction administration, and resident inspection services. Staff will integrate and coordinate project findings with MWRA's current master planning efforts.

One critical component of the Quabbin Tunnel, the pressure-reducing valves at the Oakdale Power Station, was targeted for immediate replacement. These valves were in poor condition. Due to their important function of reducing hydraulic head to allow water from the Quabbin Reservoir to flow into Wachusett Reservoir, replacement of the Oakdale Valves was a high priority.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Facilities Inspection | Assessment of existing conditions; update of infrastructure rehabilitation evaluation; identification of improvements/repairs/upgrades, establishment of priorities for repairs, and preparation of cost estimates. | Completed |
| Oakdale Valves Phase 1 | Study, design, and construction for the rehabilitation/replacement of two valves and miscellaneous support equipment at the Oakdale facility. | Completed |
| Equipment Pre-Purchase | The two large butterfly valves (84 inch and 72 inch) and the fixed orifice valve (48 inch) that were needed in Phase I Valve Rehabilitation, required 6 to 10 months to fabricate and had to be pre-purchased so the valves were available for installation. | Completed |
| **Sub-phase** | **Scope** | **Status** |

| | | |
|---|---|---|
| Oakdale Phase 1A Design & Construction | Upgrade the 60-year old Oakdale facility and electrical control systems and the switchyard which are antiquated and unsafe to personnel. Will lower the station service voltage from 2,200 to 480. | Completed |
| Ware River Intake Valve Replacement Design and Construction | Replace oil-actuated valves currently underwater and inaccessible for maintenance with electric actuated valves. Also, replace siphons with hard piped intakes and automate equipment with remote control capabilities. | Future |
| CVA Intake Motorized Screen Replacement Construction | Replace current motorized screens on the CVA Intake. One screen has failed. Both have reached the end of their useful life. The screens keep debris from entering CVA. | Completed |
| Rehabilitation of Oakdale Turbine Design and Construction | Rehabilitate turbine. Turbine was last rehabilitated in 1986 and we will be approaching thirty years which is the expected life of an overhaul. | Future |
| Rehabilitate Wachusett Bastion Design (7333) and Construction (7697) | Make structural improvements to the Bastion including a new roof, repairs of the concrete walls, and drainage and ventilation systems. | Future |
| Wachusett Lower Gatehouse Pipe Replacement Construction (7380) | Replace the oldest piping in the Lower Gatehouse. Existing piping and valves have failed or are of poor condition. Other piping and valves of the same age in this facility have already been replaced. | Future |
| Wachusett Lower Gatehouse Interim Pipe Repair (7379) | Install blind flanges on the three 48-inch ppipes in the Lower Gatehouseto isolate the pipes from the broken Equalizer pipe. | Future |
| Wachusett Lower Gatehouse Building Rehab (7698) | Replace the leaking roof, gutters, and repair/seal masonry and degraded windows and doors. Sealing of the building will allow more efficient heating of building space to prevent further deterioration. Replace the existing propane fueled boilers. The existing heating isn't sufficient to keep building warm enough and therefore remaining moisture contributes to accelerated deterioration | Future |
| Oakdale High Line Replacement | Replacement of 70 year old 69kv overhead transmission line and ground operated switch that supplies power and delivers power from the Oakdale Power Station. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $19,032 | $8,667 | 10,365 | $3 | $600 | $8,168 | $2,172 | $25 |

| | | |
|---|---|---|
| Project Status 5/19 | 45.6% | Status as % is approximation based on project budget and expenditures. Valves were received in February 2006 and Phase I Design was substantially complete in June 2007. Phase 1A Construction was substantially complete in July 2013. CVA Motorized Screens Replacement Construction was substantially complete in August 2017. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $17,120 | $19,032 | $1,912 | Jan-27 | Jan-27 | None | $1,865 | $8,168 | $6,303 |

**Explanation of Changes**

- Project cost changed due to updated cost estimates as a result of re-structured and re-scheduled Wachusett Lower Gatehouse Building Rehabilitation, Wachusett Bastion Rehabilitation, Wachusett Lower Gatehouse Pipe Replacement Construction, Rehabilitation Bastion Design, and Wachusett Dam Lower Gatehouse Interim Pipe Replacement contracts.

- Project Spending changed due to updated cost estimates and schedules listed above.

**CEB Impacts**

- None identified at this time.

# S. 617 Sudbury/Weston Aqueduct Repairs

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To ensure continued reliable delivery of high quality water to MWRA customer communities through study, design, and implementation of repairs to the Sudbury and Weston Aqueducts. These backup systems are both more than 100 years old, and need to be ready for emergency use.*

**Project History and Background**

This project includes the inspection of the Sudbury Aqueduct in preparation for future repairs. This aqueduct constructed in 1878 is almost 140 years old and is in need of renewal and upgrade. This is a critical back-up facility for the City Tunnel and the Sudbury Reservoir emergency supply. The inspection phase of the Sudbury Aqueduct was conducted in 2006. The Inspection Report identified several short-term repairs required to better prepare the aqueduct for short-term use. This project will also fund inspections of the Weston Aqueduct which is more than 110 years old. The results of the inspection will allow MWRA to evaluate and prioritize future construction and repair work for this aqueduct.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Hazardous Materials | Remove contaminated sediment from aqueduct. | Completed |
| Sudbury Aqueduct Inspection | Inspection of the Sudbury Aqueduct to identify need for future repair work. | Completed |
| Weston Aqueduct Sluice Gates Construction | Construct a means to isolate the Weston Reservoir from a break west of Ash Street that could detrimentally affect the elevation in the Weston Reservoir. The construction contract will replace antiquated stop-plank gates, stop logs and blow-off valves along the Weston Aqueduct. Design is being performed by Task Order under the Technical Assistance Contract. | Future |
| Weston Aqueduct Gatehouse Rehabilitation | Evaluation of the structural integrity of the gatehouse and design of modifications necessary to rehabilitate the structure. Design for replacement of stop logs and stop log guides. | Future |
| Sudbury Short-Term Repairs Phase 1 and 2 Construction | Repairs needed in order to better prepare the Sudbury Aqueduct for short-term use (flow test and emergency activation). | Future |
| Rosemary Brook Siphon Building Repairs | Repairs to stabilize structures for functional use as emergency water supply facility. Repairs include re-pointing and rebuilding of brick structures and roof replacement. Rosemary Brook Siphon in conjunction with the Sudbury Aqueduct supplies raw water to the Chestnut Hill Reservoir in the event of an emergency. | Completed |
| Evaluation of Farm Pond Buildings-Waban Arches (7473) | Assessment of historic structures to determine measures to repair and stabilize facilities. Will include Massachusetts Historical Commission review of proposed alternative. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Waban Arches Rehabilitation Design (7616) and Construction (7617) | Design and construction of repairs to the Waban Arches of the Sudbury Aqueduct. | Future |
| Farm Pond Inlet Chamber & Gatehouse Design (7618) and Construction (7619) | Design and repairs to the Farm Pond Inlet Chamber and Gatehouse of the Sudbury Aqueduct. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $11,507 | $2,232 | $9,276 | $395 | $575 | $1,464 | $7,144 | $667 |

| | | |
|---|---|---|
| Project Status 5/19 | 22.8% | Status as % is approximation based on project budget and expenditures. Inspection of Sudbury Aqueduct was completed in October 2006. Rosemary Brook Building Repair and Evaluation of Farm Pond Buildings-Waban Arches reached substantial completion in FY18. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $10,288 | $11,507 | $1,219 | Oct-28 | Oct-28 | None | $1,085 | $1,464 | $379 |

**Explanation of Changes**

- Project cost changed due to updated cost estimate for Weston Aqueduct Gatehouse Rehabilitation partially offset by final cost for Evaluation of Farm Pond Buildings and Waban Arches contract.
- Spending changed due to updated cash flow for Rosemary Brook Building Repair contract.

**CEB Impacts**

- None identified at this time.

# S. 621 Watershed Land

**Project Purpose and Benefit**

☑ *Fulfills regulatory requirement.*
☑ *Provides water quality benefits.*
☑ *Continues to improve public health.*

*Acquire, in the name of the Commonwealth, parcels of real estate or interests in real estate that are important or critical to the maintenance of water quality in MWRA water supply sources and the advancement of watershed protection.*

**Project History and Background**

The Watershed Protection Act (WsPA) regulates land use and activities within critical areas of the Quabbin Reservoir, Ware River, and Wachusett Reservoir watersheds for the purpose of protecting the quality of drinking water. Since the passage of the WsPA in 1992, watershed lands had been purchased by the Commonwealth through its bond proceeds. The MWRA was then billed for and, over the years, paid increasing percentages of the debt service on those bonds, eventually reaching 100% of the debt service. MWRA also makes Payments in Lieu of Taxes (PILOT) to each watershed community for the land owned for water supply protection.

Since 1992, land acquisition has evolved into program-status and is a significant component of the Watershed Protection Plans for Quabbin Reservoir/Ware River and Wachusett Reservoir. Land in the watersheds undergoes analysis by the Land Acquisition Panel (LAP), which is comprised of Department of Conservation and Recreation (DCR) and MWRA staff. The LAP analyzes critical criteria for protection of the source water resources, including presence of streams and aquifers, steep slopes, forest cover, and proximity to the reservoirs. Parcels are ranked as to their value to the water supply system and, when the desirable parcels become available, are pursued through the LAP for acquisition through a "friendly taking" in fee or conservation restriction. LAP maintains an active list of parcels to pursue as seller and LAP interest, and funding availability, exist to support acquisition.

Under the revised Memorandum of Understanding between MWRA and DCR, executed April 2004, MWRA will utilize its own bond issuances for the purpose of acquiring, in the name of the Commonwealth, parcels of real estate or interests in real estate for the purpose of watershed protection. At its December 2004 meeting, the MWRA Board of Directors approved the use of MWRA bond proceeds for such purpose.

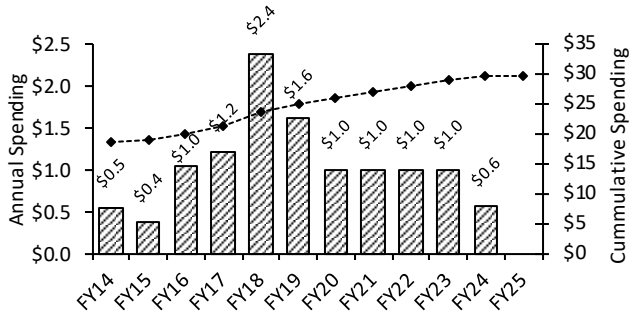
**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Land Acquisition | Acquire parcels of real estate or interests in real estate critical to protection of the watershed and source water quality. | Active |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $29,000 | $22,846 | $6,154 | $1,600 | $1,000 | $5,600 | $554 | $0 |

## Watershed Land




| | | |
|---|---|---|
| Project Status 5/19 | 85.5% | Status as % is approximation based on project budget and expenditures. MWRA began purchasing land in FY07. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $29,000 | $29,000 | $0 | Jun-23 | Jun-23 | None | $5,000 | $5,600 | $600 |

**Explanation of Changes**

- Project spending changed due to updated cash flow.

**CEB Impacts**

- None identified at this time.

# S. 622 Cosgrove Tunnel Redundancy

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Extends current asset life*
☑ *Results in a net reduction in operating costs*
☑ *Improves system operability and reliability*

***Master Plan Project ☑ 2008 Priority Rating 1 (See Appendix 3)***

*To plan, design and construct the recommended redundancy improvements the Cosgrove Tunnel.*

**Project History and Background**

This project evaluated alternatives and developed conceptual designs and cost estimates to provide redundancy for the metropolitan tunnel system and the Cosgrove Tunnel.

For the western system, the Board of Directors approved the construction of a new pump station to provide redundancy for water supply to the John J. Carroll Water Treatment Plant and to support the shutdown and repair of the Cosgrove Tunnel.

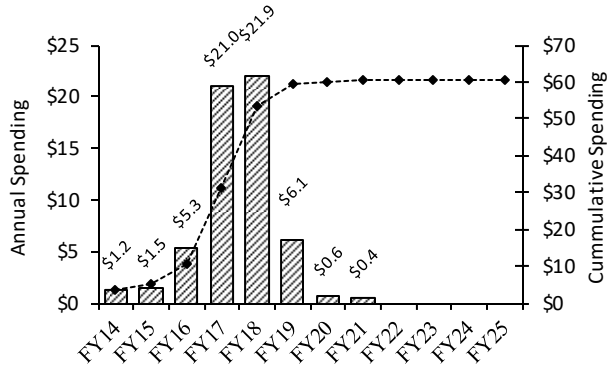
**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Wachusett Aqueduct Pump Station Design/ESDC/RI and Construction (7156/7517) | Design and construction of an emergency pump station to pump water from the Wachusett Aqueduct to the Carroll Water Treatment Plant. Pump station will provide redundancy in the event of a failure at the Cosgrove Tunnel or Intake and for the inspection/rehabilitation of the Cosgrove Tunnel. During a planned or emergency shutdown of the Cosgrove Tunnel, the existing gravity Wachusett Aqueduct with the proposed emergency pump station could deliver approximately 240 million gallons per day (mgd) of raw water to the CWTP for full treatment. The 240-mgd capacity would allow for unrestricted supply for at least eight months during the lower-demand fall/winter/spring period. This project, along with the completed Hultman Aqueduct rehabilitation and interconnections project, provide fully treated water transmission redundancy from the Wachusett Reservoir to the beginning of the metropolitan distribution system in Weston. | Completed |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $59,146 | $52,018 | $7,128 | $6,117 | $617 | $7,128 | $0 | $0 |

## Cosgrove Tunnel Redundancy




| | | |
|---|---|---|
| Project Status 5/19 | 96.7% | Status as % is approximation based on project budget and expenditures. Wachusett Aqueduct Redundancy Pump Station Design/ESDC/RI contract was awarded in January 2012. Wachusett Aqueduct Pump Station Construction was substantially complete in February 2019. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $57,495 | $59,146 | $1,651 | Feb-19 | Feb-19 | None | $5,574 | $7,128 | $1,554 |

**Explanation of Changes**

- Project cost and spending changed due to Wachusett Aqueduct Pump Station change orders and amendment.

**CEB Impacts**

- None identified at this time.

# S. 623 Dam Projects

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Extends current asset life*
☑ *Results in a net reduction in operating costs*
☑ *Improves system operability and reliability*

***Master Plan Project ☑ 2008 Priority Rating 2 (See Appendix 3)***

*To evaluate, design, and make necessary safety modifications and repairs to dams for proper operation as a result of the 2004 MOU between MWRA and DCR.*

**Project History and Background**

Massachusetts Dam Safety Regulations, 302 CMR 10.00, require modifications to the Framingham Reservoir No. 3 (Foss) Dam to provide a spillway system capable of passing the applicable Spillway Design Flood (SDF) or safely storing this same flood within the reservoir without a spillway or other emergency overflow structure. Based on existing Hydraulics and Hydrology studies for Foss Dam, needed improvements include dam embankment armoring and turf improvements to protect against wind-induced overtopping at the Spillway Design Flood (SDF).

All earthen dams and masonry dams under MWRA responsibility were built in the late 1800s to early 1900s and are in periodic need of maintenance. Based on completed internal inspections, repairs are needed including rip rap re-setting and replacement, mitigation of erosion features, and addressing mortar loss and consequent minor leakage at gatehouses are necessary at Foss, Weston, Chestnut Hill, Sudbury and Wachusett Open Channel Lower dams.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Dam Safety Modifications and Repairs | Provide Design and ESDC for required Dam Safety Modifications and Repairs. Construct parapet wave walls on dam crests to safely contain the SDF at the Weston Reservoir Dam. At present, alternatives are being evaluated at Foss. | Completed |
| Quinapoxet Dam Removal Design/ESDC, Construction, and REI | Provide final design, ESDC/RI, and construction for the removal of the Quinapoxet Dam adjacent to the Oakdale Pump Station. The removal of the dam will help landlocked fish in the Wachusett Reservoir to reach spawning grounds in the Quinapoxet River. | Future |

| Sub-phase | Scope | Status |
|---|---|---|
| Sudbury/Foss Dam Improvements/Wachusett North Dike Overtopping Protection Design CA/RI and Construction | Regulatory requirement for dam safety compliance for the Sudbury/Foss Dams to ensure spillway will properly function and regulatory requirement for dam safety compliance for the Wachusett North Dike to ensure earthen dam structure will withstand overtopping. Dike requires reconnection of earthen berm around Leominster Pump Station to protect against wave run-up/overtopping at the spillway design flood. Area of dike was removed in mid 1960s to build the P.S. instrumentation (piezometers) is required to monitor internal conditions at all High Hazard class earthen dams. Wachusett North and South Dikes will be the first of the remaining dams to have this installed. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY23 |
|---|---|---|---|---|---|---|---|
| $6,048 | $3,116 | $2,933 | $10 | $123 | $2,890 | $43 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 51.5% | Status as % is approximation based on project budget and expenditures. Design phase for Dam Safety Modifications and Repairs began in September 2009. Dam Safety Modifications and Repairs Construction reached substantial completion in September 2012. Sudbury/Foss Dam Design CA/RI commenced in March 2019. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $5,726 | $6,048 | $322 | Dec-23 | Dec-22 | (12) mos. | 2,392 | $2,890 | $498 |

**Explanation of Changes**

- Project cost and spending increased due to updated cost estimates for Quinapoxet Dam Removal Resident Engineering Inspection and award amount for Sudbury Foss Dam Design Construction Administration/Resident Inspection contract.

- Schedule updated for Quinapoxet Dam Removal Construction contract.

**CEB Impacts**

- None identified at this time.

# S. 625 Metropolitan Tunnel Redundancy

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Extends current asset life*
☑ *Results in a net reduction in operating costs*
☑ *Improves system operability and reliability*

***Master Plan Project ☑ 2008 Priority Rating 1 (See Appendix 3)***

*To plan, design and construct the recommended redundancy improvements to the City Tunnel, the City Tunnel Extension, the Dorchester Tunnel and the Cosgrove Tunnel.*

**Project History and Background**

This project includes the study, permitting, design, and construction of redundancy improvements to critical elements of the water transmission system. The study phase evaluated alternatives and developed conceptual designs and cost estimates to provide redundancy for the metropolitan tunnel system.

The metropolitan tunnel system was evaluated first with emphasis on providing redundancy for Shaft 7 of the City Tunnel. Historically, the plan for providing redundancy for the metropolitan tunnel system was based on one or more proposed parallel deep rock tunnel loops from the terminus of the Hultman Aqueduct and MetroWest Tunnel in Weston into the metropolitan area. The focus of this study was to develop and evaluate alternative surface pipe improvements, in addition to revisiting previously proposed tunnel loops, to achieve an acceptable level of redundancy at a lower cost.

The tunnels in the Metropolitan Boston area, i.e. the City Tunnel, City Tunnel Extension, and Dorchester Tunnel remain a weak link in the water transmission system. While the integrity of the underground tunnel sections is believed to be good based on very low, unaccounted for water in the MWRA transmission system, there is still risk of failure mainly due to pipe and valve failures at the surface connections to the distribution system or due to major subsurface failures as a result of earthquakes or geological faults. A rupture of piping or a valve failure at surface connections points on any of the metropolitan area tunnel shafts would cause an immediate loss of pressure throughout the entire High Service area and would require difficult emergency valve closures and lengthy system repairs. The assumption is that tunnels have a useful life of 100 years but these subsurface structures have not been inspected and their actual condition is unknown because they cannot be shut down for inspection. Facilities at the top of tunnel shafts have been examined and a number of hardening measures are needed for risk reduction at these sites. Completion of distribution system storage projects at Blue Hills and the Spot Pond Storage Facility also assist in mitigating the effects of local pipe ruptures.

In the event of a failure of the City Tunnel, a limited amount of water could be transferred through the WASM 3 (scheduled for major rehabilitation) and WASM 4 (rehabilitation completed) pipelines and the Sudbury Aqueduct would need to be brought on-line. Extensive use of the Sudbury Aqueduct/Chestnut Hill Emergency Pump Station and open distribution storage at Spot Pond and Chestnut Hill would be required. Supply would be limited and a boil order would be put in place. Failure of the City Tunnel Extension would be similar with reliance on WASM 3 and open storage at Spot Pond.

The redundancy study was undertaken to recommend a phased program which could be implemented over a period of years. The study reviewed currently proposed MWRA pipeline improvement projects and recommendations as to changes in size and/or alignment to contribute to the objective of transmission redundancy within the metropolitan system.

Additional study of the Metropolitan system has focused on the evaluation of new tunnels for providing redundancy. Several tunnel alternatives have been considered and staff presented a recommended plan to the Board of Directors in the fall of 2016. Staff also presented recommended plan to the MWRA water communities in December 2016. The recommended plan which was approved by the Board in February 2017 includes a deep rock tunnel option for both northern and southern components. The northern and southern components are identified below in the Planning, Design and Construction phases.

Subsequent Design, Permitting and Construction phases will follow-up on the recommendations of the study. The Design and Construction costs have been updated based on the recommendations of the study. Long-Term Redundancy is one of the MWRA's largest undertakings in the next decade, and a variety of options are still being evaluated.

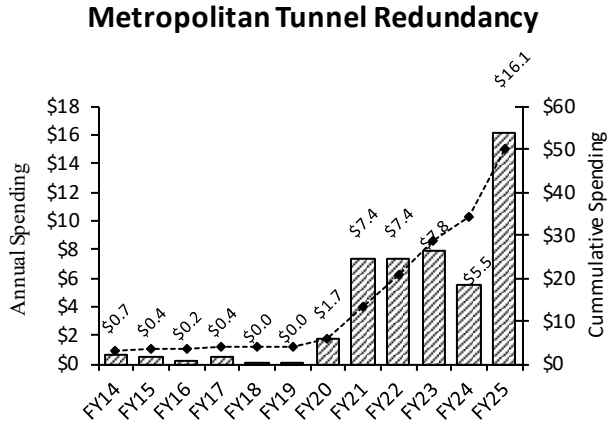
**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Water Transmission Redundancy Plan (6273) | Evaluation and recommendations of alternatives for long term redundancy. | Completed |
| Sudbury Aqueduct Pre-MEPA Review & Preliminary Design/EIR (7352) | Study and Pre-MEPA review of the Sudbury Aqueduct as a potential element for providing redundancy in the southern portions of the metropolitan tunnel system. Evaluate alternatives and conduct MEPA review for Sudbury pressurization. Also, includes final design and CA/RI for Rosemary Brook Siphon Buildings repair/stabilization. | Completed |
| Preliminary Design and MEPA Review (7159) | Preliminary design, permitting and MEPA environmental review of the Northern and Southern Tunnel Loops. | Future |
| Construction Management (7356) | Constructability review of final documents. Full inspection of all construction activity, as well as provision of construction support services including environmental and safety compliance, claims assistance, contract administration, quality assurance testing, community relations, labor relations, and provision of technical assistance. | Future |
| Final Design/Engineering Services During Construction (7556) | Final Design and Engineering Services During Construction of the Northern and Southern Tunnel Loops, including connecting mains. | Future |
| Tunnel Construction (7291) | Construction of the Northern and Southern Tunnel Loops. | Future |
| Tops of Shafts Connecting Mains Surface Construction (7357) | Construction of Connecting Mains between existing facilities and the various tunnel shafts along the Northern and Southern Tunnel Loops. | Future |
| Tops of Shafts Rehabilitation Design CA/RI (7521) and Construction (7522) | Design CA/RI and Construction to rehabilitate the Tops of Shafts of the existing tunnel system. | Future |
| Shaft 7 Buildings Design CA/RI and Construction (7558/7559) | Design and construction of a new access building above the Shaft 7 Top of Shaft structure including new electrical service, HVAC equipment, piping corrosion protection, PRV replacement, new flow meters, and structural and access improvements to the facility. | Future |
| Administration Legal and Public Outreach | Community agreements, land takings and Owner Controlled Insurance Program for the Northern and Southern Tunnel Loops. | Future |

| Sub-phase | Scope | Status |
|---|---|---|
| Program Support Services | The Program Support Services consultant firm will provide technical professional resources to the Tunnel Redundancy Department to support program-wide management, risk management, quality management, standardization, contract delivery and contract packaging. The PSS will include independent technical reviews, constructability reviews, critical path schedule evaluations, and cost estimating/opinions. | Active |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $1,421,750 | $3,456 | $1,418,294 | $13 | $1,700 | $24,313 | $185,993 | $1,207,988 |




| | | |
|---|---|---|
| Project Status 5/19 | 0.3% | Status as % is approximation based on project budget and expenditures. Sudbury Aqueduct MEPA Review was substantially complete in June 2017. Program Support Services commenced in April 2019. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $1,387,910 | $1,421,750 | $33,840 | Apr-42 | Apr-42 | None | $14,483 | $24,313 | $9,830 |

**Explanation of Changes**.

- Project cost change primarily due to inflation adjustments on unawarded contracts.

- Spending changed primarily due to restructuring and scheduling separate phase for Program Support Services phase which was broken out from Administration, Legal and Public Outreach phase, reallocating costs for Preliminary Design & MEPA Review, partially offset by updated schedule for Final Design ESDC.

**CEB Impacts**

- $1,000,000 in FY21 for salaries, benefits, and other expenses associated with the project management of the Metro Tunnel Redundancy.

# S. 628 Metropolitan Redundancy Interim Improvements

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Extends current asset life*
☑ *Results in a net reduction in operating costs*
☑ *Improves system operability and reliability*

***Master Plan Project ☑ 2008 Priority Rating 1 (See Appendix 3)***

*To plan, design and construct the recommended interim redundancy improvements to the existing tunnel system, to protect or needed as back-up in case of failure.*

**Project History and Background**

Design and Engineering Services during construction for four construction contracts that will be completed in the near term while the proposed tunnel redundancy project goes through environmental review, design and construction. These construction projects are needed to protect and improve critical facilities related to the existing tunnel system, or are needed as back-up means of supply in the event that one or more elements of the existing tunnel system fail. The construction projects include the Top of Shafts Interim Improvements, Chestnut Hill Emergency Pump Station improvements, Chestnut Hill Emergency Generator, WASM/Spot Pond Supply Mains PRV Improvements and rehabilitation of WASM 3. The Waltham Water Pipeline Project will provide water to Waltham during shutdown of WASM 3 CP-3.

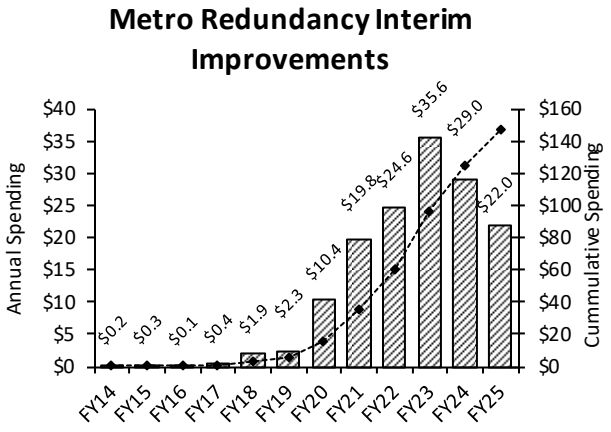
**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| CP1 Shafts 6,8,9A (7561), CP2 Shafts 7,7B,7C,7D (7670), CP3 Shafts 5,9 (7671), Tops of Shafts REI (7696) | This project will provide strengthening of pipe directly connected to the tunnel system, if it is found to be deteriorated, cathodic protection for pipe connections to prevent further corrosion, replacement of faulty air valves directly on the shafts and piping, replacement of nuts on valve connections if found to be at risk, improvements to dewatering systems inside shafts, and installation of additional valves to allow isolation of the tunnel without operating old valves that are directly connected to the tunnel. | Future |

| Sub-phase | Scope | Status |
|---|---|---|
| Chestnut Hill Emergency Pump Station Improvements Design CA/RI (7574), Construction (7562), and REI (7669) | The Chestnut Hill Emergency Pump Station is in need of improvement to piping and pumping systems to reduce surge loads on the suction and discharge piping during emergency operation when the Dorchester Tunnel is out of service. Discharge pressures from the pump station would exceed normal pressures in community pipelines increasing risk of failure during emergency operation. Also, coordination of pump station operation between Chestnut Hill and Newton Street and Hyde Park pump stations is of concern. With CHEPS not operating, grade lines in the Southern High system fall below acceptable levels at high points in the system and Blue Hills tank is unable to be filled. Improvements under this contract include potential pump and motor replacement, pipe reconfiguration, surge controls, and possibly installation of variable frequency drives on motors to regulate discharge pressures. | Active |
| WASM 3 Rehabilitation MEPA/Design CA/RI (6539) and WASM 3 Rehab CP-1(6544), CP-2 (6543) and CP-3 (6545) | MEPA/Design CA/RI and construction of the WASM 3 rehabilitation from the Hultman Aqueduct Branch in Weston to the existing PRV chamber near Section 12 at Medford Square. Construction will include cleaning and cement mortar lining, some sliplining and some pipe replacement. | Active/Future |
| WASM/Spot Pond Supply Mains West PRV Design ESDC (7575), Construction Improvements (7563), REI (7674) | The project will allow the Low Service system to be utilized to increase the supply to the Gillis Pump Station in Stoneham to avoid the need to pump out of the Spot Pond Reservoir in an emergency. The Low Service pipelines would be operated at grade lines consistent with WASM 3 grade line to push additional flow to the Gillis Pump Station in an emergency. Some Low Service revenue meters may require pressure reducing valves to lower pressures to communities along the way. In addition, PRV's on WASM 3/4 would also require replacement to maximize the supply to the north. | Active/Future |
| Shafts 5 and 9 Building Improvements Design/CA, REI (7673) and Construction (7599/7600) | Electrical and architectural improvements at Shafts 5 & 9 buildings in Weston and Somerville. Building Code Evaluation at each of these sites is being completed under Technical Assistance Task Order prior to design. | Future |
| Waltham Water Pipeline Design CA (7547), Construction (7457), and REI (7672) | Design/Construction Administration and Construction/Resident Inspection of 36" diameter pipeline of a length to be determined of a new connection to Waltham from the Northern Extra High Service Area. | Future |
| Commonwealth Avenue Pump Station Improvements Design CA/RI (7523) and Construction (7524) | Design, engineering services during construction, resident engineering/inspection services and construction to provide improvements to the Commonwealth Avenue Pump Station. The project includes new pipe connections to the Low Service Pipes and two new pumps (one replacement and one additional) for redundancy. Also, includes Supervisory Control and Data Acquisition (SCADA) controls, and heating, ventilation and air conditioning equipment to replace older equipment. | Active |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $177,348 | $2,837 | $174,511 | $2,271 | $10,358 | $92,636 | $81,777 | $98 |




| | | |
|---|---|---|
| Project Status 5/19 | 2.3% | Status as % is approximation based on project budget and expenditures. WASM 3 MEPA/Design CA/RI commenced in July 2013. Commonwealth Avenue Pump Station Improvements Design CA/RI was awarded in November 2016 and construction commenced in February 2019. Chestnut Hill Emergency Pump Station Design/CA commenced in May 2019. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $192,698 | $177,348 | ($15,350) | Dec-27 | Jun-26 | (6) mos. | $94,081 | $92,636 | ($1,445) |

**Explanation of Changes**

- Project cost changed primarily due to updated cost for Chestnut Hill Emergency Pumping Station Construction and Resident Engineering/Inspection, Weston Aqueduct Supply Mains/Spot Pond Supply Mains Pressure Reducing Valves West Construction and REI, Tops of Shafts REI, Section 101 Waltham Connection Construction and REI, and inflation adjustments on unawarded contracts. Also, Chestnut Hill Emergency Pump Station Emergency Generator Construction and Tops of Shafts Design/CA/RI projects being deleted, and WASM/SPSM PRV Design/CA and CHEPS Design/CA contracts were awarded less than budget.

- Project schedule changed due to updated Weston Aqueduct Supply Mains CP-3 schedule.

- Project spending changed due to updated cost estimates and deleted contracts listed above, updated schedules for WASM 3 Rehab CP-1,2, and 3, and award versus budget contracts listed above. This was partially offset by inflation adjustments on unawarded contracts.

**CEB Impacts**

- None identified at this time.

# S. 630 Watershed Division Capital Improvements

**Project Purpose and Benefit**

☑ *Extends current asset life*
☑ *Fulfills regulatory requirement*
☑ *Improves system operability and reliability*
☑ *Continues to improve public health*

*To renovate an aging Quabbin Administration Building complex to address existing code or operational deficiencies, energy efficiency, employee and public access. Also, to comply with regulatory requirements by Massachusetts Department of Environmental Protection related to Quabbin Administration Buildings water and wastewater systems.*

**Project History and Background**

DWSP Quabbin/Ware Region facilities support a staff of approximately 80 employees, and provide recreational opportunities and services to more than 500,000 visitors annually to the reservoir.

Construction of the QAB was completed in 1938 and it is not uncommon to find original system controls still operational today (77 years). One of the more pressing needs is the rehabilitation of critically important utilities and support systems that both distribute power and water throughout the facility. Most of these system components are exhibiting signs of deterioration (e.g. wiring, plumbing, heating) and preemptive actions are necessary to avoid catastrophic failures.

The significant investment of capital into the restoration of the facility will also trigger necessary upgrades to satisfy today's more stringent standards for Universal Access, public safety and occupational standards. Example of possible Code induced upgrades may include added environmental safeguards for occupational safety (e.g. ventilation and hazard abatements), installation of fire alarms and expanded fire protection systems, universally accessible access routes to and from the building and special accommodations (e.g. elevator, public restrooms).

Mechanical control systems for the distribution of steam throughout the Complex are very old, antiquated systems that need modernization to ensure continued reliable operation. Many components also fail to satisfy current building code requirements and would require upgrading.

As discussed above in the Quabbin Administration Building Complex: Major Renovations Project, there are many building components that need work. Two issues that need immediate attention are the boiler room wastewater discharges and the leaking water system. In 2013, the Quabbin Administrative Building (QAB) water supply system came under scrutiny by the MA Department of Environmental Protection and the State Plumbing Inspector. DEP is requiring that floor drains located inside of the buildings boiler room be abandoned and that daily well withdrawal levels be brought down to acceptable levels. Also, in 2014 wastewater discharges from the MWRA laboratory inside of the QAB facility were authorized by the DEP under the condition that daily wastewater flows be verified and shown to be within approved limits. The DWSP has initiated monitoring of wastewater flows from the QAB facility and anticipates that future upgrades to the septic system will be needed. In order to satisfy these mandates, significant investments are needed to retrofit existing mechanicals and make significant improvements to the distribution of water and handling of wastewater throughout the building immediately.

These improvements will be needed no matter what form of Quabbin Administration Building renovations are determined to be needed under the larger capital project. These two issues are essentially "fast-track" components on the larger project needed for regulatory compliance. Using professional engineering consultants, DCR will have complete repair designs by end of June 2016. The water/wastewater work included in this Fast Track project will be completed in FY17.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Quabbin Administration Building Rehabilitation Conceptual Design Report, Design/Construction Administration and Construction | Design and Construction for improvements at the Quabbin Administration Building. | Future |
| River Road Improvements - Wachusett | Improvements to River Road at Wachusett including paving and drainage. | Future |
| Quabbin Maintenance Garage/Wash Bay/Storage Building Design CA/RI and Construction | Design and installation of a modular building in stockroom area off Blue Meadow Road for large vehicle maintenance, washing, and equipment storage. Includes demolition of old sheds, conversion of underground storage tank to above ground storage tank, paving and security. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $21,900 | $0 | $21,900 | $0 | $162 | $7,840 | $14,060 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 0% | Status as % is approximation based on project budget and expenditures. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $18,000 | $21,900 | $3,900 | Mar-25 | Mar-26 | 12 mos. | $4,810 | $7,840 | $3,030 |

**Explanation of Changes**

- Project cost and spending changed primarily due to updated cost estimates and schedules for Maintenance Garage/Wash Bay/Storage Building Design/CA/RI and Construction contracts. Also new project added for River Road Improvements at Wachusett.

- Project schedule changed due to revised schedule for Quabbin Administration Building Rehabilitation.

**CEB Impacts**

- None identified at this time.

# S. 618 Peabody Pipeline Project

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*The proposed new pipeline and meter will serve the western side of town that is currently served by the Winona WTP and also provide a redundant connection to the city's water distribution system. The City estimates that their MWRA water supply would increase from 1.1 MGD to 2.5 MGD.*

**Project History and Background**

Peabody is a partially supplied MWRA water community. Peabody's drinking water is mainly supplied by the Coolidge and Winona Water Treatment Plants. Raw water from the Ipswich River is pumped to Suntaug Lake and Winona Pond. Water from Winona Pond is treated at the Winona Water Treatment Plant (Winona WTP) and water from Suntaug Lake and Spring pond are treated at the Coolidge Water Treatment Plant (Coolidge WTP). Peabody supplements it's drinking water through an existing MWRA connection, Meter 168.

Peabody's Winona WTP, constructed in 1974, has reached the end of its useful life. The city has decided to purchase more water from the MWRA instead of making the capital investment in rebuilding the aging water treatment plant. A new pipeline and meter is proposed which will serve the western side of town that is currently served by the Winona WTP and will also provide a redundant connection to the city's water distribution system.

The proposed 11,450 ft., 24-inch diameter water pipeline will extend the MWRA's Section 109 from the Lynnfield/Saugus town line to the Peabody/Lynnfield town line on Route 1.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Peabody Pipeline Design/ESDC/REI (6895) | This phase includes the design of an 11,450-linear foot, 24-inch diameter water pipeline that will extend MWRA's Section 109 from the Lynnfield/Saugus town line to the Peabody/Lynnfield line on Route 1. | On-hold |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $1,509 | $1,059 | $450 | $404 | $46 | $450 | $0 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 94.6% | Status as % is approximation based on project budget and expenditures. Design/ESDC/REI was awarded in May 2017. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $18,668 | $1,509 | ($17,159) | Aug-20 | Aug-20 | None | 17,504 | $450 | ($17,054) |

**Explanation of Changes**

- Project cost and spending changed due to Peabody Pipeline project cancelled.

**CEB Impacts**

- None identified at this time.

# S. 677 Valve Replacement

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Fulfills a regulatory requirement*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To replace, repair or retrofit approximately 500 blow-off valves and several hundred main line valves within the pipeline distribution system. Blow-off valve retrofits eliminate cross-connections into sewers or drainage piping. Main line valve replacements improve MWRA's ability to respond to emergency situations such as pipe breaks and provide tight shutdown for pipeline construction projects. Faster response reduces negative impacts on customers. Combining the two valve replacement efforts reduces the need for repeat construction at sites and alleviates traffic impacts, re-paving needs, and other site-specific issues.*

**Project History and Background**

MWRA owns and operates nearly 300 miles of distribution pipeline which contain approximately 1,578 blow-off valves and 1,713 main line valves. Some blow-off valves are cross-connected into sewers or drainage piping. To ensure there is no chance of contamination, DEP requires retrofitting of the blow-off valves to provide air gaps to ensure that non-potable water cannot reach the potable water lines. In addition, many of the main line valves in the system are significantly beyond their original design life. Many of these are either inoperable or inadequate and require replacement, repair, or retrofitting.

However, significant progress has been made in the last several years in correcting the cross connections at the blow-offs and in replacing defective main line valves and adding new valves to improve operations throughout the system. The valve replacement program continues this process. MWRA utilizes in-house crews and outside contractors to replace several blow-off and main line valves every year, both as part of the Valve Replacement Program and pipeline rehabilitation contracts.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Design/Phase 1 | Design of valve replacements, setting priorities based on the level of urgency or risk associated with each valve and scheduling work on valves that would not otherwise be replaced during upcoming pipeline rehabilitation projects. | Completed |
| Construction - Phase 1 (5126) | Purchase and installation of 27 blow-off valve retrofits. | Completed |
| Construction - Phase 2 (6105) | Purchase and installation of 10 blow-off valve retrofits and 10 main line valve replacements. | Completed |
| Construction - Phase 3 (6278) | Purchase and installation of 10 blow-off valve retrofits and 12 main line valve replacements as well as rehabilitation of two meters. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Construction - Phases 4, 5 & 6 (6345, 6346, 6435) | For each phase, purchase and install blow-off valve retrofits and main line valve replacements and rehabilitation of miscellaneous meters. Phase 4 Contract included 12 main line valves, 10 blow-off retrofits, 2 check valves and the rehabilitation of 2 meters. Phase 5 Contract included 10 blow-off valve retrofits and 13 main line valve replacements. Phase 6 included 4 blow-off valve retrofits, 8 main line valve replacements and 9 globe valves (tank isolation). | Completed |
| Construction Phases 7, 8 & 9 (6436, 7195, 7236) | For each phase, purchase and install blow-off valve retrofits and main line valve replacements and rehabilitation of miscellaneous meters. Each phase includes approximately 10 blow-off valve retrofits and 10 main line valve replacements. | Completed/Future |
| Design CA/RI Phases 8 & 9 (7417, 7418) | Design/Contract Administration/Resident Inspection for construction Phases 8 and 9. | Future |
| Equipment Purchase (6088) | Purchase of approximately 20 main line valves per phase for ten phases for replacement work to be done by in-house staff. Also includes the cost of line stops associated with this work. | Completed |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $21,655 | $12,016 | $9,638 | $0 | $0 | $0 | $6,487 | $3,151 |

| | | |
|---|---|---|
| Project Status 5/19 | 55.5% | Status as % is approximation based on project budget and expenditures. Phases 1-7 are complete. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $21,402 | $21,655 | $253 | Jun-29 | Jun-29 | None | $0 | $0 | $0 |

**Explanation of Changes**

- Project cost changed due to inflation adjustments on unawarded contracts.

**CEB Impacts**

- None identified at this time.

# S. 692 Northern High Service – Section 27 Improvements

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

To rehabilitate/replace a segment of pipe originally installed in 1898 in Lynn which suffers from poor hydraulic performance and frequent leakage. Rehabilitate/replacement of approximately 7,200 linear feet of pipeline will improve service to the communities north of Lynn.

**Project History and Background**

Section 27 is a 12–20 inch diameter cast iron main installed in 1898 that serves the communities north of Lynn. The main has become severely corroded. As a result of this deterioration, various major leaks have occurred since 1966. Because the main runs under major thoroughfares in Lynn, repair of leaks is disruptive and costly. Appropriate corrosion control methods will be employed on the pipeline to minimize corrosion potential in Section 27. During preliminary design, an evaluation determined MWRA should abandon the portion of Section 27 that parallels Section 91 and an adjacent pipeline, Section 35.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Construction Section 27 (6333) | Rehabilitation/replacement of 7,200 linear feet of pipeline to replace severely corroded pipe. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY23 |
|---|---|---|---|---|---|---|---|
| $1,326 | $124 | $1,202 | $0 | $1 | $27 | $1,175 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 9.3% | Status as % is approximation based on project budget and expenditures. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $1,294 | $1,326 | $32 | Nov-25 | Nov-25 | None | $27 | $27 | $0 |

**Explanation of Changes**

- Project cost change due to inflation adjustments on unawarded contracts.

**CEB Impacts**

- None identified at this time.

# S. 693 Northern High Service - Revere and Malden Pipeline Improvements

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To improve the delivery capabilities of major distribution lines serving the Northern High System. The existing pipelines are inadequate and suffer from extensive corrosion and leakage. Replacement, rehabilitation, and/or reinforcement will provide a strong and reliable means to convey water from the City Tunnel Extension to communities in the northern and eastern portions of the Northern High Service Area.*

**Project History and Background**

The southeast corner of the Northern High Service Area has experienced pressure deficiencies because of undersized pipes and extensive pipeline corrosion. The corrosion problems have led to numerous leaks and pressure deficiencies which can cause fire-fighting difficulties. These deficiencies particularly affect Malden, Revere, Lynn, Winthrop, Deer Island, East Boston, Saugus, Nahant, Peabody, Marblehead, and Swampscott. To correct these problems, MWRA is implementing a series of pipeline improvements.

This project includes installation of pipeline on Sections 97, 97A and 68 in Revere and Sections 49, 53, 53A and Shaft9A-D in Malden; rehabilitation of Sections 53 and 55 in Revere; and installation of control valves to improve water pressure. All the work for this project, with the exception of the design and construction of Section 53 connections and Section 53A, Section 68 and the Shaft 9A-D Extension is complete. Completion of this construction will improve the pressure and flow of water conveyed to the Northern High Service Area.

A hydraulic study of the distribution system recommended that MWRA install a new pipeline in Revere, beginning at the Everett/Chelsea/Revere border and extending through Revere to the East Boston border. This new pipeline runs parallel with existing pipelines and carries a large portion of the flow formerly carried by the existing system, thereby increasing water pressure and flow to Revere, East Boston, Winthrop, and Deer Island, particularly during periods of high demand. Installation of new control valves was required to regulate water pressure and fill the Winthrop standpipe. The original control valves between Winthrop pipelines and MWRA transmission mains were inadequate. Fluctuations in pressure threatened to rupture the town's pipelines. More efficient valves were required to eliminate the danger. Flow tests performed on Sections 32 and 55 of the existing Revere and Winthrop pipelines revealed that these sections had severe flow problems. The pipelines were only able to carry a fraction of the designed capacity because of internal corrosion. Cleaning and lining the pipelines restored flow capacity.

Section 53 in Malden and Revere was an 18,900-feet long, 30-inch diameter steel pipeline, exceeding 60 years of age. Workers dug four test pits to determine the condition of this pipeline and uncovered 18 holes in the pipe. Investigations into recent failures revealed severe corrosion through the pipe wall in several locations. Replacement of the Malden portion of Section 53 with a new 48-inch diameter pipe has been completed. The Revere portion of Section 53 has been sliplined with 24-inch diameter steel pipe. In addition to feeding into the new 48-inch Saugus/Lynn pipeline, this pipe plays an important role in the supply network for Deer Island. Sections 49 and 49A, old 24-inch pipelines, are used to connect Section 53 to Shaft 9A of the City Tunnel. They are undersized for this purpose and are a severe restriction. A new 3,500-lf, 48-inch diameter pipe (proposed Section 53A) is needed to reinforce Sections 49 and 49A. A 1,000-lf, 20-inch diameter pipe, portion of Section 68, interconnects Section 53 with the new Saugus/Lynn pipeline. This section is undersized and needs to be reinforced with 1,000 lf of new 48-inch diameter pipe to improve hydraulic capacity. Approximately 4,000 lf of Section 14, an existing 30-inch diameter cast-iron pipe installed in 1916, will be cleaned and cement mortar lined to improve

redundancy for Section 84. The Shaft 9A-D Extension will provide a more reliable connector from Shaft 9A of the City Tunnel Extension to the Section 99 pipe that serves as the suction line to the Gillis Pump Station.

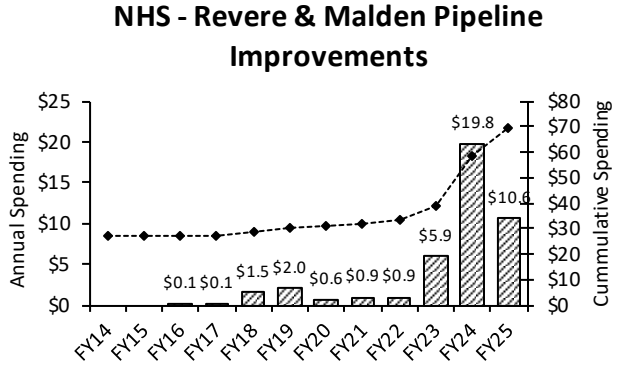
**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Design/CS/RI – Revere/Malden | Design, construction services, and resident inspection for Section 53 in Malden and Sections 97 and 97A in Revere. | Completed |
| Construction Revere Beach (5186) | Installation of 5,491 linear feet of 36-inch pipeline and 10,111 linear feet of 30-inch pipeline on Section 97, as well as 3,872 linear feet of 24-inch pipeline, and 1,350 linear feet of 20-inch pipeline on Section 97A in the vicinity of Revere Beach Parkway. | Completed |
| Construction Malden Section 53 (5176) | Installation of 11,907 feet of 48-inch diameter pipeline in Malden on Section 53. | Completed |
| Construction Linden Square (5238) | Construction and construction administration of a 1,000 linear feet segment of Section 53 in the Linden Square area of Malden. The Massachusetts Highway Dept constructed this section as part of its roadway reconstruction project around Linden Square. | Completed |
| Construction Revere Section 53 (5177) | Rehabilitation of 4,900 linear feet of 30-inch pipe in Revere on Section 53 and replacement of 1,500 linear feet under Route 1 in Revere. | Completed |
| Construction Road Restoration | Design, construction administration, and construction of the full road restoration to ensure a stable road surface without cracking on Eastern Avenue in Malden in compliance with the requirements of the Massachusetts Architectural Access Board. The City of Malden will do this work. | Completed |
| Construction Control Valves (5191) | Installation of control valves needed to regulate water pressure and fill the Winthrop standpipe. | Completed |
| Construction DI Pipeline Cleaning & Lining (5179) | Design and cleaning and lining of the 2,000 linear feet, 8-inch diameter water supply main to Deer Island. | Completed |
| Construction – Winthrop C&L (5178) | Rehabilitation of 7,900 linear feet of 16-inch diameter pipe on Section 32 and 20-inch diameter pipe on Section 55 in Revere and Winthrop. | Completed |
| Section 53 and 99 Connections Design CA (7485), REI (7682) and CP-1 Section 53 Construction (6335), CP-2 Section 14 Construction (7699), and CP-3 Section 99 Construction (6958) | Water Supply Plan, Design, Construction Administration, Resident Inspection and construction for Sections 53 and 99 Connections. | Future |
| CP-1 Construction Section 53 Connections (6335) | Construction of 4,500 linear feet of new 48-inch pipe in Malden. These proposed pipelines will eliminate hydraulic restrictions and better integrate Section 53 into the Northern High distribution system. | Future |

| Sub-phase | Scope | Status |
|---|---|---|
| CP-3 Section 99 Connections Construction (6958) | Construction of approximately 3,000 linear feet of new 60-inch diameter pipeline in Malden connecting the Shaft 9A-D line (60-inch dia.) to Section 99 (72-inch dia.). | Future |
| Section 56 Repl./Saugus River Feasibility Study (7500), Design CA (7454) and Construction (7486), and REI (7681) | Feasibility Study, Design CA and REI, and Construction to replace failed 20/30-inch diameter steel water main crossing of the Saugus River by trenchless methods. Main was installed in 1934 and is out of service. This main provides redundancy to Section 26 which is currently also out of service. | Completed/Future |
| Section 56 Demolition Construction (7536) | Section 56 Construction Pipe Demolition at General Edwards Bridge. | Active |
| Section 14 Pipe Relocation (Malden) (6957) | Abandon 540 lf of existing Section 14 water main in Malden Center and replace with 400 feet of new 36-inch ductile iron water pipe in a new alignment. A 36-inch gate valve will also be installed as well as a blow-off setup. | Completed |
| CP-2 Section 14 Construction (7699) | Rehabilitation of 4,000 lf of Section 14. | Future |
| Sections 13 & 48 Rehabilitation Design CA/RI and Construction (7602/7603) | Design and construction of the rehabilitation of Section 13 (7,300 lf of 36-inch cast-iron 1896 vintage pipe) and Section 48 (7,300 lf of 38-inch diameter and 1,400 lf of 30-inch diameter riveted steel 1929 vintage pipe) in Stoneham, Malden and Melrose from the Gate House at Fells Reservoir partially along Highland Avenue to Pleasant Street and Charles Street will improve hydraulics and water quality. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $82,804 | $28,561 | $54,243 | $1,961 | $631 | $10,344 | $42,000 | $1,898 |



| | | |
|---|---|---|
| Project Status 5/19 | 36.6% | Status as % is approximation based on project budget and expenditures. Revere Beach, Malden Section 53, Revere Section 53 Construction and Linden Square construction are complete. Section 56 Feasibility Study was substantially complete in June 2017. Section 14 Pipe Relocation – Malden was awarded in June 2017. Section 56 Pipe Demolition on General Edwards Bridge was substantially completed in May 2019. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $79,095 | $82,804 | 3,709 | Jul-28 | Jul-28 | None | $7,618 | $10,344 | $2,726 |

**Explanation of Changes**

- Project cost changed primarily due to award for updated cost estimates due to restructuring contracts including CP-2 Section 14 Construction, Sections 53 and 99 Connections Construction Design CA and REI, CP-1 Section 53 Connections Construction, and CP-3 Section 99 Connections Construction contracts. Also, Section 56 Pipe Demolition Construction award was greater than budgeted.

- Spending changed due to updated schedules and cost estimates for Sections 56 Replacement/Saugus Design Construction Administration and Sections 53 and 99 Connections Design/Construction Administration and REI, CP-1 Section 53 Construction, CP-2 Section 14, and CP-3 Section 99 Construction contracts and award listed above.

**CEB Impacts**

- None identified at this time.

# S. 702 New Connecting Mains - Shaft 7 to WASM 3

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To provide redundancy and improve the reliability of WASM 3 (Weston Aqueduct Supply Main); provide hydraulic looping and redundancy, enable Intermediate High Sections 59 and 60 to be taken off-line for rehabilitation, and improve water quality by reducing the length of unlined cast iron water mains in the MWRA system. Completion of this project will help provide the basis for a strong hydraulic network of piping among WASM 3, WASM 4, and the City Tunnel. The future conversion of Sections 23 and 24 in an emergency to provide a redundant supply to the Intermediate High Service system Section 25 and 59 that serve Belmont and Watertown via the WASM Commonwealth Avenue Pump Station.*

**Project History and Background**

WASM 3 is a 56-inch to 60-inch diameter lock-bar steel pipe installed in 1926 and 1927. It is connected to the MetroWest Tunnel and Hultman Branch at the west end and the City Tunnel Extension at its east end. It extends from Weston through Waltham, Belmont, Arlington and Somerville to Medford. Most of its flow comes from the MetroWest Tunnel Shaft W, with peak flow of 57 million gallons per day. A lesser amount enters the main from the City Tunnel Extension Shaft 9. Upon completion of the Hultman Aqueduct and its interconnection to the Weston Aqueduct Terminal Chamber in 1941, WASM 3 became part of the High Service system. There are no connecting mains along the length of this 11-mile pipeline, and no other means available to adequately supply the nine communities it serves. WASM 3 serves communities northwest of Boston and is the sole source of supply to the Northern Extra High Service Area (Bedford, Lexington, Waltham, Arlington, and Winchester) and the Intermediate High Service Area (Belmont, Arlington, and Watertown). It also supplies a portion of the Northern High Service Area (Waltham, Watertown, Belmont, Arlington, Medford, and Somerville), and is a means of supplying the Spot Pond Supply Mains and Reservoir. WASM 3 serves a population of more than 250,000.

A break almost anywhere on this pipeline would result in severe service disruptions in Waltham, Watertown, Belmont, Arlington, Lexington, Bedford, and Winchester. Virtually no water would reach Waltham if a break were to occur at the west end of the pipeline; water normally supplied through the Shaft W connection would be forced through the Shaft 9 connection, increasing flows and reducing hydraulic grade lines in WASM 3, the City Tunnel, and City Tunnel Extension. The lack of redundancy also makes routine cleaning and lining of the 90± year old pipeline impossible. The need for maintenance is indicated by a significant number of leaks, particularly on the most vulnerable west end, which are the result of corrosion pitting through the pipe wall, as well as by the reduced carrying capacity of the line.

Completion of this project will facilitate conveyance of high service water from Shaft 9 of the City Tunnel Extension to WASM 3. This will be accomplished by rehabilitating existing mains between the City Tunnel Extension and WASM 3.

Previously proposed portions of this project have been eliminated or placed on hold until the Long-Term Redundancy study is completed. Specifically, the proposed new 48-inch diameter pipe through Newton and Waltham has been eliminated. The rehabilitation of Sections 23, 24, and 47 will proceed. Also, extension of Section 75 and replacement of Section 25 with a new 20-inch pipe will allow a redundant supply connection to Sections 25 and 59 serving Belmont and Watertown by way of the Commonwealth Avenue Pump Station.

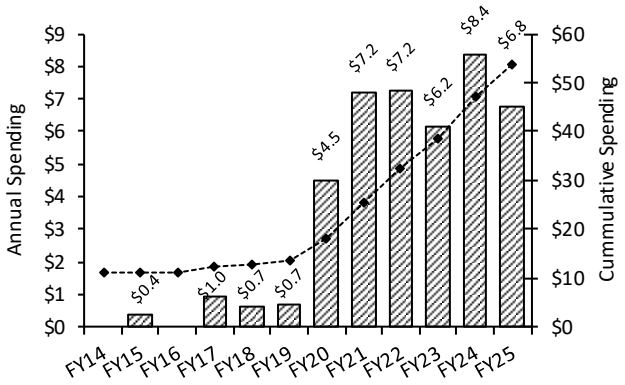
**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Watertown MOU | Payment to the City of Watertown to fund a portion of its Galen Street project to replace an existing 10-inch diameter pipeline with a new 12-inch diameter water main. | Completed |
| Routing Study (5163) | Identification of alternatives to determine the optimum approach for providing additional strong connections to WASM 3. | Completed |
| Design/CA/RI-DP1 (6383) | Design, construction administration and resident inspection services for a new 48-inch pipeline to interconnect WASM 3 with WASM 4 (CP-1). This design work was terminated based on the recommendation of the Long Term Redundancy Study. | Completed |
| Design DP2/4 Meter 120 (6384) | Design services for Section 47 from Meter 120 to WASM4. Construction Administration and Resident Inspection services to be performed by in-house staff. | Completed |
| CP3 C&L Sections 59 & 60 Construction (6548) | Cleaning and lining of 16,400 linear feet of 20-inch diameter pipe on Sections 59 and 60 (Intermediate High) from Section 25 in Watertown to Meter 121 in Arlington. | Future |
| Design/CA/RI and Construction Section 23, 24, 47 (6385/6392) | Cleaning and cement mortar lining of 4,500 feet of 36-inch diameter Section 23 and 11,500 feet of 20-inch Section 24 and Section 47; Replacing 4,200 feet of Section 23 water main, and 6,200 feet of Section 24 water main; Replacement of the check valve assembly at existing Revenue Meter 120 to Boston; and Replacement of 2,400 feet of Newton's 20-inch diameter water main in Ward Street, parallel to Sections 23 and 24. | Active/Future |
| NE Segment CP5 (6394) | Rehabilitation of 15,000 linear feet of 20 and 48-inch diameter pipe for Sections 18, 50, and 51 for the Northeast Segment plus Meter 32 replacement. | Completed |
| Design/CA for Sections 25, 75, 59 & 60 (6955) and REI (7680) | Design/Construction Administration/Resident Inspection services for replacement of Sections 25, extension of Section 75, and rehabilitation of Sections 59 & 60 pipelines. | Active/Future |
| Section 25 Replacement Construction CP-2 (6956) | Replacement of existing Section 25 (approximately 4,800 linear feet of existing 16" pipe) with a new 20-inch diameter pipeline. | Future |
| Section 75 Extension Construction CP-1 (7484) | Addition of approximately 6,000 feet of new 30-inch diameter pipe to extend Section 75 easterly to Section 23 in Newton, to provide a redundant feed to the Intermediate High Service area supplying Arlington, Belmont and Watertown which also requires replacement of Section 25 under construction Contract 6956, above. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $56,376 | $12,925 | $43,452 | $695 | $4,509 | $25,839 | $17,612 | $0 |

## New Connecting Mains




| | | |
|---|---|---|
| Project Status 5/19 | 23.6% | Status as % is approximation based on project budget and expenditures. Northeast Segment CP-5 construction contract was completed in November 2011. Design of CP3 (Sections 23, 24 & 47) commenced in August 2016. Replacement Section 25, 75, 59 & 60 Design/CA was awarded in December 2018. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $48,567 | $56,376 | $7,809 | Dec-25 | Dec-25 | None | $20,707 | $25,839 | $5,132 |

**Explanation of Changes**

- Project cost changed primarily due to updated cost for award of Section 25, 75,59 & 60 Design/ Construction Administration contract, updated REI cost estimate, as well as inflation on unawarded contracts.
- Spending changed due to award for Replace Section 25, 75, 59 & 60 Design/ Construction Administration, updated REI cost, and accelerated schedule for Replacement of Section 25 Construction CP-2.

**CEB Impacts**

- None identified at this time.

# S. 704 Rehabilitation of Other Pump Stations

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Results in a net reduction in operating costs*
☑ *Improves system operability and reliability*

*To rehabilitate five active pump stations (Brattle Court, Reservoir Road, Hyde Park, Belmont, and Spring Street) - each of which is more than 40 years old and is overdue for renewal for safety, reliability, and efficiency reasons. Project includes a future phase to rehabilitate Gillis, Newton Street, Lexington Street, and Commonwealth Ave pump stations.*

**Project History and Background**

MWRA's waterworks distribution system includes ten active pump stations. Extensive rehabilitation of the James L. Gillis, Newton Street, Lexington Street, and Commonwealth Avenue pump stations was completed 20 years ago.

The Brattle Court, Reservoir Road, Hyde Park, Belmont, and Spring Street pump stations were built in 1907, 1936, 1937 and 1958, respectively and were overdue for major rehabilitation. The Brattle Court Pump Station serves the towns of Arlington, Lexington, Waltham, and Winchester. The Reservoir Road Pump Station serves Brookline. The Hyde Park Pump Station serves Boston, Milton, Norwood, Canton, Dedham, Westwood and Stoughton. The Belmont Pump Station serves Belmont, Arlington, and Watertown. The Spring Street Pump Station serves Lexington, Bedford, part of Waltham, Belmont, Arlington, and Winchester. Some equipment at each pump station were inoperable, and system demand patterns had shifted during the life of the stations, requiring adjustments to pumping capacity. In addition, station improvements have not kept pace with changes in building and safety codes.

MWRA has divided construction for these five pump stations into two contracts. The first contract (Construction - Interim Automation), based on a fast-track design was completed in February 2001, involved installation of Supervisory Control and Data Acquisition (SCADA) systems at each station. Under the second construction contract, MWRA completed rehabilitation of the five pump stations (Brattle Court, Reservoir Road, Hyde Park, Belmont, and Spring Street). The second construction contract was awarded in October 2006 and was substantially complete in June 2010.

The next phase will be to rehabilitate the Gillis, Newton Street, and Lexington Street pump stations. The Commonwealth Avenue Pump Station rehabilitation is included in Metropolitan Redundancy Interim Improvements project.

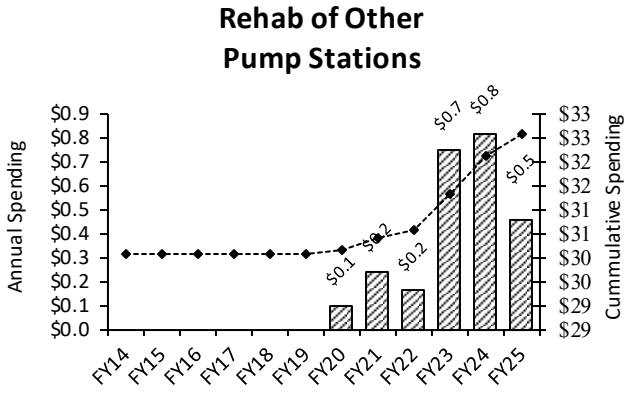
**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Preliminary Design (5153) | Planning and conceptual design including inspection and evaluation of the HVAC systems, buildings, pipes, valves, and other systems at the pump stations; determination of the need for improvements; and preparation of a conceptual design report. | Completed |
| Design 1/CA/RI (6110) | Design, Construction Administration and Resident Inspection for rehabilitation of five pump stations, including installation of SCADA systems. | Completed |
| Construction II and C (6304) | Installation of instrumentation at five pump stations to enable remote operation and monitoring. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Rehabilitation of 5 Pump Stations (6375) | Rehabilitation of Brattle Court, Reservoir Road, Hyde Park, Belmont, and Spring Street pump stations, including installation of new mechanical, electrical, instrumentation, and security systems, and building and site refurbishment, and SCADA installation. | Completed |
| Proprietary Equipment Purchases (6676) | Purchase of proprietary materials for SCADA system for Interim Instrumentation and Control. | Completed |
| Design 2 CS/RI (6980) | Final Design, construction services, and resident inspection for rehabilitation of five pump stations. | Completed |
| Pump Station Rehabilitation Evaluation (7525), Design CA/RI (7526) and Construction (7527) | Rehabilitation of the Gillis, Newton Street, and Lexington Street pump stations. The pumps in these stations are over 20 years old and maintenance of the existing units will be an issue mostly due to availability of replacement parts. More efficient units will be installed based upon age and life of the equipment. Lexington Street is the only pump stations for its respective service area. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $50,258 | $30,058 | $20,200 | $0 | $100 | $1,247 | $18,953 | $0 |




| | | |
|---|---|---|
| Project Status 5/19 | 59.8% | Status as % is approximation based on project budget and expenditures. Construction rehabilitation of 5 pump stations (Brattle Court, Reservoir Road, Hyde Park, Belmont, and Spring Street) was substantially complete in June 2010. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $50,258 | $50,258 | $0 | Jan-27 | May-27 | 4 mos. | $1,321 | $1,247 | ($74) |

**Explanation of Changes**

- Schedule and spending due to updated Pump Station Rehabilitation schedules.

**CEB Impacts**

- None identified at this time.

# S.708 Northern Extra High Service - New Pipelines

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To improve hydraulic service and reliability for major portions of the Northern Extra High System. Existing lines are undersized and frequently experience pressure problems. Improvements will include construction of two new pipe segments and rehabilitation of an existing mains.*

**Project History and Background**

Sections 34, 45 and 61 provide service to the Northern Extra High (NEH) communities of Waltham, Lexington, Bedford, Belmont, Winchester, and Arlington. The existing pipelines are not large enough to meet maximum day plus fire flow service goals. Construction of a new larger pipeline will improve reliability, pressure, and flows which will result in better fire protection and reduced pumping costs. Section 34, which is an undersized 1,532 linear feet 12-inch diameter cast iron main installed in 1911, may also be the source of water quality problems. The pipe is a key component of the NEH Service System and provides service between Brattle Court Pump Station and the community distribution systems. The remaining portion of Section 45 is a 16-inch diameter cast iron main 3,374 linear feet long that was installed in 1920. A portion of Section 45 was rehabilitated in an earlier phase of this project. The current phase includes rehabilitation of the remaining portion of the pipeline. Section 61 is a 24-inch diameter steel pipe installed in 1940.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Design/CA/RI and construction – Sections 45, 63, and 83 (5242/6340) | Replacement of approximately 2,600 linear feet of Section 45 with 24-inch diameter pipe extending from the connection point at Meter 47 to Section 82 on Park Street at the Intersection of Paul Revere Road in Arlington; installation of about 2,100 linear feet of new 24-inch pipeline (Section 101), parallel to a portion of Section 83, starting from Meter 182 and proceeding to the intersection of Waltham Street (in Lexington and part of Waltham) and Concord Ave (in Lexington). Also, Rehabilitation of Section 63, consisting of about 3,400 linear feet of 20-inch pipeline connecting Section 63 to Meter 136. | Completed |
| Design and Construction Sections 34, 45, and 61 (7404/6522) | Replacement of 1,532 linear feet of 12-inch diameter cast-iron pipe (Section 34) with new 20-inch diameter pipe and rehabilitation of 3,374 linear feet of 16-inch diameter cast iron main (Section 45) and 4,771 lf of 24-inch diameter steel pipe (Section 61). | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $10,874 | $3,632 | $7,242 | $10 | $13 | $447 | $6,795 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 33.4% | Status as % is approximation based on project budget and expenditures. Construction of a portion of Section 45 was completed in September 2001. Design of Sections 34, 45 and 61 is scheduled to start in FY22. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $10,685 | $10,874 | $189 | Jul-26 | Jul-26 | None | $402 | $447 | $45 |

**Explanation of Changes**

- Project cost and spending changed due to inflation adjustments for Sections 34, 45 & 61 Design/Construction Administration/Resident Inspection and Construction.

**CEB Impacts**

- None identified at this time.

# S. 712 Cathodic Protection of Distribution Mains

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To evaluate the condition of existing cathodic protection systems and determine the feasibility of upgrading or installing cathodic protection systems to protect the system from corrosion.*

**Project History and Background**

Within the MWRA water system there are approximately 300 miles of distribution pipe, 10 active pump stations, and 12 distribution storage facilities. A majority of the pipes are made of steel, cast iron and ductile iron and as a result are subject to corrosion due to the environmental conditions in which they reside. In order to maintain pipe integrity, cathodic protection is utilized within the system. Proper cathodic protection decreases the number of pipeline leaks and failures and ensures the integrity of the water distribution system is maintained.

Approximately 68 miles or 24% of MWRA's waterworks pipelines ranging from 24 inches to 60 inches in diameter are made of steel and are particularly subject to corrosion from acidic soils, fluctuating groundwater levels (especially where the groundwater is saline), and stray electrical currents. These steel pipelines are located in 26 of MWRA's 50 water communities.

Cathodic protection reduces deterioration of structural material, thereby increasing pipeline and storage tank life and deferring the need for replacement. Without proper cathodic protection, pipeline leaks and premature pipeline and storage tank failures increase, causing potentially costly property damage and possible loss of service to customers.

Some sections of MWRA's existing steel pipes were originally equipped with cathodic protection systems intended to reduce the effects of corrosion. Other steel pipelines had cathodic protection systems installed sometime after the original pipe installation. Other steel pipelines have been rehabilitated and still other sections of steel pipeline have never received cathodic protection.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Planning | Evaluation of the condition of the steel pipelines, identification of areas of rapid corrosion due to stray currents, and design and installation of corrosion test stations. | Completed |
| Cathodic Protection Testing and Evaluation Program (6438) | Test and evaluate 1,019 cathodic protection test stations and 16 rectifiers including: level of protection; functionality of insulation joints; perform repairs; and indentify, recommend and test replacement electrodes. | Completed |
| Cathodic Protection Shafts E & L Construction (6440) | construction of Cathodic Protection Shafts E & L. | Active |
| Cathodic Protection (Western System) Design/CA and Construction (7609/7610), and REI (7678) | Design CA/RI and Construction to replace the existing cathodic protection systems in order to maintain pipe and steel storage tanks integrity for the Western System. | Future |

| Sub-phase | Scope | Status |
|---|---|---|
| Cathodic Protection (Metro System) Design CA and Construction (7611/7612), and REI (7679) | Design CA/RI and Construction to replace the existing cathodic protection systems in order to maintain pipe and steel storage tanks integrity for the Metropolitan System. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY20 |
|---|---|---|---|---|---|---|---|
| $66,704 | $270 | $66,434 | $406 | $394 | $9,740 | $56,695 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 1.2% | Status as % is approximation based on project budget and expenditures. Project Planning phase is complete. Cathodic Protection Testing and Evaluation Program was completed in August 2017. Cathodic Protection Shafts E&L commenced in January 2019. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $62,716 | $66,704 | $3,988 | Dec-26 | Jan-27 | 1 mos. | $11,531 | $9,740 | ($1,791) |

**Explanation of Changes**

- Project cost changed primarily due to updated cost estimates for Cathodic Protection West and Metropolitan Resident Engineering/Inspection contracts.
- Spending changed due to updated cash flow for the Cathodic Protection Metropolitan System Construction, partially offset by the updated cost estimates listed above.

**CEB Impacts**

- None identified at this time.

# S. 713 Spot Pond Supply Mains - Rehabilitation

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To improve the condition, carrying capacity, and valve operability of the two long supply mains which extend north from Chestnut Hill to Spot Pond. These cast-iron mains, originally installed in 1899, deliver water to the Northern Low Service System. Improvements involve a combination of replacement, cleaning and lining, and valve replacement depending on specific site conditions and needs. Improving these supply lines will reduce the need to take water from the City Tunnel to augment the Low Service System and improve the quality of water delivered to eight user communities.*

**Project History and Background**

The East and West Spot Pond Supply Mains (SPSMs) serve the Northern Low Service Area, including portions of Brighton, East Boston, Charlestown, Chelsea, Malden, Medford, Somerville, and Everett. The lines are also designed to fully supply Cambridge during drought or emergency. The mains have historically supplied Spot Pond and subsequently the James L. Gillis Pump Station (formerly the Spot Pond Pump Station). With the closure of Spot Pond as a water supply source and the construction of the Spot Pond Suction Main (Section 99) as the primary supply to the Gillis Pump Station, the Spot Pond Supply Mains serve as distribution mains to the eight communities and provide emergency backup supply to the Gillis Pump Station. In the event Section 99 is out of service, the station would take suction directly from these mains, rather than from Spot Pond. These mains interconnect with the new Spot Pond Covered Storage and pump station.

The East Spot Pond Supply Main consists of 61,000 linear feet of mostly 48-inch diameter pipe which passes through Brookline, Boston, Cambridge, Somerville, Medford, Malden, Melrose, and Stoneham. The West Spot Pond Supply Main consists of 53,000 linear feet of 48-inch and 60-inch diameter pipe that passes through Brookline, Boston, Cambridge, Somerville, Medford, and Stoneham. Portions of the SPSMs in Brookline, primarily on Beacon Street, were rehabilitated under the Boston Low Service Pipe and Valve Rehabilitation project.

The carrying capacities of the pipes had been significantly reduced as a result of the build-up of rust deposits (tubercules) and other matter along the pipe walls, which also contributed to water quality deterioration in the Low Service System. The ability of the mains to withstand service pressures was drastically reduced in some areas due to exterior corrosion of pipes. In addition, inoperable or poorly operating valves along the mains made isolation and re-routing of flow difficult to implement.

Section 67 is included in this project because it provides a connection between the East and the West SPSM from Section 11 at Porter Square in Cambridge to Section 4 at Union Square in Somerville. Section 67 consists of 6,900 linear feet of 48-inch diameter steel pipe constructed in 1949. Rehabilitation of this main was needed because of the age of the pipe and the critical role of the main in providing flow to the East and West mains during shut downs for maintenance and construction.

Internal lining of these mains to restore capacity and improve structural integrity, will ensure adequate peak and emergency flow to user communities, alleviate water quality deterioration, and provide emergency back-up capacity for the Northern High System and Northern Intermediate High via the Gillis Pump Station. MWRA's reconfiguration of the water distribution system provides for the Spot Pond Supply Mains to be fed from the City Tunnel Extension only during periods of peak demand, thus conserving tunnel supply for High Service use. Supply to the Low Service System will be provided by Weston Aqueduct Supply Mains 1 and 2, which are connected to the new Loring Road covered storage tanks in Weston that have been constructed as part of MWRA's MetroWest Water Supply Tunnel project. A portion of the supply is from WASM 4, which connects to the East and West Spot

Pond Supply Mains at Western Avenue and North Harvard Avenue and on Memorial Drive at Magazine Beach in Cambridge.

Completion of this project will improve pressures to the far reaches of the Northern High Service Area by reducing the demand burden on the City Tunnel Extension. The quality of water delivered to eight communities will improve as a result of the upgrade of 18 miles of deteriorated pipe.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Preliminary Design and Design/CA/RI (6223) | Preliminary design, design, construction administration, and resident inspection of the rehabilitation or replacement of Sections 3, 4, 5, 6, 7, 9, 10, 11, 12, 67, and portions of Sections 2, 16W, and 57. | Completed |
| North (Medford/ Melrose) Construction-CP1 (6317) | Cleaning and lining of 20,300 feet of 48-inch and 60-inch pipe in Medford, Malden, Melrose, and Stoneham (Sections 7 and 12). Replacement of valves and reconfiguration of blow-off valves to eliminate cross-connections with storm drains or sewers. Elimination of connection with Spot Pond (considered a cross connection with a non-potable water source), and configuration to allow emergency reconnection if needed. | Completed |
| Middle (Medford/ Somerville) Construction – CP2 (6381) | Cleaning and lining of 24,100 feet of the East Spot Pond Main (48-inch pipe) in Somerville and Malden (Sections 4, 5, 6, and 7) including reinforcement at rail and MBTA crossings; cleaning and lining of 14,000 feet of the West Spot Pond Main (48-inch pipe) in Medford and Somerville; and some steel pipe replacement on the Mystic Valley Parkway (800 feet, 60-inch, Section 16W), and Middlesex Fells Parkway (700 feet, 48-inch, Section 5 on land). Cleaning and lining on Somerville Avenue (Section 67, 6,500 feet of 48-inch steel). Replacement of valves throughout the pipelines, including in Medford Square at the interconnections of Sections 12, 16W, and 57. | Completed |
| South (Cambridge/ Boston) CA/RI Construction – CP3 (6382) | Cleaning and lining of 11,700 linear feet of the East Spot Pond Main in Charles River Crossing and Cambridge (48-inch, Sections 3 and 4) including valve replacement, and cleaning and lining of 16,800 linear feet of the West Spot Pond Main in Harvard St., Franklin St., No. Harvard Avenue, and Massachusetts Avenue (48-inch, Sections 9 and 11, Brighton and Cambridge). | Completed |
| Early Valve Replacement Contract (6475) | Installation of nine main line valves and associated blow-off valves, as well as permanent by-pass piping to meters and air valves. Also includes removal of pipe at three locations for materials strength testing. | Completed |
| Walnut Street Bridge Truss Design and Construction (6697/7483) | Section 4 Bridge Truss at Walnut Street spans New Hampshire-Maine Railroad Line is in need of repair, painting and possible replacement. | Future |
| Early Valve Equipment Purchase (6483) | Purchase Order for 12 valves that were installed from 1998-2001 as a precursor to the cleaning and lining contracts. | Completed |
| Section 4 Webster Ave Bridge Pipe Rehabilitation Design and Construction (7334/7335) | Section 4 is a 48-inch diameter cast iron main crossing the Webster Ave Bridge in Somerville that needed to be rehabilitated and was currently out of service due to pipe deflection and leakage. This project returned an isolated pipeline to service to provide redundancy. | Completed |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $66,289 | $65,489 | $800 | $43 | $0 | $800 | $0 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 98.8% | Status as % is approximation based on project budget and expenditures. Construction of CP1 (North), CP2 (Middle), CP3 (South), the Early Valve Replacement Contract and Section 4 Webster Ave Bridge Pipe Replacement are complete. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $66,333 | $66,289 | ($44) | May-23 | May-23 | None | $800 | $800 | $0 |

**Explanation of Changes**

- Project cost changed due to updated final cost for the Section 4 Webster Ave Bridge Pipe Rehabilitation Design contract.

**CEB Impacts**

- None identified at this time.

# S. 719 Chestnut Hill Connecting Mains

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To simplify the complex arrangement of old pipes near the former Chestnut Hill pump stations for safety and operability. Also, create a connection between Shaft 7 of the City Tunnel and the Southern Distribution surface mains to provide redundancy along the Dorchester Tunnel. MWRA is restructuring the piping arrangement through a combination of constructing new pipelines, rehabilitating older pipelines, sliplining, abandoning aqueducts, replacing pressure regulating valves, replacing the emergency pumps at Chestnut Hill, and abandoning pipes and valves which are no longer needed for service.*

**Project History and Background**

The City Tunnel divides into two branches at Chestnut Hill: The City Tunnel Extension going north to supply the Northern High, Northern Intermediate High and Northern Extra High Systems, and the Dorchester Tunnel, which goes south to supply the Southern High and Southern Extra High Systems. There are two shafts in the Chestnut Hill area: Shaft 7 on the City Tunnel, located immediately west of the Chestnut Hill Reservoir, and Shaft 7B on the Dorchester Tunnel, located immediately east of the reservoir. At each of these shafts two newer pipes extend to connect to the older pipelines of the Boston Low, Northern Low and Southern High Systems.

Previously, the Southern High System could only be supplied from Shaft 7B. If the Dorchester Tunnel were to be out of service, it would be necessary to activate the Sudbury Reservoir System, transport water from there via the Sudbury Aqueduct (currently on standby) to the Chestnut Hill Reservoir (currently on standby) and utilize the emergency pump station at Chestnut Hill to pump water from the reservoir to the Southern High System. This water would not be of acceptable quality and its use would require a boil order. A new potable water connection has been constructed from the low service pipes to the new emergency pump station.

The older pipes in the area were originally designed to be supplied from the Cochituate and Sudbury Aqueducts, the Chestnut Hill Reservoir, or the Chestnut Hill High Service and Low Service pump stations. None of these facilities are presently in normal use, and a new underground pump station has replaced the Chestnut Hill pump stations. The pipe network is not only old and inordinately complex, but it is not designed to take water from the two tunnel shafts that are the present sources of potable supply. Portions of this pipe network have been rehabilitated and integrated into the present operation of the system. Considerable lengths of pipe with minimal or stagnant flow, which are a source of discolored water, have been abandoned. Some new pipe was added to better connect the two tunnel shafts with the surface pipe network. The interconnections between the potable water system and standby facilities, which are considered non-potable, have been rebuilt to eliminate the possibility of cross-connections during normal operation.

The High and Low Service pump station buildings at Chestnut Hill housed facilities which served four functions: emergency pumping, surge relief for the Boston Low System, level control for the Chestnut Hill Reservoir, and remote hydraulic operation of large valves on and near the site of the High Service pump station. Construction of a new underground pump station provides more reliable emergency pumping capacity and has enabled MWRA to abandon the pump station buildings and return them to the Commonwealth. Surge relief was provided in a new Shaft 7B pressure reduction chamber that also interconnects restructured piping. Gate House No. 2 has also been refurbished to provide supply to the new pump station. New valves have been constructed to replace the old hydraulic valves.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Design/CA/RI and Construction – Pump Station Potable Connection (6141/6651) | Construction of potable suction and discharge piping to the emergency pump station, restructuring piping to permit surplusing of Chestnut Hill pump station site, elimination of potential cross connections with non-potable suction and discharge lines, reconstruction of the Shaft 7B PRV Station, upgrade of the Shaft 9A PRV station, rehabilitation of valves at Waban Hill Reservoir, and abandonment of the Ward Street Pumping Station and associated piping. Construction to provide potable low service suction to the new pump station and to restructure piping to permit surplusing of the historic pumping stations site. Completion of upgrades of facilities that also may be used during the Walnut Hill Water Treatment Plant startup at Shaft 7B, Shaft 9, and Ward Street. | Completed |
| Preliminary Engineering (6301) | Provide preliminary design services for the rehabilitation and upgrade of facilities so that MWRA is able to operate the water system during normal conditions and specific emergency scenarios. | Completed |
| Design/CA/RI and Construction – Emergency Pump Relocation (6503/6501) | Relocation of the emergency pumping function and other minor facilities from the existing High and Low Service pump station buildings to a new 90-mgd underground pump station constructed adjacent to the Low Service building. The relocation enables MWRA to surplus these historic buildings. The new pump station has the capacity to pump 90-mgd from the Sudbury Aqueduct/Chestnut Hill Reservoir to the Southern High Distribution System. | Completed |
| Boston Paving (6558) | Payment(s) to the City of Boston for paving work provided. | Completed |
| BECo Emergency Pump Connection (6623) | Payment to Boston Edison Company for installation of electrical service to meet special requirements. | Completed |
| Chestnut Hill Final Connections Design ESDC/REI and Construction (6995/6982) | Chapter 30 and Chapter 149 final pipe connections. | Future |
| Equipment Pre-Purchase (6814) | Valve pre-purchase to support potable connection construction so that the Chestnut Hill Pump Station site could be returned to the Commonwealth of Massachusetts as surplus property. | Completed |
| Demolition of Garages (6820) | Demolition of garages prior to transfer of property to the Commonwealth, at request of state Department of Capital Asset Management. | Completed |
| Chestnut Hill Gatehouse No. 1 Repairs (7382) | This project provided structural stability of sub-structure of gatehouse which involved flowable fill and structural support walls. | Completed |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $33,827 | $18,287 | $15,540 | $0 | $0 | $0 | $15,534 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 54.1% | Status as % is approximation based on project budget and expenditures. Chestnut Hill Gatehouse Repairs was substantially complete in April 2018. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $33,435 | $33,827 | $392 | Dec-27 | Dec-27 | None | $0 | $0 | $0 |

**Explanation of Changes**

- Project increased due inflation adjustments for Chestnut Hill Final Connections work. This was partially offset by change orders for the Chestnut Hill Gatehouse #1 Repairs.

- Schedule shifted due to project priorities.

**CEB Impacts**

- None identified at this time.

# S. 721 Southern Spine Distribution Mains

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To increase carrying capacity and improve valve operability along the large surface mains that run parallel to the Dorchester Tunnel and provide service to the Southern High and Southern Extra High systems. These mains have serious hydraulic deficiencies and many inoperable valves. Hydraulic performance improvements are needed to provide redundancy for the Dorchester Tunnel. Work will include rehabilitation of more than 12 miles of large diameter pipeline.*

**Project History and Background**

The Southern Spine Distribution Mains comprise the surface piping which parallels the Dorchester Tunnel. The mains begin in the vicinity of Shaft 7B in Brookline and end at the Blue Hills Reservoir in Quincy. The mains serve the Southern High and Southern Extra High System communities of Boston, Brookline, Milton, Quincy, Norwood, Canton, Stoughton and Dedham-Westwood.

Because of the poor conditions of the valves, MWRA operations staff must frequently close several valves in order to shut down a line. This practice often results in closing more of the system than is otherwise necessary. Several of these pipelines are currently functioning at approximately 50% of their original carrying capacity due to the build-up of rust deposits and other matter along the pipeline walls. In their present condition, these mains could not provide adequate service to users if the Dorchester Tunnel was taken off-line.

Construction of the first two contracts for Section 22 South was completed by June 2005. The contracts for Section 107 Phase 1 and Phase 2 were completed in January 2009 and January 2012, respectively.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Sections 21,43, 22 Design/CA/RI | Design, construction administration, and resident inspection for five construction contracts in Phase 1, including rehab of 32,000 linear feet of 24- to 48-inch diameter pipes, and installation of 17,000 linear feet of 36- to 48-inch pipes. Rehabilitation to consist of cleaning and cement mortar lining, and replacement of the main line valves, blow-off valves, and appurtenances. | Completed |
| Section 22 South Construction | Rehabilitation of approximately 10,000 linear feet of 48-inch diameter Section 22 South, and installation of 1,700 linear feet of new pipe. | Completed |
| Adams Street Bridge | Relocation of a pipeline made necessary by the reconstruction of this bridge by the MBTA. | Completed |
| Southern High Ext Study (6602) | Study to determine the feasibility of expanding water services to additional communities in the Southern High Service Area. Cost of the study and public participation was fully funded by the Commonwealth of Massachusetts. Completed in May-1999. | Completed |
| Section 22 Rehab Alternative Analysis/Environmental Permitting (7155) | Section 22 rehabilitation alternatives analysis and environmental permitting. | Future |

| Sub-phase | Scope | Status |
|---|---|---|
| Section 22 Design/ESDC (7120) | Design/ESDC for Section 22. | Future |
| Section 22 Construction (6844) | Rehabilitation of 16,000 linear feet of 48-inch diameter Section 22 and 5,000 linear feet of 24-inch diameter Section 21. | Future |
| Section 20 and 58 Rehabilitation Design (6296) and Construction (6298) | Rehabilitation of approximately 19,000 feet of 36-inch diameter steel and cast iron pipes in Morton Street from Shaft 7C of the Dorchester Tunnel to Washington Street. | Future |
| Section 107 Phase 1 Construction (6845) | Construction of 4,400 linear feet of new 48-inch diameter pipe from East Milton Square to Furnace Brook Parkway in Milton and Quincy. | Completed |
| Section 107 Phase 2 Construction (7099) | Replacement of Sections 21 and 43 with 9,200 linear feet of new 48-inch diameter pipe from Dorchester Lower Mills in Boston to East Milton Square, and cleaning and lining of 4,000 feet of existing water mains | Completed |
| Contract 1 A Construction (6885) | Rehabilitation of 4,400 linear feet of Section 22 South. | Completed |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $80,308 | $36,683 | $43,625 | $0 | $767 | $3,271 | $40,245 | $109 |

| | | |
|---|---|---|
| Project Status 5/19 | 45.7% | Status as % is approximation based on project budget and expenditures. Section 22 Rehabilitation Alternatives Analysis and Environmental Permitting is expected to commence in early FY20. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $77,401 | $80,308 | $2,907 | May-27 | May-27 | None | $1,890 | $3,271 | $1,381 |

**Explanation of Changes**

- Project cost increased due to updated cost estimate for Section 22 Rehabilitation Alternatives Analysis & Environmental Permitting as well as inflation adjustments for Section 22 North Construction and Sections 20 & 58, Design and Construction.

- Spending changed primarily due to updated cost estimates listed above.

**CEB Impacts**

- None identified at this time.

# S. 722 Northern Intermediate High (NIH) Redundancy and Storage

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

***Master Plan Project ☑ 2008 Priority Rating 1 (see Appendix 3)***

*The Northern Intermediate High System lacks both pipeline redundancy and sufficient storage. The intent of this project is to identify and take measures that reduce both the risk and impacts of a pipeline failure within the Northern Intermediate High System.*

**Project History and Background**

This system serves Reading, Stoneham, Wakefield, Wilmington, Winchester, and Woburn with an average daily demand of 9.9 million gallons. The population served is approximately 150,000. The current six million gallon capacity of MWRA's Bear Hill Tank in Stoneham is both insufficient to meet MWRA's goal of one day of storage for the service area and is not advantageously placed within the NIH system.

Section 89 is a three mile, four foot diameter Prestressed Concrete Cylinder Pipe (PCCP) transmission main with no redundancy other than the low capacity, century old Section 29 that parallels its route for a short distance. The 10,500 foot length of Section 89 northwest of Spot Pond is constructed of Class IV wire which is of significant concern given experience with catastrophic failures elsewhere in the country. Section 29 was originally constructed in 1901 and measures 6,300 feet in length and 24 inches in diameter. Because of its age and the fact that it is unlined cast-iron pipe, tuberculation has reduced the pipeline carrying capacity to approximately 45% of the original design capacity (C-value: 58). In the event of a shut down in Section 89, Section 29 may not be able to meet the minimum hydraulic needs of the area and additional chlorination to maintain water quality may be required.

**Scope**

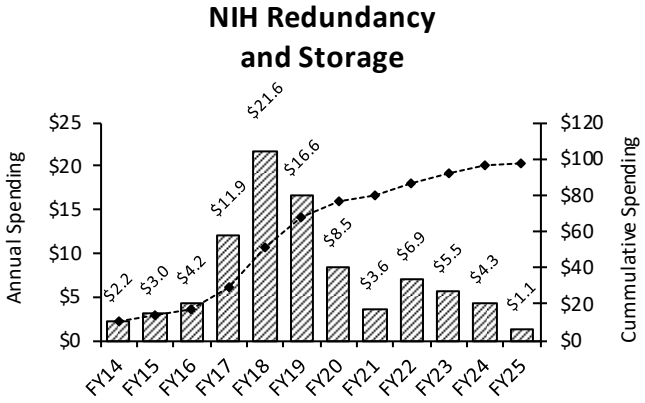
| Sub-phase | Scope | Status |
|---|---|---|
| Concept Plan, ENF, and Mobile Pump Unit | Developed a concept level plan to evaluate options to reduce the risk and the impacts of potential failures in Sections 29 and 89. Measures evaluated included valve improvements, improved community interconnections, pipeline redundancy, targeted emergency response plans, additional storage and other improvements that can be implemented within the NIH system. Concept planning work included environmental review of the recommended plan and specification and purchase of the Mobile Pump Unit. | Completed |
| Design CA/RI and construction NIH Impr/Gillis PS Impr./Reading-Stoneham Interconnection (7045/7260/7261) | This phase includes the design and construction of short-term measures identified in the conceptual plan including Gillis PS Improvements and the Reading/Stoneham Interconnection. | Completed |
| | | |

| Sub-phase | Scope | Status |
|---|---|---|
| Design CA/RI and Construction Section 89/29 Redundancy Phases 1A, 1B, 1C & 2 | Contract 6906 includes design and CA/RI for the redundant pipeline Section 110 (approximately 7 miles) consisting of 4 construction contracts. Phase 1 includes Phase 1A West Street Section 110 Woburn/Reading (7066), Phase 1B Section 110 Reading (7471) and Phase 1C Section 110/112 Stoneham and Wakefield (7478). Phase 2 includes Section 110 in Stoneham (7067). | Active/completed |
| NIH Storage Design & Construction (7311/7068) | The Concept Plan has identified several potential storage locations in the NIH system. This phase includes the design and construction of two 3-MG elevated tanks. | Future |
| Section 89 Replacement Design/CA (7116), RE/RI Services (7633) and Construction (7117) | Section 89 will be replaced after the redundant pipeline is completed. These phases include design/CA, RE/RI and construction for the replacement of Section 89. | Active/ Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $121,188 | $48,895 | $72,293 | $16,577 | $8,477 | $41,066 | $31,215 | $11 |

| | | |
|---|---|---|
| Project Status 5/19 | 53.2% | Status as % is approximation based on project budget and expenditures. Section 89/29 Redundancy Design/CA/RI contract was awarded in March 2011. Reading/Stoneham Interconnections was substantially complete in October 2012. Gillis Pump Station Improvements was substantially complete in December 2014. West St Pipeline Reading Construction Phase 1A was substantially complete in May 2015. Phase 1B and Phase 1C were substantially complete in May 2018 and September 2018, respectively. Phase 2 Construction commenced in September 2017. |



**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $118,494 | $121,188 | $2,694 | Jan-28 | Jan-28 | None | $42,080 | $41,066 | ($1,014) |

**Explanation of Changes**

- Project cost increased primarily due to change orders for Section 89/29 Redundancy Construction Phase 2, Phase 1C and B, design amendment and inflation adjustments for NIH Storage contracts.
- Project spending changed primarily due to updated cash flows for Section 89 & 29 Replacement Construction and Section 89/29 Redundancy Construction Phase 2 partially offset by updated schedule for Section 89 Replacement Resident Engineering/Resident Inspection Services, amendment for Section 89/29 Redundancy Design CA/RI, and updated cash flow for Section 89/29 Redundancy Phase 1C.

**CEB Impacts**

- None identified at this time.

# S. 723 Northern Low Service Rehabilitation - Section 8

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To improve the condition and reliability of unlined cast-iron pipes serving a portion of the Northern Low System. These pipelines, have reduced carrying capacity because of rust build-up, and have experienced leaks at above average rates. Improvements will consist of a combination of replacement, cleaning, lining, and valve repairs. Rehabilitation of Sections 37 and 46 will improve the service to East Boston and will allow the shutdown of Section 8. The construction of Section 97A provides needed redundancy to East Boston via the Northern High System.*

**Project History and Background**

Section 8 was installed between 1897 and 1915 and serves Malden, Everett, Chelsea, and East Boston. Section 8 is currently functioning at approximately 45% of its original capacity (C-value: 60) due to the build-up of rust deposits and other matter along the interior pipe wall. Excavations for the installation of new valves along portions of Section 8 have indicated severe external corrosion on the pipe wall, which could affect the structural stability of the pipeline.

Before rehabilitating Section 8, the distribution system supplying East Boston must be strengthened. Sections 37 and 46, located in Chelsea, are 36-inch diameter cast iron pipes. These two pipe sections connect between Section 57, portions of which were previously rehabilitated, and the two Chelsea River crossings to East Boston at Sections 8 and 38. It is anticipated that Sections 37 & 46 will need cleaning and cement mortar lining. Section 97A, a new 16-inch diameter pipe provides redundancy to East Boston via Northern High System. The pipeline connects to existing Meter 99 in East Boston and to the Boston low-pressure system through a new pressure-reducing valve.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Design CA/RI and Construction – Section 8 and 57 (7092/6322) | Cleaning and cement mortar lining of the pipeline interior, replacement of all defective and inoperable valves, and the addition of new valves for 7,500 linear feet of 48-inch pipe on Section 8 in Malden and Everett. Replacement work consists of replacing 9,722 feet of 42-inch pipeline with new 36-inch ductile iron main and replacement of blow-off connections from Second Street in Everett to the Mystic River Bridge in Chelsea. | Future |
| Rehab Sections 37 and 46 Chelsea, East Boston Design, CA/RI and Construction (7405/6962) | Rehabilitation of approximately 3,550 linear feet of 36-inch cast iron main (Section 37) and approximately 2,500 linear feet of 36-inch cast iron main (Section 46). Both sections are located in Chelsea and are critical to the supply of water to East Boston. Section 38, the 36-inch ductile iron pipeline under the Chelsea River, is assumed to not need rehabilitation. | Future |
| Section 97A Construction (7021) | Installation of approximately 3,000 linear feet of 20-inch, 16-inch and 12-inch water main and a new pressure-reducing valve. This completed work is part of the Northern High System and adds redundancy to East Boston, including Logan Airport. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Sections 50/57 Water and 19/20/21 Sewer Rehabilitation Design CA/RI (7540) and Construction (7541) | Design, CA/RI and construction of rehabilitation of: 12,000 feet of 20-inch cast iron Northern High System water pipe; 8,000 feet of 48-inch steel Northern Low System water pipe and 2,100 feet of 51-inch by 56-inch brick sewer of the North Metropolitan System and associated manholes, valves and structures located in Medford and Malden, MA. | Active/Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $69,584 | $2,955 | $66,630 | $607 | $1,648 | $29,898 | $35,936 | $796 |

| | | |
|---|---|---|
| Project Status 5/19 | 6.8% | Status as % is approximation based on project budget and expenditures. Section 50 & 57 Water & Sections 21/20/19 Sewer Design/ESDC/REI contract commenced in July 2017. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $62,366 | $69,584 | $7,218 | Jul-28 | Jul-28 | None | $18,269 | $29,898 | $11,629 |

**Explanation of Changes**

- Project cost changed primarily due to updated cost estimate for Section 50 & 57 Water & 21/20/19 Construction as well as inflation adjustments on unawarded contracts.

- Spending changed primarily due to updated cost estimate and accelerated schedule for Section 50 & 57 Water & 21/20/19 Sewer Construction.

**CEB Impacts**

- None identified at this time.

# S. 727 Southern Extra High Redundancy & Storage

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

***Master Plan Project ☑ 2008 Priority Rating 2 (see Appendix 3)***

*To provide redundancy to the southern extra high mains Section 77 and 88 serving Boston, Canton, Norwood, Stoughton and Dedham-Westwood by construction a redundant pipeline. Also, to increase distribution storage within the service area to improve system operation and reliability.*

**Project History and Background**

This project will provide redundancy to Sections 77 and 88 serving Boston, Canton, Norwood, Stoughton, and Dedham-Westwood, through construction of a redundant pipeline. The project will also increase distribution storage within the service area to improve system operation and reliability.

MWRA's Southern Extra High pressure zone serves Canton, Dedham, Norwood, Stoughton, Westwood, portions of Brookline, Milton, Newton, and the Roslindale and West Roxbury sections of Boston. Water is pumped to this pressure zone from the Dorchester tunnel through two pump stations.

The Southern Extra High pressure zone is currently deficient in distribution storage and lacking in redundant distribution pipelines. MWRA maintains two distribution storage tanks (Bellevue Tank 1 and Bellevue Tank 2) totaling 6.2 million gallons of storage for the entire Southern Extra High service area, which is significantly below the goal of one day of storage. Further highlighting the deficiency is the fact that the overflow elevation for the 2.5-million-gallon Bellevue Tank 1 is 25 feet lower than the overflow elevation for the newer 3.7-million-gallon Bellevue Tank 2, limiting its useful capacity.

The five communities in the southern portion of the service area (Canton, Norwood, Dedham, Westwood, and Stoughton) are served by a single MWRA 36-inch diameter transmission main (Section 77), which is five miles long. Canton and Stoughton are served by a branch (Section 88) off of Section 77. Although several of these communities are partially supplied by MWRA, the loss of this single transmission main would result in a rapid loss of service in Norwood and Canton, and water restrictions for Stoughton and Dedham/Westwood.

In addition, the Southern Extra High service area has expanded during the past several years with the addition of the partially-supplied Town of Stoughton and the Dedham-Westwood Water District. This growth has been concentrated to the south while the Bellevue tanks are located at the northern end of the service area. Although several of these communities are partially supplied by MWRA, the Town of Norwood is fully supplied by this line and has no back-up source of supply. There have been several instances when the water supply to Norwood has been interrupted due to valve and/or pipe failures.

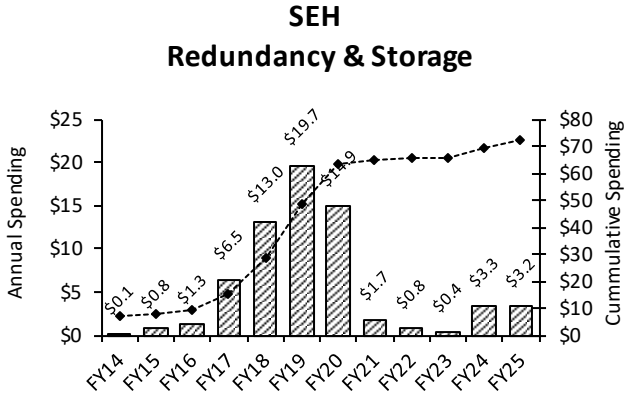
**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Concept Plan (6452) | A study to assess storage, capacity and condition of existing distribution pipes, new pipeline routing options and tank sites were identified. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| University Ave Water Main Section 108 (6445) | Initial phase to provide redundant pipeline on University Avenue in Norwood. Project broken out from the larger SEH redundancy and storage projects. This work has been completed. | Completed |
| Redundancy Pipeline Section 111 Design (6453) & Construction Ph 1 Contracts 1, 2, and 3 (6454, 7504, 7505) | The first phase funds the design and construction of a pipeline from the Bellevue storage tank to East Street in Westwood, which will provide redundancy to Sections 77 & 88. | Active |
| Storage Design & Construction Phase 2 (6444/7245) | The second phase will provide redundancy to Sections 77 & 88 through design and construction of one (1) 2.5 million gallon distribution storage tank. This tank is needed to provide adequate one day storage to the service area. | Future |
| Storage Design & Construction Phase 3 Second Tank (7263/7262) | The third phase will provide additional redundancy to Sections 77 & 88 through design and construction of an additional one (1) 2.5 million gallon distribution storage tank. This tank is needed to provide additional one day storage to the service area. | Future |
| Section 77/88 Design/Constr. (7112/7113) | Rehab of Sections 77 & 88 after redundant pipeline is in place. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY23 |
|---|---|---|---|---|---|---|---|
| $132,426 | $28,445 | $103,981 | $19,657 | $14,857 | $37,378 | $13,899 | $52,704 |



| | | |
|---|---|---|
| Project Status 5/19 | 30.4% | Status as % is approximation based on project budget and expenditures. Conceptual Design began in February 2007. University Ave Water Main was substantially complete in November 2008. Redundancy/Storage Phase 1 Final Design/CA/RI commenced in February 2014. Redundancy Pipeline Section 111 Construction 1 was substantially complete in September 2018. Redundancy Pipeline Section 111 Construction 2 began in October 2017. Redundancy Pipeline Section 111 Construction 3 was awarded in May 2018. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $129,604 | $132,426 | $2,822 | Dec-35 | Dec-35 | None | $36,806 | $37,378 | $572 |

**Explanation of Changes**

- Project cost Increased primarily due to inflation adjustments on unawarded contracts and change orders for Redundancy Pipeline Section 111 Construction 2.
- Project spending changed primarily due to change orders for Redundancy Pipeline Section 111 Construction 2.

**CEB Impacts**

None identified at this time

# S. 730 Weston Aqueduct Supply Mains (WASMs)

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To improve the condition and carrying capacity of these major supply lines and the quality of the water supplied to the communities in the Low, High, Intermediate, and Northern Extra High pressure zones. Increasing the capacity of the WASM 3 Supply Main is a key component of the Long term Redundancy Plan for the metropolitan tunnel system. Timely rehabilitation will reduce the costs of replacing corroded pipes, reduce red water and chlorine tastes, and improve water pressure.*

**Project History and Background**

MWRA's tunnels and aqueducts bring water to the metropolitan area from the supply reservoirs in central Massachusetts. In Weston, where the Hultman Aqueduct and the MetroWest Tunnel end, the water is still miles away from most customers. Together, the City Tunnel and the four Weston Aqueduct Supply Mains (WASMs) carry the water this final distance. When rehabilitation of the WASMs is complete, they will transmit about one-third of the water to MWRA's service areas, and the City Tunnel will carry the remaining two-thirds. The WASMs are now the only means of conveying water to the city in the event of a problem with the City Tunnel. The Sudbury Aqueduct can deliver non-potable water during an extreme emergency.

WASM 1 is a 48-inch diameter cast iron pipeline about 38,700 feet long that was constructed in 1904. WASM 2, built in 1916, is a 60-inch diameter cement-lined cast iron pipeline about 34,800 feet long. WASMs 1 and 2 begin in Weston at the Weston Aqueduct Terminal Chamber (WATC) and run parallel through Newton, mostly along Commonwealth Avenue, ending in Boston near Chestnut Hill Reservoir. These pipelines supply water to the Boston Low pressure zone.

WASM 3 is an 11-mile steel pipeline that was installed between 1926 and 1933. This major supply line carries high service water from the 7-ft diameter branch of the Hultman Aqueduct to community connections and MWRA pumping stations serving the Northern High, Intermediate High, and Northern Extra High service systems. It extends from the Hultman Aqueduct branch in Weston northeast to the Shaft 9 line in Medford and supplies more than 250,000 customers. WASM 4 was constructed in 1932 and is predominantly a 60-inch diameter pipeline consisting primarily of unlined steel with some pre-stressed concrete cylinder and cast iron sections. It extends 47,000 linear feet from Weston through Newton, Watertown, and Boston, and into Cambridge.

WASM 3 and WASM 4 were originally part of the Low Service System and conveyed water from the Weston Aqueduct to the Spot Pond Supply Mains. Upon completion of the Hultman Aqueduct, and its interconnection to the Weston Aqueduct Terminal Chamber in 1941, WASM 3 became part of the High Service System. With the addition of Newton to the metropolitan service area in the early 1950s, the western portion of WASM 4 was transferred to the High Service System as a temporary means of conveying water from the Hultman to portions of Newton and Watertown. Supply to the Spot Pond Supply Mains from WASMs 3 and 4 was maintained at their east ends through pressure reducing valves.

WASMs 1, 2, and 4 were previously functioning below full capacity because of the buildup of rust deposits and other matter along the pipeline walls, and undersized main line valves. Rehabilitation of these pipelines was necessary to restore their original carrying capacity and included replacement of valves to provide more efficient operations and emergency response, elimination of tuberculation on the interior walls, and application of cement mortar lining to the interior pipe walls to prevent further internal corrosion and improve water quality.

The joints on WASM 1 and WASM 2 are constructed of bells and spigots filled with lead packing. The bell and spigot construction gives the joints some flexibility, but lead packed joints are more prone to failure compared to push-on or mechanical joints with modern synthetic gasket material. The existing joints are subject to potential failure because of deterioration, pipe movement due to frost, settlement, or adjacent construction. Water leaking from a failing joint can undermine the pipe, causing catastrophic failure. These failures can cause severe damage and disruption. WASM 2 also had insulating joints consisting of cast-iron pipes with wood fillers. These joints were intended to prevent electrical current from flowing along the pipeline but, in general, have been prone to failure and leakage.

The rehabilitation of WASMs 1 and 2 is now complete. WASM 1 and WASM 2 now connect to the new Loring Road tanks in Weston and supply the Boston Low mains in Clinton Road, Beacon Street, and Boylston Street, which were rehabilitated as part of the Boston Low Service Rehabilitation project. With the completion of these projects the entire Boston Low Service System, which accounts for 15% of overall MWRA water demand, is now rehabilitated from Weston to Boston.

There is no back up for WASM 3, which is the sole source of supply for the higher elevation portions of Waltham, Belmont, Arlington, Lexington, Bedford, and Winchester. The southern portion of this pipeline cannot be shut down for maintenance or rehabilitation until a new Waltham Connection to the Northern Extra High system is complete. Next to a failure of the Hultman Aqueduct or the Metropolitan Tunnel System, analysis has shown that a failure of WASM 3 is one of the highest risks in the MWRA distribution system. Improvements to WASM 3 are included in Project 628 Metropolitan Redundancy Interim Improvements. Replacement of Section 36 improves redundancy in the Northern Extra High pressure zone between Spring Street pump station and Brattle Court pump station, and installation of a redundant line from WASM 3 to Spring Street pump station provides flexibility to maintain flow to the Spring Street pump station during the rehabilitation of WASM 3.

Nonantum Road construction (rehabilitation by sliplining and cleaning and lining) was completed in March 1997 and the rehabilitation of the western portion of WASM 4 was completed in March 2001, including meter upgrades. In order to remove the western portion of WASM 4 from service to allow it to be rehabilitated, MWRA provided alternative supplies for Watertown Meter 103 and Newton Meters 104 and 105. Meter 103 was upgraded and local water main improvements were built along Galen Street in Watertown. These efforts allow the other Watertown meters to temporarily supply the area normally served by Meter 103. These improvements were constructed as non-participating bid items (i.e., funded by MWRA) under a contract administered by the Massachusetts Highway Department. Alternative sources for the Newton northern pressure district, normally supplied by Meters 104 and 105, have been constructed. Two pressure reducing valves, one at Chestnut Street and one at Walnut Street, were installed to allow the southern pressure district that is supplied by the Commonwealth Avenue Pumping Station to temporarily serve the northern pressure district. The rehabilitation of the eastern portion of WASM 4 included fixing a portion of the South Charles River Valley Sewer Sections 163 (D) and 164 (E), a 100+ year old brick sewer that is located directly below the water main. The rehabilitation of WASM 4 is complete.

WASM 4, since rehabilitated will continue to operate as a high service main from the Hultman Aqueduct Branch connection to Shaft W of the MetroWest Tunnel up to the pressure reducing valve facility at Nonantum Road. It will then continue as a low service main to its connection with the East and West Spot Pond Supply Mains. WASM 4 also has the capability to operate completely as a low service main. This flexibility in operating conditions allows WASM 4 to best support the system.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Design/CA/RI – WASMs 1 & 2 (6142) | Design, construction administration, and resident inspection for the rehabilitation of WASM 1 and WASM 2 (construction contracts 6280 and 6281). | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Design/CA/RI - WASM 4 (5147) | Design, construction administration, and resident inspection for the rehabilitation of WASM 4 (construction contracts 6203, 6175, 6312, 6176, and 6313). | Completed |
| Construction - Newton WASMs 1 & 2 (6280) | Construction work on WASM 1 and WASM 2 along Commonwealth Avenue and WASM 1 through Centre Street to the Newton Commonwealth Golf Course. | Completed |
| Construction - Boston WASMs 1 & 2 (6281) | Construction on the remaining lengths of WASMs 1 and 2 consists of rehabilitation of 8,640 linear feet of Section 4 of WASM 1 through the Newton Commonwealth Golf Course to Gatehouse #1, rehabilitation of 11,450 linear feet of Sections 7 and 8 of WASM 2 between Grant Avenue and Cleveland Circle, and installation of 650 linear feet of 36-inch pipe from Shaft 7 to Section 47. | Completed |
| Construction - Arlington Section 28 CP1 (6546) | Rehabilitation of Section 28, the suction main to the Brattle Court Pumping Station, from the WASM 3 connection to the pumping station. | Completed |
| Construction - Auburndale WASMs 1, 2 & 4 (6175) | Cleaning and lining of 5,300 linear feet of 48-inch and 12,300 linear feet of 60-inch diameter mains of WASMs 1, 2 and 4 (Sections 2, 5, 13 and portions of 1) from Weston across the Charles River along Commonwealth Avenue to the Mass Pike in Newton, as well as replacement of existing line valves, air/vacuum valves and blow-off valves. | Completed |
| Construction - Newton WASMs 2 & 4 (6312) | Cleaning and cement lining of 21,200 linear feet of 60-inch pipe on WASM 4 (Sections 13 & 14) along Rowe, Webster, Elm and Washington Streets in Newton, and 5,800 linear feet of 60-inch pipe on WASM 2 (Section 2) along Commonwealth Avenue from Bullough Parkway to Grant Avenue as well as rehabilitation of Meters 104 and 105. | Completed |
| Construction - Allston WASM 4 & W. Ave Sewer (6313) | Replacement of the Nonantum Road PRV and sliplining of 1,600 linear feet of pipe from Brooks Street to North Beacon Street, sliplining with some limited pipe replacement and cement lining of 10,538 linear feet of 60-inch pipe mostly along Western Avenue, 1,008 linear feet of 42-inch pipe mostly along Memorial Drive, 808 linear feet of twin parallel 30-inch pipes within the Western Avenue Bridge, replacement of Master Meter 100 and rehabilitation of the South Charles River Valley Sewer to include installation of a cured-in-place liner in approximately 5,150 feet of sewer, as well as removal and disposal of sediment in the existing brick sewer, power washing, and rehabilitation of existing manholes and installation of new manholes. | Completed |
| Construction – WASM 3 PCCP SPL12 (7000) | Replacement of approximately 2,100 linear feet of 60-inch Prestressed Concrete Cylinder Pipe (PCCP) on WASM 3 (Section 12) in Arlington. Includes replacement of air release manhole, replacement of two blow-offs and addition of a mainline butterfly valve with chamber and separate air release manhole. | Completed |
| Design CA/RI WASM 3 PCCP SPL12 (7001) | Design, construction administration and resident inspection services for the replacement of the PCCP pipe portion of WASM 3 (construction contract 7000). | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Design CA/RI Section 36/ WS/Waltham Connection (6540) | Design, construction administration and resident inspection services for the replacement of Section 36, rehabilitation of the Watertown Section, a new 11B interconnection to WASM 3, replacement of meter 86 in Arlington, and replacement of butterfly valve S9-A in Medford. (construction contracts 7222, 7448). | Completed |
| Construction Watertown Section (7222) | Rehabilitation of approximately 5,795 linear feet of the Watertown Section. | Completed |
| Construction Section 36/W11/S9-A11 Valve (7448) | Replacement of approximately 5,200 linear feet of 1911 vintage 16-inch diameter cast-iron pipe from the Brattle Court pumping station to the Arlington Heights Standpipe, construction of a new 11B interconnection to WASM 3, replacement of meter 86 in Arlington, and replacement of 48 inch mainline butterfly S9-A11-A in Medford. | Completed |
| Design CA/RI Section 28 (7083) | Design, construction administration, and resident inspection services for the rehabilitation of Section 28, suction main to the Brattle Court Pumping Station, from the WASM 3 connection to the pumping station (construction phase CP1, contract 6546). | Completed |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $80,457 | $80,403 | $54 | $54 | $0 | $54 | $0 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 99.9% | Status as % is approximation based on project budget and expenditures. Rehabilitation of WASMs 1, 2 & 4 are complete. Section 28 Arlington CP-1 was substantially complete in April 2011. Design CA/RI Section 36/Watertown Section/Waltham Connection commenced in January 2011. Watertown Section Rehabilitation was substantially complete in December 2013. Section 36/W11/S- 9-A11-A Valve was substantially completed in December 2016. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $80,464 | $80,457 | ($7) | Dec-16 | Dec-16 | None | $0 | $54 | $54 |

**Explanation of Changes**

- Project spending changed due to updated cash flow for Watertown Section Rehabilitation.

**CEB Impacts**

- None identified at this time.

# S. 735 Section 80 Rehabilitation

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

***Master Plan Project☑ 2009 Priority Rating 3 (see Appendix 3)***

*Rehabilitation of approximately 16,197 feet of pipe along Route128/95. Section 80 supplies water to Wellesley and Needham. Rehabilitation will improve water quality to these two MWRA communities.*

**Project History and Background**

Section 80 is a steel main that runs from Shaft 5 of the City Tunnel in Weston extending through Newton to supply Wellesley and Needham. The main runs along portions of 128/95 and has been exposed to highly corrosive conditions and the cathodic protection system has not been maintained. Complaints from residents in Needham and Wellesley of a tar-like smell in the water indicate deterioration of the pipe liner. Testing indicated phenols levels 10 times above allowable limits. Failure of Section 80 would create huge traffic challenges on this major metro-Boston highway.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Section 80 Rehabilitation Design CA (6892), Construction (6891), and REI (7675) | Design and rehabilitation of approximately 16,197 feet of Section 80 along route 128/95. | Future |
| Section 80 Replacement Construction (7532) | Replacement of 200 linear feet of Section 80 that was leaking. | Completed |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $13,552 | $1,925 | $11,627 | $0 | $3 | $706 | $10,921 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 14.2% | Status as % is approximation based on project budget and expenditures. Section 80 Replacement Construction was substantially complete in June 2018. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $12,419 | $13,552 | $1,133 | Jul-26 | Jul-26 | None | $688 | $706 | $18 |

**Explanation of Changes**

- Project cost changed primarily due to updated cost estimate for Section 80 Rehabilitation Resident Engineering/Inspection and inflation adjustments on Section 80 Rehabilitation Design/Construction Administration and Construction.

- Spending changed due to inflation adjustment on Section 80 Rehabilitation Design/Construction Administration contract.

**CEB Impacts**

- None identified at this time.

# S. 753 Central Monitoring System

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Improves system operability and reliability*
☑ *Extends current asset life*
☑ *Results in a net reduction in operating costs*

*To provide a modern centralized system for monitoring, coordinating, and controlling critical waterworks functions. Many existing MWRA facilities are monitored and operated using obsolete methods and equipment, which can hinder emergency response capabilities and prevent coordinated system operation. Two operations control centers are already operational, and various field facilities have been equipped with telemetry and communications equipment as part of this project.*

**Project History and Background**

MWRA has been converting to system-wide remote monitoring and control of essentially all hydraulic and hydroelectric operations. The original instrumentation used to measure operating parameters was incomplete, old, and in poor condition. In many cases necessary instrumentation did not exist. The system also lacked telemetry to provide centralized and immediate information on system performance, and the ability to remotely intervene when malfunctions occurred. Without telemetry, operating decisions had to be delayed until field personnel were dispatched to collect measurements. This was a cumbersome and undesirable mode of operation, particularly in emergency situations.

The lack of flow measurement within the water delivery system also impeded identification of sources of unmetered water. When fully implemented, the central monitoring system will generate instantaneous data on water flow and pressure in 18 subsystems beginning with the supply sources and ending at the delivery points to user communities. The data will assist operations staff in detecting and pinpointing leaks in the system. The response time for leak repair work can then be lessened, resulting in significant savings of water and reduction in potential MWRA liability for public safety and property damage.

The central monitoring project has grown from the initial automation of the Reservoir Road Pump Station to include eight other pump stations. Monitoring and control of water treatment facilities has expanded to include the Interim Corrosion Control Facility in Marlborough, the Cosgrove Disinfection Facility, the Norumbega Temporary Disinfection Facility and the Ware Disinfection Facility. In addition, water quality is monitored at seven locations from two Operations Control Centers. Real time Supervisory Control and Data Acquisition (SCADA) monitoring of Telog data is being established with 150 sites currently active. Operation control centers (OCCs) at the MWRA Chelsea and Clinton facilities provide remote monitoring and control of all the SCADA facilities. Also, as part of its Integrated Water Supply Improvement Program, MWRA built several new and upgraded facilities. These included the Nash Hill Covered Storage facility and the Loring Road Covered Storage facility, Carroll Water Treatment Plant, MetroWest Water Supply Tunnel, and the Norumbega Covered Storage facility. The existing system-wide backbone microwave communications network has been improved to connect these facilities to the waterworks communications system.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Study | Study to determine the implementation phases. | Completed |
| Design | Design of the replacement and rehabilitation of 34 existing master meter sites, 22 new master meter sites, 15 western revenue meter sites, 28 reservoir level instrumentation sites, ten pumping stations, eight pressure regulator control sites, four major throttle valve sites, six chemical feed sites, four hydroelectric sites, five weather stations, five sluice gate control sites, one stream gauging station, and other facilities. | Completed |
| Communications Structures | Installation of two radio towers, five antennas, one satellite dish, and an equipment shelter. | Completed |
| CS/Start-Up Services | Construction and startup services for the metropolitan Operations Control Center, as well as metering and monitoring construction. | Completed |
| Equipment Pre-Purchase | Purchase of instrumentation equipment, mechanical equipment, and new master meters. | Completed |
| Construction 1 – Reservoir Road and Cosgrove Pilots | Purchase and installation of equipment to automate the Reservoir Road Pump Station and an aqueduct monitoring system for use by the Cosgrove Intake and Shaft 4 operators. MWRA staff installed the equipment. | Completed |
| SCADA Implementation | Purchase of Supervisory Control and Data Acquisition System (SCADA) equipment for monitoring, control and metering sites. | Active |
| Microwave Equipment | Purchase of services and equipment necessary to allow MWRA to convert from analog to digital communications to continue to utilize the Commonwealth's Interagency Microwave System. | Completed |
| Construction – Operations Center | Construction of a 5,000 square feet center including an environmentally controlled computer room, a printer room, a control room, office space, and sanitary facilities in Chestnut Hill. | Completed |
| System Wide Backbone C.P. Construction– Monitoring & Control Communications Network | Improvement of the existing Waterworks system wide backbone including upgrades of microwave antennas at MDC Hill and Bellevue water tank and provision of new microwave antennas at five facilities. | Completed |
| Study and Design – Waterworks Monitoring & Control Communications Network | Provision of microwave antennas and radio equipment at twelve facilities. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Microwave Communication for Waterworks Facilities | Furnish and install seventeen microwave antennas (dishes), three 3-legged, 90- to 100-foot towers, one unpowered 80-foot steel monopole, and two prefabricated concrete shelters to house radio equipment with associated racks, cabinets and wiring. | Completed |
| Quabbin Power, Communication & Security Design CA/RI and Construction | Design and construction of 2.4 miles of power, and communication to Quabbin Aqueduct Shaft 12 and 1,500 feet to the DCR Boat Cove. Also, upgrading 9,000 feet of existing overhead power line from Winsor Power Station to Quabbin Lookout Tower to insure uninterrupted service of the communication network. Increased security will be provided at Shaft 12, Winsor Power Station, CVA Intake, Nash Hill gate house, William A. Brutsch Water Treatment Facility, DCR Boat Cove and Quabbin Administration building. The Verizon communications service needed for the security devices to communicate to the Chelsea Head-end Facility was extended to support this function. | Completed |
| Waterworks SCADA/PLC Upgrades (CWTP SCADA Upgrades Design Programming RE and Construction, Other Design and Programming Services, Other Construction, and Other Equipment/Hardware) | Replacement of existing SCADA PLC's nearing their end of life with an updated PLC platform. New PLC's further provide enhanced security capabilities, continued vendors support and future reliability. Secondary goals include standardizing PLC logic and HMI graphics, and upgrading aging field instrumentation. During FY17 staff purchased equipment and contracted outside support to replace the obsolete PLC at the Commonwealth Ave. West Pump Station. This work was complete in the spring of 2017. Additional work to upgrade the Brutsch Water Treatment facility chemical feed PLC through CIP purchases and use of In-house staff for design and installation will be complete in 2019. In-house work to scope out the design contract to upgrade the JJC WTP was completed, and an engineering design services contract was awarded in December 2018. The initial conditions assessment and conceptual report has been completed with the construction contract for JJCWTP SCADA improvements scheduled to be awarded in May 2020. | Active/Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $39,002 | $20,705 | $18,298 | $564 | $850 | $10,203 | $5,576 | $2,518 |

| | | |
|---|---|---|
| Project Status 5/19 | 54.1% | Status as % is approximation based on project budget and expenditures. Quabbin Power Communications & Security Construction was substantially complete in April 2017. CWTP SCADA Design Programming RE was awarded in December 2018. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $39,017 | $39,002 | ($15) | Oct-31 | Oct-31 | None | $9,600 | $10,203 | $603 |

**Explanation of Changes**

- Project cost changed due to final cost adjustment for Quabbin Power, Communication and Security Design CA/RI contract.
- Spending changed primarily due to award of CWTP SCADA Upgrade Design and Programming contract being greater than budgeted.

**CEB Impacts**

- None identified at this time.

# S. 763 Distribution Systems Facilities Mapping

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Improves system operability and reliability*

*To produce a complete, up-to-date set of appropriate scale maps of all underground waterworks facilities, along with a comprehensive database inventory. Existing maps were outdated and unreliable, complicating emergency response, field repairs, and planning.*

**Project History and Background**

In 1995 MWRA did not have an adequate, updated set of maps of all of its underground waterworks facilities. Existing maps did not consistently show current conditions and were often incompatible or contradictory with MWRA databases. Engineering, operations, and emergency response were all affected by this inadequacy. Outdated maps hampered engineering because maps needed to be re-created. Field operations crews could not predict with certainty the results of valve shut-offs during repair efforts. The planning process was impaired because management did not have authoritative, consolidated data to evaluate pipe condition, age, C-Values, materials, and soil conditions. Additionally, the lack of a comprehensive understanding of the relationships between MWRA and local community pipe systems could result in service delays. The former mapping system created the possibility of incorrect actions, and in critical instances could have resulted in exacerbated property damage.

Reliable engineering records do not exist for certain sections of the distribution system. The Records Development sub-phase will create, update and automate record drawings and detail records for high priority areas.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Planning/Design | Creation of a complete set of 200 to 400 scale maps of the distribution system with an associated verified inventory of size, material, age, and condition of pipes. | Completed |
| Data Purchase | Purchase of project related data from Boston Edison. | Completed |
| Records Development (6525) | Automation of MWRA record drawings. | Future |
| Update of Record Drawings (7489) | Update record drawings and detail record information for selected water pipeline sections using information from detail records, plans, field books, surveys, and valve inventories. Establish procedures for continued updating and maintenance of detail record information. | Future |
| Water System Hydraulic Model (7613) | Upgrade and calibrate the water system hydraulic model. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $2,799 | $1,036 | $1,763 | $0 | $0 | $1,549 | $214 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 37.0% | Status as % is approximation based on project budget and expenditures. Update of Record Drawings is expected to begin in FY20. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $2,799 | $2,799 | $0 | Jan-22 | Oct-23 | 21 mos. | $1,663 | $1,549 | ($114) |

**Explanation of Changes**

- Schedule and spending shifted due to sequencing of Update of Record Drawings and Records Development projects.

**CEB Impacts**

- No additional impacts identified at this time.

# S. 765 Local Water System Assistance Program

**Project Purpose and Benefit**

☑ *Contributes to improved public health*
☑ *Provides environmental benefits.*

*To provide loans to facilitate water system improvements in MWRA communities.*

**Project History and Background**

The Local Water System Assistance Program is a critical piece of MWRA's Integrated Water Supply Improvement Program. In November 1999, the Board of Directors approved the Phase 1 Local Pipeline Assistance Program, supported through a Tax Exempt Commercial Paper (TECP) program, to make $25 million available annually in loans to MWRA communities for pipeline relining and replacement in proportion to each community's share of total unlined pipe miles. Communities are required to pay back principal for each loan during a ten-year time period beginning one year after the project funding is approved. MWRA increased the initial total program budget to $256,796,500 to provide funds for additional water system communities: Stoughton ($4,480,000), Reading ($1,916,000), Lynnfield ($320,000), Dedham/Westwood ($7,500), and Wilmington ($73,000). The Phase 1 Local Pipeline Assistance Program concluded at the end of FY13 with a total of $222.3 million in interest-free loans distributed to member water communities.

An additional $210 million was added to the FY11 budget for the Phase 2 Local Water System Assistance Program. Community distributions from this program will be made from FY11 through FY23 with repayments scheduled for FY12 through FY33. The $210 million is split with $200 million allocated among 42 Metro-Boston/Metro-West communities and $10 million allocated among three Chicopee Valley Aqueduct (CVA) communities.

The Local Water System Assistance Program was expanded beginning in FY17 to include $100 million in interest-free loans to communities solely for efforts to fully replace lead service lines. The *Lead Service Line Replacement Loan Program* is budgeted over twenty years, but the pace of spending for the program will depend on the level of participation by communities, the communities' ability to work with individual homeowners, and future regulatory requirements.

In FY18 Local Water System Assistance Program Phase 3 was added in the amount of $292 million. Community distributions from this program will be made from FY18 through FY30 with repayments scheduled for FY19 through FY40.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Community Loans | Loans for MWRA water communities to replace and rehabilitate local water pipelines based on each community's share of total unlined pipe miles. These loans will be complete by the end of FY13. | Completed |
| Community Repayments | Principal repayment over a ten-year period beginning one year after origination of the loans. | Active |
| Local Water System Assistance Program Loans | This is a continuation of the program of providing interest-free loans to water system communities for pipeline replacement, cleaning and lining, water metering and other local water system improvements. | Active |
| Local Water System Assistance Program Repayments | Principal repayment over a ten-year period beginning one year after origination of the loans. | Active |

| | | |
|---|---|---|
| CVA Loans | This is an extension of the Local Water System Assistance program to the CVA communities to provide interest-free loans to water system communities for pipeline replacement, cleaning and lining, water metering and other local water system improvements. | Active |
| CVA Repayments | Principal repayment over a ten-year period beginning one year after origination of the loans. | Active |
| Lead Service Line Replacement Loans | Replacement of lead service lines budgeted over a twenty year period beginning in FY17. | Active |
| Lead Service Line Replacement Repayments | Principal repayment over a ten-year period beginning one year after origination of the loans. | Active |
| Local Water System Assistance Phase 3 Loans | This is a continuation of the program (Phase 3) of providing interest-free loans to water system communities for pipeline replacement, cleaning and lining, water metering and other local water system improvements. | Active |
| Local Water System Assistance Phase 3 Repayments | Principal repayment over a ten-year period beginning one year after origination of the loans. | Active |
| Local Water System Assistance Phase 3 CVA Loans | This is an extension of the Local Water System Assistance program to the CVA communities to provide interest-free loans to water system communities for pipeline replacement, cleaning and lining, water metering and other local water system improvements. | Active |
| Local Water System Assistance Phase 3 CVA Repayments | Principal repayment over a ten-year period beginning one year after origination of the loans. | Active |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget* | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $0 | $140,273 | ($140,273) | $22,400 | $9,698 | $37,498 | $20,033 | ($197,804) |

***Total Loan Distributions less Loan Repayments.**

| | | |
|---|---|---|
| Project Distribution Status 5/19 | 51.3% | Through May 2019, MWRA has distributed $423.1 million in loans to fund 448 projects in 42 communities under the Local Water System Financial Assistance Program. |

| | | |
|---|---|---|
| Project Repayment Status 5/19 | 32.6% | Through May 2019, a total of $269.0 million has been repaid by member communities receiving interest-free loans under the Local Water System Assistance Program. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $0 | $0 | $0 | May-46 | May-46 | None | $32,408 | $37,498 | $5,090 |

**Explanation of Changes**

- Spending change is primarily due to updated cash flows for Phases 2 and 3 for Local Water Supply Assistance Program distributions and repayments as well as repayments for Lead Service distributions.

**CEB Impact**

- The annual interest paid for the Commercial Paper program supporting the Local Water System Assistance Program initiative is nearly $1.1 million average per year based on the last 5 years of actual spending.

# S. 766 Waterworks Facility Asset Protection

**Project Purpose and Benefits**

☑ *Contributes to improved public health*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*

*To protect the investment of MWRA ratepayers by ensuring timely replacement of equipment and systems.*

**Project History and Background**

This project was developed to ensure that MWRA maintains ongoing service while optimizing operations in its water facilities. This project in its current form addresses immediate critical facility and equipment issues. This project will eventually include five areas:

1. Equipment replacement (pumps, HVAC equipment, blowers, etc.).
2. Architectural projects (concrete corrosion, etc.).
3. Utilities projects (water, sewer, drainage, electrical wiring, heating system, etc.).
4. Support Projects (process control system upgrades, etc.).
5. Specialty Projects (instrumentation upgrades, fuel storage tanks, etc.).

While the current schedule indicates a completion date of 2023 for construction, the Waterworks Facility Asset Protection project will be ongoing throughout the useful life of the facilities.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Meter Vault Manhole Retrofits Design and Construction (6689/7479) | Retrofit approximately 195 meter manholes. | Future |
| Painting for Deer Island Water Storage Tank (7601) | Exterior and interior abrasive blast cleaning and painting for Deer Island Tank. Structural and concrete repairs. Removing, storing, installing and reinstalling components of the microwave communication system. Erection and maintenance for scaffolding and staging including enclosures with protection and ventilation. | Active |
| Painting for Bellevue 2 and Turkey Hill Steel Water Storage Tanks (7634) | Exterior and interior abrasive blast cleaning and painting for Bellevue 2 and Turkey Hill Tanks. Structural and concrete repairs and design and erect scaffolding to support the temporary antenna relocation at Turkey Hill. Installation of the interior components of the cathodic protection system. | Active |
| Design/CA for Steel Tank Improvements (6832), Construction (7493) and REI (7676) | Design and construction to repaint, replace cathodic protection systems and make necessary improvements to 3 steel water storage tanks (Bellevue 1, Park Circle, and Walnut Hill). Design and construction for improvements to the recently painted Bellevue 2, Turkey Hill and Deer Island storage tanks. | Future |
| Waltham Pipe Bridge Replacement (6910) | Replacement of approximately 100 feet of 30-inch steel pipe over commuter rail tracks in Waltham including a bridge crossing. | Completed |

| Sub-phase | Scope | Status |
|---|---|---|
| Design and Construction Cosgrove Valve Replacement (7064/7065) | Replacement of isolation sluice gates at Cosgrove Intake to improve reliability for emergency shut down of Cosgrove facility and to isolate new sliding sleeve valves to facilitate preventive maintenance and any future corrective maintenance. | Future |
| Transformer at Cosgrove Intake Building (7228) | Replacement of a 45 year old main service transformer and load break switch. This transformer supplies power to the Cosgrove Intake Building. If it were to fail, the building would be running on generator power for a significant period of time. | Completed |
| Covered Storage Tank Rehabilitation Design and Construction (7385/7482) | Rehabilitation of Fells and Loring Road Covered storage facilities commencing in FY19. The valves, sluice gates, and piping should be considered for rehabilitation by this time, as each facility will be more than 20 years old. | Future |
| Electrical Distribution Upgrades at Southborough (7425) | Upgrade of existing 13.8kV distribution system that supplies the various buildings at Southborough Complex due to on-going service disruptions. Install electrical metering equipment to better manage electrical use in facility. | Future |
| Water Meter Upgrade Replacement and Meter Vault Manhole Retrofit Design CA/RI (7542) and Construction (7453) | Replace five older Venturi meters and seven above ground cabinets in Boston. Remove fire flowbypasses of four additional water metersand upgrade the venture tube at each of the meters. Retrofit the manholes of a total of nine of these existing meters. This will provide more accurate and reliable meter data since current meters are beyond their life expectancy. | Future |
| Beacon Street Line Repair Design CA/RI (7474) and Construction (7458) | Repair of 48” water main in Brookline serving Boston Meter 44. This main provides important water supply redundancy to Meter 60 which serves the Longwood Medical Center in Boston. Construction Contract 7458 was awarded with an NTP dated June 23, 2016. Project substantial completion achieved March 31, 2017. | Completed |
| Cosgrove Construction (7022)/and Gillis PS/Cottage Farm CSO Construction (6888) Flat Roof Replacements | Replacement of the entire flat roofs at Cosgrove, Gillis Pump Station, and Cottage Farm CSO Facility. Designs have been developed with the assistance of Technical Assistance Consulting Services Task Orders. Limited Task Order services are being used to support ESDC services. | Active |
| New Roofs at Water Pumping Stations Construction (7626) | Replace pump station roofs at Belmont (membrane), Brattle Ct (slate), Spring St (membrane), Newton St (membrane) and Lexington St in Belmont, Arlington, Waltham and Brookline. Design is being developed through the Technical Assistance Consulting Services Task Orders. | Future |
| Generator Docking Station (7025) and REI (7024) | To install an electrical switchboard eleven facilities, 5 - Water and 6 - Wastewater as a means for a quick connection to a towable generator. Generator will be deployed for use as a back-up in the event of prolonged utility failure or failure of the in-house emergency power generator. Construction Contract 7025 was awarded with an NTP on April 23, 2019. REI Contract 7024 awarded at April 17, 2019 BOD meeting. | Active |

| | | |
|---|---|---|
| Masonry/Structural Repairs Bellevue 1/Arlington Heights | Evaluate the current structural condition of the concrete/masonry at the Bellevue 1 standpipe and the Arlington Heights tank and provide recommendations and preliminary design documents for the repair/replacement to be utilized for the future preparation of design and construction bid documents for one construction project. | Active |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $41,884 | $2,383 | $39,501 | $5,583 | $4,059 | $24,776 | $14,725 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 11.8% | Status as % is approximation based on project budget and expenditures. Transformer Replacement at Cosgrove Intake Building contract was completed in July 2012. Beacon Street Line Repair construction was substantially complete in April 2017. Bellevue Hill II and Turkey Hill Tanks Repainting are expected to commenced in August 2018. Cosgrove Roof Replacement NTP issued in November 2018, Gillis PS/Cottage Farm CSO Roof Replacement NTP issued in July 2019. Generator Docking Station construction NTP was issued and Generator Docking Station REI contract was awarded in April 2019. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $40,882 | $41,884 | $1,002 | Jul-26 | Jul-26 | None | $29,191 | $24,776 | ($4,415) |

**Explanation of Changes**

- Project cost changed due updated cost estimates for Masonry/Structural Repairs Bellevue 1/Arlington Heights Tanks, Steel Tank Improvements Design/CA, Generator Docking Station for resident/inspection services, and award greater than budgeted for Cosgrove Intake Roof Replacement. This was partially offset by award being less than budgeted for the Painting Bellevue 2 and Turkey Hill Tanks and Painting Deer Island Water Tank contracts.

- Project spending changed primarily due to several schedule changes including Steel Tank Improvements Design/Construction Administration, Construction, and Resident Engineering/Inspection. Also, award was less than budgeted for the Painting Bellevue 2 and Turkey Hill Tank and Painting DI Water Tank, partially offset by updated cost estimates listed above.

**CEB Impacts**

- None identified at this time.

# Business and Operations Support

# S. 881 Equipment Purchase

**Project Purpose**

*To provide critical equipment for improved maintenance and operations at MWRA facilities.*

**Project History and Background**

This project includes the purchase of large vehicles, purchase and installation of security equipment at various MWRA facilities, and purchase of an Inductively Coupled Plasma-Mass Spectrometer (ICP-MS) for MWRA's Central Laboratory. The security equipment and installation component of the project includes the design and installation of security systems at MWRA facilities. MWRA is ranking facilities and locations with respect to the critical nature of service delivery, with an emphasis on the waterworks system. This ranking will frame the extent and scheduling of the security improvements for each specific site.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Security Equipment & Installation | Design and installation of security systems at various MWRA facilities and sites. | Active |
| ICP-MS Lab Testing Equipment | Purchase of Inductively Coupled Plasma – Mass Spectrometer to replace a 14-year-old instrument and expand the laboratory's high sensitivity metals testing capacity. Equipment was purchased in 2008. | Completed |
| FY14-18 Major Laboratory Instrumentation | Purchase major laboratory instrumentation, such as high resolution GC-MS or LC-MS to provide for lab testing of newly regulated contaminants. | Active |
| *Vehicles:* | | |
| High Lift Fork Loader (Lull) | Purchase High Lift Fork Loader (Lull) to move equipment and materials at Deer Island. | Completed |
| Prior Vehicle Purchases | Vehicle purchases including TV Inspection Truck, Two Back Hoes, Vactor Truck, Water Service Truck, Bucket Machine, Excavator, Grove Crane, Land Fill Loader, Power Sweeper/Catch Basin Cleaner, Front-End Loader, Two Dump Trucks, Crane, and International Tractor/Trailer. | Completed |
| Ramp Truck | Purchase of Ramp Truck to support Fleet Services. | Completed |
| Street Sweeper | Purchase of Street Sweeper to support MWRA facilities and community assistance. | Completed |
| Contaminant Monitoring Equipment | Contaminant monitoring equipment including radiological monitoring, contaminant monitoring system panel replacement or expansion, and buoys. | Future |
| FY11-13 Vehicle Purchases | Vehicle purchases planned for FY11-13. | Completed |
| FY14-18 Vehicle Purchases | Vehicle purchases planned for FY14-18. | Completed |
| FY19-23 Vehicle Purchases | Vehicle purchases planned for FY19-23. | Active |
| FY24-28 Vehicle Purchases | Vehicle purchases planned for FY24-28. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $39,090 | $21,857 | $17,233 | $1,598 | $2,186 | $10,453 | $6,780 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 58.4% | Status as % is approximation based on project budget and expenditures. Purchase and installation of security equipment is in process and will continue into FY23. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $33,825 | $39,090 | $5,265 | Jun-23 | Jun-28 | None | $9,391 | $10,453 | $1,062 |

**Explanation of Changes**

- Project cost and spending increased primarily due to updated cost estimates for Vehicle Purchases, and Security Equipment and Installation.
- Schedule changed due to updated cost and schedule for vehicle purchases beyond FY23.

**CEB Impacts**

- No impacts identified at this time.

# S.925 Technical Assistance

***Project Purpose***

*To ensure ready access on an as needed basis, to professional and technical services not available or not cost-effectively provided by in-house staff.*

**Project History and Background**

Efficient implementation of MWRA's Capital Improvement Program and other projects often requires specialized skills and technical assistance that are not available from in-house staff. This project ensures ready access to a variety of services through a series of task order contracts with pre-set limits. Task orders are used when immediate expertise on projects is required. When a task order is complete, the expense is transferred to the appropriate capital project or Current Expense Budget cost center.

**Scope**

| Sub-phase | Scope |
|---|---|
| Technical Assistance | MWRA technical assistance contracts include the following: surveying, hazardous materials assessment, and land appraisals. |

**Status:** MWRA uses technical assistance contracts in support of various CIP and CEB projects.

**Expenditure Forecast** (in $000s)

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $1,125 | $0 | $1,125 | $0 | $391 | $1,125 | $0 | $0 |

**Changes in Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY19 | Chge. |
| $1,100 | $1,125 | $25 | Jun-21 | Jun-22 | 12 mos. | $1,074 | $1,125 | $51 |

**Explanation of Changes**

- Project cost changed due to Survey amendment.
- Schedule and spending shifted to reflect continuation of contracts for an additional year and amendment above.

**CEB Impacts**

- When Technical Assistance contracts are used to support a project in the operating budget, the costs are charged to the Current Expense Budget (CEB).

# S. 933 Capital Maintenance Planning/Development

**Project Purpose**

*To optimize the efficiency and effectiveness of MWRA maintenance practices by developing and implementing a strategic maintenance plan for MWRA assets.*

**Project History and Background**

MWRA is responsible for rehabilitating, repairing, and maintaining the regional water and sewerage system infrastructure. Since its assumption of the ownership and operations of the water and sewer systems in 1985, MWRA has undertaken an ambitious program of capital improvements to the systems, with estimated expenditures of more than $8 billion for fiscal years 1986 through 2018.

Given the significant value and critical nature of these assets, system maintenance is of paramount importance. This project helps MWRA optimize maintenance practices by evaluating alternative approaches to equipment, infrastructure and facility maintenance, recommending a maintenance strategy, implementing a pilot program to test the recommended strategy, and developing a plan to implement the recommended strategy throughout MWRA.

The purpose of technical assistance contracts is to make available, on a continuing basis, the services of qualified, professional engineering firms to assist MWRA staff on engineering study and/or design initiatives. The contracts involve the engineering disciplines of architecture, civil, structural, geotechnical, surveying, environmental and sanitary, mechanical and process, fire protection, electrical, control systems, chemical, corrosion and odor control, permitting and security. These agency-wide technical assistance contracts supplement in-house staff on high-priority or unanticipated projects, or provide expertise on short-term assignments requiring specialized disciplines that are not cost effective for MWRA to maintain on an in-house basis and will ensure that adequate resources are available to quickly and comprehensively respond to MWRA's needs, particularly when emergency or unanticipated situations arise.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Inventory & Evaluation Phases 1 & 2 | Development of a comprehensive, strategic maintenance plan for MWRA. (Completed by July 2005). | Completed |
| As-Needed CS/REI 1 & 2 | As-Needed Construction Services/Resident Engineering Inspection Services. Services/Contracts can be used in circumstances when additional Resident Engineers or senior level Resident Engineers with special expertise are required as well as CS/REI services for in-house or as-needed technical assistance design contracts. | Active |
| As-Needed Design | Contracts for professional design and/or technical assistance services for either wastewater or waterworks system improvement projects to supplement existing engineering resources for specialized and/or complex engineering issues. Sub-phases consist of As-Needed Design phases 1-19. | Completed/Active |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $27,587 | $14,201 | $13,386 | $1,599 | $2,972 | $13,386 | $0 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 55.2% | Status as % is approximation based on project budget and expenditures. All tasks in *Inventory & Evaluation Phases 1 & 2* are complete. As-Needed Design 7 was substantially completed in July 2012. As-Needed Design 8 was completed in February 2012. As-Needed Contracts 9 and 10 were completed in January and February 2014, respectively. Contract 11 was completed in August 2015. Contracts 12 and 13 were completed in July 2016 and August 2016, respectively. As-Needed Contracts 14 and 15 commenced in June 2016 and were completed in December 2018. Contracts 16 and 17 commenced in June 2018. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| 23,157 | $27,587 | $4,430 | Sep-21 | Jul-22 | 10 mos. | $8,519 | $13,386 | $4,867 |

**Explanation of Changes**

- Project cost and schedule changed primarily due to new contracts added for As-Needed Design 18 and 19.
- Project spending changed due to new contracts added for As-Needed Design 18 and 19 as well as updated cash flows for As-Needed Design contracts 14 and 15.

**CEB Impacts**

- None identified at this time.

# S. 934 MWRA Facilities Management and Planning

**Project Purpose**

*To improve MWRA operations by consolidating projects and providing a central point of review and decision making for space planning decisions.*

**Project History and Background**

This project consolidated existing MWRA projects (DI Maintenance Facilities and DI CSB Demolition) to provide a central point of review and decision making for space planning decisions across the organization.

The project will cover work to rehabilitate or demolish the old Administration Building on Deer Island as the building has deteriorated and certain structures need to be upgraded to current standards if it is to remain occupied. The project also included funds for demolition of the CSB (Construction Support Building) which was built as a temporary structure and has also deteriorated. The CSB Demolition contract was completed in September 2009.

**Scope**

| Sub-phase | Scope | Status |
|---|---|---|
| Design & Engineering Services | Design and engineering services to support space plan. | Future |
| Facilities Construction | Construction of modifications to MWRA facilities in accordance with space plan. | Completed/Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $2,971 | $371 | $2,600 | $0 | $250 | $2,600 | $0 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 12.5% | Status as % is approximation based on project budget and expenditures. CSB Demolition contract was substantially complete in September 2009. Records Center Shelving and Moving to the interim warehouse/records center was completed in the spring of 2009. Remaining work is to demolish old Administration Building on Deer Island. Some rehabilitation work will need to be done as well. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $2,151 | $2,971 | $820 | Mar-21 | Dec-21 | 9 mos. | $1,780 | $2,600 | $820 |

**Explanation of Changes**

- Project cost and spending changed due to updated cost estimates for DI Administration Building Design and Construction.

- Project schedule shifted due to project priorities.

**CEB Impacts**

- None identified at this time.

# S. 935 Alternative Energy Initiatives

***Project Purpose***

*A comprehensive "green energy" initiative that is expected to bring solar, wind and hydroelectric power either alone or in combination to a number of MWRA facilities*

**Project History and Background**

This project was originally included under Deer Island in previous budget cycles. Building upon its track record in sustainable resource use – most notably dramatic system-wide reductions in water demand, 100% beneficial reuse of biosolids, self-generation of approximately 25% of Deer's Island power needs, and maximizing revenue through hydropower – MWRA continues to work aggressively to use its resources efficiently, respond appropriately to climate change, and reduce the environmental impacts of its daily operations. Key initiatives completed to-date include: A comprehensive "green energy" initiative that brought solar, wind and hydroelectric power to a number of MWRA facilities.

**Scope**

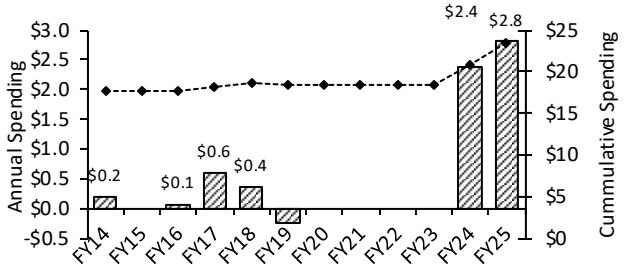
| Sub-phase | Scope | Status |
|---|---|---|
| DI Solar Residuals Odor Control (ROC) | Design and construction of 100 kw photovoltaic array. Projected annual output estimated at 105,000 kwh. | Completed |
| DI Wind | Design and construction of 2 600kw solar wind turbine systems. Projected annual output estimated at 2,300,000 kwh. Project added to include repair/rehabilitation contract. | Completed |
| DI Solar Maintenance/Warehouse | Design and construction of 180kw photovoltaic array. Projected annual output estimated at over 200,000 kwh. Project funding includes $735K million from the American Recovery and Reinvestment Act ("ARRA"). | Completed |
| Future Renewable Energy (7270) | Design and construction for future renewable energy projects throughout the Authority. | Future |
| DI Solar Power Purchase Agreement (PPA) | Design and construction of 456 kw photovoltaic array through a third party 20 yr Power Purchase Agreement. Projected annual output estimated at 520,000 kwh. Project partially subsidized by $1.1M from ARRA program. No capital costs to MWRA; pay for electricity generated. | Completed |
| Loring Road Hydro | Construction of a 200 kW hydropower turbine/generator at Loring Road. Projected annual output estimated at 1,200,000 kwh. Project funding includes $1.5 million from the ARRA program. | Completed |
| Energy Adv Con Services | Consultant for comprehensive energy advisory services on throughout the Authority. | Completed |
| Technical Assistance | Various technical assistance contracts to aid solar, wind, and hydro initiatives. | Completed |
| Carroll WTP Solar Construction | Installation of photovoltaic cells with generating capacity of 496 kw at Carroll WTP plant. Projected annual output estimated at over 616,000 kwh. Project funding includes $2.2 million from the ARRA program. | Completed |

| | | |
|---|---|---|
| Charlestown Wind | Design and construction of 1.5 MW wind turbine system. Projected annual output estimated at 3,000,000 kwh. Project funding includes $4.8 million from the ARRA program. | Completed |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $23,364 | $18,418 | $4,947 | ($234) | $0 | ($234) | $5,181 | $0 |

**Alternative Energy Initiatives**




| | | |
|---|---|---|
| Project Status 5/19 | 77.8% | Status as % is approximation based on project budget and expenditures. Carroll Water Treatment Solar and Loring Road Hydro Construction were completed in May 2011. Carroll Water Treatment Plant Solar Construction and Charlestown Wind Project were completed in 2011. DITP Solar PPA was completed in 2011. Hatchery Pipeline & Hydro was substantially complete in September 2017. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $23,476 | $23,364 | ($112) | Dec-24 | Dec-24 | None | $0 | ($234) | ($234) |

**Explanation of Changes**

- Project cost changed due to final cost adjustment for Charlestown Wind partially offset by inflation adjustment on Future Renewable Energy contract.
- Project spending changed due to final cost adjustment for Charlestown Wind.

**CEB Impacts**

- None identified at this time.

# Information Technology (IT)

The MIS Department provides MWRA with the secure information processing services necessary to carry out the Authority's mission. Applications in use range from financial to operational, and enhance MWRA's ability to access data and improve internal controls, reporting, and management performance. In addition to computing and telephone systems, the department also provides library and records management services. The MIS department supports more than 1,155 MWRA users, including those at the Charlestown Navy Yard (CNY), Chelsea Facility, Deer Island Wastewater Treatment Plant, Southborough Facility, Carroll Water Treatment Plant, and other remote sites.

In order to provide these services, MIS has structured its capital improvement projects as follows:

**Application Improvement Program** – This program, along with associated projects, continue MWRA's efforts to update and enhance a wide range of applications to improve efficiencies of business processes and effectiveness of the staff while ensuring the availability and integrity of the MWRA's data resources.

**Information Security Program** – This program focuses on the strength, resiliency, and sustainability of MWRA's cyber security practices for its data and computing-related assets. The program also monitors for and protects against penetrations, intrusions, and malicious actions from both internal and external threats. The projects associated with this program continue to assess, implement, and improve MWRA's information security protections, including recommendations to improve each IT system's security profile.

**Information Technology Management Program** -This program improves the organization of MIS and the oversight processes for selecting and implementing IT solutions throughout the MWRA. This program updates the IT Steering Committee to ensure that the business and technology priorities of the MWRA are aligned and are being met.

**Information Technology Improvement Program-**This program assesses and implements consolidated and optimized versions of core IT infrastructure elements to improve and optimize data management practices, including: storage, backup, archive and purge processes, and technologies. These improvements cover the 1,411 desktops, 143 laptops, 112 servers, 163 tablets, 239 smartphones, 19 Wide Area Network Circuits and associated ancillary equipment, as well as the 18 Terabytes of data managed by MIS.

# S. 940 Applications Improvements Program

***Project Purpose***

*To develop, improve, and procure management information systems (MIS) applications to improve efficiencies of business processes associated with managing the operations, and support divisions.*

**Project History and Background**

This program will continue the good work started in previous years to update and enhance a wide range of applications to improve efficiencies of business process and effectiveness of the staff performing the processes while ensuring the availability, integrity and confidentiality of the MWRA's data resources. The program will continue to enhance the integration and availability of data to provide a more holistic view of the overall operational status with seamless access to the detailed data.

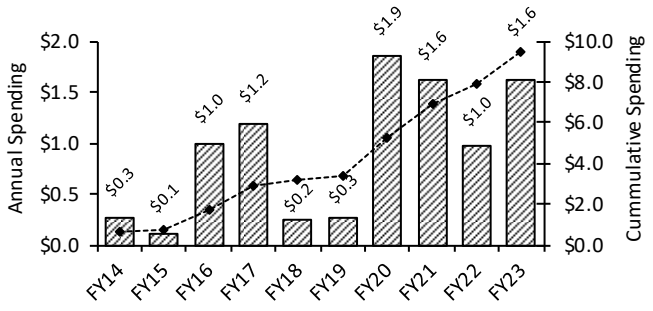
**Scope –** The table describes the CIP phases and associated projects.

| Sub-phase | Scope | Status |
|---|---|---|
| GIS Applications & Integration | Expand role of GIS technology for scientific, environmental and engineering applications. This project will assess the current state of the GIS Program and make recommendations for improvements. | Planned FY20 |
| Lawson Upgrade | Upgrade current Infor application to version 11 and ultimately to version 12, Infor's latest version. | Future |
| Maximo Upgrade | Completed high priority pending items post Maximo upgrade to v7.6, such as IBM Control Desk (ICD), addition of the Clinton site, and integrations with Lawson. An end to end Maximo application performance study was conducted by a third party vendor and appropriate corrective measures were applied. | Completed |
| Pre-Treatment Information Management System (PIMS) Replace or Build | PIMS system is used by the MWRA to monitor the pretreatment program pursuant to MWRA's NPDES permit and EPA regulations. Planned are the PIMS CROMERR implementation, Dental Permitting functionality, and server operating system upgrade to a supported version. | Future |
| SAP BO Upgrade/ Migration | Upgrade SAP Business Objects Suite to v4.2, including Crystal Reports to v2016. The upgraded Business Objects platform will support existing custom reports and provide data visualization to end-users of various data systems. Nearly 1000 existing Crystal reports will be migrated to the new platform. The upgraded platform will also host existing Oracle Discoverer Reports. Oracle has ended support for Oracle Discoverer product since June 2017. | Active |
| Enterprise Content Management | Implement an Authority-wide Content Management Program to address dependence upon paper records, support records management and improve access to information, streamline workflows and replace several department-level solutions. | Active |
| WQRS Aquarius | Implement functionality improvements to the Water Quality Reporting System. | Active |

| Sub-phase | Scope | Status |
|---|---|---|
| Laboratory Information Management System (LIMS) Upgrade | E-Lab is a project that will improve productivity of staff and reduce the amount of paper being generated. This initiative added a new module into LIMS called Electric Laboratory Notebook (ELN). ELN replaced paper based laboratory notebooks with tablets that are connected to LIMS and integrated into the core product. This project included the purchase of tablets, ELN licenses and services required to implement the new module. Phase I of the project is complete for the Water Labs. An Improvement project is currently underway and once completed, Phase II will begin for the Wastewater Labs. | Future |
| Lawson Global HR | Upgrade to Infor's Global Human Resources to provide the latest enhancements to the Employee Safety, Position Budgeting, Benefits, Employee Relations, Absence and Occupational Health modules as well as introduce a new configurable Organizational / person structure to our HR platform. | Planned FY20 |
| Time Entry System/WFM | Provide a new time entry and tracking system that includes all of the modern Work Force Management (WFM) features. | Planned FY20 |
| AP Invoice Automation | Automate the paper-based process for processing invoices and getting payment authorization from the divisions. | Future |
| Hyperion Pillar | The Hyperion Pillar application, currently used for budgeting, is out dated and no longer supported by Oracle and needs to be replaced with a commercially viable product, most likely the Infor Budget module. | Future |
| 8M Permit | Develop a system that will manage the issuance of 8M Permits required for certain construction projects. The permits allow other entities to build, construct, excavate, or cross within an easement or other property interest held by the Authority. | Planned FY20 |
| Instrument Data Management | There is a need for ancillary in-house (LIMS) data management improvements for laboratory instruments at MWRA. Massachusetts certification and records retention laws require that raw data from instruments be retained and accessible for up to 15 years. While the final results and a limited amount of raw data are transferred from the instruments' data systems to LIMS, the bulk of the raw data are retained and archived outside of LIMS. The current approach is labor-intensive, thus a more user-friendly, automated approach is needed. | Future |
| PI (OSI) | Consolidation of the separate DI and FOD PI systems into one. | Future |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY23 |
|---|---|---|---|---|---|---|---|
| $13,093 | $2,892 | $10,201 | $256 | $1,854 | $6,290 | $3,911 | $0 |




| | | |
|---|---|---|
| Project Status 5/19 | 22.7% | Status as % is approximation based on project budget and expenditures. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $12,198 | $13,093 | $895 | Sep-25 | Sep-25 | None | $5,337 | $6,290 | $953 |

**Explanation of Changes**

- Project cost and spending changed due to updated, re-structured, and re-scheduled Application Improvements MIS initiatives for the next five years.

**CEB Impacts**

- None identified at this time.

# S. 942 Information Security Program

**Project Purpose**

*To ensuring the availability, integrity and confidentiality of the MWRA's data resources through the selection and implementation of Information technology solutions associated with cyber security.*

**Project History and Background**

This program focuses on the resiliency and sustainability of the MWRA's data security practices. The projects associated with this program established policies, procedures and an information security awareness program for all of the MWRA. This program included the design of both an information security program and electronic security plans in order to provide a more formal, comprehensive IT security framework that is compliant with Federal Standards.

**Scope –** The table describes the CIP phases and associated projects.

| Sub-phase | Scope | Status |
|---|---|---|
| MSSP | The current Managed Security Service Provider (MSSP) contract ends on 6/30/21. | Active |
| ITSM Access Management | Implementation of additional technologies to manage and monitor user access to IT assets and services. | Planned FY20 |
| MSSP/SIEM | New contract for Managed Security Service Provider (MSSP) and Security information and event management (SIEM) starting 7/1/21. | Future |
| Active Directory | The authentication services application for MWRA systems is Microsoft's Active Directory. The version currently installed is end-of-life and will need to be upgraded over the next year. | Active |
| XEN Mobile/XEN App/Work Space | Upgrade the existing mobile device, remote access and Sharefile services. | Future |
| Information Security Plan Implementation | Coordinate a system-by-system development of Information Security Plan to apply security controls and standards to each system within MWRA's application portfolio. | Planned FY20 |
| IT Security Program (ISP) Development | Formal and informal activities to inform staff (including contractors and business partners) of the information security risks associated with their activities and their responsibilities in complying with MWRA policies and procedures designed to reduce these risks. This project started in FY13 and was completed in FY14. | Completed |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $5,506 | $1,708 | $3,798 | $31 | $1,087 | $3,798 | $0 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 31.0% | Status as % is approximation based on project budget and expenditures. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** | **FY19** | **FY20** | **Chge.** |
| $3,727 | $5,506 | $1,779 | Jun-23 | Jun-21 | (24) mos. | $2,045 | $3,798 | $1,753 |

**Explanation of Changes**

- Project cost, schedule, and spending changed due to updated, re-structured, and re-scheduled Information Security Program MIS initiatives for the next five years.

**CEB Impacts**

- None identified at this time.

# S. 944 Information Technology Management Program

**Project Purpose**

*To improve the overall efficiencies in how MIS delivers IT services and to more effectively adapt to the changing business needs associated with managing the operational and administrative systems of the Authority.*

**Project History and Background**

This program improves the organization of MIS and the oversight processes for selecting and implementing IT solutions throughout the MWRA. This program updates the IT Steering Committee to ensure that the business and technology priorities of the MWRA are aligned and are being met.

**Scope –** The table describes the CIP phases and associated projects.

| Sub-phase | Scope | Status |
|---|---|---|
| IT Project Management Methodology | Implement a set of procedures, standards, tools and techniques that will improve the predictability of deliverables and cost associated with information technology projects. | Active |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $200 | $0 | $200 | $0 | $160 | $200 | $0 | $0 |

| | | |
|---|---|---|
| Project Status 5/19 | 0% | Status as % is approximation based on project budget and expenditures. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $636 | $200 | ($436) | Dec-20 | Jun-20 | (6) mos. | $636 | $200 | ($436) |

**Explanation of Changes**

- Project cost, schedule and spending changed primarily due to moving Software Development Life Cycle contract to Application Improvements Program project and deleting contract for Service Delivery & Best Practices.

**CEB Impacts**

- None identified at this time.

# S. 946 IT Infrastructure Program

**Project Purpose**

*To assess and implement consolidated and optimized versions of equipment and data bases and improve and optimize data management practices.*

**Project History and Background**

The MWRA currently owns and operates 1,411 desktops, 143 laptops, 112 servers, 163 tablets, 239 smartphones, 19 Wide Area Network Circuits and associated ancillary equipment, as well as 18 Terabytes of data. This program assesses and implements consolidated and optimized versions of core IT infrastructure elements to improve and optimize data management practices, including: storage, backup, archive and purge processes, and technologies.

**Scope –** The table describes the CIP phases and associated projects.

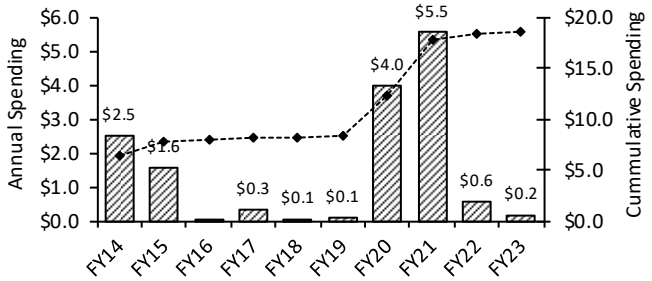
| Sub-phase | Scope | Status |
|---|---|---|
| IT Infrastructure Upgrades | Server upgrades will be performed in FY18. These upgrades will use specifications developed for server hardware and software including ability to implement greater virtualization as well as take advantage of opportunities to standardize operating systems, and hardware, for greater ease of support. | Completed |
| Cabling | Replacement of older Ethernet cabling to support PBX replacement. | Planned FY20 |
| Sans Storage | Implement recommended IT infrastructure changes that include enhancements to capacity and performance of networking and communications, storage, backups, server consolidation, disaster recovery, and integration approach and tools. | Future |
| Oracle Database Appliance | Upgrade Oracle Database appliances that will be end-of-life. | Future |
| Servers Upgrades | Upgrade of existing end-of-life hardware | Active |
| Near Field Communications | Implementation of wireless asset management technology. | Future |
| Exchange Upgrades | Upgrade the current version of Exchange which will reach End of Life in January 2020. Upgrading will ensure continuous support and reliable service. | Active |
| Enterprise Data Management | Develop an Authority-wide data architecture that maximizes benefit from data capture and ongoing maintenance. Implement Authority-wide data modeling and management, to standardize data access across multiple systems for a consistent view of the Authority across all business units. | Future |
| NetScalers | Upgrade the Netscaler hardware on which the XEN Mobile/XEN App/Work Space applications reside. | Planned FY20 |
| Telephone System Upgrade | Replace the end-of-life PBX telephone system. The Authority's current hardware cannot be replaced except with refurbished equipment as it is no longer being manufactured. A new system will offer up-to-date technology with features that are not available in the 20 year old system | Planned FY20 |
| Core Switches | Upgrade of existing end-of-life hardware. | Future |
| Edge Switches | Upgrade of existing end-of-life hardware. | Planned FY20 |

| Sub-Phase | Scope | Status |
|---|---|---|
| Disaster Recovery | Design and implementation of disaster recovery solution. | Future |
| Instrumentation & Controls IT | Design and implementation of technologies to monitor and manage IT infrastructure and applications. | Planned FY20 |

**Expenditure Forecast (in $000s) and Project Status**

| Total Budget | Payments thru FY18 | Remaining Balance | FY19 | FY20 | FY19-23 | FY24-28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|
| $16,602 | $5,731 | $10,471 | $78 | $3,968 | $10,321 | $150 | $0 |

**IT Infrastucture Program**




| | | |
|---|---|---|
| Project Status 5/19 | 35.4% | Status as % is approximation based on project budget and expenditures. |

**Changes to Project Scope, Budget, and Schedule**

| Project Cost | | | Scheduled Completion Date | | | FY19-23 Spending | | |
|---|---|---|---|---|---|---|---|---|
| FY19 | FY20 | Chge. | FY19 | FY20 | Chge. | FY19 | FY20 | Chge. |
| $15,754 | $16,202 | $448 | Dec-22 | Dec-23 | 12 mos. | $9,789 | $10,321 | $532 |

**Explanation of Changes**

- Project cost, schedule, and spending changed due to updated, re-structured, and re-scheduled Information Technology Infrastructure initiatives for the next five years.

**CEB Impacts**

- None identified at this time.

# APPENDIX 2

# Expenditure Forecast Report with Planned NTP and SC dates

# Understanding the Expenditure Forecast

Capital expenditure forecasts, also referred to as projected cashflows, are presented in this section of the FY20 Proposed CIP document. Expenditure forecasts are accrual based, i.e., they are estimated based on when services are expected to be rendered. Projects appear in this report in the same order they appear on-line, i.e. organized by capital program area.

The following presents a description of each column in the expenditure forecast tables:

**Project and Subphase Names**

The first column of the expenditure forecast identifies the organizational hierarchy of the CIP: division area (i.e., Wastewater), followed by the program category (i.e., Interception and Pumping), then individual sub-phases (i.e. Design/CS/RI,) followed by the project name and dollar totals comprising all the sub-phases within that project (i.e. Braintree-Weymouth Relief Facilities). Sub-phases represent both awarded and unawarded contracts.

**Contract Number**

Following each project name is a string of nine numbers. These numbers are assigned by the Rates and Budget Department and are the number reference for the sub-phase in MWRA's capital budgeting database.

The first string is a five-digit number representing the MWRA Lawson Activity Management System sub-phase number. Project budgets and expenditures are tracked by this account number.

Following the five-digit sub-phase number is a four-digit number representing the contract reference number in MWRA's contract management system. This reference number is used to access contract information such as the award amount, change order activity, and processed invoices.

**Notice to Proceed (NTP) and Substantial Completion (SC)**

Project schedules are tracked by two key milestones; Notice to Proceed and Substantial Completion. These milestones indicate the expected start and end dates for contract activity.

**Contract Value**

The Contract Value represents the budgeted amount for the capital program, divisions, program categories, projects, and sub-phases. For unawarded contracts, the contract amount is based on a cost estimate. For awarded contracts, this amount includes the award amount plus any change orders, amendments, and purchase orders accounted for prior to completing the budget.

**Payments through FY18**

Payments through FY18 include actual and accrued expenditures since the inception of the contract through the end of FY18.

**Remaining Balance**

Remaining Balance is calculated by subtracting Payments through FY18 from the Contract Amount. This amount is then spread in the columns to the right, for FY19, FY19-23, and Beyond FY23.

**APPENDIX 2**
**FY20 FINAL FIVE-YEAR CIP BY MAJOR PROGRAM CATEGORY**
**FY20 by Quarters**

| CAPITAL IMPROVEMENT PROGRAM | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXPENDITURE FORECAST FY2019-2023 | | | | | | | | | | | | | |
| ($000) | | | | | | | | | | | | | |
| | Total Contract Amount | Project Payments Thr. FY18 | Balance as of 6/30/18 | FY19 | QI FY20 | QII FY20 | QIII FY20 | QIV FY20 | FY20 | FY21 | FY22 | FY23 | 5-Year Total FY19-23 |
| **Wastewater System Improvements** | 3,719,451 | 2,061,317 | 1,658,134 | 77,637 | 19,745 | 19,789 | 25,259 | 57,711 | 122,504 | 176,582 | 144,442 | 119,313 | 640,479 |
| **Waterworks System Improvements** | 4,299,730 | 2,111,415 | 2,188,315 | 80,563 | 14,764 | 15,827 | 15,125 | 18,450 | 64,166 | 74,077 | 90,307 | 89,257 | 398,370 |
| **Business & Operations Support** | 164,990 | 101,030 | 63,960 | 3,328 | 1,882 | 2,374 | 3,489 | 5,123 | 12,868 | 17,777 | 8,277 | 5,688 | 47,939 |
| **Total MWRA** | 8,184,171 | 4,273,762 | 3,910,409 | 161,528 | 36,391 | 37,990 | 43,873 | 81,283 | 199,538 | 268,436 | 243,027 | 214,259 | 1,086,787 |
| **Contingency** | 184,941 | | 184,941 | | | | | | 10,281 | 15,284 | 14,167 | 12,933 | 52,665 |
| **Total MWRA w/ Contingency** | 8,369,112 | 4,273,762 | 4,095,350 | 161,528 | 36,391 | 37,990 | 43,873 | 81,283 | 209,819 | 283,720 | 257,194 | 227,192 | 1,139,452 |

**Massachusetts Water Resources Authority**
**Capital Imrovement Program**
**FY20 Final Expenditure Forecast**

| Program / Project / Contract | Contract No. | Notice to Proceed | Substantial Completion | Total Contract Amount | Payments through FY18 | Remaining Balancce | FY19 | FY20 | FY21 | FY22 | FY23 | FY19-23 | FY24 - FY28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total MWRA** | | | | **8,184,170,966** | **4,273,762,257** | **3,910,408,663** | **161,527,882** | **199,537,763** | **268,435,934** | **243,026,731** | **214,258,903** | **1,086,787,213** | **1,611,215,901** | **1,212,405,496** |
| | | | | | | | | | | | | | | |
| **Wastewater** | | | | **3,719,450,670** | **2,061,317,063** | **1,658,133,560** | **77,637,446** | **122,503,959** | **176,581,781** | **144,442,410** | **119,313,485** | **640,479,081** | **906,340,777** | **111,313,676** |
| | | | | | | | | | | | | | | |
| **Interception & Pumping** | | | | **1,193,346,281** | **602,400,132** | **590,946,150** | **27,601,237** | **50,090,558** | **60,778,648** | **37,239,696** | **19,627,564** | **195,337,704** | **337,110,856** | **58,497,589** |
| | | | | | | | | | | | | | | |
| **102 Quincy Pump Facilities Total** | | **completed project** | | **25,907,202** | **25,907,202** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **104 Braintree-Weymouth Relief Facilities** | | | | | | | | | | | | | | |
| Geotechnical - Marine | 10001_5333 | Nov-91 | Apr-92 | 442,860 | 442,860 | - | | | | | | | | |
| Geotechnical - Land | 10044_5332 | Nov-91 | Mar-92 | 7,980 | 7,980 | - | | | | | | | | |
| Facilities Planning - Phase 1 | 10045_5311 | Oct-81 | Dec-90 | 331,140 | 331,140 | - | | | | | | | | |
| EIR - Phase 1 | 10046_5312 | Nov-84 | Oct-90 | 513,530 | 513,530 | - | | | | | | | | |
| Design 1/CS/RI | 10047_5313 | Nov-94 | Jun-06 | 18,882,312 | 18,882,312 | - | | | | | | | | |
| Land Acquisition | 10048_5314 | Mar-97 | Jun-10 | 12,841,909 | 12,841,908 | - | | | | | | | | |
| Tunnel Construction/Rescue | 10049_5315 | Jun-99 | Jul-03 | 83,190,599 | 83,190,599 | - | | | | | | | | |
| Intermediate Pump Station-Construction | 10050_5316 | Dec-00 | Apr-05 | 47,444,929 | 47,444,929 | - | | | | | | | | |
| North Weymouth Relief Interceptor | 10051_5303 | Mar-01 | Jun-02 | 4,704,618 | 4,704,618 | - | | | | | | | | |
| HDD Siphon - Construction | 10052_5373 | Jul-03 | May-07 | 16,357,407 | 16,357,407 | - | | | | | | | | |
| B-W Replacement Pump Station | 10054_5375 | Jan-05 | Apr-08 | 17,728,028 | 17,728,028 | - | | | | | | | | |
| Design - Rehab | 10055_5308 | Sep-88 | Dec-89 | 23,710 | 23,710 | - | | | | | | | | |
| Construction - Rehab | 10056_5309 | Jan-92 | Dec-96 | 255,490 | 255,490 | - | | | | | | | | |
| Final EIR/Facility Plan | 10057_5324 | Apr-91 | Aug-93 | 1,111,007 | 1,111,007 | - | | | | | | | | |
| Design 2/CS/RI | 10058_5331 | Apr-95 | Dec-11 | 14,999,141 | 14,999,141 | - | | | | | | | | |
| Rehabilitation of Section 624 - Const. | 10060_5310 | Jul-10 | Dec-10 | 2,505,767 | 2,505,767 | - | | | | | | | | |
| Technical Assistance | 10061_5951 | Nov-84 | Apr-07 | 144,264 | 144,264 | - | | | | | | | | |
| Sedimentation Testing | 10251_6016 | Sep-94 | Apr-96 | 95,880 | 95,880 | - | | | | | | | | |
| Legal | 10263_6072 | Jul-95 | Apr-08 | 849,220 | 849,220 | - | | | | | | | | |
| Hazardous Waste | 10265_6074 | Jul-95 | Apr-07 | 7,937 | 7,937 | - | | | | | | | | |
| Marine Pipeline - Design | 10278_6119 | Feb-97 | Aug-97 | 1,100,000 | 1,100,000 | - | | | | | | | | |
| Mill Cove Siphon - Construction | 10302_6368 | Aug-97 | Jun-98 | 2,748,908 | 2,748,908 | - | | | | | | | | |
| Community Technical Assistance | 10354_6631 | Jul-99 | Apr-07 | 1,111,451 | 1,111,451 | - | | | | | | | | |
| Geotechnical Consultant | 10375_6766 | Sep-00 | Mar-03 | 56,045 | 56,045 | - | | | | | | | | |
| IPS/RPS Communication System | 10378_6792 | Dec-02 | Apr-08 | 224,884 | 224,884 | - | | | | | | | | |
| Wetlands Replication | 10470_7290 | | | 25,607 | 25,606 | 1 | | | | | | | | |
| Mill Cove Siphon Sluice Gates - Design | 10479_7326 | Apr-24 | Apr-27 | 834,870 | - | 834,870 | | | | | | | 834,870 | |
| Mill Cove Sluice Gates - Construction | 10480_7327 | Aug-25 | Apr-26 | 2,000,000 | - | 2,000,000 | | | | | | | 2,000,000 | |
| B/W Improvements - Construction | 10493_7366 | Sep-23 | Sep-25 | 7,000,000 | - | 7,000,000 | | | | | | | 7,000,000 | |
| B/W Improve - Design/CS | 19567_7435 | Dec-18 | Dec-23 | 2,084,918 | - | 2,084,918 | 163,656 | 417,034 | 417,034 | 417,034 | 417,034 | 1,831,792 | 253,126 | |
| B/W Improvements - REI | 19568_7683 | Sep-23 | Sep-25 | 480,000 | - | 480,000 | | | | | | | 480,000 | |
| **104 Braintree-Weymouth Relief Facilities Total** | | | | **240,104,411** | **227,704,621** | **12,399,789** | **163,656** | **417,034** | **417,034** | **417,034** | **417,034** | **1,831,792** | **10,567,996** | |
| | | | | | | | | | | | | | | |
| **105 New Neponset Valley Relief Total** | | **completed project** | | **30,300,304** | **30,300,304** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **106 Wellesley Extension Replacement Sewer Total** | | **completed project** | | **64,358,543** | **64,358,543** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **107 Framingham Extension Relief Sewer Total** | | **completed project** | | **47,855,986** | **47,855,986** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **127 Cummingsville Replacement Sewer Total** | | **completed project** | | **8,998,768** | **8,998,768** | **-** | | | | | | | | |

**Massachusetts Water Resources Authority**
**Capital Imrovement Program**
**FY20 Final Expenditure Forecast**

| Program / Project / Contract | Contract No. | Notice to Proceed | Substantial Completion | Total Contract Amount | Payments through FY18 | Remaining Balancce | FY19 | FY20 | FY21 | FY22 | FY23 | FY19-23 | FY24 - FY28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **130 Siphon Structure Rehabilitation** | | | | | | | | | | | | | | |
| Planning | 10253_6017 | Jan-96 | Nov-98 | 937,670 | 937,670 | - | | | | | | | | |
| Land Acquisition | 10280_6165 | Mar-21 | Mar-23 | 50,000 | 2,100 | 47,900 | | | 2,083 | 25,000 | 20,817 | 47,900 | | |
| Design/CS/RI | 10293_6224 | Sep-19 | Feb-24 | 1,584,200 | - | 1,584,200 | | 290,000 | 460,000 | 460,000 | 260,000 | 1,470,000 | 114,200 | |
| Construction | 10294_6225 | Sep-21 | Feb-23 | 3,960,360 | - | 3,960,360 | | | | 1,350,000 | 1,610,360 | 2,960,360 | 1,000,000 | |
| Phase 2 Land Acquisition | 10600_7684 | Dec-24 | Dec-26 | 50,000 | - | 50,000 | | | | | | | 50,000 | |
| Phase 2 Design CS/RI | 10601_7685 | Jul-23 | Dec-27 | 1,584,200 | - | 1,584,200 | | | | | | | 1,584,200 | |
| Phase 2 Construction | 10602_7686 | Jul-25 | Dec-26 | 3,960,360 | - | 3,960,360 | | | | | | | 3,960,360 | |
| **130 Siphon Structure Rehabilitation Total** | | | | **12,126,790** | **939,770** | **11,187,020** | | **290,000** | **462,083** | **1,835,000** | **1,891,177** | **4,478,260** | **6,708,760** | |
| | | | | | | | | | | | | | | |
| **131 Upper Neponset Valley Sewer System Total** | | **completed project** | | **54,174,077** | **54,174,077** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **132 Corrosion & Odor Control** | | | | | | | | | | | | | | |
| Planning/Study | 10279_6137 | Jan-97 | Dec-98 | 587,422 | 587,422 | - | | | | | | | | |
| Land Acquisition | 10323_6549 | Aug-02 | Jun-05 | 23,175 | 11,831 | 11,344 | 11,344 | | | | | 11,344 | | |
| Legal | 10325_6551 | Dec-00 | Jul-08 | 1,925 | 1,925 | - | | | | | | | | |
| Design/CS/RI | 10327_6553 | Aug-02 | Jun-05 | 1,787,912 | 1,787,912 | - | | | | | | | | |
| Interim Corrosion Control | 10373_6743 | Jul-00 | Dec-01 | 620,805 | 620,805 | - | | | | | | | | |
| FES/FERS Biofilters - Design | 10406_6919 | Jul-23 | May-26 | 1,193,533 | - | 1,193,533 | | | | | | | 1,193,533 | |
| FES/FERS Biofilters - Construction | 10456_7215 | Dec-23 | Dec-24 | 1,953,054 | - | 1,953,054 | | | | | | | 1,953,054 | |
| System-wide Odor Control - Study | 10491_7364 | Jan-24 | Jan-26 | 1,000,000 | - | 1,000,000 | | | | | | | 1,000,000 | |
| NI Mech & Elect Upg Design/CA | 10492_7365 | Jul-23 | Nov-28 | 4,800,000 | - | 4,800,000 | | | | | | | 3,960,000 | 840,000 |
| NI System-wide Odor Control - Evaluation | 10495_7494 | Sep-15 | Feb-17 | 487,280 | 487,280 | - | | | | | | | | |
| NI Mech & Elect Upg Construct | 10496_7495 | Nov-25 | Nov-27 | 20,000,000 | - | 20,000,000 | | | | | | | 20,000,000 | |
| NI Odor Ctrl & HVAC Des/CA/REI | 10497_7517 | Mar-17 | Jul-23 | 6,236,901 | 2,682,765 | 3,554,136 | 399,060 | 781,096 | 781,096 | 781,096 | 781,097 | 3,523,445 | 30,691 | |
| NI Odor Ctrl HVAC Imp Constr. Ph 2 | 10498_7548 | Sep-19 | Jul-22 | 45,000,000 | - | 45,000,000 | | 7,976,999 | 13,353,735 | 12,983,437 | 4,558,285 | 38,872,456 | 6,127,544 | |
| NI Mech & Elect Upgrades-REI | 10580_7635 | Nov-25 | Nov-27 | 440,000 | - | 440,000 | | | | | | | 440,000 | |
| **132 Corrosion & Odor Control Total** | | | | **84,132,007** | **6,179,940** | **77,952,067** | **410,404** | **8,758,095** | **14,134,831** | **13,764,533** | **5,339,382** | **42,407,245** | **34,704,822** | **840,000** |
| | | | | | | | | | | | | | | |
| **136 West Roxbury Tunnel** | | | | | | | | | | | | | | |
| Inspection | 10299_6230 | Jul-98 | Sep-99 | 344,202 | 344,202 | - | | | | | | | | |
| Tunnel Easements & Permits | 10329_6566 | Mar-10 | Dec-15 | 53,789 | 53,789 | - | | | | | | | | |
| Legal | 10330_6567 | Apr-00 | Mar-10 | 2,133 | 2,133 | - | | | | | | | | |
| Land Acquisition | 10331_6568 | Apr-00 | Mar-10 | 440,154 | 440,154 | - | | | | | | | | |
| Construction | 10332_6569 | Jun-01 | Jun-02 | 6,673,671 | 6,673,671 | - | | | | | | | | |
| Design/CS/RI | 10333_6570 | Apr-00 | Jun-03 | 1,416,580 | 1,416,580 | - | | | | | | | | |
| Technical Assistance | 10366_6709 | Nov-99 | Mar-10 | 7,752 | 7,752 | - | | | | | | | | |
| Tunnel - Design | 10400_6897 | Feb-09 | Jun-11 | 1,375,292 | 1,375,292 | - | | | | | | | | |
| Tunnel Inspection | 10401_6898 | Sep-23 | Jun-24 | 1,000,000 | - | 1,000,000 | | | | | | | 1,000,000 | |
| **136 West Roxbury Tunnel Total** | | | | **11,313,573** | **10,313,573** | **1,000,000** | | | | | | | **1,000,000** | |
| | | | | | | | | | | | | | | |
| **137 Wastewater Central Monitoring** | | | | | | | | | | | | | | |
| Planning | 10301_6232 | Jan-98 | Jul-99 | 563,425 | 563,425 | - | | | | | | | | |
| Design and Integration Services | 10319_6532 | Jun-02 | Jul-10 | 6,344,266 | 6,344,266 | - | | | | | | | | |
| Construction 1 (CP1) | 10320_6533 | Mar-06 | Jan-08 | 7,662,173 | 7,662,173 | - | | | | | | | | |
| Construction 2 (CP2) | 10321_6534 | Feb-08 | Jul-09 | 5,139,444 | 5,139,444 | - | | | | | | | | |
| Technical Assistance | 10322_6535 | Sep-02 | Jul-10 | 7,425 | 7,425 | - | | | | | | | | |
| Equipment Prepurchase | 10398_6861 | Apr-05 | Dec-09 | 65,303 | 65,303 | - | | | | | | | | |
| Wastewater Redundant Communications | 10490_7363 | Jul-20 | Mar-24 | 700,000 | - | 700,000 | | | 187,000 | 187,000 | 187,000 | 561,000 | 139,000 | |
| Design & Programming Services | 10551_7578 | Apr-18 | Oct-27 | 3,470,000 | - | 3,470,000 | 23,795 | 281,295 | 160,000 | 160,000 | 160,000 | 785,090 | 2,684,910 | |
| Construction | 10552_7579 | Dec-23 | Oct-31 | 1,420,000 | - | 1,420,000 | | | | | | | 1,420,000 | |
| Equipment/Hardware | 10553_7580 | Jun-18 | Oct-27 | 2,110,000 | - | 2,110,000 | 113,180 | 166,820 | 100,000 | 100,000 | 100,000 | 580,000 | 1,530,000 | |
| **137 Wastewater Central Monitoring Total** | | | | **27,482,036** | **19,782,036** | **7,700,000** | **136,975** | **448,115** | **447,000** | **447,000** | **447,000** | **1,926,090** | **5,773,910** | |
| | | | | | | | | | | | | | | |
| **139 South System Relief Project** | | | | | | | | | | | | | | |
| Archdale - CS/RI | 10309_6419 | Nov-98 | Aug-99 | 5,379 | 5,379 | - | | | | | | | | |
| Archdale - Construction | 10310_6420 | May-99 | Aug-99 | 210,748 | 210,748 | - | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sections 70 & 71 HLS - Evaluation | 10318_6519 | Sep-98 | Oct-99 | 215,140 | 215,140 | - | | | | | | | | |
| Outfall 023 - Design | 10345_6595 | Jun-99 | Sep-99 | 509 | 509 | - | | | | | | | | |
| Outfall 023 - Cleaning | 10346_6596 | Apr-00 | Nov-00 | 1,097,526 | 1,097,526 | - | | | | | | | | |
| Land Acquisition/Easements | 10347_6605 | Apr-99 | Apr-05 | 5,053 | 5,053 | - | | | | | | | | |
| Sections 70 & 71 HLS - Construction | 10349_6611 | Jun-99 | Oct-99 | 417,021 | 417,021 | - | | | | | | | | |
| Milton Financial Assistance | 10350_6616 | Oct-99 | Jun-00 | 1,487,868 | 1,487,868 | - | | | | | | | | |
| Outfall 023 - Structural Improvements | 10386_6801 | Jan-24 | Dec-25 | 1,500,000 | - | 1,500,000 | | | | | | | 1,500,000 | |
| **139 South System Relief Project Total** | | | | **4,939,244** | **3,439,244** | **1,500,000** | | | | | | | **1,500,000** | |
| | | | | | | | | | | | | | | |
| **141 Wastewater Process Optimization** | | | | | | | | | | | | | | |
| Planning | 10367_6733 | Aug-01 | Aug-04 | 930,308 | 930,308 | - | | | | | | | | |
| North System Hydraulic Study | 10412_6930 | Nov-11 | Jun-15 | 560,840 | 571,459 | (10,619) | (10,619) | | | | | (10,619) | | |
| Somerville Sewer - Design | 10413_6931 | Oct-23 | Mar-26 | 200,000 | - | 200,000 | | | | | | | 200,000 | |
| Somerville Sewer - Construction | 10414_6932 | Mar-24 | Mar-25 | 1,193,533 | - | 1,193,533 | | | | | | | 1,193,533 | |
| Hydraulic Modeling Eng Design and Constr | 19401_7412 | Mar-19 | Jun-31 | 7,442,023 | - | 7,442,023 | 54,732 | 218,930 | 218,930 | 219,930 | | 712,522 | 5,152,664 | 1,576,837 |
| **141 Wastewater Process Optimization Total** | | | | **10,326,704** | **1,501,767** | **8,824,937** | **44,113** | **218,930** | **218,930** | **219,930** | | **701,903** | **6,546,197** | **1,576,837** |
| | | | | | | | | | | | | | | |
| **142 Wastewater Meter System - Equipment Replacement** | | | | | | | | | | | | | | |
| Planning / Study / Design | 10371_6739 | Jul-17 | Aug-19 | 3,858,154 | 586,455 | 3,271,699 | 1,455,287 | 977,141 | 825,834 | 13,437 | | 3,271,699 | | |
| Equipment Purchase & Installation | 10379_6793 | Nov-03 | Jun-08 | 5,137,912 | 5,137,912 | - | | | | | | | | |
| Meter Power Install - Construction | 10411_6929 | Dec-20 | Dec-21 | 500,000 | - | 500,000 | | | 150,000 | 350,000 | | 500,000 | | |
| WW Metering Asset Protect/Equip Purchases | 10451_7191 | Feb-20 | Dec-30 | 12,941,846 | - | 12,941,846 | | 1,600,000 | 2,100,000 | | | 3,700,000 | | 9,241,846 |
| Meter Power REI | 10800_7687 | Dec-20 | Dec-21 | 190,000 | - | 190,000 | | | 58,000 | 132,000 | | 190,000 | | |
| **142 Wastewater Meter System - Equipment Replacement Total** | | | | **22,627,912** | **5,724,367** | **16,903,545** | **1,455,287** | **2,577,141** | **3,133,834** | **495,437** | | **7,661,699** | | **9,241,846** |
| | | | | | | | | | | | | | | |
| **143 Regional I/I Management Pl Total** | | **completed project** | | **168,987** | **168,987** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **145 Facility Asset Protection** | | | | | | | | | | | | | | |
| Prison Point HVAC Upgrades-Construct. | 10380_6795 | Dec-10 | Dec-13 | 2,764,181 | 2,764,181 | - | | | | | | | | |
| Remote Headworks Heating Syst Upgrade | 10381_6796 | May-05 | May-06 | 1,175,181 | 1,175,181 | - | | | | | | | | |
| Alewife Brook Pump Stn Rehab - Const. | 10382_6797 | Jan-16 | Apr-19 | 13,503,159 | 9,773,277 | 3,729,882 | 3,729,883 | | | | | 3,729,883 | | |
| Rehab of Section 93A Lexington | 10383_6798 | Jul-03 | Apr-04 | 1,565,742 | 1,565,742 | - | | | | | | | | |
| Chelsea Creek Upgrades - REI | 10387_6802 | Nov-16 | Feb-21 | 3,446,834 | 864,594 | 2,582,239 | 771,319 | 987,027 | 823,894 | | | 2,582,240 | | |
| Technical Assistance | 10392_6829 | Jul-02 | Mar-22 | 126,714 | 97,677 | 29,037 | 29,037 | | | | | 29,037 | | |
| Sections 80 & 83 | 10394_6842 | Apr-07 | Sep-07 | 364,590 | 364,590 | - | | | | | | | | |
| Section 160 | 10395_6843 | Jun-07 | Dec-08 | 1,581,369 | 1,581,369 | - | | | | | | | | |
| Survey | 10396_6857 | Nov-04 | May-05 | 10,708 | 10,708 | - | | | | | | | | |
| Permits | 10397_6858 | May-03 | May-25 | 14,979 | 14,979 | - | | | | | | | | |
| Remote Headworks Concept Plan | 10399_6886 | May-08 | Sep-09 | 670,436 | 670,436 | - | | | | | | | | |
| Construction CB1 Sections 26 & 27 | 10418_6936 | Sep-25 | Sep-27 | 30,000,000 | - | 30,000,000 | | | | | | | 30,000,000 | |
| Alewife Brook Pump Stn Rehab - Des/CA | 10419_6937 | Apr-10 | Oct-11 | 223,194 | 223,194 | - | | | | | | | | |
| Prison Point HVAC Upgrades - Design | 10420_6938 | Jan-08 | Mar-13 | 441,387 | 441,387 | - | | | | | | | | |
| 93 A Force Main Replacement | 10423_6987 | May-06 | Jan-07 | 461,962 | 461,962 | - | | | | | | | | |
| Mill Brook Valley Sewer Section 79&92 | 10424_7004 | Jun-04 | Mar-05 | 542,292 | 542,292 | - | | | | | | | | |
| Hingham Pump Stn Isolation Gate-Const | 10427_7033 | Sep-11 | May-12 | 124,500 | 124,500 | - | | | | | | | | |
| Alewife Brook Pump Station Final Design/CA/REI | 10428_7034 | Mar-12 | Feb-20 | 2,263,848 | 1,634,900 | 628,948 | 546,945 | 82,002 | | | | 628,947 | | |
| Caruso Pump Station Improvements - Design/CA/REI | 10431_7037 | Aug-12 | Jun-17 | 865,096 | 861,097 | 3,999 | | 3,999 | | | | 3,999 | | |
| Land/Easements | 10440_7073 | Jul-03 | Jun-10 | 103,386 | 103,386 | - | | | | | | | | |
| Nut Island Headworks Fire Alarm/Wire | 10444_7144 | Jun-09 | Dec-09 | 285,391 | 285,391 | - | | | | | | | | |
| Chelsea Creek Upgrades - Construction | 10445_7161 | Nov-16 | Nov-20 | 82,503,972 | 31,530,134 | 50,973,838 | 15,264,112 | 21,818,384 | 13,891,342 | | | 50,973,838 | | |
| Hayes Pump Station Rehab Design | 10446_7162 | Nov-19 | May-24 | 1,508,310 | - | 1,508,310 | | 250,000 | 500,000 | 365,000 | 365,000 | 1,480,000 | 28,310 | |
| Inter Ren 1, Reading Ext. - Des/CA/REI | 10447_7163 | Aug-15 | Jun-19 | 1,156,116 | 691,793 | 464,323 | 342,179 | 122,144 | | | | 464,323 | | |
| Inter Ren 1, Read Ext. Sew. - Construct. | 10448_7164 | Aug-17 | Dec-18 | 1,936,195 | 973,509 | 962,686 | 962,686 | | | | | 962,686 | | |
| Chelsea Creek Upgrades - Design/CA | 10455_7206 | Jul-10 | Oct-21 | 10,315,831 | 7,360,894 | 2,954,937 | 1,236,222 | 687,486 | 687,486 | 343,744 | | 2,954,938 | | |
| Inter Ren 7-Study/Design/CA/REI | 10457_7216 | Jan-20 | Dec-23 | 900,000 | - | 900,000 | | | 150,000 | 300,000 | 300,000 | 750,000 | 150,000 | |
| Inter Ren 7-Malden&Melrose-Constr. | 10458_7217 | Jan-24 | Jun-25 | 3,500,000 | - | 3,500,000 | | | | | | | 3,500,000 | |
| Remote Hdwks & DI Shaft Study | 10463_7237 | Sep-18 | Jan-20 | 1,371,789 | - | 1,371,789 | 389,464 | 982,325 | | | | 1,371,789 | | |
| Inter Ren 3, Dor Inter Sewer - Construction | 10467_7279 | Jul-19 | Dec-20 | 5,580,000 | - | 5,580,000 | | 2,790,000 | 2,790,000 | | | 5,580,000 | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Construction CB2 Sections 23 & 24 | 10468_7280 | Sep-27 | Sep-29 | 30,000,000 | - | 30,000,000 | | | | | | | 8,400,000 | 21,600,000 |
| Cottage Farm Fuel System Upgrade | 10469_7281 | Jun-12 | Apr-13 | 497,358 | 497,558 | (200) | (200) | | | | | (200) | | |
| NI Elec & Grit/Sreenings Conveyance-Design | 10477_7312 | Mar-11 | May-16 | 1,229,761 | 1,229,761 | - | | | | | | | | |
| NI Elec & Grit/Sreenings Conveyance-Construction | 10478_7313 | Jul-13 | May-15 | 5,192,243 | 5,192,243 | - | | | | | | | | |
| Interceptor Renewal 5 New Neponset Valley Sewer 607 Constr. | 10481_7328 | Jul-25 | Jul-27 | 13,200,000 | - | 13,200,000 | | | | | | | 13,200,000 | |
| Interceptor Renewal No. 6 - Chelsea | 10482_7329 | Aug-26 | Aug-28 | 11,000,000 | - | 11,000,000 | | | | | | | 9,708,000 | 1,292,000 |
| Prison Point/Cottage Farm Pump & Gear Box/ESDC | 10483_7330 | Feb-14 | Dec-16 | 314,767 | 314,767 | - | | | | | | | | |
| Somerville/Marginal Influent Gates Replace | 10484_7344 | Jul-11 | Nov-11 | 366,848 | 366,848 | - | | | | | | | | |
| Prison Point Rehab - Design/CA/RI | 10486_7359 | Aug-16 | Nov-22 | 3,374,319 | 1,398,976 | 1,975,343 | 437,579 | 576,662 | 576,662 | 384,441 | | 1,975,344 | | |
| System Relief & Contingency Planning | 10487_7360 | Jul-20 | Jun-23 | 500,000 | - | 500,000 | | | 125,001 | 166,667 | 166,666 | 458,334 | 41,666 | |
| DeLauri PS Screens & Security Upgrades | 10488_7361 | Feb-18 | Feb-19 | 1,342,025 | 193,206 | 1,148,819 | 1,148,819 | | | | | 1,148,819 | | |
| Caruso Pump Station Impovements - Const. | 10489_7362 | Mar-16 | Jun-17 | 4,416,578 | 4,416,578 | - | | | | | | | | |
| Hayes Pump Station Rehab Const | 10500_7375 | May-21 | May-23 | 10,000,000 | - | 10,000,000 | | | | 3,000,000 | 5,000,000 | 8,000,000 | 2,000,000 | |
| Sect 156 Rehab - Design/Build | 10503_7393 | Jul-11 | Jul-12 | 2,562,773 | 2,562,773 | - | | | | | | | | |
| Camb Branch Sect 26, 27 Des/ ESDC | 10504_7410 | Sep-23 | Sep-28 | 6,000,000 | - | 6,000,000 | | | | | | | 5,688,000 | 312,000 |
| Sections 4, 5, 6, 186 - Design CA/RI | 10505_7421 | Jul-20 | Jul-26 | 2,004,000 | - | 2,004,000 | | | 223,000 | 223,000 | 223,000 | 669,000 | 1,335,000 | |
| Sections 4, 5, 6, 186 - Construction | 10506_7422 | Jul-23 | Jul-25 | 7,400,000 | - | 7,400,000 | | | | | | | 7,400,000 | |
| Sections 4, 5, 6, 186 - Study | 10507_7423 | Feb-17 | May-18 | 905,649 | 905,649 | - | | | | | | | | |
| Ward St & Colum Pk Headworks Des/CA | 10510_7429 | Feb-20 | Nov-28 | 11,421,823 | - | 11,421,823 | | 247,214 | 1,483,281 | 1,483,281 | 1,483,281 | 4,697,057 | 6,691,433 | 33,333 |
| Ward St Headworks Const | 10511_7430 | Feb-23 | Aug-27 | 57,558,319 | - | 57,558,319 | | | | | | | 52,325,746 | 5,232,573 |
| Chelsea Screenhouse Upgrades | 10512_7431 | Aug-15 | Sep-16 | 4,953,041 | 4,953,041 | - | | | | | | | | |
| PP/Cottage Farm Pump & Gearbox Rebuilds | 10515_7452 | Oct-13 | Nov-15 | 6,439,438 | 6,439,438 | - | | | | | | | | |
| Prison Point Piping Rehab | 10518_7459 | Oct-16 | Sep-17 | 461,919 | 199,552 | 262,367 | 262,367 | | | | | 262,367 | | |
| Prison Point Rehab - Construction | 10519_7462 | Nov-19 | Nov-21 | 36,143,456 | - | 36,143,456 | | 7,529,886 | 18,071,728 | 10,541,842 | | 36,143,456 | | |
| Cottage Farm Rehab - Construction | 10520_7463 | Jul-23 | Jul-25 | 11,995,827 | - | 11,995,827 | | | | | | | 11,995,827 | |
| Chelsea Screenhouse Upgrades - ESDC/REI | 10521_7490 | Sep-15 | Sep-17 | 863,238 | 848,887 | 14,351 | 14,351 | | | | | 14,351 | | |
| Cottage Farm Rehab - Design/CA/REI | 10522_7508 | Jul-21 | Jul-26 | 2,399,166 | - | 2,399,166 | | | | 400,000 | 600,000 | 1,000,000 | 1,399,166 | |
| Chelsea Headworks-Caruso Pump Stn. Utilities | 10523_7510 | Jul-16 | Jun-19 | 32,000 | 10,856 | 21,144 | 9,397 | 11,747 | | | | 21,144 | | |
| Cambridge Branch 23, 24, 26, 27 - Study | 10524_7511 | Oct-16 | Jan-18 | 511,602 | 511,602 | - | | | | | | | | |
| Inter. Ren. 3 Dorch. Interceptor Sewer Design CA/RI | 10525_7512 | Apr-17 | Oct-21 | 1,496,354 | 363,506 | 1,132,848 | 246,644 | 338,635 | 338,635 | 208,934 | | 1,132,848 | | |
| Cambr. Branch Sect 23, 24 Design/ESDC | 10526_7513 | Sep-25 | Sep-30 | 6,000,000 | - | 6,000,000 | | | | | | | 3,206,000 | 2,794,000 |
| Intercep. Ren. 6 Chelsea - Design CA/REI | 10527_7514 | Aug-24 | Aug-29 | 2,200,000 | - | 2,200,000 | | | | | | | 1,925,000 | 275,000 |
| Int Ren 5 New Neponset Valley Sewer 607-610 Design/CA | 10528_7515 | Sep-23 | Sep-28 | 3,000,000 | - | 3,000,000 | | | | | | | 3,000,000 | |
| Quincy/Hingham Pump Stations Fuel Storage Upgr Constr. | 10529_7534 | Jul-17 | Mar-18 | 528,532 | 528,532 | - | | | | | | | | |
| Chelsea Headworks & DI Shaft Design/CA/RI | 10530_7549 | Dec-23 | May-27 | 1,200,000 | - | 1,200,000 | | | | | 146,342 | 146,342 | 1,053,658 | |
| Chelsea Headworks & DI Shaft Rehab Const | 10531_7550 | May-24 | May-25 | 8,500,000 | - | 8,500,000 | | | | | | | 8,500,000 | |
| Wiggins Terminal Pump Station Design/REI/Construction | 10533_7552 | Jul-20 | Jul-21 | 1,131,500 | - | 1,131,500 | | | 777,906 | 353,594 | | 1,131,500 | | |
| Fuel Oil Tank Replacement Constr. Ph 1 | 10535_7554 | Dec-19 | Dec-20 | 1,361,197 | - | 1,361,197 | | 453,732 | 907,465 | | | 1,361,197 | | |
| Fuel Oil Tank Replacement Constr. Ph 2 | 10536_7555 | Dec-20 | Dec-22 | 2,302,024 | - | 2,302,024 | | | 356,973 | 1,070,921 | 874,130 | 2,302,024 | | |
| Columbus Park Headworks Construction | 10537_7587 | May-23 | Nov-27 | 57,558,319 | - | 57,558,319 | | | | | | | 57,558,319 | |
| Ward St & Colum Pk Headworks-REI | 10538_7636 | Feb-23 | Nov-27 | 7,161,000 | - | 7,161,000 | | | | | 125,600 | 125,600 | 7,035,400 | |
| Fuel Oil Tank Repl Constr Ph 3 | 10539_7637 | Dec-21 | Apr-23 | 2,000,000 | - | 2,000,000 | | | | 470,588 | 1,411,765 | 1,882,353 | 117,647 | |
| Hayes Pump Station Rehab REI | 10540_7668 | May-21 | May-23 | 500,000 | - | 500,000 | | | | 250,000 | 250,000 | 500,000 | | |
| PS & CSO Facility Rehab Construction | 10545_7688 | Nov-23 | Nov-30 | 37,500,000 | - | 37,500,000 | | | | | | | 25,300,000 | 12,200,000 |
| PS & CSO Rehab Design/CA/REI | 10546_7689 | Nov-21 | Nov-31 | 7,500,000 | - | 7,500,000 | | | | 150,000 | 500,000 | 650,000 | 3,750,000 | 3,100,000 |
| Sects 191 & 192 Rehab | 54012_7643 | Aug-19 | Jan-20 | 500,000 | - | 500,000 | | 500,000 | | | | 500,000 | | |
| **145 Facility Asset Protection Total** | | | | **542,832,238** | **95,050,946** | **447,781,291** | **25,390,804** | **37,381,243** | **41,703,373** | **19,712,012** | **11,445,784** | **135,633,216** | **265,309,172** | **46,838,906** |
| | | | | | | | | | | | | | | |
| **146 Deer Island Cross Harbor Tunnel** | | | | | | | | | | | | | | |
| DI Cross Harbor Tunnels Inspection | 10454_7199 | Jul-24 | Jun-29 | 5,000,000 | - | 5,000,000 | | | | | | | 5,000,000 | |
| **146 Deer Island. Cross Harbor Tunnel Total** | | | | **5,000,000** | **-** | **5,000,000** | | | | | | | **5,000,000** | |
| | | | | | | | | | | | | | | |
| **147 Randolph Trunk Sewer Relief** | | | | | | | | | | | | | | |
| Study | 10461_7220 | Jul-20 | Jun-22 | 697,500 | - | 697,500 | | | 261,563 | 348,750 | 87,187 | 697,500 | | |
| **147 Randolph Trunk Sewer Relief Total** | | | | **697,500** | **-** | **697,500** | | | **261,563** | **348,750** | **87,187** | **697,500** | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Treatment** | | | | **1,054,393,146** | **301,156,788** | **753,236,359** | **11,591,778** | **34,125,935** | **83,080,668** | **78,331,450** | **71,892,862** | **279,022,692** | **424,954,252** | **49,259,415** |
| | | | | | | | | | | | | | | |
| **182 Deer Island Primary and Secondary Treatment Total** | | **completed project** | | **(957,878)** | **(957,878)** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **200 Deer Island Plant Optimization Total** | | **completed project** | | **33,278,598** | **33,278,598** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **206 Deer Island Treatment Plant Asset Protection** | | | | | | | | | | | | | | |
| DITP Roof Replacements | 18045_6196 | Jun-10 | Jun-11 | 2,299,881 | 2,299,881 | - | | | | | | | | |
| Dig/Stor Tk Rehab Const | 19161_6240 | Jul-23 | Jan-27 | 34,000,000 | - | 34,000,000 | | | | | | | 34,000,000 | |
| DISC Application | 19162_6241 | | | 125,077 | 125,077 | - | | | | | | | | |
| Pump Packing Replacement | 19176_6422 | Sep-03 | Jun-08 | 732,447 | 732,447 | - | | | | | | | | |
| Demineralizer Construction | 19177_6423 | Jul-00 | Dec-00 | 50,527 | 50,527 | - | | | | | | | | |
| Odor Control Rehab - Construction | 19188_6538 | Sep-24 | Mar-28 | 32,522,270 | - | 32,522,270 | | | | | | | 30,973,590 | 1,548,680 |
| Odor Control Rehab - REI | 19191_6592 | Sep-24 | Jun-28 | 4,016,005 | - | 4,016,005 | | | | | | | 3,569,782 | 446,223 |
| Equipment Condition Monitoring | 19193_6594 | May-04 | Jan-05 | 1,776,946 | 1,776,946 | - | | | | | | | | |
| NMPS WTF Valve & Piping - ESDC/REI | 19194_6598 | Dec-14 | Oct-18 | 1,486,644 | 1,493,121 | (6,476) | (6,476) | | | | | (6,476) | | |
| Expansion Joint Repair - Design | 19204_6668 | Apr-99 | Oct-04 | 149,421 | 149,421 | - | | | | | | | | |
| Expansion Joint Repair - Construct. 1 | 19205_6669 | Aug-02 | Nov-03 | 304,726 | 304,726 | - | | | | | | | | |
| Expansion Joint Repair - Construct. 2 | 19217_6704 | Aug-12 | Feb-14 | 1,893,500 | 1,893,500 | - | | | | | | | | |
| Expansion Joint Repair - Construction 3 | 19218_6705 | Sep-19 | Sep-21 | 1,950,945 | - | 1,950,945 | | 433,543 | 975,472 | 541,930 | | 1,950,945 | | |
| As-needed Design Phase 6-1 | 19220_6721 | May-09 | Oct-12 | 1,910,867 | 1,910,867 | - | | | | | | | | |
| As-needed Design Phase 6-2 | 19221_6722 | May-09 | Aug-12 | 1,743,843 | 1,743,843 | - | | | | | | | | |
| E Seawall Des/ESDC/REI | 19222_6723 | Aug-19 | Mar-24 | 1,220,249 | - | 1,220,249 | | 249,112 | 445,111 | 326,499 | 181,388 | 1,202,110 | 18,139 | |
| Eastern Seawall Construction - 1 | 19223_6724 | Feb-21 | Mar-23 | 4,500,020 | - | 4,500,020 | | | 500,014 | 2,750,000 | 1,250,006 | 4,500,020 | | |
| Barge Berth Des/ESDC/REI | 19224_6725 | Apr-23 | Aug-28 | 1,362,990 | - | 1,362,990 | | | | | | | 1,351,900 | 11,090 |
| Barge Berth Rehab Const | 19225_6726 | Feb-25 | Aug-27 | 6,814,948 | - | 6,814,948 | | | | | | | 6,814,947 | |
| Rip-rap Material DITP | 19226_6727 | Mar-17 | Jun-17 | 227,055 | 227,055 | - | | | | | | | | |
| Digester Gas Flare No. 4 - Design | 19227_6728 | Oct-23 | Jul-27 | 597,756 | - | 597,756 | | | | | | | 597,756 | |
| Digester Gas Flare No. 4 - Construction | 19228_6729 | Apr-25 | Jul-26 | 1,235,362 | - | 1,235,362 | | | | | | | 1,235,362 | |
| CHP Des/ESDC/REI | 19229_6730 | Aug-21 | May-29 | 5,580,000 | - | 5,580,000 | | | | 778,750 | 1,895,000 | 2,673,750 | 2,716,638 | 189,612 |
| Roof Replacement - Phase I | 19230_S464 | Mar-09 | Mar-10 | 2,749,941 | 2,749,941 | - | | | | | | | | |
| Drive Chain Replacement | 19231_6742 | Oct-01 | Jul-03 | 264,000 | 264,000 | - | | | | | | | | |
| Busduct Replacement (2+22) | 19236_6763 | Jan-01 | Oct-01 | 195,500 | 195,500 | - | | | | | | | | |
| Reline Hypochlorite Tanks 1 & 3 | 19237_6764 | May-07 | Nov-07 | 1,691,095 | 1,691,095 | - | | | | | | | | |
| CTG Modifications | 19238_6765 | Mar-01 | May-02 | 482,339 | 482,339 | - | | | | | | | | |
| Electrical Equipment Upgrade-Const 2 | 19239_6767 | Apr-05 | Feb-07 | 1,913,183 | 1,913,183 | - | | | | | | | | |
| Document Format Conversion | 19241_6791 | May-07 | Jun-19 | 68,110 | 68,110 | - | | | | | | | | |
| Outfall Modification - Inspection | 19243_6811 | Dec-01 | Jul-02 | 173,500 | 173,500 | - | | | | | | | | |
| Secondary Clarifier Access | 19244_6812 | Sep-01 | Jul-02 | 274,874 | 274,874 | - | | | | | | | | |
| Transformer Replacement | 19245_6813 | | | 1,703,072 | 1,703,072 | - | | | | | | | | |
| DSL Pump Replacement - Phase 2 | 19246_6821 | Jan-16 | Jul-17 | 2,672,377 | 2,673,377 | (1,000) | (1,000) | | | | | (1,000) | | |
| Co-Digestion Design/Build | 19247_6822 | Aug-23 | Feb-25 | 5,000,000 | - | 5,000,000 | | | | | | | 5,000,000 | |
| Reline Hypochlorite Tanks 2 & 4 | 19250_6849 | Apr-08 | Oct-08 | 2,241,692 | 2,241,692 | - | | | | | | | | |
| Chemical Pipe Replacement - Design | 19252_6851 | Jun-21 | Dec-25 | 637,606 | - | 637,606 | | | | 239,102 | 91,294 | 330,396 | 307,210 | |
| Chemical Pipe Replacement - Construction | 19253_6852 | Dec-22 | Dec-24 | 2,146,775 | - | 2,146,775 | | | | | 89,449 | 89,449 | 2,057,326 | |
| Electrical Equipment Upgrade-Const. 3 | 19256_6855 | Feb-08 | Aug-11 | 15,173,750 | 15,173,750 | - | | | | | | | | |
| WTF VFD Replacement - Construction | 19258_6875 | Jun-16 | Sep-20 | 11,951,088 | 3,614,772 | 8,336,316 | 3,010,461 | 3,565,910 | 1,759,945 | | | 8,336,316 | | |
| Heat Loop Pipe Replacement - Constr 1 | 19259_6876 | Mar-05 | Dec-05 | 615,000 | 615,000 | - | | | | | | | | |
| Secondary Reactor VFDs | 19260_6877 | May-05 | Aug-16 | 3,232,191 | 3,233,191 | (1,000) | (1,000) | | | | | (1,000) | | |
| Grit Air Handler Replacements | 19264_6881 | Jul-08 | Jun-10 | 2,029,247 | 2,029,247 | - | | | | | | | | |
| CEMS Equipment Replacement | 19265_6882 | Nov-05 | Mar-06 | 100,392 | 100,392 | - | | | | | | | | |
| Heat Loop Pipe Replacement - Const. 2 | 19266_6883 | Dec-06 | Feb-08 | 1,488,356 | 1,488,356 | - | | | | | | | | |
| PICS Replacement - Construction | 19267_6884 | Jul-11 | Sep-15 | 1,229,952 | 1,229,952 | - | | | | | | | | |
| Primary&Second Clarifier Rehab-Const | 19268_6899 | Feb-09 | Feb-12 | 58,613,089 | 58,613,089 | - | | | | | | | | |
| Electrical Equipment Upgrade - Const 4 | 19270_6901 | May-13 | May-16 | 7,831,148 | 7,871,148 | (40,000) | (40,000) | | | | | (40,000) | | |
| NMPS VFD Replacement - Design/ESDC | 19271_6902 | Dec-07 | Apr-12 | 1,277,604 | 1,277,604 | - | | | | | | | | |
| NMPS VFD Replacement - Construction | 19272_6903 | Dec-11 | Mar-16 | 24,432,063 | 24,432,063 | - | | | | | | | | |
| Fire Alarm System Replacemen - Design | 19273_6904 | Dec-15 | Aug-24 | 2,078,771 | 718,689 | 1,360,082 | 28,446 | 151,161 | 362,785 | 362,786 | 394,440 | 1,299,618 | 60,464 | |
| CHP Alternatives Study | 19274_6963 | Apr-19 | Jul-20 | 1,149,500 | - | 1,149,500 | 100,000 | 950,000 | 99,500 | | | 1,149,500 | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Combined Heat & Power - Construction | 19275_6964 | Jan-24 | Jan-28 | 83,000,000 | - | 83,000,000 | | | | | | | 83,000,000 | |
| Primary&Second Clarifier Rehab-Design | 19276_6965 | Mar-09 | Sep-13 | 1,677,666 | 1,677,666 | - | | | | | | | | |
| Gravity Thickener Improvements-Constr. | 19277_6966 | Apr-10 | Jun-12 | 928,773 | 933,118 | (4,345) | (4,345) | | | | | (4,345) | | |
| STG System Modifications - Design | 19278_6967 | Jun-09 | Apr-11 | (44,268) | (44,268) | - | | | | | | | | |
| Electrical Equipment Upgrade 3 - REI | 19279_6968 | Feb-08 | Nov-11 | 1,111,984 | 1,111,984 | - | | | | | | | | |
| NMPS Motor Control Center - Constr. | 19283_6972 | Jan-12 | Apr-13 | 913,900 | 913,900 | - | | | | | | | | |
| STG System Modifications - Construct. | 19284_6973 | May-10 | Apr-11 | 2,119,673 | 2,119,673 | - | | | | | | | | |
| Digester Chiller Replacement | 19287_7005 | Sep-05 | May-06 | 635,244 | 635,244 | - | | | | | | | | |
| Dystor Tank Membrane Replacement | 19288_7006 | Sep-04 | Oct-05 | 640,195 | 640,195 | - | | | | | | | | |
| Fire Alarm System Replacement - Construction | 19289_7051 | Feb-20 | Aug-23 | 25,000,000 | - | 25,000,000 | | 619,047 | 5,285,714 | 5,285,714 | 4,285,715 | 15,476,190 | 9,523,810 | |
| Digester & Storage Tank Rehab Design/ESD | 19290_7052 | Jul-20 | Jul-27 | 4,055,000 | - | 4,055,000 | | | 1,013,750 | 1,013,750 | 286,235 | 2,313,735 | 1,741,265 | |
| Digestr/Storage Tk REI | 19291_7053 | Jan-23 | Oct-26 | 4,092,000 | - | 4,092,000 | | | | | 245,000 | 245,000 | 3,847,000 | |
| Thick Primary Sludge Pump Repl-Construction | 19292_7054 | Oct-13 | Jun-14 | 27,297 | 27,297 | - | | | | | | | | |
| Digester Modules 1 & 2 Pipe Replacement | 19293_7055 | Aug-11 | Aug-14 | 7,096,335 | 7,096,335 | - | | | | | | | | |
| Cathodic Protection - Construction | 19294_7056 | Jan-22 | Jul-24 | 6,402,659 | - | 6,402,659 | | | | | 480,532 | 480,532 | 5,922,127 | |
| Centrifuge Backdrive Replacement | 19295_7057 | Feb-13 | Mar-15 | 3,965,204 | 3,965,204 | - | | | | | | | | |
| Switchgear Relay Replac Construction | 19297_7059 | Apr-21 | Apr-24 | 7,440,000 | - | 7,440,000 | | | | 1,860,000 | 2,480,000 | 4,340,000 | 3,100,000 | |
| Power Consultant Recommned - Design | 19298_7060 | Jan-06 | Jul-09 | 2,097,404 | 2,097,404 | - | | | | | | | | |
| Power System Improvements - Construct. | 19299_7061 | Jan-09 | May-17 | 10,117,307 | 10,117,307 | - | | | | | | | | |
| NMPS VFD Replacement - REI | 19300_7062 | Dec-12 | Jun-16 | 740,442 | 740,442 | - | | | | | | | | |
| Heat Loop Pipe Replacement - Const. 3 | 19301_7063 | Jun-09 | Jun-11 | 11,410,205 | 11,546,391 | (136,187) | (136,187) | | | | | (136,187) | | |
| Odor Control Rehab - Design/ESDC | 19303_7088 | Mar-21 | Mar-28 | 4,266,208 | - | 4,266,208 | | | | 933,333 | 933,333 | 1,866,666 | 2,313,294 | 86,248 |
| Sodium Hypo Tank Liner Removal | 19304_7089 | May-06 | Sep-06 | 196,400 | 196,400 | - | | | | | | | | |
| As-needed Design Phase 5-1 | 19305_7090 | Aug-07 | Aug-09 | 955,174 | 955,174 | - | | | | | | | | |
| As-needed Design Phase 5-2 | 19306_7091 | Jul-07 | Jul-09 | 1,055,822 | 1,055,822 | - | | | | | | | | |
| HVAC Equip Replac REI | 19307_7094 | Mar-20 | Dec-23 | 2,000,000 | - | 2,000,000 | | | 602,326 | 713,953 | 611,628 | 1,927,907 | 72,093 | |
| HVAC Equipment Replacement - Des/ESDC | 19309_7111 | Mar-14 | Dec-24 | 2,411,441 | 1,389,151 | 1,022,290 | 34,725 | 418,542 | 281,557 | 181,557 | 90,779 | 1,007,160 | 15,130 | |
| HVAC Equipment Replacement - Construct. | 19310_7110 | Mar-20 | Sep-23 | 50,204,700 | - | 50,204,700 | | | 11,855,269 | 13,767,551 | 12,540,940 | 38,163,760 | 12,040,940 | |
| DI As-needed Technical Design | 19311_7121 | Jul-23 | Jun-30 | 20,250,000 | - | 20,250,000 | | | | | | | 15,000,000 | 5,250,000 |
| Radio Rptr Syst Upgr 1 | 19312_7122 | Oct-18 | Oct-19 | 242,896 | - | 242,896 | 182,896 | 60,000 | | | | 242,896 | | |
| Digester Sludge Pump Replace - Construct | 19313_7123 | Oct-09 | Dec-14 | 1,870,723 | 1,793,146 | 77,577 | 77,577 | | | | | 77,577 | | |
| Elect Equip Upgrade 5 Const | 19314_7124 | Dec-24 | Dec-27 | 23,161,875 | - | 23,161,875 | | | | | | | 23,161,875 | |
| Misc. VFD Replacements FY19-FY23 | 19315_7125 | Oct-20 | Jun-25 | 4,495,620 | - | 4,495,620 | | | 500,000 | 500,000 | 1,119,000 | 2,119,000 | 2,376,620 | |
| SSPS VFD Replace Des/ESDC/REI | 19316_7126 | Sep-19 | Sep-25 | 4,464,000 | - | 4,464,000 | | 674,736 | 939,789 | 769,526 | 878,076 | 3,262,127 | 1,201,873 | |
| SSPS VFD Replace Const | 19317_7127 | Sep-21 | Sep-24 | 20,553,000 | - | 20,553,000 | | | | 1,567,333 | 5,051,000 | 6,618,333 | 13,934,667 | |
| NMPS VFD Replace Des/ESDC/REI | 19318_7128 | Jun-24 | Dec-31 | 4,420,000 | - | 4,420,000 | | | | | | | 2,767,864 | 1,652,136 |
| NMPS VFD Replace Construction | 19319_7129 | Dec-26 | Dec-30 | 25,000,000 | - | 25,000,000 | | | | | | | 6,770,833 | 18,229,167 |
| Elect Equip 5 Des/ESDC/REI | 19320_7130 | Dec-22 | Dec-28 | 4,308,132 | - | 4,308,132 | | | | | 287,209 | 287,209 | 3,857,324 | 163,599 |
| Misc. VFD Replacements FY18 | 19321_7131 | Oct-17 | Jun-18 | 498,000 | 450,000 | 48,000 | 48,000 | | | | | 48,000 | | |
| DI Swtchgr Repl Des/ESDC/REI | 19322_7132 | Jul-23 | Jul-28 | 4,500,000 | - | 4,500,000 | | | | | | | 4,459,091 | 40,909 |
| DI Switchgear Replacement - Construct. | 19323_7133 | Jul-25 | Jul-27 | 16,000,000 | - | 16,000,000 | | | | | | | 16,000,000 | |
| Radio Rptr Syst Upgr 2 | 19324_7134 | Nov-19 | May-21 | 2,500,000 | - | 2,500,000 | | 1,000,000 | 1,500,000 | | | 2,500,000 | | |
| DI Dystor Membrane Replacements | 19325_7135 | Jul-20 | Nov-20 | 4,000,000 | - | 4,000,000 | | | 2,000,000 | | | 2,000,000 | | 2,000,000 |
| DI CTG Rebuilds | 19326_7136 | Jul-23 | Jul-26 | 8,000,000 | - | 8,000,000 | | | | | | | 8,000,000 | |
| Centrifuge Replac Des/ESCD/REI | 19327_7137 | Dec-23 | Jun-28 | 4,160,000 | - | 4,160,000 | | | | | | | 4,122,182 | 37,818 |
| DI Centrifuge Replacements - Construct. | 19328_7138 | Jun-25 | Jun-27 | 16,640,000 | - | 16,640,000 | | | | | | | 16,640,000 | |
| Cryogenics Plant Equipment Replace-Desig | 19329_7139 | Dec-21 | Jun-28 | 3,255,000 | - | 3,255,000 | | | | 195,300 | 781,200 | 976,500 | 2,257,899 | 20,601 |
| Cryogenics Plant Equip Replace - Const. | 19330_7140 | Jun-24 | Jun-27 | 15,000,000 | - | 15,000,000 | | | | | | | 15,000,000 | |
| Replace Hypo & Bisulfite Tks | 19332_7142 | Jul-22 | Jul-26 | 20,000,000 | - | 20,000,000 | | | | | 2,500,000 | 2,500,000 | 17,500,000 | |
| Gas Protect Systm Replac Ph 1 | 19333_7167 | Jun-19 | Sep-20 | 1,000,000 | - | 1,000,000 | | 300,000 | 700,000 | | | 1,000,000 | | |
| Personnel Dock Rehab | 19334_7168 | Feb-17 | Oct-17 | 1,367,835 | 1,452,579 | (84,744) | (84,744) | | | | | (84,744) | | |
| Gas Protect Systm Replac Ph 2 | 19335_7169 | Dec-20 | Dec-22 | 2,500,000 | - | 2,500,000 | | | 1,250,000 | 1,250,000 | | 2,500,000 | | |
| E/W Odor Control Air Handler Replace. | 19336_7170 | Jun-25 | Jun-30 | 2,000,000 | - | 2,000,000 | | | | | | | 2,000,000 | |
| PICS FiberLoop Replac | 19338_7172 | Jul-23 | Jun-26 | 12,462,000 | - | 12,462,000 | | | | | | | 12,462,000 | |
| NMPS & WTF Butterfly Valve Replace. | 19339_7275 | Jun-14 | Sep-17 | 17,513,566 | 17,513,566 | - | | | | | | | | |
| Chemical Tank and Digester Pipe | 19345_7373 | Jul-19 | Nov-21 | 8,000,000 | - | 8,000,000 | | 2,000,000 | 4,000,000 | 2,000,000 | | 8,000,000 | | |
| Clarifier W3H Flush System | 19346_7374 | Jul-12 | Jul-13 | 1,262,406 | 1,262,406 | - | | | | | | | | |
| Clarifier Rehab Phase 2 - Design | 19347_7394 | Jan-15 | Oct-21 | 2,375,346 | 1,178,533 | 1,196,813 | 112,362 | 212,242 | 272,242 | 272,241 | 317,322 | 1,186,409 | 10,404 | |
| Clarifier Rehab Phase 2 - Construction | 19348_7395 | Aug-19 | May-24 | 135,000,000 | - | 135,000,000 | | 12,050,000 | 31,475,000 | 31,475,000 | 29,000,000 | 104,000,000 | 31,000,000 | |
| Scum Skimmer Replacement | 19349_7396 | Oct-13 | Oct-16 | 20,393,784 | 20,393,784 | - | | | | | | | | |
| Clarifier Rehab Phase 2 - REI | 19351_7397 | Aug-19 | May-25 | 3,000,000 | - | 3,000,000 | | 200,000 | 675,000 | 831,250 | 750,000 | 2,456,250 | 543,750 | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cryogenics Chillers Replacement | 19352_7398 | Oct-14 | Oct-16 | 3,218,470 | 3,219,270 | (800) | (800) | | | | | (800) | | |
| As-Needed Design 7-1 | 19353_7399 | Oct-12 | Oct-15 | 1,547,446 | 1,547,445 | - | | | | | | | | |
| As-Needed Design 7-2 | 19354_7400 | Oct-12 | Apr-16 | 1,060,919 | 1,060,919 | - | | | | | | | | |
| TPP Boiler Controls Replacement | 19355_7401 | Nov-14 | Nov-16 | 1,619,520 | 1,619,520 | - | | | | | | | | |
| Elect Equip Upgrade 6 Constr | 19557_7414 | Dec-27 | Dec-31 | 20,000,000 | - | 20,000,000 | | | | | | | 416,667 | 19,583,333 |
| Fuel Pipe Abandonment | 19558_7415 | Aug-12 | Jan-13 | 229,800 | 230,000 | (200) | (200) | | | | | (200) | | |
| Electrical Equipment Upgrades 4 - REI | 19559_7416 | May-14 | Oct-16 | 858,375 | 858,375 | - | | | | | | | | |
| Motor Control Center Switchgear Repl. Design/ESDC/REI | 19560_7419 | Jan-17 | Feb-23 | 2,479,672 | 607,222 | 1,872,450 | 234,128 | 501,247 | 514,087 | 428,406 | 194,581 | 1,872,449 | | |
| Motor Control Center & Switchgear Replace Construction | 19561_7420 | Aug-19 | Feb-22 | 10,585,725 | - | 10,585,725 | | 1,881,432 | 4,234,290 | 4,470,003 | | 10,585,725 | | |
| Roof Replacement Phase 3 | 19562_7424 | Sep-13 | Jul-14 | 609,500 | 610,500 | (1,000) | (1,000) | | | | | (1,000) | | |
| Fire System Replacement - REI | 19563_7426 | Feb-20 | Nov-23 | 2,139,000 | - | 2,139,000 | | 137,666 | 570,400 | 570,400 | 570,400 | 1,848,866 | 290,134 | |
| Gravity Thickener Center Column Replacement | 19564_7427 | Jan-13 | Jan-14 | 825,457 | 825,457 | - | | | | | | | | |
| Gravity Thickener Rehab | 19565_7428 | May-18 | Feb-21 | 19,662,407 | 407,500 | 19,254,907 | 5,700,441 | 6,296,574 | 7,257,892 | | | 19,254,907 | | |
| As-Needed Design 7-3 | 19566_7434 | Oct-12 | Apr-16 | 950,148 | 950,148 | - | | | | | | | | |
| As-Needed Design 8-1 | 19600_7501 | Jul-16 | Dec-19 | 925,136 | 444,523 | 480,613 | 218,203 | 262,410 | | | | 480,613 | | |
| As-Needed Design 8-2 | 19601_7502 | Jul-16 | Dec-19 | 996,592 | 382,890 | 613,702 | 430,053 | 183,649 | | | | 613,702 | | |
| As-Needed Design 8-3 | 19602_7503 | Jul-16 | Mar-21 | 817,986 | 408,036 | 409,950 | 259,950 | 120,000 | 30,000 | | | 409,950 | | |
| Hydroturb Repl Des/ESDC/REI | 19603_7570 | Jun-20 | Sep-26 | 1,860,000 | - | 1,860,000 | | | 390,600 | 260,400 | 265,714 | 916,714 | 943,286 | |
| Hydroturb Repl Const | 19604_7571 | Mar-22 | Sep-25 | 9,300,000 | - | 9,300,000 | | | | | 2,214,286 | 2,214,286 | 7,085,714 | |
| As-Needed Des 9-1 | 19605_7644 | Dec-19 | Dec-22 | 2,800,000 | - | 2,800,000 | | 202,221 | 646,112 | 1,318,333 | 633,334 | 2,800,000 | | |
| As-Needed Des 9-2 | 19606_7645 | Dec-19 | Dec-22 | 2,800,000 | - | 2,800,000 | | 202,221 | 646,112 | 1,318,333 | 633,334 | 2,800,000 | | |
| As-Needed Des 9-3 | 19607_7646 | Dec-19 | Dec-22 | 2,800,000 | - | 2,800,000 | | 202,221 | 646,112 | 1,318,333 | 633,334 | 2,800,000 | | |
| Co-Digestion Temporary Facilities | 26073_7148 | Sep-13 | Jun-15 | 433,832 | 433,832 | - | | | | | | | | |
| **206 Deer Island Treatment Pl Asset Protection Total** | | | | **993,148,627** | **252,359,437** | **740,789,189** | **10,161,490** | **32,873,934** | **81,429,079** | **77,299,783** | **71,684,529** | **273,448,815** | **418,080,956** | **49,259,416** |
| | | | | | | | | | | | | | | |
| **210 Clinton Wastewater Treatment Plant** | | | | | | | | | | | | | | |
| Clinton Soda Ash Replacement | 19302_7075 | Nov-07 | Aug-08 | 267,221 | 267,221 | - | | | | | | | | |
| Clinton Permanent Standby Generator | 19308_7095 | Feb-07 | Nov-07 | 230,440 | 230,440 | - | | | | | | | | |
| Clinton Concr Rpr - Design | 19340_7276 | Feb-13 | Dec-13 | 62,615 | 62,615 | - | | | | | | | | |
| Clinton Digester Cleaning & Rehab | 19341_7277 | May-10 | Apr-17 | 3,442,672 | 3,442,672 | - | | | | | | | | |
| Clinton Aeration Effciency Improvement | 19342_7278 | Apr-12 | Feb-13 | 1,864,562 | 1,864,561 | - | | | | | | | | |
| Clinton WWTP Rehab Des/ESDC/RE | 19343_7371 | Sep-21 | Mar-26 | 1,000,000 | - | 1,000,000 | | | | 291,667 | 208,333 | 500,000 | 500,000 | |
| Valves & Screw Pumps Replacnt | 19344_7372 | Aug-19 | Oct-21 | 2,500,000 | - | 2,500,000 | | 1,000,000 | 1,000,000 | 500,000 | | 2,500,000 | | |
| Phosphorus Reduction - Design/ESDC | 19350_7377 | Nov-13 | Mar-19 | 1,443,350 | 1,415,952 | 27,397 | 27,397 | | | | | 27,397 | | |
| Phosphorus Reduction - Construction | 19400_7411 | Mar-16 | Mar-18 | 7,568,622 | 6,585,732 | 982,889 | 982,890 | | | | | 982,890 | | |
| Clinton Roofing Rehab | 19405_7450 | Sep-18 | Sep-19 | 672,000 | - | 672,000 | 420,000 | 252,000 | | | | 672,000 | | |
| Clinton WWTP Rehab Constr | 19406_7451 | Mar-23 | Mar-25 | 4,073,295 | - | 4,073,295 | | | | | | | 4,073,295 | |
| NGRID Gas Line | 19407_7528 | Apr-16 | Jun-17 | 395,762 | 395,762 | - | | | | | | | | |
| Screw Pump Replac Ph 2 Const | 19408_7591 | Jun-23 | Jun-25 | 2,300,000 | - | 2,300,000 | | | | | | | 2,300,000 | |
| Digestr Cover Replac | 19409_7648 | Jul-20 | Dec-21 | 600,000 | - | 600,000 | | | 360,000 | 240,000 | | 600,000 | | |
| Equip Storage Bldg | 19410_7693 | Jan-20 | Apr-21 | 291,589 | - | 291,589 | | | 291,589 | | | 291,589 | | |
| **210 Clinton Wastewater Treatment Plant Total** | | | | **26,712,128** | **14,264,955** | **12,447,170** | **1,430,287** | **1,252,000** | **1,651,589** | **1,031,667** | **208,333** | **5,573,876** | **6,873,295** | |
| | | | | | | | | | | | | | | |
| **211 Laboratory Services Total** | | **completed project** | | **2,211,674** | **2,211,674** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Residuals** | | | | **167,792,622** | **65,047,023** | **102,745,600** | **509,472** | **8,130,026** | **5,059,183** | **617,556** | **895,333** | **15,211,570** | **31,337,517** | **56,196,513** |
| | | | | | | | | | | | | | | |
| **261 Residuals Total** | | **completed project** | | **63,810,848** | **63,810,848** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **271 Residuals Asset Protection** | | | | | | | | | | | | | | |
| Residuals Facility Plan / EIR | 26069_7143 | Jan-22 | Jan-25 | 1,000,000 | - | 1,000,000 | | | - | 55,556 | 333,333 | 388,889 | 611,111 | |
| Residuals Facility Upgrades - Design | 26070_7145 | Feb-21 | Aug-23 | 1,415,313 | - | 1,415,313 | | | 55,167 | 562,000 | 562,000 | 1,179,167 | 236,146 | |
| Condition Assess/Tech & Reg Review | 26072_7147 | May-09 | Jan-14 | 831,775 | 831,775 | - | | | | | | | | |
| Residuals Phase 2 - Design | 26074_7149 | Nov-23 | Apr-32 | 15,000,000 | - | 15,000,000 | | | | | | | 9,586,093 | 5,413,907 |
| Residuals Phase 2 - Construction | 26075_7150 | Apr-26 | Apr-32 | 71,686,773 | - | 71,686,773 | | | | | | | 20,904,167 | 50,782,606 |
| Sludge Tk & Silo Coating | 26076_7151 | Sep-17 | Sep-18 | 766,672 | 257,200 | 509,472 | 509,472 | | | | | 509,472 | | |
| Residuals Electrical/Mechanical/Drum Replacements | 26078_7153 | Jun-19 | Dec-20 | 10,131,242 | 147,200 | 9,984,042 | | 6,240,026 | 3,744,016 | | | 9,984,042 | | |
| Pellet Piping - Relocate | 26079_7173 | Jul-19 | Dec-20 | 3,150,000 | - | 3,150,000 | | 1,890,000 | 1,260,000 | | | 3,150,000 | | |

**Massachusetts Water Resources Authority**
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| Program / Project / Contract | Contract No. | Notice to Proceed | Substantial Completion | Total Contract Amount | Payments through FY18 | Remaining Balancce | FY19 | FY20 | FY21 | FY22 | FY23 | FY19-23 | FY24 - FY28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 271 Residuals Asset Protection Total | | | | 103,981,775 | 1,236,175 | 102,745,600 | 509,472 | 8,130,026 | 5,059,183 | 617,556 | 895,333 | 15,211,570 | 31,337,517 | 56,196,513 |
| | | | | | | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CSO** | | | | **911,052,759** | **902,396,415** | **8,656,343** | **1,464,658** | **4,457,527** | **2,679,693** | **54,449** | | **8,656,327** | | |
| | | | | | | | | | | | | | | |
| **CSO MWRA Managed** | | | | **433,534,309** | **433,534,309** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **339 North Dorchester Bay Total** | | **completed project** | | **221,509,794** | **221,509,793** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **347 East Boston Branch Sewer Relief Total** | | **completed project** | | **85,637,164** | **85,637,164** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **348 BOS019 Storage Conduit Total** | | **completed project** | | **14,287,581** | **14,287,581** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **349 Chelsea Trunk Sewer Total** | | **completed project** | | **29,779,319** | **29,779,320** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **350 Union Park Detention Treatment Facility Total** | | **completed project** | | **49,583,407** | **49,583,407** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **353 Upgrade Existing CSO Facilities Total** | | **completed project** | | **22,385,200** | **22,385,200** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **354 Hydraulic Relief Projects Total** | | **completed project** | | **2,294,549** | **2,294,549** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **355 MWR003 Gate & Siphon Total** | | **completed project** | | **4,424,220** | **4,424,219** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **357 Charles River CSO Controls Total** | | **completed project** | | **3,633,077** | **3,633,077** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **CSO Community Managed** | | | | **423,780,126** | **420,017,055** | **3,763,070** | | **1,881,527** | **1,881,527** | | | **3,763,054** | | |
| | | | | | | | | | | | | | | |
| **340 Dorchester Bay Sewer Separation (Fox Point) Total** | | **completed project** | | **55,028,985** | **55,028,985** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **341 Dorchester Bay Sewer Separation (Commercial Point)** | | | | | | | | | | | | | | |
| Design | 32650_6154 | Jun-96 | Dec-16 | 16,410,225 | 16,410,225 | | | | | | | | | |
| Construction | 32665_6248 | Apr-99 | Dec-16 | 43,451,415 | 43,451,415 | - | | | | | | | | |
| DOR Int Inflow Remo Constr | 32750_7576 | Jul-19 | Jun-21 | 3,763,054 | - | 3,763,054 | | 1,881,527 | 1,881,527 | | | 3,763,054 | | |
| **341 Dorchester Bay Sewer Separation (Commercial Point) Total** | | | | **63,624,694** | **59,861,640** | **3,763,054** | | **1,881,527** | **1,881,527** | | | **3,763,054** | | |
| | | | | | | | | | | | | | | |
| **342 Neponset River Sewer Separation Total** | | **completed project** | | **2,491,747** | **2,491,747** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **343 Constitution Beach Sewer Separation Total** | | **completed project** | | **3,731,315** | **3,731,315** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **344 Stony Brook Sewer Separation Total** | | **completed project** | | **44,319,314** | **44,319,314** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **346 Cambridge Sewer Separation Total** | | **completed project** | | **104,552,056** | **104,552,054** | **2** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **351 BWSC Floatables Controls Total** | | **completed project** | | **945,936** | **945,936** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **352 Cambridge Floatables Controls Total** | | **completed project** | | **1,126,708** | **1,126,708** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **356 Fort Point Channel Sewer Separation Total** | | **completed project** | | **11,507,257** | **11,507,256** | **1** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **358 Morrissey Boulevard Drain Total** | | **completed project** | | **32,181,036** | **32,181,034** | **2** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **359 Reserved Channel Sewer Separation Total** | | **completed project** | | **70,524,212** | **70,524,205** | **8** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **360 Brookline Sewer Separation Total** | | **completed project** | | **24,715,291** | **24,715,291** | **-** | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| **361 Bulfinch Triangle Sewer Separation Total** | | **completed project** | | **9,031,576** | **9,031,575** | **1** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **324 CSO Support** | | | | | | | | | | | | | | |
| Technical Assistance | 32400_5790 | Feb-94 | Dec-95 | 228,320 | 228,320 | - | | | | | | | | |
| Planning/EIR | 32401_5791 | Mar-88 | Sep-90 | 10,768,610 | 10,768,610 | - | | | | | | | | |
| Master Planning | 32403_5716 | Mar-92 | Sep-04 | 21,762,805 | 21,762,805 | - | | | | | | | | |
| Technical Assistance - Geotech | 32407_5970 | Jun-90 | Jun-92 | 61,110 | 61,110 | - | | | | | | | | |
| Modeling | 32409_5795 | May-92 | Mar-95 | 299,840 | 299,840 | - | | | | | | | | |
| SOP Program | 32411_5767 | Jan-94 | May-01 | 772,828 | 772,829 | - | | | | | | | | |
| Watershed Planning | 32645_6036 | Dec-94 | Apr-01 | 877,134 | 877,134 | - | | | | | | | | |
| Technical Review | 32648_6150 | Jul-96 | Jun-21 | 584,583 | 528,932 | 55,651 | | 28,000 | 27,651 | | | 55,651 | | |
| Land Acquisition/Easement | 32658_6169 | Jul-96 | Jun-21 | 12,875,388 | 12,844,914 | 30,474 | 6,000 | 12,000 | 12,474 | | | 30,474 | | |
| System Assessment | 32691_6372 | May-97 | Jun-21 | 255,000 | 68,637 | 186,363 | | 80,000 | 106,363 | | | 186,363 | | |
| Som Marginal In-System Storage | 32748_7539 | Aug-18 | Apr-21 | 1,400,000 | - | 1,400,000 | | 1,400,000 | | | | 1,400,000 | | |
| CSO Performance Assessment | 32749_7572 | Nov-17 | Apr-22 | 3,852,705 | 631,920 | 3,220,785 | 1,458,658 | 1,056,000 | 651,678 | 54,449 | | 3,220,785 | | |
| **324 CSO Support Total** | | | | **53,738,324** | **48,845,051** | **4,893,273** | **1,464,658** | **2,576,000** | **798,166** | **54,449** | | **4,893,273** | | |
| | | | | | | | | | | | | | | |
| **Other Wastewater** | | | | **392,865,861** | **190,316,707** | **202,549,107** | **36,470,301** | **25,699,913** | **24,983,589** | **28,199,260** | **26,897,727** | **142,250,789** | **112,938,152** | **(52,639,841)** |
| | | | | | | | | | | | | | | |
| **128 I/I Local Financial Assistance** | | | | | | | | | | | | | | |
| Phase II - Grants | 10273_6084 | May-93 | May-06 | 15,928,524 | 15,928,524 | - | | | | | | | | |
| Phase II - Loans | 10274_6085 | May-93 | May-06 | 47,664,000 | 47,664,000 | - | | | | | | | | |
| Phase II - Repayments | 10282_6170 | May-94 | May-11 | (47,664,000) | (47,664,000) | - | | | | | | | | |
| Public Participation | 10348_6609 | Feb-99 | Jun-02 | 6,461 | 6,461 | - | | | | | | | | |
| Phase IV - Grants | 10368_6736 | Nov-99 | May-10 | 34,650,000 | 34,650,000 | - | | | | | | | | |
| Phase IV - Loans | 10369_6737 | Nov-99 | May-10 | 42,350,000 | 42,350,000 | - | | | | | | | | |
| Phase IV - Repayments | 10370_6738 | Nov-00 | May-15 | (42,350,000) | (42,350,000) | - | | | | | | | | |
| Phase V - Grants | 10407_6925 | Aug-04 | May-12 | 18,000,000 | 18,000,000 | - | | | | | | | | |
| Phase V - Loans | 10408_6926 | Aug-04 | May-12 | 22,000,000 | 22,000,000 | - | | | | | | | | |
| Phase V - Repayments | 10409_6927 | Aug-05 | May-17 | (22,000,000) | (22,000,000) | - | | | | | | | | |
| Phase Vl - Grants | 10441_7107 | Nov-06 | Jun-21 | 18,000,000 | 17,528,397 | 471,603 | 471,600 | | | | | | | |
| Phase Vl - Loans | 10442_7108 | Nov-06 | Jun-21 | 22,000,000 | 21,423,596 | 576,404 | 576,400 | | | | | | | |
| Phase Vl - Repayments | 10443_7109 | Nov-07 | Jun-26 | (22,000,000) | (19,671,442) | (2,328,558) | (708,025) | (677,269) | (450,092) | (196,994) | (180,896) | (2,213,274) | (115,284) | |
| Phase VII - Grants | 10471_7293 | Aug-09 | Jun-21 | 18,000,000 | 17,263,782 | 736,219 | 100,000 | 225,000 | 411,218 | | | 736,218 | | |
| Phase VII - Loans | 10472_7294 | Aug-09 | Jun-21 | 22,000,000 | 21,100,179 | 899,822 | 206,251 | 275,000 | 418,571 | | | 899,822 | | |
| Phase VII - Repayments | 10473_7295 | Aug-10 | Jun-26 | (22,000,000) | (17,341,481) | (4,658,519) | (1,330,088) | (1,098,867) | (800,000) | (600,000) | (400,000) | (4,228,955) | (429,564) | |
| Phase VIII - Grants | 10474_7296 | Aug-12 | Jun-21 | 18,000,000 | 15,610,685 | 2,389,315 | 700,000 | 540,000 | 500,000 | 649,315 | | 2,389,315 | | |
| Phase VIII - Loans | 10475_7297 | Aug-12 | Jun-21 | 22,000,000 | 19,079,727 | 2,920,273 | 900,001 | 660,000 | 700,000 | 660,273 | | 2,920,274 | | |
| Phase VIII - Repayments | 10476_7298 | Aug-13 | Jun-26 | (22,000,000) | (12,345,291) | (9,654,709) | (2,750,972) | (2,000,000) | (1,277,984) | (1,200,000) | (1,012,703) | (8,241,659) | (1,413,051) | |
| Phase IX Grants | 10560_7464 | Jul-14 | Jun-21 | 60,000,000 | 30,706,992 | 29,293,008 | 7,499,999 | 7,500,000 | 3,750,000 | 3,750,000 | 3,750,000 | 26,249,999 | 3,043,009 | |
| Phase IX Loans | 10561_7465 | Jul-14 | Jun-21 | 20,000,000 | 10,235,664 | 9,764,336 | 2,500,000 | 2,500,000 | 1,250,000 | 1,250,000 | 1,250,000 | 8,750,000 | 1,014,336 | |
| Phase IX Repayment | 10562_7466 | Jul-15 | Jun-31 | (20,000,000) | (2,232,249) | (17,767,751) | (1,308,722) | (1,368,831) | (1,857,830) | (1,853,040) | (1,598,380) | (7,986,802) | (6,918,967) | (2,861,982) |
| Phase X Grants | 10563_7467 | Jul-16 | Jun-25 | 60,000,000 | 15,466,350 | 44,533,650 | 7,500,000 | 7,500,000 | 7,500,000 | 7,500,000 | 6,000,000 | 36,000,000 | 8,533,650 | |
| Phase X Loans | 10564_7468 | Jul-16 | Jun-25 | 20,000,000 | 5,155,450 | 14,844,550 | 2,500,000 | 2,500,000 | 2,500,000 | 2,500,000 | 2,000,000 | 12,000,000 | 2,844,550 | |
| Phase X Repayment | 10565_7469 | Jul-16 | Jun-35 | (20,000,000) | (529,513) | (19,470,488) | (508,045) | (555,120) | (1,060,295) | (1,310,295) | (1,560,295) | (4,994,050) | (9,251,078) | (5,225,359) |
| Phase XI Grants | 10566_7620 | Aug-18 | Aug-24 | 75,000,000 | - | 75,000,000 | 15,164,587 | 4,500,000 | 6,000,000 | 7,500,000 | 7,500,000 | 40,664,587 | 34,335,413 | |
| Phase XI Loans | 10567_7621 | Aug-18 | Aug-24 | 25,000,000 | - | 25,000,000 | 5,054,862 | 1,500,000 | 2,000,000 | 2,500,000 | 2,500,000 | 13,554,862 | 11,445,138 | |
| Phase XI Repayment | 10568_7622 | Aug-19 | Aug-34 | (25,000,000) | - | (25,000,000) | (97,500) | (300,000) | (500,000) | (700,000) | (900,000) | (2,497,500) | (8,800,000) | (13,702,500) |
| Phase XII Grants | 10569_7623 | Aug-19 | Aug-25 | 75,000,000 | - | 75,000,000 | | 3,000,000 | 4,500,000 | 6,000,000 | 7,500,000 | 21,000,000 | 45,000,000 | 9,000,000 |
| Phase XII Loans | 10570_7624 | Aug-19 | Aug-25 | 25,000,000 | - | 25,000,000 | | 1,000,000 | 1,500,000 | 2,000,000 | 2,500,000 | 7,000,000 | 15,000,000 | 3,000,000 |
| Phase XII Repayment | 10571_7625 | Aug-20 | Aug-35 | (25,000,000) | - | (25,000,000) | | | (100,000) | (250,000) | (450,000) | (800,000) | (6,350,000) | (17,850,000) |
| I/I Loans Only | 10572_7640 | Jul-23 | Jun-30 | 100,000,000 | - | 100,000,000 | | | | | | | 30,000,000 | 70,000,000 |
| I/I Loans Only Repayment | 10573_7641 | Jul-24 | Jun-40 | (100,000,000) | - | (100,000,000) | | | | | | | (5,000,000) | (95,000,000) |
| **128 I/I Local Financial Assistance Total** | | | | **392,584,985** | **190,035,831** | **202,549,108** | **36,470,301** | **25,699,913** | **24,983,588** | **28,199,259** | **26,897,726** | **142,250,790** | **112,938,152** | **(52,639,841)** |
| | | | | | | | | | | | | | | |
| **138 Sewerage System Mapping Upgrades Total** | | **completed project** | | **280,876** | **280,876** | **-** | | | | | | | | |

**Massachusetts Water Resources Authority**
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| Program / Project / Contract | Contract No. | Notice to Proceed | Substantial Completion | Total Contract Amount | Payments through FY18 | Remaining Balancce | FY19 | FY20 | FY21 | FY22 | FY23 | FY19-23 | FY24 - FY28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Waterworks** | | | | **4,299,730,438** | **2,111,415,257** | **2,188,315,181** | **80,562,509** | **64,165,579** | **74,076,910** | **90,307,471** | **89,257,054** | **398,369,523** | **688,853,814** | **1,101,091,820** |
| | | | | | | | | | | | | | | |
| **Drinking Water Quality Improvements** | | | | **704,201,861** | **649,972,373** | **54,229,484** | **1,035,603** | **2,972,524** | **3,335,350** | **4,124,000** | **1,366,000** | **12,833,477** | **13,125,000** | **28,271,000** |
| | | | | | | | | | | | | | | |
| **542 Carroll Water Treatment Plant** | | | | | | | | | | | | | | |
| Study 1 | 53293_5023 | Jan-88 | Feb-89 | 444,190 | 444,190 | - | | | | | | | | |
| Study 2 | 53294_5024 | Jul-90 | Mar-94 | 2,368,323 | 2,368,323 | - | | | | | | | | |
| EIR / Conceptual Design | 53296_5042 | Nov-93 | Jul-95 | 5,807,703 | 5,807,703 | - | | | | | | | | |
| Technical Assistance | 53300_5997 | Jan-88 | Jun-00 | 74,558 | 74,558 | - | | | | | | | | |
| Wachusett WTP - Design/CS/RI | 53301_5017 | Oct-96 | Sep-06 | 46,605,542 | 46,605,542 | - | | | | | | | | |
| Permit Fees | 53304_5157 | Jul-93 | Nov-19 | 87,037 | 86,674 | 363 | 363 | | | | | 363 | | |
| Cryptosporidium Inactivation Study | 53367_6118 | Feb-97 | May-00 | 150,000 | 150,000 | - | | | | | | | | |
| Management Support - Design | 53371_6134 | Apr-97 | Apr-00 | 1,729,937 | 1,729,937 | - | | | | | | | | |
| AWWARF Study | 53375_6182 | Dec-96 | Sep-03 | 650,342 | 650,342 | - | | | | | | | | |
| Emerg Discharge Reserv Water Mgmt Study | 53376_6206 | Nov-98 | Sep-02 | 1,453,825 | 1,453,825 | - | | | | | | | | |
| Wachusett and Cosgrove Intakes - CP1 | 53377_6207 | Jun-00 | Jun-03 | 15,489,314 | 15,489,314 | - | | | | | | | | |
| Construction Management / RI | 53378_6208 | Aug-98 | Sep-06 | 31,437,824 | 31,437,824 | - | | | | | | | | |
| Cosgrove Disinfection - Phase II | 53390_6365 | Apr-98 | May-99 | 2,169,292 | 2,169,292 | - | | | | | | | | |
| Cosgrove Disinfection - Phase I | 53391_6397 | Jul-97 | Oct-97 | 150,380 | 150,380 | - | | | | | | | | |
| Distribution Water Consultant | 53392_6401 | Jul-97 | Jun-98 | 3,200 | 3,200 | - | | | | | | | | |
| Immediate Disinfection - MECO | 53393_6406 | Jul-97 | Jul-97 | 10,300 | 10,300 | - | | | | | | | | |
| Cosgrove Disinfection Fac. - Underwater | 53406_6479 | Jan-98 | Jun-98 | 217,400 | 217,400 | - | | | | | | | | |
| Community Chlorine Analyzers | 53410_6485 | Apr-98 | Jun-98 | 48,863 | 48,863 | - | | | | | | | | |
| Wachusett Aqueduct Interim Rehab. - CP2 | 53412_5522 | Dec-00 | Oct-02 | 23,400,005 | 23,400,005 | - | | | | | | | | |
| Sitework & Storage Tanks - CP3 | 53413_6488 | Mar-99 | Nov-02 | 67,367,673 | 67,367,673 | - | | | | | | | | |
| Treatment Facilities - CP4 | 53414_6489 | Dec-00 | Jul-05 | 145,761,497 | 145,761,497 | - | | | | | | | | |
| Late Sitework - CP6 | 53416_6491 | Jul-04 | Jan-06 | 4,087,831 | 4,087,831 | - | | | | | | | | |
| OCIP | 53418_6494 | Mar-99 | Dec-07 | 5,107,089 | 5,107,089 | - | | | | | | | | |
| Professional Services | 53419_6495 | Sep-98 | Oct-05 | 2,752,328 | 2,752,328 | - | | | | | | | | |
| Marlboro MOA | 53420_6497 | Sep-98 | Jun-05 | 5,859,141 | 5,859,141 | - | | | | | | | | |
| CWTP- MECO | 53421_6520 | Sep-98 | Mar-05 | 128,328 | 128,328 | - | | | | | | | | |
| Site Security Services | 53425_6613 | May-99 | Mar-05 | 1,263,635 | 1,263,635 | - | | | | | | | | |
| Existing Facilities Modifications - CP7 | 53426_6650 | Aug-15 | Aug-20 | 8,082,357 | 6,930,369 | 1,151,987 | 151,987 | 800,000 | 200,000 | | | 1,151,987 | | |
| CSX Crossing | 53427_6670 | Aug-01 | Dec-01 | 64,700 | 64,700 | - | | | | | | | | |
| Wachusett Algae - Design CS/RI | 53428_6671 | Jul-24 | Dec-27 | 450,000 | - | 450,000 | | | | | | | 450,000 | |
| Public Health Research | 53432_6691 | Jul-00 | Jun-07 | 1,702,560 | 1,702,560 | - | | | | | | | | |
| Security Equipment | 53435_6756 | Jun-00 | Jun-00 | 570,721 | 570,721 | - | | | | | | | | |
| Cosgrove Screens, CP8 - Construction | 53437_6773 | Aug-03 | Aug-04 | 3,238,306 | 3,238,306 | - | | | | | | | | |
| AWWARF - Evaluation Ozone & UV | 53443_6815 | Jul-01 | Jan-04 | 301,750 | 301,750 | - | | | | | | | | |
| Fitout / Construction | 53445_6827 | Oct-03 | Feb-21 | 712,615 | 547,117 | 165,498 | 115,498 | | | 50,000 | | 165,498 | | |
| Wachusett Algae - Construction | 53448_6889 | Feb-25 | Dec-26 | 1,800,000 | - | 1,800,000 | | | | | | | 1,800,000 | |
| CWTP Ultraviolet Disinfect.-Des/ESDC/REI | 53450_6923 | Jul-08 | Apr-15 | 4,350,956 | 4,350,956 | - | | | | | | | | |
| CWTP Ultraviolet Disinfection - Construc | 53451_6924 | Apr-11 | Feb-14 | 31,057,187 | 31,057,187 | - | | | | | | | | |
| As-needed Technical Assistance #1 | 53452_6939 | Jan-06 | Jun-08 | 491,274 | 491,274 | - | | | | | | | | |
| Existing Facilities Modif., CP7 - Design | 53453_6951 | Jul-05 | Apr-15 | 964,746 | 964,746 | - | | | | | | | | |
| As-needed Technical Assistance | 53455_6989 | Jan-06 | Jun-08 | 702,024 | 702,024 | - | | | | | | | | |
| Ancillary Modifications - Construct. 1 | 53456_7084 | Jul-06 | Jun-08 | 160,475 | 160,475 | - | | | | | | | | |
| Ancillary Modifications - Construction | 53457_7085 | Jan-09 | May-20 | 5,879,176 | 4,897,943 | 981,233 | 358,233 | 623,000 | | | | 981,233 | | |
| Ancillary Modifications - Design 3 | 53458_7192 | Mar-08 | Sep-10 | 299,101 | 299,101 | - | | | | | | | | |
| Ancillary Modifications - Design 4 | 53459_7208 | Mar-08 | Sep-10 | 527,412 | 527,412 | - | | | | | | | | |
| Technical Assistance 5 | 53464_7315 | Sep-10 | Mar-13 | 254,922 | 254,922 | - | | | | | | | | |
| Technical Assistance 6 | 53465_7316 | Sep-10 | Mar-13 | 407,989 | 407,989 | - | | | | | | | | |
| CWTP Storage Tank Roof Drainage System | 53470_7376 | Jan-24 | Nov-26 | 7,000,000 | - | 7,000,000 | | | | | | | 7,000,000 | |
| Technical Assistance 7 | 75530_7406 | Jun-13 | Nov-15 | 593,529 | 593,529 | - | | | | | | | | |
| Technical Assistance 8 | 75531_7407 | Jan-16 | Jun-18 | 419,454 | 428,149 | (8,695) | (8,695) | | | | | (8,695) | | |
| Technical Assistance 9 | 75601_7543 | Jul-18 | Jun-20 | 731,567 | - | 731,567 | 139,333 | 400,000 | 192,233 | | | 731,566 | | |
| Technical Assistance 10 | 75602_7544 | Jul-18 | Jun-20 | 750,000 | - | 750,000 | 213,883 | 400,000 | 136,117 | | | 750,000 | | |
| **542 Carroll Water Treatment Plant Total** | | | | **436,138,378** | **423,116,424** | **13,021,953** | **970,602** | **2,223,000** | **528,350** | **50,000** | | **3,771,952** | **9,250,000** | |
| | | | | | | | | | | | | | | |

**Massachusetts Water Resources Authority**
**Capital Imrovement Program**
**FY20 Final Expenditure Forecast**

| Program / Project / Contract | Contract No. | Notice to Proceed | Substantial Completion | Total Contract Amount | Payments through FY18 | Remaining Balancce | FY19 | FY20 | FY21 | FY22 | FY23 | FY19-23 | FY24 - FY28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **543 Brutsch Water Treatment Plant Total** | | **completed project** | | **19,972,883** | **19,972,879** | **3** | | | | | | | | |

**Massachusetts Water Resources Authority**
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| Program / Project / Contract | Contract No. | Notice to Proceed | Substantial Completion | Total Contract Amount | Payments through FY18 | Remaining Balancce | FY19 | FY20 | FY21 | FY22 | FY23 | FY19-23 | FY24 - FY28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| **544 Norumbega Covered Storage Total** | | **completed project** | | **106,674,147** | **106,674,146** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **545 Blue Hills Covered Storage Total** | | **completed project** | | **40,082,837** | **40,082,837** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **550 Spot Pond Storage Facility Total** | | **completed project** | | **60,126,092** | **60,126,087** | **5** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **555 Carroll Water Treatment Plant (CWTP) Asset Protection** | | | | | | | | | | | | | | |
| CWTP Control Rm Fire Supp Sys | 54000_7592 | Jul-20 | Jul-21 | 325,000 | - | 325,000 | | | 300,000 | 25,000 | | 325,000 | | |
| CWTP Asset Protection Study | 54001_7593 | Oct-22 | Oct-23 | 465,000 | - | 465,000 | | | | | 365,000 | 365,000 | 100,000 | |
| LOX Yard Redundancy | 54002_7594 | Jul-21 | Jul-22 | 670,000 | - | 670,000 | | | | 650,000 | 20,000 | 670,000 | | |
| CWTP Water Pump VFD Replacement | 54003_7595 | Oct-22 | Oct-23 | 186,000 | - | 186,000 | | | | | 140,000 | 140,000 | 46,000 | |
| OZONE Generator Re-Build | 54004_7596 | Jul-21 | Oct-22 | 930,000 | - | 930,000 | | | | 880,000 | 50,000 | 930,000 | | |
| CWTP Chemical System Pipe Pumps Replacement | 54005_7597 | Jul-20 | Jun-22 | 4,000,000 | - | 4,000,000 | | | 1,440,000 | 1,920,000 | 640,000 | 4,000,000 | | |
| PT Bldg Soda Ash Equip Repl | 54006_7598 | Jul-20 | Aug-21 | 465,000 | - | 465,000 | | | 415,000 | 50,000 | | 465,000 | | |
| HVAC Equipment Repl | 54007_7605 | Jul-19 | May-22 | 1,750,000 | - | 1,750,000 | | 398,000 | 652,000 | 549,000 | 151,000 | 1,750,000 | | |
| Water Pump Replacement | 54008_7606 | Jul-27 | Jul-30 | 2,000,000 | - | 2,000,000 | | | | | | | 486,000 | 1,514,000 |
| OZONE Generator Replacement | 54009_7607 | Oct-27 | Oct-30 | 20,000,000 | - | 20,000,000 | | | | | | | 3,243,000 | 16,757,000 |
| UV Reactor Replacement | 54010_7608 | Oct-32 | Oct-34 | 10,000,000 | - | 10,000,000 | | | | | | | | 10,000,000 |
| CWTP Emergency Generator #1 Replacement | 54011_7642 | Feb-19 | Nov-19 | 416,524 | - | 416,524 | 65,000 | 351,524 | | | | 416,524 | | |
| **555 Carroll Water Treatment Plant (CWTP) Asset Protection Total** | | | | **41,207,524** | **-** | **41,207,524** | **65,000** | **749,524** | **2,807,000** | **4,074,000** | **1,366,000** | **9,061,524** | **3,875,000** | **28,271,000** |
| | | | | | | | | | | | | | | |
| **Transmission** | | | | **2,522,587,515** | **825,200,270** | **1,697,387,245** | **10,613,284** | **15,134,688** | **37,182,326** | **39,482,333** | **47,830,651** | **150,243,282** | **337,713,073** | **1,209,430,878** |
| | | | | | | | | | | | | | | |
| **597 Winsor Station Pipeline** | | | | | | | | | | | | | | |
| Preliminary Permit, Study & Licensing | 60032_6276 | Nov-97 | Jun-99 | 38,901 | 38,897 | 4 | | | | | | | | |
| Quabbin Aqueduct TV Inspection | 60033_6277 | Jul-23 | Oct-24 | 3,255,090 | - | 3,255,090 | | | | | | | 3,255,090 | |
| Hatchery Pipeline - Design/ESDC/RI | 60077_7017 | Aug-13 | Mar-19 | 909,493 | 777,973 | 131,520 | 131,519 | | | | | 131,519 | | |
| Quabbin Aqueduct & Winsor Power Station Upg. Design/CA/RI | 60087_7114 | Feb-10 | Aug-15 | 838,031 | 838,031 | - | | | | | | | | |
| Quabbin Aqueduct WPS-Const | 60088_7115 | Jan-24 | Jan-26 | 19,400,336 | - | 19,400,336 | | | | | | | 19,400,336 | |
| Shaft 12 Isolation Gates Const | 60095_7197 | Jan-24 | Jan-26 | 16,616,160 | - | 16,616,160 | | | | | | | 16,616,160 | |
| Winsor Station Chapman Valve Repai | 60101_7212 | Feb-09 | Nov-09 | 416,425 | 416,425 | - | | | | | | | | |
| Purchase of Sleeve Valves | 60105_7234 | Jul-08 | May-09 | 368,270 | 368,270 | - | | | | | | | | |
| Hatchery Pipeline - Construction | 60106_7235 | Mar-16 | Sep-17 | 2,567,661 | 2,509,767 | 57,895 | 57,895 | | | | | 57,895 | | |
| Quabb Aqueduct Winsor Power Station Final Design/CA/RI | 60140_7460 | Jan-24 | Jan-29 | 4,350,000 | - | 4,350,000 | | | | | | | 3,697,500 | 652,500 |
| Shaft 12 Isolation Gates Des CA/RI | 60141_7509 | Mar-17 | Dec-18 | 799,095 | 784,522 | 14,573 | 14,573 | | | | | 14,573 | | |
| **597 Winsor Station Pipeline Total** | | | | **49,559,462** | **5,733,885** | **43,825,578** | **203,987** | | | | | **203,987** | **42,969,086** | **652,500** |
| | | | | | | | | | | | | | | |
| **601 Sluice Gate Rehabilitation Total** | | **completed project** | | **9,158,411** | **9,158,411** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **604 MetroWest Tunnel** | | | | | | | | | | | | | | |
| Study | 59794_5043 | Jun-84 | Oct-89 | 414,770 | 414,770 | - | | | | | | | | |
| Design/EIR - Tunnel/ESDC | 59795_5044 | Apr-92 | Mar-07 | 37,939,302 | 37,939,302 | - | | | | | | | | |
| Sudbury Pipe Bridge - Construction | 59796_5048 | Nov-91 | Jun-92 | 295,910 | 295,910 | - | | | | | | | | |
| West Tunnel Segment - CP1 | 59798_6054 | Apr-97 | Apr-03 | 147,774,009 | 147,774,009 | - | | | | | | | | |
| Construction Management/Resident Inspection | 59799_5284 | May-95 | Apr-04 | 39,427,799 | 39,427,799 | - | | | | | | | | |
| Technical Assistance | 59804_5976 | Jun-84 | Jun-98 | 131,400 | 131,400 | - | | | | | | | | |
| Land Acquisition | 59805_5139 | Oct-95 | Jul-13 | 6,258,741 | 6,258,741 | - | | | | | | | | |
| Hultman Study | 59806_5141 | Apr-95 | Mar-05 | 1,863,998 | 1,863,998 | - | | | | | | | | |
| DEP Permit Fees | 60012_6037 | Oct-94 | Sep-14 | 58,000 | 56,178 | 1,822 | | | | | | | 1,822 | |
| Middle Tunnel Segment - CP2 | 60013_6055 | Jun-96 | Apr-03 | 245,809,358 | 245,809,358 | - | | | | | | | | |
| MHD Salt Sheds - CP5 | 60014_6056 | Sep-96 | Jun-97 | 1,313,900 | 1,313,900 | - | | | | | | | | |
| Shaft 5A - CP3 | 60015_6059 | Aug-97 | Aug-98 | 5,815,614 | 5,815,614 | - | | | | | | | | |
| Local Supply Contingency - Design/CA/RI | 60017_6063 | May-96 | Oct-99 | 858,703 | 858,703 | - | | | | | | | | |
| Community Technical Assistance | 60018_6067 | Jun-95 | Apr-99 | 297,408 | 297,408 | - | | | | | | | | |
| Professional Services | 60020_6117 | Nov-95 | Dec-03 | 730,860 | 730,860 | - | | | | | | | | |
| OCIP | 60021_6122 | Jun-96 | May-06 | 26,021,794 | 26,021,794 | - | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hultman Leak Repair | 60022_6128 | Aug-96 | May-97 | 307,280 | 307,280 | - | | | | | | | | |
| Framingham MOU | 60023_6129 | May-96 | Dec-03 | 2,444,171 | 2,444,171 | - | | | | | | | | |
| Local Supply Contingency - Construction | 60024_6130 | Jun-97 | Dec-03 | 4,298,444 | 4,298,444 | - | | | | | | | | |
| Local Supply Contingency - Legal/Easement | 60025_6131 | Apr-97 | Jun-02 | 9,110 | 9,110 | - | | | | | | | | |
| Hultman Repair Bands | 60026_6140 | Aug-96 | Dec-96 | 28,400 | 28,400 | - | | | | | | | | |
| Loring Road Storage Tanks - CP-8 | 60029_6203 | Sep-97 | Nov-00 | 41,367,921 | 41,367,921 | - | | | | | | | | |
| Testing & Disinfection - CP7 | 60030_6204 | Jan-03 | Oct-03 | 3,612,435 | 3,612,435 | - | | | | | | | | |
| Upper Hultman Rehab - CP6B | 60031_6205 | Apr-12 | Jun-13 | 5,849,390 | 5,849,390 | - | | | | | | | | |
| Southboro MOA | 60038_6366 | May-97 | Jun-03 | 254,883 | 254,883 | - | | | | | | | | |
| Weston MOA | 60039_6367 | Apr-96 | Oct-04 | 1,005,524 | 1,005,524 | - | | | | | | | | |
| East Tunnel Segment - CP3A | 60040_6374 | Nov-98 | Sep-02 | 56,262,907 | 56,262,907 | 1 | | | | | | | | |
| Hultman Investigation and Repair | 60042_6430 | Jun-99 | Nov-00 | 1,604,381 | 1,604,381 | - | | | | | | | | |
| Hultman Repair Bands 98-99 | 60043_6492 | Apr-99 | Jun-99 | 116,457 | 116,457 | - | | | | | | | | |
| Wayland MOA | 60053_6762 | Jun-00 | Dec-02 | 35,040 | 35,040 | - | | | | | | | | |
| Equipment Prepurchase | 60054_6777 | Jun-05 | Mar-06 | 198,000 | 198,000 | - | | | | | | | | |
| Hultman Rehab - CP9 | 60058_6856 | Nov-05 | Dec-06 | 3,256,702 | 3,256,702 | - | | | | | | | | |
| Interim Disinfection | 60059_6872 | Jan-03 | Oct-05 | 1,244,540 | 1,244,540 | - | | | | | | | | |
| Hultman Interconnect - Final Design/CA/R | 60066_6911 | Sep-05 | Sep-14 | 5,732,364 | 5,732,364 | - | | | | | | | | |
| Lower Hultman Rehab -CP6A | 60073_6975 | Sep-09 | May-13 | 52,288,838 | 52,288,838 | - | | | | | | | | |
| Hultman Interconnection - RI Services | 60083_7082 | Jan-10 | Jan-15 | 1,870,346 | 1,870,346 | - | | | | | | | | |
| CP6 Easements | 60085_7105 | Jan-08 | Apr-14 | 33,094 | 33,091 | 3 | | | | | | | | |
| CP6A Demolition | 60086_7106 | Sep-08 | Jan-09 | 57,222 | 57,222 | - | | | | | | | | |
| Valve Chamber & Storage Tank Improve Design | 60109_7283 | Jul-23 | Mar-28 | 600,000 | - | 600,000 | | | | | | | 600,000 | |
| Valve Chamber & Storage Tank Access Impr. Construction | 60160_7476 | Mar-25 | Mar-27 | 2,400,000 | - | 2,400,000 | | | | | | | 2,400,000 | |
| Shaft 5A/5 Surface Piping Cathodic Protection | 60161_7477 | Nov-16 | Jun-17 | 142,028 | 142,028 | - | | | | | | | | |
| Hultman Leak Shaft 5A | 60162_7507 | Mar-16 | May-16 | 153,138 | 153,138 | - | | | | | | | | |
| **604 MetroWest Tunnel Total** | | | | **700,184,181** | **697,182,356** | **3,001,826** | | | | | | | **3,001,822** | |
| | | | | | | | | | | | | | | |
| **615 Chicopee Valley Aqueduct Redundancy Total** | | **completed project** | | **8,666,292** | **8,666,291** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **616 Quabbin Transmission System** | | | | | | | | | | | | | | |
| Facilities Inspection | 60055_6828 | Oct-05 | Oct-07 | 1,005,413 | 1,005,413 | - | | | | | | | | |
| Oakdale High Line Repl. Constr | 60068_6940 | Mar-20 | Jul-20 | 465,000 | - | 465,000 | | | 465,000 | | | 465,000 | | |
| Equipment Pre-purchase | 60075_7007 | Feb-05 | Jun-08 | 534,366 | 534,366 | - | | | | | | | | |
| Oakdale Phase 1A Electrical - Design | 60103_7229 | Oct-09 | Jul-14 | 775,534 | 775,534 | - | | | | | | | | |
| Oakdale Phase 1A Electrical - Constructi | 60104_7230 | Apr-12 | Jul-13 | 2,260,002 | 2,260,001 | 1 | | | | | | | | |
| Ware River Intake Valve Replacement - De | 60108_7282 | Sep-20 | Sep-25 | 300,000 | - | 300,000 | | | 50,000 | 50,000 | 50,000 | 150,000 | 150,000 | |
| Rehab Wach. Gatehouse/Bastion Lower Gatehouse Design | 60113_7333 | Jul-20 | Jun-24 | 500,000 | - | 500,000 | 3,357 | | 150,000 | 150,000 | 100,000 | 403,357 | 96,643 | |
| Rehabilitate Oakdale Turbine | 60135_7378 | May-26 | Jan-27 | 1,000,000 | - | 1,000,000 | | | | | | | 1,000,000 | |
| Wach Dam LGH Interim Pipe Repair | 60136_7379 | Jul-19 | Dec-19 | 200,000 | - | 200,000 | | 200,000 | | | | 200,000 | | |
| Wach. LGH Pipe Replacement Constr. | 60137_7380 | Jan-20 | Jan-21 | 2,600,000 | - | 2,600,000 | | 400,000 | 2,200,000 | | | 2,600,000 | | |
| Ware Rver Intake Vlve Rep Const | 60138_7487 | Sep-22 | Sep-24 | 900,000 | - | 900,000 | | | | | 150,000 | 150,000 | 750,000 | |
| CVA Motorized Screens Replacement-Const | 60139_7488 | Jan-17 | Aug-17 | 1,209,930 | 1,209,930 | - | | | | | | | | |
| Oakdale Turbine Rehab Des | 60201_7545 | May-25 | Jun-29 | 200,000 | - | 200,000 | | | | | | | 175,000 | 25,000 |
| Wach Bastion Rehab | 60225_7697 | Jun-21 | Jun-22 | 2,000,000 | - | 2,000,000 | | | | 1,500,000 | 500,000 | 2,000,000 | | |
| Wach LGH Building Rehab | 60226_7698 | Jun-20 | Jun-21 | 2,200,000 | - | 2,200,000 | | | 2,200,000 | | | 2,200,000 | | |
| Oakdale Valves - Phase 1 Construction | 75491_6690 | Oct-05 | Jun-06 | 1,811,309 | 1,811,309 | - | | | | | | | | |
| Oakdale Valves - Phase 1 Study & Design | 75496_6831 | Apr-04 | Jun-07 | 1,070,290 | 1,070,290 | - | | | | | | | | |
| **616 Quabbin Transmission System Total** | | | | **19,031,844** | **8,666,843** | **10,365,001** | **3,357** | **600,000** | **5,065,000** | **1,700,000** | **800,000** | **8,168,357** | **2,171,643** | **25,000** |
| | | | | | | | | | | | | | | |
| **617 Sudbury/Weston Aqueduct Repairs** | | | | | | | | | | | | | | |
| Sudbury Aqueduct Inspection | 60056_6838 | Aug-05 | Oct-06 | 369,520 | 369,520 | - | | | | | | | | |
| Technical Assistance | 60057_6839 | Sep-09 | Dec-11 | 25,000 | 25,000 | - | | | | | | | | |
| Sudbury Short-Term Repairs | 60076_7016 | Jul-23 | Jun-24 | 489,380 | - | 489,380 | | | | | | | 489,380 | |
| Sudbury Short-Term Repairs - Phase 2 | 60110_7317 | Jul-23 | Jul-24 | 2,098,000 | - | 2,098,000 | | | | | | | 2,098,000 | |
| Weston Aqueduct Sluice Gates - Const | 60130_7369 | Sep-19 | Sep-20 | 1,069,500 | - | 1,069,500 | | 575,000 | 494,500 | | | 1,069,500 | | |
| Rosemary Brook Building Repair | 60150_7472 | Mar-16 | May-18 | 1,748,794 | 1,362,837 | 385,956 | 385,956 | | | | | 385,956 | | |
| Eval. of Farm Pond Bldgs-Waban Arches | 60151_7473 | Jul-16 | Jul-18 | 217,771 | 208,942 | 8,829 | 8,829 | | | | | 8,829 | | |
| Waban Arch-Rehab Design/CA/RI | 60153_7616 | Oct-23 | Oct-28 | 300,000 | - | 300,000 | | | | | | | 288,000 | 12,000 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Waban Arch-Rehab Construciton | 60154_7617 | Oct-25 | Oct-27 | 1,200,000 | - | 1,200,000 | | | | | | | 1,200,000 | |
| Farm Prd Inlet Chamber & Gatehouse Desig | 60155_7618 | Oct-24 | Oct-29 | 400,000 | - | 400,000 | | | | | | | 305,000 | 95,000 |
| Farm Prd Inlet Chamber & Gatehouse Construction | 60156_7619 | Oct-26 | Oct-28 | 2,000,000 | - | 2,000,000 | | | | | | | 1,440,000 | 560,000 |
| Weston Aqued Gatehouse Rehab | 60157_7700 | Jan-24 | Jan-25 | 1,324,000 | - | 1,324,000 | | | | | | | 1,324,000 | |
| Hazardous Material Sudbury Aqueduct | 75486_6617 | Apr-99 | May-05 | 265,428 | 265,428 | - | | | | | | | | |
| **617 Sudbury/Weston Aqueduct Repairs Total** | | | | **11,507,393** | **2,231,727** | **9,275,665** | **394,785** | **575,000** | **494,500** | | | **1,464,285** | **7,144,380** | **667,000** |
| | | | | | | | | | | | | | | |
| **620 Wachusett Reservoir Spillway Improvements Total** | | **completed project** | | **9,287,460** | **9,287,460** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **621 Watershed Land** | | | | | | | | | | | | | | |
| Land Acquisition | 60081_7069 | Apr-06 | Jun-23 | 29,000,000 | 22,846,400 | 6,153,600 | 1,600,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 5,600,000 | 553,600 | |
| **621 Watershed Land Total** | | | | **29,000,000** | **22,846,400** | **6,153,600** | **1,600,000** | **1,000,000** | **1,000,000** | **1,000,000** | **1,000,000** | **5,600,000** | **553,600** | |
| | | | | | | | | | | | | | | |
| **622 Cosgrove Tunnel Redundancy** | | | | | | | | | | | | | | |
| Wachusett Aqueduct Pumping Station - Design/ESDC/RI | 60090_7156 | Feb-12 | May-20 | 7,983,600 | 6,481,679 | 1,501,922 | 500,052 | 610,587 | 391,283 | | | 1,501,922 | | |
| Wachusett Aqueduct Pumping Station - Const. | 60091_7157 | Mar-16 | Feb-19 | 51,147,096 | 45,530,231 | 5,616,864 | 5,616,865 | | | | | 5,616,865 | | |
| Permits/Easements | 60124_7354 | Aug-15 | Jun-21 | 15,000 | 5,985 | 9,015 | | 6,591 | 2,424 | | | 9,015 | | |
| **622 Cosgrove Tunnel Redundancy Total** | | | | **59,145,696** | **52,017,895** | **7,127,801** | **6,116,917** | **617,178** | **393,707** | | | **7,127,802** | | |
| | | | | | | | | | | | | | | |
| **623 Dam Projects** | | | | | | | | | | | | | | |
| Dam Safety Modificat. & Repairs - Constr. | 60094_7194 | Aug-11 | Sep-12 | 2,054,559 | 2,054,554 | 5 | | | | | | | | |
| Dam Safety Modificat. & Repairs Des/ESDC | 60100_7211 | Sep-09 | Jun-14 | 1,060,757 | 1,060,757 | - | | | | | | | | |
| Dam Permits | 60118_7346 | Jul-18 | Dec-21 | 1,000 | 434 | 566 | | 566 | | | | 566 | | |
| Quinapoxet Rem Dam - Design/ESDC/RI | 60119_7347 | Jul-20 | Dec-23 | 200,000 | - | 200,000 | | | 43,000 | 57,000 | 57,000 | 157,000 | 43,000 | |
| Quinapoxet Dam Removal - Construction | 60120_7348 | Jul-21 | Dec-22 | 600,000 | - | 600,000 | | | | 300,000 | 300,000 | 600,000 | | |
| Sudbury/Foss Dam Design/CA/RI | 60190_7614 | Mar-19 | Jun-23 | 432,029 | - | 432,029 | 10,000 | 122,000 | 122,000 | 122,000 | 56,029 | 432,029 | | |
| Sudbury/Foss Dam Construction | 60191_7615 | Jul-20 | Jun-22 | 1,600,000 | - | 1,600,000 | | | 600,000 | 800,000 | 200,000 | 1,600,000 | | |
| Quinapoxet Rem Dam REI | 60192_7690 | Jul-21 | Feb-23 | 100,000 | - | 100,000 | | | | 45,000 | 55,000 | 100,000 | | |
| **623 Dam Projects Total** | | | | **6,048,345** | **3,115,745** | **2,932,600** | **10,000** | **122,566** | **765,000** | **1,324,000** | **668,029** | **2,889,595** | **43,000** | |
| | | | | | | | | | | | | | | |
| **625 Metropolitan Tunnel Redundancy** | | | | | | | | | | | | | | |
| Water Transmission Redundancy Plan | 60035_6273 | Oct-08 | Sep-11 | 1,396,572 | 1,396,572 | - | | | | | | | | |
| Preliminary Design & MEPA Review | 60092_7159 | Apr-20 | Apr-23 | 16,000,000 | - | 16,000,000 | | | 5,333,333 | 5,333,333 | 5,333,334 | 16,000,000 | | |
| Tunnel Construction | 60107_7291 | Jan-27 | Jan-40 | 983,003,279 | - | 983,003,279 | | | | | | | 93,916,000 | 889,087,279 |
| Sudbury Aqueduct - MEPA Review | 60122_7352 | Oct-12 | Jun-17 | 2,072,688 | 2,059,395 | 13,292 | 13,292 | | | | | 13,292 | | |
| Construction Management | 60126_7356 | Jul-25 | Jan-40 | 117,037,860 | - | 117,037,860 | | | | | | | 22,069,000 | 94,968,860 |
| Tops of Shafts Surface Construction | 60127_7357 | Jan-34 | Jan-40 | 41,542,702 | - | 41,542,702 | | | | | | | | 41,542,702 |
| Admin Legal & Public Outreach | 60170_7516 | Jan-24 | Jan-40 | 140,347,369 | - | 140,347,369 | | | | | | | 37,100,000 | 103,247,369 |
| Top of Shaft Rehab Design/CA/RI | 60172_7521 | Apr-38 | Apr-43 | 1,262,173 | - | 1,262,173 | | | | | | | | 1,262,173 |
| Top of Shaft Rehab Construction | 60173_7522 | Apr-40 | Apr-42 | 5,278,178 | - | 5,278,178 | | | | | | | | 5,278,178 |
| Final Design/ESDC | 60174_7556 | Jan-24 | Jan-40 | 89,729,026 | - | 89,729,026 | | | | | | | 23,710,000 | 66,019,026 |
| Shaft 7 Building Design CA/RI | 60176_7558 | Apr-38 | Apr-43 | 1,316,472 | - | 1,316,472 | | | | | | | | 1,316,472 |
| Shaft 7 Buildings Construction | 60177_7559 | Apr-40 | Apr-42 | 5,265,888 | - | 5,265,888 | | | | | | | | 5,265,888 |
| Program Support Services | 60178_7655 | Apr-19 | Mar-28 | 17,497,877 | - | 17,497,877 | | 1,700,000 | 2,050,000 | 2,050,000 | 2,500,000 | 8,300,000 | 9,197,877 | - |
| **625 Metropolitan Tunnel Redundancy Total** | | | | **1,421,750,084** | **3,455,967** | **1,418,294,116** | **13,292** | **1,700,000** | **7,383,333** | **7,383,333** | **7,833,334** | **24,313,292** | **185,992,877** | **1,207,987,947** |
| | | | | | | | | | | | | | | |
| **628 Metropolitan Redundancy Interim Improvements** | | | | | | | | | | | | | | |
| CP1 Shafts 6, 8, 9A | 60202_7561 | Oct-19 | Oct-20 | 2,100,000 | - | 2,100,000 | | 969,000 | 1,131,000 | | | 2,100,000 | | |
| CHEPS Improvements Construction | 60203_7562 | Jul-21 | Jul-23 | 12,729,120 | - | 12,729,120 | | | | 3,582,000 | 5,110,000 | 8,692,000 | 4,037,120 | |
| WASM/SPSM West PRV Constr | 60204_7563 | Jul-20 | Jul-22 | 6,682,788 | - | 6,682,788 | | | 2,405,000 | 3,207,000 | 1,070,788 | 6,682,788 | | |
| Easements/Permits | 60206_7573 | Apr-19 | Jun-27 | 300,000 | 100 | 299,900 | 1,055 | 48,945 | 50,000 | 50,000 | 50,000 | 200,000 | 99,900 | |
| CHEPS Design/CA | 60207_7574 | Apr-19 | Oct-24 | 2,074,167 | - | 2,074,167 | 38,000 | 460,000 | 460,000 | 460,000 | 460,000 | 1,878,000 | 196,167 | |
| WASM/SPSM PRV Des/CA | 60208_7575 | Jul-18 | Jul-23 | 2,849,332 | - | 2,849,332 | 376,978 | 593,000 | 593,000 | 593,000 | 593,000 | 2,748,978 | 100,354 | |
| Shafts 5 & 9 Impr Des/CA | 60209_7599 | Jan-20 | Jan-24 | 750,000 | - | 750,000 | | 56,000 | 225,000 | 225,000 | 225,000 | 731,000 | 19,000 | |
| Shafts 5&9 Bldg Impr Constr | 60210_7600 | Jan-22 | Jan-23 | 3,000,000 | - | 3,000,000 | | | | 692,000 | 2,308,000 | 3,000,000 | | |
| CHEPS Improvements REI | 60212_7669 | Jul-21 | Jul-23 | 572,000 | - | 572,000 | | | | 205,000 | 274,000 | 479,000 | 93,000 | |
| CP2 Shafts 7, 7B, 7C, 7D | 60213_7670 | Oct-20 | Oct-21 | 2,500,000 | - | 2,500,000 | | | 1,153,000 | 1,347,000 | | 2,500,000 | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CP3 Shafts 5, 9 | 60214_7671 | Apr-20 | Apr-21 | 2,500,000 | - | 2,500,000 | | | 2,307,000 | 193,000 | | 2,500,000 | | |
| Waltham Water Pipeline REI | 60215_7672 | Jan-22 | Jan-24 | 1,040,000 | - | 1,040,000 | | | | 125,000 | 499,000 | 624,000 | 416,000 | |
| Shafts 5 & 9 Impr REI | 60216_7673 | Jan-22 | Jan-23 | 286,000 | - | 286,000 | | | | 66,000 | 220,000 | 286,000 | | |
| WASM/SPSM REI | 60217_7674 | Jul-20 | Jul-22 | 995,000 | - | 995,000 | | | 358,000 | 477,000 | 160,000 | 995,000 | | |
| Tops of Shaft REI | 60219_7696 | Oct-19 | Oct-21 | 750,000 | - | 750,000 | | 180,000 | 360,000 | 210,000 | | 750,000 | | |
| WASM 3 - MEPA/Design/CA/RI | 68166_6539 | Jul-13 | Jun-27 | 15,512,835 | 2,014,405 | 13,498,430 | 903,074 | 1,300,000 | 1,400,000 | 1,400,000 | 1,400,000 | 6,403,074 | 6,996,925 | 98,431 |
| WASM 3 Rehab CP-2 | 68170_6543 | Jul-22 | Jul-24 | 27,613,800 | - | 27,613,800 | | | | | 9,940,000 | 9,940,000 | 17,673,800 | |
| WASM 3 CP-1 | 68171_6544 | Jul-20 | Jul-22 | 20,366,500 | - | 20,366,500 | | | 7,331,000 | 8,775,000 | 3,260,500 | 19,366,500 | 1,000,000 | |
| WASM 3 Rehab CP-3 | 68172_6545 | Jul-24 | Jun-26 | 42,598,254 | - | 42,598,254 | | | | | | | 42,598,254 | |
| Waltham Water Pipeline Const | 68333_7457 | Jan-22 | Jan-24 | 19,483,145 | - | 19,483,145 | | | | 2,338,000 | 9,352,000 | 11,690,000 | 7,793,145 | |
| Waltham Water Pipeline Des/CA | 68334_7547 | Oct-19 | Jan-25 | 3,000,000 | - | 3,000,000 | | 321,000 | 642,000 | 642,000 | 642,000 | 2,247,000 | 753,000 | |
| Commonwealth Ave Pumping Station Redund-Des/CA/RI | 75580_7523 | Jan-17 | Jul-21 | 2,765,907 | 822,784 | 1,943,124 | 401,838 | 720,000 | 771,286 | 50,000 | | 1,943,124 | | |
| Commonwealth Ave Pumping Station Improvements Constr. | 75581_7524 | Feb-19 | Sep-20 | 6,879,500 | - | 6,879,500 | 550,000 | 5,710,000 | 619,500 | | | 6,879,500 | | |
| **628 Metropolitan Redundancy Interim Improvements Total** | | | | **177,348,348** | **2,837,289** | **174,511,060** | **2,270,945** | **10,357,945** | **19,805,786** | **24,637,000** | **35,564,288** | **92,635,964** | **81,776,665** | **98,431** |
| | | | | | | | | | | | | | | |
| **630 Watershed Division Capital Improvement** | | | | | | | | | | | | | | |
| Quabbin Admin Bldg Rehab Des CA\RI | 60300_7564 | Mar-22 | Mar-27 | 2,800,000 | - | 2,800,000 | | | | 57,000 | 688,000 | 745,000 | 2,055,000 | |
| Quabbin Admin Bldg Rehab Constr | 60301_7565 | Mar-24 | Mar-26 | 12,000,000 | - | 12,000,000 | | | | | | | 12,000,000 | |
| QAB Concept Design Report | 60302_7569 | Oct-20 | Oct-21 | 200,000 | - | 200,000 | | | 92,000 | 108,000 | | 200,000 | | |
| Maintenance Garage/Wash Bay/Storage Bldg Construction | 60303_7577 | Oct-20 | Oct-22 | 3,900,000 | - | 3,900,000 | | | 936,000 | 1,872,000 | 1,092,000 | 3,900,000 | | |
| Maintenance Garage/Wash Bay/Storage Bldg Design/CA/RI | 60304_7677 | Oct-19 | Oct-23 | 1,000,000 | - | 1,000,000 | | 162,000 | 324,000 | 324,000 | 185,000 | 995,000 | 5,000 | |
| River Rd Improv-Wachusett | 60305_7701 | Oct-20 | Oct-21 | 2,000,000 | - | 2,000,000 | | | 923,000 | 1,077,000 | | 2,000,000 | | |
| **630 Watershed Division Capital Improvement Total** | | | | **21,900,000** | **-** | **21,900,000** | | **162,000** | **2,275,000** | **3,438,000** | **1,965,000** | **7,840,000** | **14,060,000** | |
| | | | | | | | | | | | | | | |
| **Distribution And Pumping** | | | | **981,768,212** | **464,357,486** | **517,410,726** | **40,366,466** | **31,451,830** | **20,365,390** | **34,527,794** | **34,555,036** | **161,266,516** | **297,468,363** | **58,675,843** |
| | | | | | | | | | | | | | | |
| **618 Peabody Pipeline Project** | | | | | | | | | | | | | | |
| Peabody Pipe Design/ESDC/REI | 60063_6895 | Jun-17 | Aug-21 | 1,498,857 | 1,054,831 | 444,026 | 399,944 | 44,082 | | | | 444,026 | | |
| Easements | 60064_6896 | Jun-17 | Feb-20 | 10,000 | 4,250 | 5,750 | 3,750 | 2,000 | | | | 5,750 | | |
| **618 Peabody Pipeline Project Total** | | | | **1,508,857** | **1,059,081** | **449,776** | **403,694** | **46,082** | | | | **449,776** | | |
| | | | | | | | | | | | | | | |
| **677 Valve Replacement** | | | | | | | | | | | | | | |
| Construction 1 | 67559_5126 | Nov-95 | Nov-96 | 717,800 | 717,800 | - | | | | | | | | |
| Technical Assistance | 67560_5124 | Oct-95 | May-10 | 124,607 | 124,607 | - | | | | | | | | |
| Equipment Purchase | 68005_6088 | Oct-95 | Jun-18 | 1,111,804 | 1,111,804 | - | | | | | | | | |
| Construction 2 | 68012_6105 | Nov-97 | Jul-99 | 1,356,516 | 1,356,516 | - | | | | | | | | |
| Construction 3 | 68039_6278 | Feb-00 | Aug-01 | 1,337,571 | 1,337,571 | - | | | | | | | | |
| Construction 4 | 68079_6345 | May-02 | Oct-03 | 1,539,911 | 1,539,911 | - | | | | | | | | |
| Construction 5 | 68080_6346 | Mar-04 | Jul-05 | 1,389,006 | 1,389,006 | - | | | | | | | | |
| Construction 6 | 68126_6435 | May-07 | Dec-08 | 1,571,992 | 1,571,992 | - | | | | | | | | |
| Construction 7 | 68127_6436 | Apr-11 | Apr-13 | 2,858,864 | 2,858,859 | 5 | | | | | | | | |
| Permits | 68239_6859 | Jan-02 | Jun-29 | 2,542 | 2,542 | - | | | | | | | | |
| Easements | 68240_6860 | Jan-02 | Jun-29 | 5,770 | 5,770 | - | | | | | | | | |
| Construction 8 | 68300_7195 | Jan-26 | Jun-28 | 4,016,011 | - | 4,016,011 | | | | | | | 3,613,000 | 403,011 |
| Construction 9 | 68307_7236 | Jun-27 | Jun-29 | 4,016,011 | - | 4,016,011 | | | | | | | 1,606,000 | 2,410,011 |
| Phase 8 - Design/CA/RI | 68330_7417 | Jan-24 | Jun-30 | 803,202 | - | 803,202 | | | | | | | 733,202 | 70,000 |
| Phase 9 - Design/CA/RI | 68331_7418 | Jun-25 | Jun-30 | 803,202 | - | 803,202 | | | | | | | 535,000 | 268,202 |
| **677 Valve Replacement Total** | | | | **21,654,809** | **12,016,378** | **9,638,431** | | | | | | | **6,487,202** | **3,151,224** |
| | | | | | | | | | | | | | | |
| **678 Boston Low Service - Pipe & Valve Rahabilitation Total** | **completed project** | | | **23,690,863** | **23,690,863** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **683 Heath Hill Road Pipe Replacement Total** | **completed project** | | | **19,358,036** | **19,358,036** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **689 James L. Gillis Pump Station Total** | **completed project** | | | **33,419,007** | **33,419,008** | **-** | - | - | - | - | - | - | - | - |
| | | | | | | | | | | | | | | |
| **692 Northern High Service - Section 27 Improvements** | | | | | | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Section 27 - Construction | 67769_6333 | Mar-24 | Nov-25 | 1,201,067 | 26,581 | 1,174,486 | - | - | - | - | - | - | 1,174,486 | - |
| Easements | 68192_6589 | Apr-16 | Jun-22 | 22,800 | - | 22,800 | - | - | - | 11,400 | 11,400 | 22,800 | - | - |
| Technical Assistance | 68211_6712 | Oct-99 | Jun-22 | 64,500 | 59,794 | 4,706 | 412 | 1,238 | 850 | 850 | 850 | 4,200 | 506 | - |
| Surveying | 68229_6809 | Jun-01 | Mar-17 | 37,271 | 37,271 | - | - | - | - | - | - | - | - | - |
| **692 Northern High Service - Section 27 Improvements Total** | | | | **1,325,638** | **123,646** | **1,201,992** | **412** | **1,238** | **850** | **12,250** | **12,250** | **27,000** | **1,174,992** | **-** |
| | | | | | | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **693 NHS - Revere & Malden Pipeline Improvements** | | | | | | | | | | | | | | |
| Revere & Malden - Design/CS/RI | 67780_5185 | May-88 | Sep-94 | 1,785,747 | 1,785,747 | - | - | - | - | - | - | - | - | - |
| Revere Beach - Construction | 67781_5186 | Aug-92 | Oct-94 | 6,314,186 | 6,314,186 | - | - | - | - | - | - | - | - | - |
| Malden Section 53 - Construction | 67782_5176 | Apr-92 | Sep-94 | 10,026,430 | 10,026,430 | - | - | - | - | - | - | - | - | - |
| Revere Section 53 - Construction | 67784_5177 | Sep-08 | Aug-09 | 2,938,022 | 2,938,022 | - | - | - | - | - | - | - | - | - |
| Control Valves - Construction | 67785_5191 | Jun-88 | Aug-89 | 948,780 | 948,780 | - | - | - | - | - | - | - | - | - |
| DI Pipeline Cleaning & Lining - Construction | 67786_5179 | Jun-90 | Sep-90 | 157,930 | 157,930 | - | | | | | | | | |
| Winthrop Cleaning & Lining - Construction | 67787_5178 | Jun-90 | Aug-90 | 575,040 | 575,040 | - | | | | | | | | |
| CP-1 Section 53 Connections-Construction | 67790_6335 | Jul-22 | Jan-25 | 9,650,000 | - | 9,650,000 | | | | | 1,895,000 | 1,895,000 | 7,755,000 | |
| Technical Assistance | 67791_5986 | Jul-06 | Mar-18 | 246,445 | 246,445 | - | | | | | | | | |
| Linden Square - Construction | 67792_5238 | Apr-91 | Nov-91 | 1,849,430 | 1,849,430 | - | | | | | | | | |
| Linden Square - Construction Admin. | 67793_5239 | Apr-91 | Nov-91 | 125,380 | 125,380 | - | | | | | | | | |
| Road Restoration - Design/CA/RI | 67996_6033 | Nov-94 | Dec-95 | 77,250 | 77,250 | - | | | | | | | | |
| Road Restoration - Construction | 67997_6034 | Jul-95 | Jun-96 | 1,713,790 | 1,713,790 | - | | | | | | | | |
| Malden Section 53 - Landscaping | 68020_6113 | Apr-96 | Jun-96 | 20,000 | 20,000 | - | | | | | | | | |
| Sidewalk Restoration | 68033_6183 | Sep-96 | Oct-96 | 54,100 | 54,100 | - | | | | | | | | |
| Revere Section 53 - Easements | 68078_6334 | Sep-02 | Jul-09 | 210 | 210 | - | | | | | | | | |
| Sect 14 Water Pip Relocate (Malden) | 68257_6957 | Jul-17 | May-18 | 1,555,800 | 1,501,660 | 54,140 | 52,458 | 1,681 | | | | 54,139 | | |
| CP-3 Section 99 Connections-Construction | 68258_6958 | Jul-22 | Jan-25 | 8,500,000 | - | 8,500,000 | | | | | 1,468,000 | 1,468,000 | 7,032,000 | |
| Easements | 68265_6978 | Jul-06 | Dec-20 | 30,000 | - | 30,000 | 9,555 | 11,945 | 8,500 | | | 30,000 | | |
| Permits | 68280_7049 | Apr-05 | Mar-22 | 5,000 | 2,130 | 2,870 | 920 | 833 | 1,117 | | | 2,870 | | |
| Sect 56 Replacement/Saugus Design/CA | 75545_7454 | Aug-19 | Aug-25 | 1,536,995 | - | 1,536,995 | | 302,000 | 302,000 | 302,000 | 302,000 | 1,208,000 | 328,995 | |
| Sect 53 and 99 Conn.-Design/CA | 75548_7485 | Jul-19 | Jul-26 | 4,500,000 | - | 4,500,000 | | 315,000 | 620,000 | 620,000 | 720,000 | 2,275,000 | 2,225,000 | |
| Section 56 Replacement- Construction | 75549_7486 | Apr-23 | Apr-24 | 9,750,000 | - | 9,750,000 | | | | | 437,500 | 437,500 | 9,312,500 | |
| Section 56 Replacement Feasibility Study | 75565_7500 | Dec-15 | Jun-17 | 224,777 | 224,777 | - | | | | | | | | |
| Sec 56 Pipe Demo Constr | 75570_7536 | Oct-18 | May-19 | 1,898,500 | - | 1,898,500 | 1,898,500 | | | | | 1,898,500 | | |
| Sect 13&48 Rehab Design/CA/RI | 75571_7602 | Jul-24 | Jul-29 | 2,150,000 | - | 2,150,000 | | | | | | | 1,972,000 | 178,000 |
| Sect 13&48 Rehab Constr | 75572_7603 | Jul-26 | Jul-28 | 10,750,000 | - | 10,750,000 | | | | | | | 9,030,000 | 1,720,000 |
| Sect 56 Replace REI | 75573_7681 | Apr-23 | Apr-24 | 520,000 | - | 520,000 | | | | | | | 520,000 | |
| Sect 53 & 99 Conn. REI | 75574_7682 | Jul-22 | Jul-25 | 2,100,000 | - | 2,100,000 | | | | | 525,000 | 525,000 | 1,575,000 | |
| CP2 Section 14 Constr | 75577_7699 | Jan-23 | Jul-25 | 2,800,000 | - | 2,800,000 | | | | | 550,000 | 550,000 | 2,250,000 | |
| **693 NHS - Revere & Malden Pipeline Improvements Total** | | | | **82,803,812** | **28,561,307** | **54,242,505** | **1,961,433** | **631,459** | **931,617** | **922,000** | **5,897,500** | **10,344,009** | **42,000,495** | **1,898,000** |
| | | | | | | | | | | | | | | |
| **702 New Connect Mains - Shaft 7 to WASM 3** | | | | | | | | | | | | | | |
| Routing Study | 67846_5163 | Aug-94 | Nov-96 | 397,087 | 397,087 | - | | | | | | | | |
| Watertown MOU | 68035_6199 | Jun-94 | Sep-97 | 167,000 | 167,000 | - | | | | | | | | |
| CP1- Design/CA/RI | 68110_6383 | Sep-98 | Jul-11 | 3,532,814 | 3,532,814 | - | | | | | | | | |
| Des/CA/RI DP2/4 Meter 120 | 68111_6384 | Aug-02 | Oct-08 | 1,277,722 | 1,277,722 | - | | | | | | | | |
| CP3 (Sect 23,24,47)-Final Design/CA/RI | 68112_6385 | Jul-16 | Jun-22 | 3,506,868 | 1,608,806 | 1,898,062 | 557,107 | 606,517 | 473,579 | 260,859 | | 1,898,062 | | |
| CP1 A&B - Easements | 68114_6387 | | | 16,919 | 16,919 | - | | | | | | | | |
| CP3 - Easements | 68115_6388 | Jan-18 | Dec-18 | 40,000 | - | 40,000 | 11,111 | 28,889 | | | | 40,000 | | |
| CP5 - Easements | 68117_6390 | Dec-06 | Jan-11 | 21,659 | 21,659 | - | | | | | | | | |
| CP3-Sect 23,24,47, Rehab | 68119_6392 | Sep-19 | Mar-22 | 14,322,000 | - | 14,322,000 | | 2,864,000 | 5,729,000 | 5,729,000 | | 14,322,000 | | |
| CP5 - Northeast Segment | 68121_6394 | Aug-09 | Nov-11 | 5,902,607 | 5,902,606 | 1 | | | | | | | | |
| CP3 - Clean & Line Sections 59&60 - Construction | 68174_6548 | Dec-23 | Dec-25 | 8,899,480 | - | 8,899,480 | | | | | | | 8,899,480 | |
| CP2 -Easements | 68175_6547 | May-17 | May-25 | 33,000 | - | 33,000 | 4,194 | 10,000 | 7,500 | 7,500 | 2,243 | 31,437 | 1,563 | |
| Repl Sect 25, 75, 59 & 60 Design/CA | 68255_6955 | Jan-19 | Jun-26 | 6,451,907 | - | 6,451,907 | 122,800 | 1,000,000 | 1,000,000 | 800,000 | 800,000 | 3,722,800 | 2,729,107 | |
| Replace of Sect 25 - Const CP-2 | 68256_6956 | Apr-22 | Apr-24 | 3,904,288 | - | 3,904,288 | | | | 200,000 | 1,900,000 | 2,100,000 | 1,804,288 | |
| Section 75 Extension - Construction CP-1 | 68350_7484 | Apr-22 | Apr-24 | 4,185,000 | - | 4,185,000 | | | | 200,000 | 2,125,000 | 2,325,000 | 1,860,000 | |
| Sect 25, 75, 59, & 60 REI | 68351_7680 | Apr-22 | Dec-25 | 3,718,000 | - | 3,718,000 | | | | 50,000 | 1,350,000 | 1,400,000 | 2,318,000 | |
| **702 New Connect Mains - Shaft 7 to WASM 3 Total** | | | | **56,376,351** | **12,924,613** | **43,451,738** | **695,212** | **4,509,406** | **7,210,079** | **7,247,359** | **6,177,243** | **25,839,299** | **17,612,438** | |
| | | | | | | | | | | | | | | |

**Massachusetts Water Resources Authority**
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| Program / Project / Contract | Contract No. | Notice to Proceed | Substantial Completion | Total Contract Amount | Payments through FY18 | Remaining Balancce | FY19 | FY20 | FY21 | FY22 | FY23 | FY19-23 | FY24 - FY28 | Beyond FY28 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **704 Rehab of Other Pump Stations** | | | | | | | | | | | | | | |
| Preliminary Design | 67885_5153 | Aug-94 | Mar-96 | 351,000 | 351,000 | - | | | | | | | | |
| Design/CS/RI | 68017_6110 | May-97 | Nov-04 | 2,545,826 | 2,545,826 | - | | | | | | | | |
| Construction II & C | 68072_6304 | Jan-00 | Feb-01 | 639,272 | 639,272 | - | | | | | | | | |
| Rehab of 5 Pump Stations | 68102_6375 | Oct-06 | Jun-10 | 21,847,856 | 21,847,856 | - | | | | | | | | |
| Legal | 68179_6557 | Jul-99 | Jan-10 | 6,097 | 6,097 | - | | | | | | | | |
| Proprietary Equipment Purchases | 68204_6676 | Jun-99 | Jan-10 | 157,638 | 157,638 | - | | | | | | | | |
| Design 2 CS/RI | 68266_6980 | Dec-04 | Jun-11 | 4,510,163 | 4,510,163 | - | | | | | | | | |
| Pump Station Rehab-Evaluation | 75582_7525 | Nov-19 | Nov-21 | 500,000 | - | 500,000 | | 100,000 | 240,000 | 160,000 | | 500,000 | | |
| PS Rehab-Design/CA/RI | 75583_7526 | May-22 | May-28 | 3,940,000 | - | 3,940,000 | | | | | 747,000 | 747,000 | 3,193,000 | |
| Pump Station Rehab-Construction | 75584_7527 | May-25 | May-27 | 15,760,000 | - | 15,760,000 | | | | | - | - | 15,760,000 | |
| **704 Rehab of Other Pump Stations Total** | | | | **50,257,852** | **30,057,852** | **20,200,000** | | **100,000** | **240,000** | **160,000** | **747,000** | **1,247,000** | **18,953,000** | |
| | | | | | | | | | | | | | | |
| **706 NHS - New Connecting Mains from Section 91 Total** | **completed project** | | | **2,360,194** | **2,360,194** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **708 Northern Extra High Service - New Pipelines** | | | | | | | | | | | | | | |
| Design/CA/RI | 67970_5242 | Sep-94 | Jun-01 | 587,802 | 587,802 | - | | | | | | | | |
| Appraisal &Easements | 67971_6339 | Sep-94 | Jun-01 | 389 | 389 | - | | | | | | | | |
| Construction | 67972_6340 | Aug-99 | Sep-01 | 3,031,572 | 3,031,572 | - | | | | | | | | |
| Regulatory Compliance | 68010_6099 | Nov-95 | Oct-00 | 250 | 250 | - | | | | | | | | |
| Sect 34,45 & 61 - Construction | 68162_6522 | Jan-24 | Jul-26 | 5,983,656 | - | 5,983,656 | | | | | | | 5,983,656 | |
| Public Participation | 68176_6554 | Jul-15 | Dec-20 | 5,000 | - | 5,000 | 888 | 2,452 | 1,200 | 460 | | 5,000 | | |
| Legal | 68177_6555 | Jul-15 | Dec-20 | 5,000 | - | 5,000 | 417 | 2,750 | 1,833 | | | 5,000 | | |
| Technical Assistance | 68210_6707 | Nov-10 | Dec-20 | 17,631 | 7,886 | 9,745 | 1,667 | 8,078 | | | | 9,745 | | |
| PLC Equipment Purchases | 68215_6749 | Dec-99 | Dec-00 | 4,220 | 4,220 | 1 | | | | | | | | |
| Permits | 68281_7050 | Nov-10 | Dec-20 | 5,000 | - | 5,000 | 1,249 | 3,751 | | | | 5,000 | | |
| Sect 34,45 & 61 - Design/CA/RI | 75528_7404 | Jan-22 | Jul-27 | 1,233,560 | - | 1,233,560 | | | | 107,388 | 315,000 | 422,388 | 811,172 | |
| **708 Northern Extra High Service - New Pipelines Total** | | | | **10,874,080** | **3,632,119** | **7,241,962** | **4,221** | **17,031** | **3,033** | **107,848** | **315,000** | **447,133** | **6,794,828** | |
| | | | | | | | | | | | | | | |
| **712 Cathodic Protection of Distribution Mains** | | | | | | | | | | | | | | |
| Planning Phase I | 68002_6058 | Apr-95 | Dec-97 | 107,680 | 107,680 | - | | | | | | | | |
| Cathodic Protection Testing Eval. Progra | 68129_6438 | Aug-15 | Aug-17 | 128,716 | 128,716 | - | | | | | | | | |
| Cathodic Prot Shafts E&L | 68131_6440 | Jan-19 | Aug-19 | 893,500 | - | 893,500 | 406,333 | 393,500 | 35,000 | 30,000 | 28,667 | 893,500 | | |
| Technical Assistance | 68216_6751 | Jan-00 | May-09 | 33,233 | 33,233 | - | | | | | | | | |
| Cathodic Protection West Design/CA | 68380_7609 | Jul-20 | Jul-24 | 930,000 | - | 930,000 | | | 186,000 | 248,000 | 248,000 | 682,000 | 248,000 | |
| Cathodic Protection West Construction | 68381_7610 | Jul-21 | Jun-25 | 4,300,000 | - | 4,300,000 | | | | 941,000 | 941,000 | 1,882,000 | 2,418,000 | |
| Cath Prot Metro System Design/CA | 68382_7611 | Jul-20 | Jul-28 | 9,207,000 | - | 9,207,000 | | | 1,233,860 | 1,523,000 | 1,523,000 | 4,279,860 | 4,927,140 | |
| Cath Prot Metro System Construction | 68383_7612 | Jan-23 | Jan-27 | 47,100,000 | - | 47,100,000 | | | | | 751,000 | 751,000 | 46,349,000 | |
| Cathodic Protection West REI | 68384_7678 | Jun-21 | Jun-25 | 2,288,000 | - | 2,288,000 | | | | 572,000 | 572,000 | 1,144,000 | 1,144,000 | |
| Cathodic Protection Metro REI | 68385_7679 | Jan-23 | Jan-27 | 1,716,000 | - | 1,716,000 | | | | | 107,250 | 107,250 | 1,608,750 | |
| **712 Cathodic Protection of Distribution Mains Total** | | | | **66,704,129** | **269,629** | **66,434,500** | **406,333** | **393,500** | **1,454,860** | **3,314,000** | **4,170,917** | **9,739,610** | **56,694,890** | |
| | | | | | | | | | | | | | | |
| **713 Spot Pond Supply Mains Rehabilitation** | | | | | | | | | | | | | | |
| Sec 4 Webster Ave Bridge Pipe Rehab - Design | 60114_7334 | Oct-13 | Mar-17 | 642,341 | 642,341 | - | | | | | | | | |
| Sec 4 Webster Ave Bridge Pipe Rehab - Construction | 60115_7335 | May-15 | Dec-16 | 3,792,313 | 3,792,313 | - | | | | | | | | |
| Walnut St Bridge Truss-Construction | 60145_7483 | Oct-21 | May-23 | 800,000 | - | 800,000 | | | | 600,000 | 200,000 | 800,000 | | |
| Preliminary Design & Design/CA/RI | 68038_6223 | Sep-98 | Oct-08 | 10,868,582 | 10,868,582 | - | | | | | | | | |
| Easements & Paving - CP1 | 68059_6316 | May-00 | Mar-02 | 143,347 | 143,347 | - | | | | | | | | |
| North (Medford/Melrose) | 68060_6317 | May-00 | Jan-02 | 6,597,330 | 6,597,330 | - | | | | | | | | |
| Easements - CP2 | 68106_6379 | May-02 | Jun-06 | 49,601 | 49,601 | - | | | | | | | | |
| Easements - CP3 | 68107_6380 | Apr-04 | Nov-07 | 79,782 | 79,782 | - | | | | | | | | |
| Middle (Medford/Somerville) | 68108_6381 | Jun-02 | Jul-06 | 22,176,813 | 22,176,813 | - | | | | | | | | |
| South (Cambridge/Boston) | 68109_6382 | Oct-04 | Apr-08 | 17,590,133 | 17,590,133 | - | | | | | | | | |
| Early Valve Replacement Contract | 68150_6475 | Sep-98 | Jan-00 | 2,387,073 | 2,387,073 | - | | | | | | | | |
| Easements - CP4 | 68151_6476 | Sep-06 | May-09 | 1,451 | 1,451 | - | | | | | | | | |
| Early Valve Equipment Purchase | 68153_6483 | May-98 | Nov-01 | 161,390 | 161,390 | - | | | | | | | | |
| Easements - CP5 | 68225_6784 | Jul-14 | Jun-20 | 74,497 | 74,497 | - | | | | | | | | |
| CA/RI - CP3 | 68274_7003 | Sep-04 | Apr-09 | 924,656 | 924,656 | - | | | | | | | | |

**Massachusetts Water Resources Authority**
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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **713 Spot Pond Supply Mains Rehabilitation Total** | | | | **66,289,309** | **65,489,309** | **800,000** | | | | **600,000** | **200,000** | **800,000** | | |
| | | | | | | | | | | | | | | |
| **714 Southern Extra High - Sections 41 & 42 Total** | **completed project** | | | **3,657,244** | **3,657,244** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **719 Chestnut Hill Connecting Mains** | | | | | | | | | | | | | | |
| Pump Stn. Potable Connect.-Design/CA/RI | 68026_6141 | Mar-00 | Dec-04 | 1,359,533 | 1,359,533 | - | | | | | | | | |
| Preliminary Engineering | 68051_6301 | Jan-05 | Apr-06 | 457,200 | 457,200 | - | | | | | | | | |
| Easements | 68053_6303 | Apr-03 | Dec-07 | 80,575 | 80,575 | - | | | | | | | | |
| Emergency Pump Relocation - Const. | 68155_6501 | Feb-99 | Mar-01 | 6,502,187 | 6,502,187 | - | | | | | | | | |
| Emergency Pump Relocation - Design/CA/RI | 68157_6503 | May-98 | May-01 | 1,120,816 | 1,120,816 | - | | | | | | | | |
| Boston Paving | 68180_6558 | Jul-99 | Dec-07 | 132,896 | 132,896 | - | | | | | | | | |
| Legal | 68182_6560 | Jul-99 | Jun-08 | 1,137 | 1,137 | - | | | | | | | | |
| BECo Emergency Pump Construction | 68199_6623 | Sep-99 | Jun-00 | 430,641 | 430,641 | - | | | | | | | | |
| Pump Station Potable Connection - Const | 68203_6651 | Apr-02 | Dec-03 | 7,132,109 | 7,132,109 | - | | | | | | | | |
| Equipment Pre-purchase | 68230_6814 | Apr-01 | Oct-01 | 154,337 | 154,337 | - | | | | | | | | |
| Demolition of Garages | 68231_6820 | Feb-02 | May-02 | 71,600 | 71,600 | - | | | | | | | | |
| Utilities | 68244_6869 | Jun-02 | Aug-02 | 43,644 | 43,644 | - | | | | | | | | |
| Chestnut Hill Final Connections Construction | 68267_6982 | Jul-25 | Dec-27 | 12,953,655 | - | 12,953,655 | | | | | | | 12,953,655 | |
| Chestnut Hill Final Connections Design/ESDC/REI | 68268_6995 | Jul-23 | Dec-28 | 2,586,752 | - | 2,586,752 | | | | | | | 2,580,752 | 6,000 |
| Chestnut Hill Gatehouse # 1 Repair Constr. | 75521_7382 | Nov-17 | Apr-18 | 799,843 | 799,843 | - | | | | | | | | |
| **719 Chestnut Hill Connecting Mains Total** | | | | **33,826,925** | **18,286,518** | **15,540,407** | | | | | | | **15,534,407** | **6,000** |
| | | | | | | | | | | | | | | |
| **720 Warren Cottage Line Rehab Total** | **completed project** | | | **1,204,821** | **1,204,821** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **721 Southern Spine Distribution Mains Total** | | | | | | | | | | | | | | |
| Sections 21, 43 & 22 - Design | 68083_6290 | Sep-00 | May-13 | 7,114,815 | 7,114,815 | - | | | | | | | | |
| Sections 21, 43 & 22 - Easements | 68084_6291 | Mar-02 | May-12 | 106,986 | 106,986 | - | | | | | | | | |
| Section 22 South - Construction | 68085_6292 | Jul-03 | Jun-05 | 4,993,131 | 4,993,131 | - | | | | | | | | |
| Sections 20 & 58 - Design | 68089_6296 | Jun-23 | May-28 | 3,350,435 | - | 3,350,435 | | | | | | | 3,241,683 | 108,752 |
| Sections 20 & 58 - Easements | 68090_6297 | Sep-21 | Sep-25 | 35,070 | - | 35,070 | | | | 5,115 | 8,768 | 13,883 | 21,187 | |
| Sections 20 & 58 - Construction | 68091_6298 | Sep-25 | May-27 | 15,767,304 | - | 15,767,304 | | | | | | | 15,767,304 | |
| Adams Street Bridge | 68122_6396 | Jul-98 | Dec-99 | 153,783 | 153,783 | - | | | | | | | | |
| Southern High Public Participation | 68193_6601 | Oct-98 | May-99 | 15,000 | 15,000 | - | | | | | | | | |
| Southern High Extension Study | 68194_6602 | Sep-98 | May-99 | 242,372 | 242,372 | - | | | | | | | | |
| Boston Paving | 68228_6787 | | | 3,194 | 3,194 | - | | | | | | | | |
| Section 22 - Construction | 68235_6844 | Feb-25 | Feb-27 | 19,243,016 | - | 19,243,016 | | | | | | | 19,243,016 | |
| Section 107 Phase 1 - Construction | 68236_6845 | Jul-07 | Jan-09 | 6,184,362 | 6,184,362 | - | | | | | | | | |
| Legal | 68237_6846 | May-04 | May-27 | 5,000 | 1,192 | 3,808 | 127 | 381 | 381 | 481 | 481 | 1,851 | 1,958 | |
| Technical Assistance | 68238_6847 | Feb-04 | Oct-05 | 28,102 | 28,102 | - | | | | | | | | |
| Contract 1A - Construction | 68247_6885 | Nov-03 | Jun-05 | 2,858,603 | 2,858,603 | - | | | | | | | | |
| Section 107 Phase 2 - Construction | 68290_7099 | Jan-10 | Jan-12 | 14,846,562 | 14,846,562 | - | | | | | | | | |
| Milton Pressure Regulator Valve | 68291_7104 | Jun-06 | Nov-06 | 135,000 | 135,000 | - | | | | | | | | |
| Section 22 - Design/ESDC | 68298_7120 | Aug-22 | Feb-28 | 2,325,000 | - | 2,325,000 | | | | | 355,000 | 355,000 | 1,970,000 | |
| Sect 22 Rehab Alt Anal&Env Perag | 68299_7155 | Jun-19 | Jun-22 | 2,900,000 | - | 2,900,000 | | 767,000 | 881,000 | 881,000 | 371,000 | 2,900,000 | | |
| **721 Southern Spine Distribution Mains Total** | | | | **80,307,735** | **36,683,102** | **43,624,633** | **127** | **767,381** | **881,381** | **886,596** | **735,249** | **3,270,734** | **40,245,148** | **108,752** |
| | | | | | | | | | | | | | | |
| **722 Northern Intermediate High (NIH) Redundancy & Storage** | | | | | | | | | | | | | | |
| Concept Plan | 53454_6954 | Feb-06 | Aug-10 | 796,748 | 796,748 | - | | | | | | | | |
| Easements | 68093_6306 | Jul-17 | Jun-20 | 429,450 | 429,450 | - | | | | | | | | |
| Section 89 & 29 Redundancy - Design | 68252_6906 | Mar-11 | Aug-20 | 6,791,235 | 5,171,365 | 1,619,869 | 677,980 | 797,300 | 144,590 | | | 1,619,870 | | |
| Purchase Mobile Pump Unit | 68276_7026 | Jul-09 | Jan-10 | 290,848 | 290,848 | - | | | | | | | | |
| Short Term Improvements - Design/CA/RI | 68277_7045 | Sep-09 | May-15 | 820,733 | 820,733 | - | | | | | | | | |
| Permits | 68278_7047 | Jan-10 | Dec-18 | 5,000 | 150 | 4,850 | 2,850 | 2,000 | | | | 4,850 | | |
| Technical Assistance | 68279_7048 | Jan-10 | Dec-18 | 18,000 | - | 18,000 | 5,125 | 12,875 | | | | 18,000 | | |
| West St Pipe Reading Construct. Phase1A | 68282_7066 | Jun-14 | May-15 | 1,909,952 | 1,909,952 | - | | | | | | - | | |
| Section 89 & 29 Redundancy Const. Phase 2 | 68283_7067 | Sep-17 | Jun-20 | 24,803,496 | 5,456,202 | 19,347,293 | 12,556,267 | 6,762,350 | 28,677 | | | 19,347,294 | | |
| NIH Storage - Construction | 68284_7068 | Jan-26 | Jan-28 | 22,634,264 | - | 22,634,264 | | | | | | | 22,634,264 | |
| Section 89 & 29 Replacement Design/ESDC | 68294_7116 | Apr-18 | Jan-23 | 3,948,625 | 144,753 | 3,803,872 | 1,061,897 | 902,836 | 930,247 | 823,625 | 85,267 | 3,803,872 | | |

**Massachusetts Water Resources Authority**
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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Section 89 & 29 Replacement - Construction | 68295_7117 | Jul-20 | Jul-22 | 16,000,000 | - | 16,000,000 | | | 1,760,000 | 5,120,000 | 5,120,000 | 12,000,000 | 4,000,000 | |
| Gillis Pump Station Improvements | 68309_7260 | Jul-13 | Dec-14 | 2,092,773 | 2,178,325 | (85,552) | (85,552) | | | | | (85,552) | | |
| Reading/Stoneham Interconnections | 68310_7261 | Aug-11 | Oct-12 | 3,466,546 | 3,466,546 | - | | | | | | | | |
| NIH Storage - Design | 68316_7311 | Jan-24 | Jan-29 | 4,592,459 | - | 4,592,459 | | | | | | | 4,581,000 | 11,459 |
| Section 89&29 Redundancy Phase 1B Const. | 68317_7471 | Jan-16 | May-18 | 12,374,590 | 12,247,811 | 126,780 | 126,780 | | | | | 126,780 | | |
| Section 89&29 Redundancy Phase 1C Const. | 68318_7478 | Jan-17 | Sep-18 | 18,275,988 | 16,044,743 | 2,231,246 | 2,231,246 | | | | | 2,231,246 | | |
| Reading Reimbursement | 68319_7590 | Jun-17 | Sep-17 | (62,470) | (62,470) | - | | | | | | | | |
| Sect 89 & 29 Replacement RE/RI Svcs | 68320_7633 | Jul-20 | Jul-22 | 2,000,000 | - | 2,000,000 | | | 720,000 | 960,000 | 320,000 | 2,000,000 | | |
| **722 Northern Intermediate High (NIH) Redundancy & Storage Total** | | | | **121,188,237** | **48,895,156** | **72,293,081** | **16,576,593** | **8,477,361** | **3,583,514** | **6,903,625** | **5,525,267** | **41,066,360** | **31,215,264** | **11,459** |
| | | | | | | | | | | | | | | |
| **723 Northern Low Service Rehabilitation - Section 8** | | | | | | | | | | | | | | |
| Easements | 68094_6321 | Jul-15 | Jul-27 | 80,000 | - | 80,000 | 6,389 | 7,986 | 10,000 | 10,000 | 10,000 | 44,375 | 35,625 | |
| Section 8 & 57 Construction | 68095_6322 | Jul-26 | Jul-28 | 25,280,004 | - | 25,280,004 | | | | | | | 24,616,262 | 663,742 |
| Rehab Sects. 37 & 46 Chelsea/East Boston Constr. | 68262_6962 | Jul-25 | Jun-27 | 3,200,000 | - | 3,200,000 | | | | | | | 3,200,000 | |
| Permits | 68263_6977 | Jul-05 | Jul-27 | 299,000 | 284,912 | 14,088 | 689 | 861 | 1,600 | 1,600 | 1,600 | 6,350 | 7,738 | |
| Technical Assistance | 68264_6979 | Jul-05 | Jul-17 | 44,245 | 44,245 | - | | | | | | | | |
| Section 97A - Construction | 68275_7021 | Oct-08 | Oct-09 | 1,991,829 | 1,991,829 | - | | | | | | | | |
| Section 8 & 57 Design/CA/RI | 68287_7092 | Jul-23 | Jul-29 | 5,056,001 | - | 5,056,001 | | | | | | | 4,923,252 | 132,749 |
| Rehab Sec 37&46 Chel/Bos - Design/CA/RI | 75529_7405 | Jul-23 | Jun-28 | 852,935 | - | 852,935 | | | | | | | 852,935 | |
| Sec 50 & 57 Water & 21/20/19 Sew Desig/ESDC | 75610_7540 | Jul-17 | May-22 | 5,980,403 | 633,628 | 5,346,775 | 600,000 | 1,639,107 | 2,300,000 | 807,668 | | 5,346,775 | | |
| Sec 50 & 57 Water & 21/20/19 Sewer Rehab Construction | 75611_7541 | Jul-20 | Jul-22 | 26,800,000 | - | 26,800,000 | | | 2,000,000 | 12,500,000 | 10,000,000 | 24,500,000 | 2,300,000 | |
| **723 Northern Low Service Rehabilitation - Section 8 Total** | | | | **69,584,417** | **2,954,614** | **66,629,803** | **607,078** | **1,647,954** | **4,311,600** | **13,319,268** | **10,011,600** | **29,897,500** | **35,935,812** | **796,491** |
| | | | | | | | | | | | | | | |
| **725 Hydraulic Model Update** | | | | | | | | | | | | | | |
| Hydraulic Model Update | 68101_6342 | Jun-99 | Dec-02 | 563,329 | 563,329 | - | | | | | | | | |
| Model Enhancement Support Services | 68165_6531 | Jul-00 | Jun-07 | 35,029 | 35,029 | - | | | | | | | | |
| **725 Hydraulic Model Update Total** | | | | **598,358** | **598,358** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **727 Southern Extra High (SEH) Redundancy & Storage** | | | | | | | | | | | | | | |
| Concept Plan/Prelim. Design/Env. Review | 53397_6452 | Feb-07 | Feb-14 | 632,519 | 632,520 | - | | | | | | | | |
| Redundancy Pipeline Ph 1 Des/CA/RI | 53398_6453 | Feb-14 | Aug-21 | 7,677,305 | 4,603,590 | 3,073,715 | 907,352 | 800,000 | 966,973 | 399,390 | | 3,073,715 | | |
| Redundancy Pipeline Section III Ph 1-Constr. | 53399_6454 | Jul-16 | Sep-18 | 12,595,931 | 12,407,969 | 187,963 | 187,963 | | | | | 187,963 | | |
| Redundancy/Storage Ph 2 Final Des/CA/RI | 68135_6444 | Jan-26 | Dec-31 | 7,370,186 | - | 7,370,186 | | | | | | | 4,021,000 | 3,349,186 |
| University Avenue Water Main | 68136_6445 | Mar-08 | Nov-08 | 6,137,445 | 6,137,445 | - | | | | | | | | |
| Sections 77 & 88 Rehab - Design | 68292_7112 | Mar-21 | Mar-26 | 1,410,462 | - | 1,410,462 | | | 25,060 | 343,000 | 343,000 | 711,060 | 699,402 | |
| Sections 77 & 88 Rehab - Construction | 68293_7113 | Apr-23 | Apr-25 | 6,066,500 | - | 6,066,500 | | | | | | | 6,066,500 | |
| Easements/Agreements | 68305_7226 | Jul-14 | Jul-27 | 300,000 | 12,048 | 287,952 | 83,333 | 95,519 | 36,100 | 11,333 | 20,000 | 246,285 | 41,667 | |
| Permits/Utilities | 68306_7227 | Aug-08 | Jul-27 | 300,000 | 5,801 | 294,199 | 100,000 | 100,001 | 94,198 | | | 294,199 | | |
| Redundancy/Storage Phase 2 - Construct. | 68308_7245 | Jan-28 | Dec-30 | 36,850,930 | - | 36,850,930 | | | | | | | 3,070,000 | 33,780,930 |
| Phase 3, 2nd Tank - Construction | 68311_7262 | Jan-33 | Dec-35 | 12,978,168 | - | 12,978,168 | | | | | | | | 12,978,168 |
| Phase 3, 2nd Tank - Design | 68312_7263 | Jan-31 | Dec-36 | 2,595,633 | - | 2,595,633 | | | | | | | | 2,595,633 |
| Redundancy Pipeline Sect 111 - Constr. 2 | 68555_7504 | Oct-17 | Nov-19 | 18,425,557 | 4,645,440 | 13,780,116 | 9,265,578 | 4,514,539 | | | | 13,780,116 | | |
| Redundancy Pipeline Sect 111 - Constr. 3 | 68556_7505 | Aug-18 | Nov-20 | 19,085,000 | - | 19,085,000 | 9,112,890 | 9,347,110 | 625,000 | | | 19,085,000 | | |
| **727 Southern Extra High (SEH) Redundancy & Storage Total** | | | | **132,425,636** | **28,444,813** | **103,980,824** | **19,657,116** | **14,857,169** | **1,747,331** | **753,723** | **363,000** | **37,378,338** | **13,898,569** | **52,703,917** |
| | | | | | | | | | | | | | | |
| **730 Weston Aqueduct Supply Mains** | | | | | | | | | | | | | | |
| Newton Water Mains - Construction | 59774_5034 | Apr-95 | Oct-96 | 668,790 | 668,790 | - | | | | | | | | |
| Technical Assistance | 59776_5975 | Mar-95 | Oct-18 | 186,424 | 186,424 | - | | | | | | | | |
| WASM 4 - Design/CA/RI | 67865_5147 | Mar-95 | Sep-07 | 5,978,368 | 5,978,368 | - | | | | | | | | |
| WASMs 1 & 2 - Design/CA/RI | 68027_6142 | Jun-97 | Jul-06 | 5,059,988 | 5,059,988 | - | | | | | | | | |
| Appraisal / Easement | 68030_6174 | Mar-95 | Oct-18 | 448,682 | 448,682 | - | | | | | | | | |
| WASM 1, 2 & 4 - Auburndale | 68031_6175 | Jun-97 | Nov-98 | 4,001,461 | 4,001,461 | - | | | | | | | | |
| Meter 103 - Construction | 68032_6176 | Oct-96 | Jul-98 | 61,027 | 61,027 | - | | | | | | | | |
| WASMs 1 & 2 - Newton | 68041_6280 | Mar-00 | Jun-02 | 9,218,520 | 9,218,520 | - | | | | | | | | |
| WASMs 1 & 2 - Boston | 68042_6281 | Feb-03 | Jun-05 | 7,038,896 | 7,038,896 | - | | | | | | | | |
| WASMs 2 & 4 - Newton | 68069_6312 | Apr-98 | Mar-01 | 8,281,877 | 8,281,877 | - | | | | | | | | |
| WASM 4 - Allston & Western Ave. Sewer | 68070_6313 | Feb-02 | Dec-04 | 17,330,800 | 17,330,800 | - | | | | | | | | |
| Sect 36/WS/Waltham Conn. - Design/CA/RI | 68167_6540 | Jan-11 | May-17 | 2,011,328 | 2,011,329 | - | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Section 28, Arlington - CP1 | 68173_6546 | Aug-09 | Feb-11 | 2,303,626 | 2,303,626 | - | | | | | | | | |
| Survey | 68245_6870 | Dec-01 | Oct-25 | 88,681 | 88,681 | - | | | | | | | | |
| Arlington Pipe Work | 68269_6996 | Dec-09 | May-10 | 401,035 | 401,035 | - | | | | | | | | |
| WASM3 Section 12 Replacement - Constr. | 68272_7000 | Oct-04 | Sep-05 | 2,113,693 | 2,113,693 | - | | | | | | | | |
| WASM3 Section 12 Replacement - Design | 68273_7001 | May-04 | Aug-06 | 264,663 | 264,663 | - | | | | | | | | |
| Section 28 - Design/CA/RI | 68285_7083 | Oct-06 | Apr-11 | 866,688 | 866,688 | - | | | | | | | | |
| Watertown Sect Rehab | 68301_7222 | May-13 | Dec-13 | 2,818,298 | 2,764,050 | 54,247 | 54,247 | | | | | 54,247 | | |
| Section 36/W11/S 9-A11 Valve | 68332_7448 | Nov-14 | Dec-16 | 11,314,379 | 11,314,379 | - | | | | | | | | |
| **730 Weston Aqueduct Supply Mains Total** | | | | **80,457,224** | **80,402,977** | **54,247** | **54,247** | | | | | **54,247** | | |
| | | | | | | | | | | | | | | |
| **731 Lynnfield Pipeline Total** | **completed project** | | | **5,625,829** | **5,625,828** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **732 Walnut St. & Fisher Hill Pipeline Rehabilitation Total** | **completed project** | | | **2,717,141** | **2,717,141** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **735 Section 80 Rehabilitation** | | | | | | | | | | | | | | |
| Section 80 Rehab Construction | 68249_6891 | Jul-23 | Jul-26 | 8,735,762 | - | 8,735,762 | | | | | | | 8,735,762 | |
| Section 80 Rehab Design CS | 68250_6892 | Jul-21 | Jul-27 | 2,031,066 | - | 2,031,066 | | | | 300,000 | 398,760 | 698,760 | 1,332,306 | |
| Section 80 Replacement Construction | 68410_7532 | Dec-16 | Jun-18 | 1,908,279 | 1,908,279 | - | | | | | | | | |
| Permits | 68411_7533 | Oct-16 | Jun-24 | 26,605 | 16,605 | 10,000 | | 3,250 | 1,125 | 1,125 | 1,250 | 6,750 | 3,250 | |
| Section 80 Rehab REI | 68412_7675 | Jul-23 | Jul-26 | 850,000 | - | 850,000 | | | | | | | 850,000 | |
| **735 Section 80 Rehabilitation Total** | | | | **13,551,712** | **1,924,884** | **11,626,828** | | **3,250** | **1,125** | **301,125** | **400,010** | **705,510** | **10,921,318** | |
| | | | | | | | | | | | | | | |
| **Other Waterworks** | | | | **91,172,854** | **171,885,128** | **(80,712,274)** | **28,547,155** | **14,606,537** | **13,193,844** | **12,173,344** | **5,505,367** | **74,026,247** | **40,547,379** | **(195,285,901)** |
| | | | | | | | | | | | | | | |
| **753 Central Monitoring System** | | | | | | | | | | | | | | |
| Study | 75300_5025 | Mar-84 | Sep-86 | 189,590 | 189,590 | - | | | | | | | | |
| Design | 75301_5026 | Oct-87 | Jan-92 | 2,651,250 | 2,651,250 | - | | | | | | | | |
| Equipment Prepurchase | 75302_5027 | Oct-87 | Dec-93 | 2,161,920 | 2,161,920 | - | | | | | | | | |
| SCADA Implementation | 75303_5028 | Aug-96 | Mar-17 | 2,101,110 | 2,034,833 | 66,277 | 66,277 | | | | | 66,277 | | |
| Communications Structures | 75304_5160 | Nov-92 | May-93 | 161,290 | 161,290 | - | | | | | | | | |
| Construction & Start-up Services | 75305_5173 | Jul-92 | Aug-98 | 352,040 | 352,040 | - | | | | | | | | |
| Construction 1 | 75306_5171 | Nov-97 | Nov-98 | 208,950 | 208,950 | - | | | | | | | | |
| Operations Center - Construction | 75308_5849 | Sep-92 | Jun-94 | 1,498,980 | 1,498,980 | - | | | | | | | | |
| Technical Assistance | 75309_5987 | Jul-92 | Dec-97 | 385,601 | 385,601 | - | | | | | | | | |
| Waterworks SCADA/PLC Upgrades | 75310_5218 | Oct-16 | Oct-31 | 2,706,875 | 188,547 | 2,518,328 | | | | | | | | 2,518,328 |
| Microwave Equipment | 75474_6125 | Mar-96 | Dec-01 | 781,987 | 781,987 | - | | | | | | | | |
| Microwave Comm System-Wide Backbone | 75488_6653 | Sep-01 | Jun-02 | 1,694,018 | 1,694,018 | - | | | | | | | | |
| Monitoring & Control - Study & Design | 75489_6654 | Dec-99 | Sep-04 | 1,807,784 | 1,807,784 | - | | | | | | | | |
| Microwave Communic for Waterworks Fac. | 75494_6816 | Sep-02 | Jul-04 | 1,957,399 | 1,957,399 | - | | | | | | | | |
| Ludlow Communications | 75495_6825 | Sep-01 | Oct-01 | 40,504 | 40,504 | - | | | | | | | | |
| Quabbin Power, Comm. & Security - Constr | 75512_7338 | Feb-16 | Apr-17 | 3,512,205 | 3,512,205 | - | | | | | | | | |
| Quabbin Power, Comm. & Security - Design | 75540_7461 | Sep-14 | Sep-18 | 798,792 | 813,905 | (15,113) | (15,113) | | | | | (15,113) | | |
| Utility Fees and Permits | 75541_7475 | Jul-14 | Dec-17 | 263,775 | 263,773 | 2 | | | | | | | | |
| CWTP SCADA Upgrd Design Prog RE | 75630_7581 | Jan-19 | Jul-23 | 4,652,028 | - | 4,652,028 | 513,000 | 850,000 | 1,000,000 | 1,300,000 | 989,028 | 4,652,028 | | |
| CWTP SCADA Upgrade Construction | 75631_7582 | Jul-20 | Jul-22 | 4,900,000 | - | 4,900,000 | | | 2,450,000 | 1,950,000 | 500,000 | 4,900,000 | | |
| Other Design and Prgmg Srvcs | 75632_7583 | Jul-22 | Oct-28 | 2,880,000 | - | 2,880,000 | | | | | 240,000 | 240,000 | 2,640,000 | |
| Other Construction | 75633_7584 | Dec-22 | Oct-28 | 1,776,000 | - | 1,776,000 | | | | | 200,000 | 200,000 | 1,576,000 | |
| Other Equipment/Hardware | 75634_7585 | Dec-22 | Oct-28 | 1,520,000 | - | 1,520,000 | | | | | 160,000 | 160,000 | 1,360,000 | |
| **753 Central Monitoring System Total** | | | | **39,002,098** | **20,704,576** | **18,297,522** | **564,164** | **850,000** | **3,450,000** | **3,250,000** | **2,089,028** | **10,203,192** | **5,576,000** | **2,518,328** |
| | | | | | | | | | | | | | | |
| **763 Distribution Systems Facilities Mapping** | | | | | | | | | | | | | | |
| Planning and Design | 75458_5162 | Feb-95 | Dec-98 | 936,368 | 936,368 | - | | | | | | | | |
| Data Purchase | 75476_6152 | Nov-95 | Aug-96 | 100,000 | 100,000 | - | | | | | | | | |
| Records Development | 75484_6525 | Oct-21 | Oct-23 | 762,551 | - | 762,551 | | | | 183,000 | 366,000 | 549,000 | 213,551 | |
| Update of Record Drawings | 75600_7489 | Jun-20 | Jun-21 | 500,000 | - | 500,000 | | | 385,000 | 115,000 | | 500,000 | | |
| Water System Hydraulic Model | 75650_7613 | Jul-20 | Jun-21 | 500,000 | - | 500,000 | | | 346,000 | 154,000 | | 500,000 | | |
| **763 Distribution Systems Facilities Mapping Total** | | | | **2,798,919** | **1,036,368** | **1,762,551** | | | **731,000** | **452,000** | **366,000** | **1,549,000** | **213,551** | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| **764 Local Water Infrastrastructure Rehabilitation Total** | **completed project** | | | **7,487,762** | **7,487,762** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **765 Local Water Pipeline Financial Assistance Program** | | | | | | | | | | | | | | |
| Community Loans | 75485_6608 | Aug-00 | Jun-13 | 222,317,575 | 222,317,575 | 1 | | | | | | | | |
| Community Repayment | 75493_6759 | Aug-01 | Jun-23 | (222,317,575) | (200,091,718) | (22,225,857) | (8,235,519) | (5,902,057) | (3,706,396) | (2,550,610) | (1,821,015) | (22,215,597) | (10,260) | |
| Local Water System Assistance Loans | 75513_7339 | Aug-10 | Jun-20 | 200,000,000 | 140,130,800 | 59,869,200 | 24,689,363 | 16,000,000 | 11,200,000 | 7,979,837 | | 59,869,200 | | |
| Local Water System Assistance Repayment | 75514_7340 | Aug-11 | Jun-30 | (200,000,000) | (42,416,710) | (157,583,290) | (14,092,923) | (15,025,860) | (18,100,000) | (18,600,000) | (17,900,000) | (83,718,783) | (60,247,050) | (13,617,458) |
| CVA Loans | 75515_7350 | Nov-10 | Jun-20 | 10,000,000 | 5,573,000 | 4,427,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 427,000 | 4,427,000 | | |
| CVA Repayments | 75516_7351 | Nov-11 | Jun-30 | (10,000,000) | (1,331,000) | (8,669,000) | (557,300) | (557,300) | (757,300) | (857,300) | (863,800) | (3,593,000) | (3,762,500) | (1,313,500) |
| Lead Service Line Replace Loans | 75517_7529 | Aug-16 | May-36 | 100,000,000 | 8,979,000 | 91,021,000 | 4,000,000 | 5,000,000 | 5,000,000 | 5,000,000 | 5,000,000 | 24,000,000 | 25,000,000 | 42,021,000 |
| Lead Service Line Replace Repayment | 75518_7530 | Aug-17 | May-46 | (100,000,000) | (600,000) | (99,400,000) | (917,400) | (917,400) | (1,800,000) | (2,300,000) | (2,800,000) | (8,734,800) | (20,900,000) | (69,765,200) |
| LWSAP Phase 3 Distributions | 75620_7567 | Aug-17 | May-26 | 278,000,000 | 7,212,265 | 270,787,735 | 17,284,757 | 12,000,000 | 16,000,000 | 20,000,000 | 20,000,000 | 85,284,757 | 150,002,978 | 35,500,000 |
| LWSAP Phase 3 Repayments | 75621_7568 | Aug-18 | May-36 | (278,000,000) | - | (278,000,000) | (721,227) | (1,849,702) | (3,600,000) | (5,200,000) | (7,200,000) | (18,570,929) | (76,000,000) | (183,429,071) |
| LWSAP Phase 3 CVA Loans | 75622_7588 | Aug-17 | May-26 | 14,000,000 | 500,000 | 13,500,000 | | | | | 1,000,000 | 1,000,000 | 8,000,000 | 4,500,000 |
| LWSAP Phase 3 CVA Repayments | 75623_7589 | Aug-18 | Aug-36 | (14,000,000) | - | (14,000,000) | (50,000) | (50,000) | (50,000) | (50,000) | (50,000) | (250,000) | (2,050,000) | (11,700,000) |
| **765 Local Water Pipeline Financial Assistance Program Total** | | | | **-** | **140,273,212** | **(140,273,211)** | **22,399,751** | **9,697,681** | **5,186,304** | **4,421,927** | **(4,207,815)** | **37,497,848** | **20,033,168** | **(197,804,229)** |
| | | | | | | | | | | | | | | |
| **766 Waterworks Facility Asset Protection** | | | | | | | | | | | | | | |
| Meter Vault Manhole Retrofits - Design | 75490_6689 | Oct-19 | Jul-23 | 450,989 | - | 450,989 | | 61,000 | 122,000 | 122,000 | 122,989 | 427,989 | 23,000 | |
| Steel Tank Impr Design/CA | 75497_6832 | Sep-19 | Mar-25 | 3,000,000 | - | 3,000,000 | | 300,000 | 600,000 | 600,000 | 600,000 | 2,100,000 | 900,000 | |
| Gillis PS/CF Roof Repl | 75500_6888 | May-19 | May-20 | 519,000 | - | 519,000 | | 467,100 | 51,900 | | | 519,000 | | |
| Waltham Bridge Pipe Replacement | 75501_6910 | Mar-04 | Sep-04 | 237,550 | 237,550 | - | | | | | | | | |
| Permits and Legal Fees | 75502_6920 | Mar-04 | Jun-18 | 16,340 | 11,186 | 5,154 | 333 | 2,765 | 1,639 | 417 | | 5,154 | | |
| Cosgrove Intake Roof Replacement | 75505_7022 | Nov-18 | May-19 | 911,000 | - | 911,000 | 911,000 | | | | | 911,000 | | |
| Generator Docking Station REI | 75507_7024 | Jul-19 | May-20 | 209,063 | - | 209,063 | | 209,063 | | | | 209,063 | | |
| Generator Docking Station | 75508_7025 | May-19 | May-20 | 916,928 | - | 916,928 | | 916,928 | | | | 916,928 | | |
| Cosgrove Valve Replacement - Construction | 75509_7064 | Jul-24 | Dec-24 | 1,992,520 | - | 1,992,520 | | | | | | | 1,992,520 | |
| Cosgrove Valve Replacement - Design | 75510_7065 | Jul-23 | Dec-25 | 229,140 | - | 229,140 | | | | | | | 229,140 | |
| Transformer at Cosgrove Intake Building | 75511_7228 | Jun-11 | Jul-12 | 299,313 | 299,313 | - | | | | | | | | |
| Covered Storage Tank Rehab - Design CA/R | 75524_7385 | Jul-22 | Jul-27 | 1,000,000 | - | 1,000,000 | | | | | 184,000 | 184,000 | 816,000 | |
| Electrical Distrib. Upgrades at Southborough | 75535_7425 | Jan-21 | Jan-22 | 1,200,000 | - | 1,200,000 | | | 500,000 | 700,000 | | 1,200,000 | | |
| Water Meter Upgrade Replacement | 75536_7453 | Oct-21 | Oct-22 | 1,000,000 | - | 1,000,000 | | | | 461,000 | 539,000 | 1,000,000 | | |
| Beacon Street Line Repair - Construction | 75537_7458 | Jun-16 | Apr-17 | 1,441,390 | 1,441,390 | - | | | | | | | | |
| Beacon Street Line Repair - Design/CA/RI | 75538_7474 | Nov-14 | Dec-17 | 393,771 | 393,771 | - | | | | | | | | |
| Meter Vault Manhole Retrofits - Construction | 75550_7479 | Sep-20 | Jun-22 | 1,443,165 | - | 1,443,165 | | | 460,000 | 789,000 | 194,165 | 1,443,165 | | |
| Covered Storage Tank Rehab - Construction | 75553_7482 | Jul-24 | Jul-26 | 4,000,000 | - | 4,000,000 | | | | | | | 4,000,000 | |
| Water Meter Upgr Design CA/RI | 75554_7542 | Oct-19 | Oct-23 | 200,000 | - | 200,000 | | 30,000 | 61,000 | 61,000 | 36,000 | 188,000 | 12,000 | |
| Painting DI Water Tank | 75555_7601 | Mar-19 | Nov-19 | 2,590,000 | - | 2,590,000 | 518,000 | 2,072,000 | | | | 2,590,000 | | |
| New Roofs at Water Pumping Stations Constr. | 75556_7626 | Jul-25 | Jun-26 | 500,000 | - | 500,000 | | | | | | | 500,000 | |
| New Roofs at Water Pumping Sations Design/CA/RI | 75558_7628 | Jul-24 | Jun-27 | 100,000 | - | 100,000 | | | | | | | 100,000 | |
| Paint Bellevue II TH Tanks | 75559_7634 | Aug-18 | May-19 | 4,153,907 | - | 4,153,907 | 4,153,907 | | | | | 4,153,907 | | |
| Steel Tanks Improvements REI | 75560_7676 | Jan-22 | Jan-24 | 1,200,000 | - | 1,200,000 | | | | 144,000 | 576,000 | 720,000 | 480,000 | |
| Masonry/Structural Repairs Bellevue 1/Arlington Heights | 75575_7694 | Apr-20 | Apr-21 | 2,200,000 | - | 2,200,000 | | | 2,030,000 | 170,000 | | 2,200,000 | | |
| Steel Tank/Improvements Construction | 77552_7493 | Jan-22 | Jan-24 | 11,680,000 | - | 11,680,000 | | | | 1,002,000 | 5,006,000 | 6,008,000 | 5,672,000 | |
| **766 Waterworks Facility Asset Protection Total** | | | | **41,884,076** | **2,383,210** | **39,500,866** | **5,583,240** | **4,058,856** | **3,826,539** | **4,049,417** | **7,258,154** | **24,776,206** | **14,724,660** | |

**Massachusetts Water Resources Authority**
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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Business & Operations Support** | | | | **164,989,859** | **101,029,937** | **63,959,922** | **3,327,927** | **12,868,225** | **17,777,243** | **8,276,850** | **5,688,364** | **47,938,608** | **16,021,309** | |
| | | | | | | | | | | | | | | |
| **881 Equipment Purchase** | | | | | | | | | | | | | | |
| Contaminant Monitoring Equipment | 88108_7631 | Sep-21 | Jun-25 | 2,690,000 | - | 2,690,000 | | | | 630,000 | 530,000 | 1,160,000 | 1,530,000 | |
| Security Equipment & Installation | 92374_6760 | Jan-01 | Jun-23 | 11,764,951 | 9,106,884 | 2,658,067 | 325,687 | 847,818 | 828,562 | 328,000 | 328,000 | 2,658,067 | | |
| ICP-MS Lab Testing Equipment | 92379_6808 | Oct-08 | Dec-08 | 117,432 | 117,432 | - | | | | | | | | |
| High Lift Fork Loader (Lull) | 92411_7239 | Oct-10 | Dec-10 | 121,449 | 121,449 | - | | | | | | | | |
| Ford Ramp Truck | 92416_7246 | Apr-10 | Jun-10 | 121,572 | 121,572 | - | | | | | | | | |
| Street Sweeper | 92417_7247 | Jul-09 | Sep-09 | 181,673 | 181,673 | - | | | | | | | | |
| Prior Vehicle Purchases | 98454_7306 | Jul-00 | Jun-10 | 2,415,190 | 2,415,190 | - | | | | | | | | |
| FY11-13 Vehicle Purchases | 98455_7307 | Jul-09 | Jun-13 | 2,361,415 | 2,361,415 | - | | | | | | | | |
| FY14-18 Vehicle Purchases | 98456_7308 | Jul-13 | Jun-18 | 6,670,782 | 6,670,780 | 2 | | | | | | | | |
| FY19-23 Vehicle Purchases | 98457_7309 | Jul-18 | Jun-23 | 5,634,573 | - | 5,634,573 | 1,084,367 | 1,150,206 | 845,000 | 555,000 | 2,000,000 | 5,634,573 | | |
| FY14-18 Major Lab Instrumentation | 98458_7310 | Jun-16 | Jun-18 | 639,294 | 639,294 | - | | | | | | | | |
| Front-End Loader | 98467_7325 | Oct-10 | Dec-10 | 121,221 | 121,221 | - | | | | | | | | |
| FY19-23 Major Lab Instrumentation | 98495_7632 | Jul-18 | Jun-23 | 1,000,000 | - | 1,000,000 | 187,500 | 188,000 | 187,500 | 187,500 | 249,500 | 1,000,000 | | |
| FY24-28 Vehicle Purchases | 98497_7695 | Jul-23 | Jun-28 | 5,250,000 | - | 5,250,000 | | | | | | | 5,250,000 | |
| **881 Equipment Purchase Total** | | | | **39,089,552** | **21,856,910** | **17,232,642** | **1,597,554** | **2,186,024** | **1,861,062** | **1,700,500** | **3,107,500** | **10,452,640** | **6,780,000** | |
| | | | | | | | | | | | | | | |
| **925 Technical Assistance** | | | | | | | | | | | | | | |
| Land Appraisal | 77000_LAND | | | 100,000 | - | 100,000 | | 33,000 | 33,000 | 34,000 | | 100,000 | | |
| Surveying | 80000_SURV | | | 125,000 | - | 125,000 | | 58,000 | 33,000 | 34,000 | | 125,000 | | |
| Hazardous Material | 90000_HAZM | | | 900,000 | - | 900,000 | | 300,000 | 300,000 | 300,000 | | 900,000 | | |
| **925 Technical Assistance Total** | | | | **1,125,000** | **-** | **1,125,000** | | **391,000** | **366,000** | **368,000** | | **1,125,000** | | |
| | | | | | | | | | | | | | | |
| **930 MWRA Facility - Chelsea Total** | **completed project** | | | **9,812,071** | **9,812,071** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **931 Business Systems Plan Total** | **completed project** | | | **24,562,104** | **24,562,604** | **(500)** | **(500)** | | | | | **(500)** | | |
| | | | | | | | | | | | | | | |
| **932 Environmental Remediation Total** | | | | **1,478,602** | **1,478,602** | **-** | | | | | | | | |
| | | | | | | | | | | | | | | |
| **933 Capital Maintenance Planning & Development** | | | | | | | | | | | | | | |
| Inventory & Evaluation - 1 & 2 | 19175_6421 | Apr-00 | Jul-05 | 2,579,434 | 2,579,434 | - | | | | | | | | |
| As-Needed Design Contract 1 | 92387_6976 | Mar-05 | Sep-07 | 313,302 | 313,302 | - | | | | | | | | |
| As Needed Design Contract 2 | 92393_6988 | Mar-05 | Sep-07 | 317,539 | 317,539 | - | | | | | | | | |
| As-Needed Design Contract 5 | 92399_7070 | Sep-08 | Mar-11 | 558,111 | 558,111 | - | | | | | | | | |
| As-Needed Design Contract 3 | 92402_7101 | Aug-07 | Feb-10 | 578,622 | 578,623 | - | | | | | | | | |
| As-Needed Design Contract 4 | 92403_7102 | Aug-07 | Aug-09 | 247,384 | 247,384 | - | | | | | | | | |
| As-Needed Design Contract 6 | 92413_7242 | Aug-08 | Aug-10 | 704,220 | 704,220 | - | | | | | | | | |
| As-Needed Design Contract 7 | 92414_7243 | Jan-10 | Jul-12 | 979,576 | 979,576 | - | | | | | | | | |
| As-Needed Design Contract 8 | 92415_7244 | Feb-10 | Jun-13 | 1,043,586 | 1,043,586 | - | | | | | | | | |
| As-Needed CS/REI Contract 1 | 94491_7629 | Sep-18 | Sep-21 | 1,500,000 | - | 1,500,000 | 81,333 | 486,000 | 486,000 | 446,667 | | 1,500,000 | | |
| As-Needed CS/REI Contract 2 | 94492_7630 | Sep-18 | Sep-21 | 1,500,000 | - | 1,500,000 | 81,333 | 486,000 | 486,000 | 446,667 | | 1,500,000 | | |
| As-Needed Design Contract 9 | 98470_7390 | Jul-11 | Jan-14 | 1,609,621 | 1,609,621 | - | | | | | | | | |
| As-Needed Design Contract 10 | 98471_7391 | Aug-11 | Feb-14 | 1,867,677 | 1,867,677 | - | | | | | | | | |
| As-Needed Design Contract 11 | 98473_7436 | Feb-14 | Aug-15 | 431,584 | 431,584 | - | | | | | | | | |
| As-Needed Design Contract 12 | 98474_7437 | Jan-14 | Jul-16 | 721,695 | 721,695 | - | | | | | | | | |
| As-Needed Design Contract 13 | 98485_7456 | Feb-14 | Aug-16 | 683,439 | 683,439 | - | | | | | | | | |
| As-Needed Design Contract 14 | 98487_7496 | Jun-16 | Dec-18 | 890,376 | 678,945 | 211,431 | 211,431 | | | | | 211,431 | | |
| As-Needed Design Contract 15 | 98488_7497 | Jun-16 | Dec-18 | 1,206,625 | 885,926 | 320,698 | 320,699 | | | | | 320,699 | | |
| As-Needed Design Contract 16 | 98489_7498 | Jun-18 | Jun-20 | 2,451,225 | - | 2,451,225 | 498,818 | 1,000,000 | 952,407 | | | 2,451,225 | | |
| As-Needed Design Contract 17 | 98490_7604 | Jun-18 | Jun-20 | 2,402,518 | - | 2,402,518 | 404,958 | 1,000,000 | 997,560 | | | 2,402,518 | | |
| As-Needed Design Contract 18 | 98493_7691 | Jul-20 | Jul-22 | 2,500,000 | - | 2,500,000 | | | 900,000 | 1,200,000 | 400,000 | 2,500,000 | | |
| As-Needed Design Contract 19 | 98494_7692 | Jul-20 | Jul-22 | 2,500,000 | - | 2,500,000 | | | 900,000 | 1,200,000 | 400,000 | 2,500,000 | | |
| **933 Capital Maintenance Planning & Development Total** | | | | **27,586,534** | **14,200,662** | **13,385,872** | **1,598,572** | **2,972,000** | **4,721,967** | **3,293,334** | **800,000** | **13,385,873** | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **934 MWRA Facilities Management** | | | | | | | | | | | | | | |
| Design/Engineering Services | 92389_6983 | Oct-19 | Dec-20 | 600,000 | (2) | 600,002 | | 250,002 | 350,000 | | | 600,002 | | |
| Facilities Construction | 92390_6984 | Dec-20 | Dec-21 | 2,370,535 | 370,535 | 2,000,000 | | | 615,000 | 1,385,000 | | 2,000,000 | | |
| **934 MWRA Facilities Management Total** | | | | **2,970,535** | **370,533** | **2,600,002** | | **250,002** | **965,000** | **1,385,000** | | **2,600,002** | | |
| | | | | | | | | | | | | | | |
| **935 Alternative Energy Initiatives** | | | | | | | | | | | | | | |
| Deer Island Solar | 19285_6974 | Sep-07 | May-08 | 903,714 | 903,714 | - | | | | | | | | |
| DI Wind | 92428_6974C | Nov-08 | Apr-10 | 4,063,294 | 4,063,294 | - | | | | | | | | |
| Future Renewable Energy Projects | 92430_7270 | Oct-23 | Dec-24 | 5,180,552 | - | 5,180,552 | | | | | | | 5,180,552 | |
| Loring Road Hydro - Design | 92432_6974E | Mar-08 | Sep-09 | 2,344 | 2,344 | - | | | | | | | | |
| Technical Assistance - Solar | 92439_7274 | May-09 | Nov-12 | 123,540 | 123,540 | - | | | | | | | | |
| Energy Advisory Consultant Services | 92440_6974B | Jun-08 | Jun-10 | 45,632 | 45,632 | - | | | | | | | | |
| Wind Power Feasibility Study | 92441_OP67 | Mar-07 | Jun-10 | 346,426 | 346,426 | - | | | | | | | | |
| DI Photovoltaic System Phase 1 - Const. | 92442_7292 | Sep-09 | Mar-10 | 1,119,000 | 1,119,000 | - | | | | | | | | |
| Technical Assistance-Energy Efficiency | 92443_7274A | May-09 | Nov-13 | 463,085 | 463,085 | - | | | | | | | | |
| Technical Assistance - Solar II | 92444_7274B | May-09 | Nov-12 | 347,937 | 347,937 | - | | | | | | | | |
| Tech Assistance - Emerging Technology | 92445_7274C | May-09 | Dec-13 | 101,264 | 101,263 | - | | | | | | | | |
| Technical Assistance - Wind | 92446_7274D | May-09 | May-13 | 460,242 | 460,242 | - | | | | | | | | |
| Charlestown Wind - Construction | 98450_7302 | Feb-10 | Oct-11 | 4,890,654 | 5,124,502 | (233,848) | (233,852) | | | | | (233,852) | | |
| John J. Carroll WTP Solar-Construction | 98452_7304 | Jan-10 | Aug-11 | 2,367,287 | 2,367,287 | - | | | | | | | | |
| Loring Road Hydro - Construction | 98459_6974F | Jan-10 | May-11 | 1,882,218 | 1,882,218 | - | | | | | | | | |
| DI Wind Phase II Construction | 98463_7321 | | | 37,080 | 37,080 | - | | | | | | | | |
| Fish Hatchery Pipeline Hydro | 98465_7323 | Mar-16 | Sep-17 | 1,030,000 | 1,030,000 | - | | | | | | | | |
| **935 Alternative Energy Initiatives Total** | | | | **23,364,269** | **18,417,564** | **4,946,704** | **(233,852)** | | | | | **(233,852)** | **5,180,552** | |
| | | | | | | | | | | | | | | |
| **940 Application Improvement Program** | | | | | | | | | | | | | | |
| GIS Applications & Integration | 92420_7251 | Jan-14 | Jun-21 | 350,000 | 22,272 | 327,728 | | 150,000 | 177,728 | | | 327,728 | | |
| Lawson Upgrade | 92435_7286 | Jul-20 | Jun-24 | 1,590,000 | - | 1,590,000 | 3 | | 180,000 | 410,000 | 550,000 | 1,140,003 | 450,000 | |
| Maximo Upgrade | 92436_7287 | Jul-15 | Jun-19 | 2,625,904 | 2,434,468 | 191,436 | 191,436 | | | | | 191,436 | | |
| PIMS Replace or Build | 92437_7288 | Jul-23 | Sep-25 | 3,400,000 | - | 3,400,000 | | | | | | | 3,400,000 | |
| SAP BO Migration | 92469_7386 | Jun-16 | Dec-20 | 480,900 | 80,900 | 400,000 | | 200,000 | 200,000 | | | 400,000 | | |
| Enterprise Content Mgmt | 98475_7438 | Sep-19 | Jun-22 | 1,013,437 | - | 1,013,437 | | 208,649 | 357,684 | 357,684 | 89,420 | 1,013,437 | | |
| WQRS Aquarius | 98478_7441 | Jan-19 | Dec-20 | 325,000 | - | 325,000 | 65,000 | 130,000 | 130,000 | | | 325,000 | | |
| LIMS Upgrade | 98484_7447 | Mar-15 | Jun-22 | 654,490 | 354,490 | 300,000 | | | 150,000 | 150,000 | | 300,000 | | |
| Lawson Golbal HR | 98500_7649 | Dec-19 | Dec-20 | 655,000 | - | 655,000 | | 455,000 | 200,000 | | | 655,000 | | |
| Time Entry System / WFM | 98501_7650 | Jul-19 | Dec-19 | 560,000 | - | 560,000 | | 560,000 | | | | 560,000 | | |
| AP Invoice Automation | 98502_7651 | Apr-23 | Jun-23 | 325,000 | - | 325,000 | | | | | 325,000 | 325,000 | | |
| Hyperion | 98503_7652 | Dec-22 | Jun-23 | 160,000 | - | 160,000 | | | | | 160,000 | 160,000 | | |
| 8M Permit | 98504_7653 | Jul-19 | Jun-20 | 150,000 | - | 150,000 | | 150,000 | | | | 150,000 | | |
| Instrument Data Mgmt | 98506_7656 | Jul-22 | Dec-23 | 545,001 | - | 545,001 | | | | | 484,444 | 484,444 | 60,557 | |
| PI (OSI) | 98606_7666 | Jan-21 | Dec-21 | 258,000 | - | 258,000 | | | 213,000 | 45,000 | | 258,000 | | |
| **940 Application Improvement Program Total** | | | | **13,092,732** | **2,892,130** | **10,200,602** | **256,439** | **1,853,649** | **1,608,412** | **962,684** | **1,608,864** | **6,290,048** | **3,910,557** | |
| | | | | | | | | | | | | | | |
| **942 Information Security Program (ISP)** | | | | | | | | | | | | | | |
| IT Security Infrastructure - Equipment | 92434_7285 | Sep-11 | Jun-14 | 501,414 | 501,414 | - | | | | | | | | |
| MSSP | 92500_7499 | Jun-16 | Dec-20 | 1,050,330 | 861,511 | 188,819 | 31,470 | 94,409 | 62,940 | | | 188,819 | | |
| ITSM Access Management | 92501_7657 | Jul-19 | Jun-20 | 325,000 | - | 325,000 | | 325,000 | | | | 325,000 | | |
| MSSP/SIEM | 92502_7658 | Apr-21 | Jun-21 | 2,600,000 | - | 2,600,000 | | | 2,600,000 | | | 2,600,000 | | |
| Active Directory | 92503_7659 | Jan-20 | Sep-20 | 194,600 | - | 194,600 | | 177,934 | 16,666 | | | 194,600 | | |
| XenMobile/XenApp WorxSpace | 98476_7439 | Apr-14 | Mar-20 | 156,568 | 26,569 | 129,999 | | 129,999 | | | | 129,999 | | |
| Inform Security Plan Implem | 98477_7440 | Oct-19 | Jun-20 | 360,000 | - | 360,000 | | 360,000 | | | | 360,000 | | |
| IT Security Program (ISP) Development | 98483_7446 | May-13 | Jun-14 | 318,411 | 318,411 | - | | | | | | | | |
| **942 Information Security Program (ISP) Total** | | | | **5,506,323** | **1,707,905** | **3,798,418** | **31,470** | **1,087,342** | **2,679,606** | | | **3,798,418** | | |
| | | | | | | | | | | | | | | |
| **944 Information Technology Management Program** | | | | | | | | | | | | | | |
| IT Project Management Methodology | 98472_7408 | Apr-19 | Jun-20 | 200,000 | - | 200,000 | | 160,000 | 40,000 | | | 200,000 | | |
| **944 Information Technology Management Program Total** | | | | **200,000** | **-** | **200,000** | | **160,000** | **40,000** | | | **200,000** | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **946 IT Infrastructure Program** | | | | | | | | | | | | | | |
| IT System Architecture | 92404_7200 | Sep-12 | Oct-15 | 1,009,341 | 1,009,341 | - | | | | | | | | |
| Cabling | 92405_7201 | Mar-11 | Jun-21 | 5,066,302 | 1,065,716 | 4,000,586 | | 2,000,000 | 2,000,586 | | | 4,000,586 | | |
| Sans Storage | 92406_7203 | Jul-13 | Sep-21 | 2,058,502 | 1,040,503 | 1,017,999 | | | 1,012,000 | 5,999 | | 1,017,999 | | |
| Oracle Database Appliance | 92407_7204 | Jul-13 | Dec-21 | 760,658 | 580,658 | 180,000 | | | 165,000 | 15,000 | | 180,000 | | |
| Servers | 92408_7205 | Oct-13 | Mar-23 | 1,164,992 | 304,992 | 860,000 | 76,445 | 267,555 | 172,000 | 172,000 | 172,000 | 860,000 | | |
| Near Field Communications | 98480_7443 | Jul-23 | Dec-23 | 790,379 | 638,379 | 152,000 | 1,800 | | | | | 1,800 | 150,200 | |
| Exchange Upgrades | 98481_7444 | Jun-16 | Jun-20 | 190,478 | 8,006 | 182,472 | | 182,472 | | | | 182,472 | | |
| Enterprise Data Management | 98482_7445 | Jan-14 | Dec-21 | 2,121,361 | 1,083,362 | 1,037,999 | | | 692,000 | 346,000 | | 1,038,000 | | |
| NetScalers | 98505_7654 | Jul-19 | Dec-19 | 100,000 | - | 100,000 | | 100,000 | | | | 100,000 | | |
| Telephone System Upgrade | 98600_7660 | Oct-19 | Sep-20 | 447,125 | - | 447,125 | | 408,182 | 38,943 | | | 447,125 | | |
| Core Switches | 98601_7661 | Jul-20 | Sep-20 | 500,000 | - | 500,000 | | | 500,000 | | | 500,000 | | |
| Edge Switches | 98602_7662 | Jul-19 | Dec-19 | 700,000 | - | 700,000 | | 700,000 | | | | 700,000 | | |
| Disaster Recovery | 98603_7663 | Jan-21 | Sep-21 | 983,000 | - | 983,000 | | | 954,667 | 28,333 | | 983,000 | | |
| Instrumentation & Controls IT | 98604_7664 | Jul-19 | Mar-20 | 310,000 | - | 310,000 | | 310,000 | | | | 310,000 | | |
| **946 IT Infrastructure Program Total** | | | | **16,202,138** | **5,730,957** | **10,471,181** | **78,245** | **3,968,209** | **5,535,196** | **567,332** | **172,000** | **10,320,982** | **150,200** | |

# APPENDIX 3

# New Capital Projects Added During the FY20 CIP

**APPENDIX 3**
**New Capital Projects Added to the FY20 CIP**

| Program | Project | Subphase | Contract Number | Total Contract Amount | NTP | SC | FY19 | FY20 | FY21 | FY22 | FY23 | FY19-23 | Beyond FY23 | Total Expenditures |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| Interception & Pumping | Facility Asset Protection | Section 191 & 192 Charles River Valley Sewer | 7643 | $ 500,000 | Aug-19 | Jan-20 | | $ 500,000 | | | | **$ 500,000** | $ - | **$ 500,000** |
| Interception & Pumping | Facility Asset Protection | Pump Stations & CSO Facility Rehab Design/CA/REI | 7689 | $ 7,500,000 | Nov-21 | Nov-31 | | | | $ 150,000 | $ 500,000 | **$ 650,000** | $ 6,850,000 | **$ 7,500,000** |
| Interception & Pumping | Facility Asset Protection | Pump Stations & CSO Facility Rehab Construction | 7688 | $ 37,500,000 | Nov-23 | Nov-30 | | | | | | **$ -** | $ 37,500,000 | **$ 37,500,000** |
| Treatment | Clinton Wastewater Treatment Plant | Equipment & Supplies Storage Building | 7693 | $ 291,589 | Jan-20 | Apr-21 | | | $ 291,589 | | | **$ 291,589** | | **$ 291,589** |
| Drinking Water Quality Improvements | Carroll Water Treatment Asset Protection | CWTP Emergency Generator #1 Replacement (Electric Portion) | 7642 | $ 416,524 | Feb-19 | Nov-19 | 65,000 | $351,524 | | | | **$ 416,524** | | **$ 416,524** |
| Transmission | Watershed Division Capital Improvements | River Road Improvements Wachusett | 7701 | $ 2,000,000 | Oct-20 | Oct-21 | | | $923,000 | $1,077,000 | | **$ 2,000,000** | | **$ 2,000,000** |
| Business & Operations Support | Capital Maintenance Planning & Support | As-Needed Design Contract 18 | 7691 | $ 2,500,000 | Jul-20 | Jul-22 | | | 900,000 | 1,200,000 | 400,000 | **$ 2,500,000** | | **$ 2,500,000** |
| Business & Operations Support | Capital Maintenance Planning & Support | As-Needed Design Contract 19 | 7692 | $ 2,500,000 | Jul-20 | Jul-22 | | | 900,000 | 1,200,000 | 400,000 | **$ 2,500,000** | | **$ 2,500,000** |
| **SUMMARY:** | | | | | | | | | | | | | | |
| **Total Wastewater Projects** | | | | **$ 45,791,589** | | | **$ -** | **$ 500,000** | **$ 291,589** | **$ 150,000** | **$ 500,000** | **$ 1,441,589** | **$ 44,350,000** | **$ 45,791,589** |
| **Total Waterworks Projects** | | | | **$ 2,416,524** | | | **$ 65,000** | **$ 351,524** | **$ 923,000** | **$ 1,077,000** | **$ -** | **$ 2,416,524** | **$ -** | **$ 2,416,524** |
| **Business & Operations Support** | | | | **$ 5,000,000** | | | **$ -** | **$ -** | **$ 1,800,000** | **$ 2,400,000** | **$ 800,000** | **$ 5,000,000** | **$ -** | **$ 5,000,000** |
| **Total Projects** | | | | **$ 53,208,113** | | | **$ 65,000** | **$ 851,524** | **$ 3,014,589** | **$ 3,627,000** | **$ 1,300,000** | **$ 8,858,113** | **$ 44,350,000** | **$ 53,208,113** |

# APPENDIX 4

# Overview of the FY20 Final CIP and Changes from the FY19 Final CIP

# APPENDIX 4
## Overview of the FY20 Final CIP and Changes from the Final FY19 CIP

| Program and Project | FY19 Final | | | | FY20 Final | | | | Change from Final FY19 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total Budget Amount | FY14-18 | FY19-23 | Beyond 23 | Total Budget Amount | FY14-18 | FY19-23 | Beyond 23 | Total Budget Amount | FY14-18 | FY19-23 | Beyond 23 |
| **Total MWRA** | **8,009,088** | **595,622** | **1,051,829** | **2,673,508** | **8,184,170** | **585,638** | **1,094,772** | **2,815,005** | **174,665** | **(9,984)** | **38,622** | **145,401** |
| | | | | | | | | | | | | |
| **Wastewater** | **3,603,553** | **334,086** | **643,200** | **890,263** | **3,719,452** | **325,315** | **648,465** | **1,009,037** | **115,899** | **(8,771)** | **5,265** | **118,774** |
| | | | | | | | | | | | | |
| **Interception & Pumping** | **1,115,506** | **83,504** | **188,703** | **322,759** | **1,193,347** | **81,861** | **203,324** | **386,991** | **77,841** | **(1,643)** | **14,621** | **64,232** |
| | | | | | | | | | | | | |
| 102 Quincy Pump Facilities | 25,907 | - | - | - | 25,907 | - | - | - | - | - | - | - |
| 104 Braintree-Weymouth Relief Facilities | 239,378 | 1 | 1,814 | 9,859 | 240,104 | 1 | 1,832 | 10,568 | 726 | - | 18 | 709 |
| 105 New Neponset Valley Relief Sewer | 30,300 | - | - | - | 30,300 | - | - | - | - | - | - | - |
| 106 Wellesley Extention Replacement Sewer | 64,359 | - | - | - | 64,359 | - | - | - | - | - | - | - |
| 107 Framingham Extension Relief Sewer | 47,856 | - | - | - | 47,856 | - | - | - | - | - | - | - |
| 127 Cummingsville Replacement Sewer | 8,999 | - | - | - | 8,999 | - | - | - | - | - | - | - |
| 130 Siphon Structure Rehabilitation | 6,168 | - | 5,228 | - | 12,127 | - | 5,568 | 5,619 | 5,959 | - | 340 | 5,619 |
| 131 Upper Neponset Valley Sewer | 54,174 | - | - | - | 54,174 | - | - | - | - | - | - | - |
| 132 Corrosion & Odor Control | 76,754 | 2,947 | 41,502 | 29,304 | 84,132 | 3,179 | 40,935 | 31,902 | 7,378 | 232 | (567) | 2,598 |
| 136 West Roxbury Tunnel | 11,314 | - | - | 1,000 | 11,314 | - | - | 1,000 | - | - | - | - |
| 137 Wastewater Central Monitoring | 27,482 | - | 2,200 | 5,500 | 27,482 | - | 2,061 | 5,639 | - | - | (139) | 139 |
| 139 South System Relief Project | 4,939 | - | - | 1,500 | 4,939 | - | - | 1,500 | - | - | - | - |
| 141 Wastewater Process Optimization | 10,306 | 297 | - | 8,804 | 10,327 | 297 | - | 8,836 | 21 | - | - | 32 |
| 142 Wastewater Meter System-Equipment | 28,733 | 974 | 13,679 | 8,942 | 22,628 | 586 | 13,667 | 8,942 | (6,105) | (388) | (12) | - |
| 143 Regional I/I Management Planning | 169 | - | - | - | 169 | - | - | - | - | - | - | - |
| 145 Facility Asset Protection | 472,970 | 79,285 | 123,582 | 252,850 | 542,832 | 77,798 | 138,563 | 307,985 | 69,862 | (1,487) | 14,981 | 55,135 |
| 146 D.I. Cross Harbor Tunnel Inspection | 5,000 | - | - | 5,000 | 5,000 | - | - | 5,000 | - | - | - | - |
| 147 Randolph Trunk Sewer Relief | 698 | - | 698 | - | 698 | - | 698 | - | - | - | - | - |
| | | | | | | | | | | | | |
| **Treatment** | **1,017,420** | **117,772** | **312,076** | **402,848** | **1,054,394** | **116,434** | **279,023** | **474,213** | **36,974** | **(1,338)** | **(33,053)** | **71,365** |
| | | | | | | | | | | | | |
| 182 DI Primary and Secondary | **(958)** | - | - | - | (958) | - | - | - | - | - | - | - |
| 200 DI Plant Optimization | 33,279 | (148) | - | - | 33,279 | (148) | - | - | - | - | - | - |
| 206 DI Treatment Plant Asset Protection | 956,523 | 105,912 | 305,312 | 397,798 | 993,149 | 104,859 | 273,449 | 467,341 | 36,626 | (1,053) | (31,863) | 69,543 |
| 210 Clinton Wastewater Treat Plant | 26,364 | 12,024 | 6,764 | 5,051 | 26,712 | 11,739 | 5,574 | 6,873 | 348 | (285) | (1,190) | 1,822 |
| 211 Laboratory Services | 2,212 | (16) | - | - | 2,212 | (16) | - | - | - | - | - | - |
| | | | | | | | | | | | | |
| **Residuals** | **167,643** | **675** | **11,487** | **90,945** | **167,793** | **511** | **15,212** | **87,535** | **150** | **(164)** | **3,725** | **(3,410)** |
| | | | | | | | | | | | | |
| 261 Residuals | 63,811 | - | - | - | 63,811 | - | - | - | - | - | - | - |
| 271 Residuals Asset Protection | 103,832 | 675 | 11,487 | 90,945 | 103,982 | 511 | 15,212 | 87,535 | 150 | (164) | 3,725 | (3,410) |
| | | | | | | | | | | | | |

# APPENDIX 4
## Overview of the FY20 Final CIP and Changes from the Final FY19 CIP

| Program and Project | FY19 Final | | | | FY20 Final | | | | Change from Final FY19 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total Budget Amount | FY14-18 | FY19-23 | Beyond 23 | Total Budget Amount | FY14-18 | FY19-23 | Beyond 23 | Total Budget Amount | FY14-18 | FY19-23 | Beyond 23 |
| **CSO** | **910,118** | **64,699** | **7,711** | **-** | **911,052** | **64,688** | **8,655** | **-** | **934** | **(11)** | **944** | **-** |
| | | | | | | | | | | | | |
| 340 Dorchester Bay Sewer Separation (Fox Point) | 55,029 | 877 | - | - | 55,029 | 877 | - | - | - | - | - | - |
| 341 Dorchester Bay Sewer Separation (Commercial Point) | 63,619 | (1,286) | 3,758 | - | 63,625 | (1,286) | 3,763 | - | 6 | - | 5 | - |
| 342 Neponset River Sewer Separation | 2,492 | 47 | - | - | 2,492 | 47 | - | - | - | - | - | - |
| 343 Constitution Beach Sewer Separation | 3,731 | (38) | - | - | 3,731 | (38) | - | - | - | - | - | - |
| 344 Stony Brook Sewer Separation | 44,319 | 121 | - | - | 44,319 | 121 | - | - | - | - | - | - |
| 346 Cambridge Sewer Separation | 104,552 | 54,068 | - | - | 104,552 | 54,068 | - | - | - | - | - | - |
| 351 BWSC Floatables Controls | 946 | 13 | - | - | 946 | 13 | - | - | - | - | - | - |
| 352 Cambridge Floatables Control | 1,127 | 40 | - | - | 1,127 | 40 | - | - | - | - | - | - |
| 356 Fort Point Channel Sewer Separation | 11,507 | (499) | - | - | 11,507 | (499) | - | - | - | - | - | - |
| 358 Morrissey Boulevard Drain | 32,181 | (166) | - | - | 32,181 | (166) | - | - | - | - | - | - |
| 359 Reserved Channel Sewer Separation | 70,524 | 10,484 | - | - | 70,524 | 10,484 | - | - | - | - | - | - |
| 360 Brookline Sewer Separation | 24,715 | (1,282) | - | - | 24,715 | (1,282) | - | - | - | - | - | - |
| 361 Bulfinch Triangle Sewer Separation | 9,032 | (826) | - | - | 9,032 | (826) | - | - | - | - | - | - |
| 339 North Dorchester Bay | 221,510 | (111) | - | - | 221,510 | (111) | - | - | - | - | - | - |
| 347 East Boston Branch Sewer Relief | 85,637 | (9) | - | - | 85,637 | (9) | - | - | - | - | - | - |
| 348 BOS019 Storage Conduit | 14,288 | - | - | - | 14,288 | - | - | - | - | - | - | - |
| 349 Chelsea Trunk Sewer | 29,779 | - | - | - | 29,779 | - | - | - | - | - | - | - |
| 350 Union Park Detention Treatment Facility | 49,583 | - | - | - | 49,583 | - | - | - | - | - | - | - |
| 353 Upgrade Existing CSO Facilities | 22,385 | - | - | - | 22,385 | - | - | - | - | - | - | - |
| 354 Hydraulic Relief Projects | 2,295 | - | - | - | 2,295 | - | - | - | - | - | - | - |
| 355 MWR003 Gate & Siphon | 4,424 | 3,775 | - | - | 4,424 | 3,775 | - | - | - | - | - | - |
| 357 Charles River CSO Controls | 3,633 | - | - | - | 3,633 | - | - | - | - | - | - | - |
| 324 CSO Support | 52,810 | (508) | 3,954 | - | 53,738 | (519) | 4,893 | - | 928 | (11) | 939 | - |
| | | | | | | | | | | | | |
| **Other Wastewater** | **392,866** | **67,436** | **123,223** | **73,711** | **392,866** | **61,821** | **142,251** | **60,298** | **-** | **(5,615)** | **19,028** | **(13,413)** |
| | | | | | | | | | | | | |
| 128 I/I Local Financial Assistance | 392,585 | 67,436 | 123,223 | 73,711 | 392,585 | 61,821 | 142,251 | 60,298 | - | (5,615) | 19,028 | (13,413) |
| 138 Sewerage System Mapping Upgrade | 281 | - | - | - | 281 | - | - | - | - | - | - | - |
| | | | | | | | | | | | | |
| **Total Waterworks** | **4,253,659** | **237,374** | **370,062** | **1,771,547** | **4,299,729** | **236,734** | **398,373** | **1,789,949** | **45,653** | **(640)** | **23,990** | **22,306** |
| | | | | | | | | | | | | |
| **Drinking Water Quality** | **703,468** | **54,845** | **8,115** | **45,300** | **704,202** | **54,765** | **12,834** | **41,396** | **317** | **(80)** | **398** | **-** |
| | | | | | | | | | | | | |
| 542 Carroll Water Treatment Plant | 435,675 | 11,842 | 3,374 | 9,250 | 436,138 | 11,908 | 3,772 | 9,250 | 463 | 66 | 398 | - |
| 543 Quabbin Water Treatment Plant | 19,973 | 7,205 | - | - | 19,973 | 7,205 | - | - | - | - | - | - |
| 544 Norumbega Covered Storage | 106,674 | - | - | - | 106,674 | - | - | - | - | - | - | - |
| 545 Blue Hills Covered Storage | 40,083 | 120 | - | - | 40,083 | 120 | - | - | - | - | - | - |
| 550 Spot Pond Storage Facility | 60,272 | 35,678 | - | - | 60,126 | 35,532 | - | - | (146) | (146) | - | - |
| 555 CWTP Asset Protection | 40791 | 0 | 4741 | 36050 | 41,208 | - | 9,062 | 32,146 | 417 | - | 4,321 | (3,904) |
| | | | | | | | | | | | | |

# APPENDIX 4
## Overview of the FY20 Final CIP and Changes from the Final FY19 CIP

| Program and Project | FY19 Final | | | | FY20 Final | | | | Change from Final FY19 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total Budget Amount | FY14-18 | FY19-23 | Beyond 23 | Total Budget Amount | FY14-18 | FY19-23 | Beyond 23 | Total Budget Amount | FY14-18 | FY19-23 | Beyond 23 |
| **Transmission** | **2,494,174** | **70,511** | **129,441** | **1,539,191** | **2,522,587** | **70,164** | **150,245** | **1,547,147** | **28,413** | **(347)** | **20,804** | **7,956** |
| | | | | | | | | | | | | |
| 597 Winsor Station Pipeline | 48,640 | 4,505 | 149 | 42,591 | 49,559 | 4,338 | 204 | 43,622 | 919 | (167) | 55 | 1,031 |
| 601 Sluice Gate Rehabilitation | 9,158 | - | - | - | 9,158 | - | - | - | - | - | - | - |
| 604 MetroWest Tunnel | 700,184 | 1,784 | - | 3,002 | 700,184 | 1,784 | - | 3,002 | - | - | - | - |
| 615 Chicopee Valley Aqueduct Redundancy | 8,666 | - | - | - | 8,666 | - | - | - | - | - | - | - |
| 616 Quabbin Transmission System | 17,120 | 1,464 | 1,865 | 6,588 | 19,032 | 1,464 | 8,168 | 2,197 | 1,912 | - | 6,303 | (4,391) |
| 617 Sudbury/Weston Aqueduct Repairs | 10,288 | 2,069 | 1,085 | 6,475 | 11,507 | 1,572 | 1,464 | 7,811 | 1,219 | (497) | 379 | 1,336 |
| 620 Wachusett Reservior Spillway Improvement | 9,287 | - | - | - | 9,287 | - | - | - | - | - | - | - |
| 621 Watershed Land | 29,000 | 5,254 | 5,000 | 1,404 | 29,000 | 5,504 | 5,600 | 554 | - | 250 | 600 | (850) |
| 622 Cosgrove/Wachusett Redundancy | 57,495 | 50,746 | 5,574 | - | 59,146 | 50,842 | 7,128 | - | 1,651 | 96 | 1,554 | - |
| 623 Dam Projects | 5,726 | 31 | 2,392 | 218 | 6,048 | 31 | 2,890 | 43 | 322 | - | 498 | (175) |
| 625 Metro Tunnel Redundancy | 1,387,910 | 1,790 | 14,483 | 1,369,970 | 1,421,750 | 1,790 | 24,313 | 1,393,981 | 33,840 | - | 9,830 | 24,011 |
| 628 Metro Redundancy Interim Improvement | 192,698 | 2,566 | 94,081 | 96,051 | 177,348 | 2,837 | 92,636 | 81,875 | (15,350) | 271 | (1,445) | (14,176) |
| 630 Watershed Division Capital Improvement | 18,000 | 300 | 4,810 | 12,890 | 21,900 | - | 7,840 | 14,060 | 3,900 | (300) | 3,030 | 1,170 |
| | | | | | | | | | | | | |
| **Distribution & Pumping** | **965,831** | **90,418** | **159,644** | **343,064** | **981,767** | **91,654** | **161,268** | **356,142** | **15,936** | **1,236** | **1,624** | **13,078** |
| | | | | | | | | | | | | |
| 618 Peabody Pipeline | 18,668 | 1,163 | 17,504 | - | 1,509 | 1,059 | 450 | - | (17,159) | (104) | (17,054) | - |
| 677 Valve Replacement | 21,402 | - | - | 9,385 | 21,655 | - | - | 9,638 | 253 | - | - | 253 |
| 678 Boston Low Service-Pipe & Valve Rehabilitation | 23,691 | - | - | - | 23,691 | - | - | - | - | - | - | - |
| 683 Heath Hill Road Pipe Replacement | 19,358 | - | - | - | 19,358 | - | - | - | - | - | - | - |
| 689 James L. Gillis Pump Station Rehabilitation | 33,419 | - | - | - | 33,419 | - | - | - | - | - | - | - |
| 692 NHS - Section 27 Improvements | 1,294 | - | 27 | 1,143 | 1,326 | - | 27 | 1,175 | 32 | - | - | 32 |
| 693 NHS - Revere & Malden Pipeline Improvement | 79,095 | 1,572 | 7,618 | 43,072 | 82,804 | 1,729 | 10,344 | 43,898 | 3,709 | 157 | 2,726 | 826 |
| 702 New Connect Mains-Shaft 7 to WASM 3 | 48,567 | 1,929 | 20,707 | 14,970 | 56,376 | 1,964 | 25,839 | 17,612 | 7,809 | 35 | 5,132 | 2,642 |
| 704 Rehabilitation of Other Pump Stations | 50,258 | - | 1,321 | 18,879 | 50,258 | - | 1,247 | 18,953 | - | - | (74) | 74 |
| 706 NHS-Connecting Mains from Section 91 | 2,360 | - | - | - | 2,360 | - | - | - | - | - | - | - |
| 708 Northern Extra High Service New Pipelines | 10,685 | 13 | 402 | 6,638 | 10,874 | - | 447 | 6,795 | 189 | (13) | 45 | 157 |
| 712 Cathodic Protection Of Distrubution Mains | 62,716 | 129 | 11,531 | 50,915 | 66,704 | 129 | 9,740 | 56,695 | 3,988 | - | (1,791) | 5,780 |
| 713 Spot Pond Supply Mains Rehabilitation | 66,333 | 4,551 | 800 | - | 66,289 | 4,507 | 800 | - | (44) | (44) | - | - |
| 714 Southern Extra High Sections 41 & 42 | 3,657 | - | - | - | 3,657 | - | - | - | - | - | - | - |
| 719 Chestnut Hill Connecting Mains | 33,435 | 816 | - | 15,132 | 33,827 | 800 | - | 15,540 | 392 | (16) | - | 408 |
| 720 Warren Cottage Line Rehabilitation | 1,205 | - | - | - | 1,205 | - | - | - | - | - | - | - |
| 721 South Spine Distribution Mains | 77,401 | (9) | 1,890 | 38,828 | 80,308 | (9) | 3,271 | 40,354 | 2,907 | - | 1,381 | 1,526 |
| 722 NIH Redundancy & Storage | 118,494 | 41,927 | 42,080 | 28,512 | 121,188 | 42,921 | 41,066 | 31,226 | 2,694 | 994 | (1,014) | 2,714 |
| 723 Northern Low Service Rehabilitation Section 8 | 62,366 | 829 | 18,269 | 40,947 | 69,584 | 634 | 29,898 | 36,732 | 7,218 | (195) | 11,629 | (4,215) |
| 724 Northern High Service - Pipeline Rehabilitation | - | - | - | - | - | - | - | - | - | - | - | - |
| 725 Hydraulic Model Update | 598 | - | - | - | 598 | - | - | - | - | - | - | - |
| 727 Southern Extra High Redundancy & Storage | 129,604 | 21,206 | 36,806 | 64,836 | 132,426 | 21,688 | 37,378 | 66,603 | 2,822 | 482 | 572 | 1,767 |
| 730 Weston Aqueduct Supply Mains | 80,464 | 14,420 | - | - | 80,457 | 14,360 | 54 | - | (7) | (60) | 54 | - |
| 731 Lynnfield Pipeline | 5,626 | (52) | - | - | 5,626 | (52) | - | - | - | - | - | - |
| 732 Walnut St. & Fisher Hill Pipeline Rehabilitation | 2,717 | - | - | - | 2,717 | - | - | - | - | - | - | - |

## APPENDIX 4
## Overview of the FY20 Final CIP and Changes from the Final FY19 CIP

| Program and Project | FY19 Final | | | | FY20 Final | | | | Change from Final FY19 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total Budget Amount | FY14-18 | FY19-23 | Beyond 23 | Total Budget Amount | FY14-18 | FY19-23 | Beyond 23 | Total Budget Amount | FY14-18 | FY19-23 | Beyond 23 |
| 733 NHS Pipeline Rehabilitation 13-18 & 48 | - | - | - | - | - | - | - | - | - | - | - | - |
| 734 Southern Extra High Pipelines-Sections 30, 39,40, & 44 | - | - | - | - | - | - | - | - | - | - | - | - |
| 735 Section 80 Rehabilitation | 12,419 | 1,925 | 688 | 9,807 | 13,552 | 1,925 | 706 | 10,921 | 1,133 | - | 18 | 1,114 |
| | | | | | | | | | | | | |
| **Other** | **90,186** | **21,600** | **72,862** | **(156,010)** | **91,173** | **20,151** | **74,026** | **(154,738)** | **987** | **(1,449)** | **1,164** | **1,272** |
| | | | | | | | | | | | | |
| 753 Central Monitoring System | 39,017 | 5,061 | 9,600 | 8,552 | 39,002 | 4,901 | 10,203 | 8,094 | (15) | (160) | 603 | (458) |
| 763 Distribution Systems Facilities Mapping | 2,799 | - | 1,663 | 100 | 2,799 | - | 1,549 | 214 | - | - | (114) | 114 |
| 764 Local Water Infrastructure Rehabilitation Assistance Program | 7,488 | - | - | - | 7,488 | - | - | - | - | - | - | - |
| 765 Local Water Pipeline Improvement Loan Program | - | 14,654 | 32,408 | (173,921) | - | 13,414 | 37,498 | (177,771) | - | (1,240) | 5,090 | (3,850) |
| 766 Waterworks Facility Asset Protection | 40,882 | 1,886 | 29,191 | 9,259 | 41,884 | 1,837 | 24,776 | 14,725 | 1,002 | (49) | (4,415) | 5,466 |
| | | | | | | | | | | | | |
| **Business & Operations Support** | **151,876** | **24,160** | **38,572** | **11,701** | **164,989** | **23,587** | **47,939** | **16,022** | **13,113** | **(573)** | **9,367** | **4,321** |
| | | | | | | | | | | | | |
| 881 Equipment Purchase | 33,825 | 9,796 | 9,391 | 2,530 | 39,090 | 9,750 | 10,453 | 6,780 | 5,265 | (46) | 1,062 | 4,250 |
| 925 Technical Assistance | 1,100 | 26 | 1,074 | - | 1,125 | - | 1,125 | - | 25 | (26) | 51 | - |
| 930 MWRA Facility - Chelsea | 9,812 | (2) | - | - | 9,812 | (2) | - | - | - | - | - | - |
| 931 Business Systems Plan | 24,563 | 111 | - | - | 24,562 | 111 | (1) | - | (1) | - | (1) | - |
| 932 Environmental Remediation | 1,479 | - | - | - | 1,479 | - | - | - | - | - | - | - |
| 933 Capital Maintenance Planning | 23,157 | 4,513 | 8,519 | - | 27,587 | 4,076 | 13,386 | - | 4,430 | (437) | 4,867 | - |
| 934 MWRA Facilities Management | 2,151 | - | 1,780 | - | 2,971 | - | 2,600 | - | 820 | - | 820 | - |
| 935 Alternative Energy Initiatives | 23,476 | 1,221 | - | 5,058 | 23,364 | 1,221 | (234) | 5,181 | (112) | - | (234) | 123 |
| 940 Applicat Improv Program | 12,198 | 2,828 | 5,337 | 3,961 | 13,093 | 2,819 | 6,290 | 3,911 | 895 | (9) | 953 | (50) |
| 942 Info Security Program ISP | 3,727 | 1,146 | 2,045 | - | 5,506 | 1,173 | 3,798 | - | 1,779 | 27 | 1,753 | - |
| 944 Info Tech Mgmt Program | 636 | - | 636 | - | 200 | - | 200 | - | (436) | - | (436) | - |
| 946 IT Infrastructure Program | 15,754 | 4,522 | 9,789 | 152 | 16,202 | 4,440 | 10,321 | 150 | 448 | (82) | 532 | (2) |

# APPENDIX 5

# Master Plan/CIP Status

# Appendix 5
## Master Plan/CIP Status
## (in 000s)

| Listing of Master Plan Projects | Original MP Rating | CIP Year | Rating when added to CIP | NTP | SC | Total Contract Amount | FY19-23 | Beyond FY23 | Comment |
|---|---|---|---|---|---|---|---|---|---|
| **FY20 Budget Cycle** | | | | | | | | | |
| **S.145 I&P Asset Protection** | | | | | | | | | |
| Section 191 & 192 Charles River Valley Sewer | **3** | **FY20** | **3** | May-19 | Oct-19 | 500,000 | 500,000 | 0 | |
| Pump Stations & CSO Facility Rehab Design/CA/REI | **3** | **FY20** | **3** | Nov-21 | Nov-31 | 7,500,000 | 650,000 | 6,850,000 | |
| Pump Stations & CSO Facility Rehab Construction | **3** | **FY20** | **3** | Nov-23 | Nov-30 | 37,500,000 | 0 | 37,500,000 | |
| **S.555 Carroll Water Treatment Plant Asset Protection** | | | | | | | | | |
| CWTP Emergency Generator #1 Replacement (Electric Portion) | **3** | **FY20** | **2** | Jan-19 | Aug-19 | 750,000 | 750,000 | 0 | |
| **FY20 Master Plan Totals - 3 projects** | | | | | | **$46,250,000** | **$1,900,000** | **$44,350,000** | |
| **FY19 Budget Cycle** | | | | | | | | | |
| **S.206 Deer Island Asset Protection** | | | | | | | | | |
| Hydroturbine Replacements Design/ESDC/REI | **3** | **FY19** | **3** | Sep-18 | Jun-24 | 2,000,000 | 1,720,253 | 279,747 | |
| Hydroturbine Replacements Construction | **3** | **FY19** | **3** | Jun-20 | Jun-23 | 10,000,000 | 8,611,111 | 1,388,889 | |
| Bidirectional Radio Repeater System Upgrade | **2** | **FY19** | **2** | Apr-18 | Oct-19 | 3,000,000 | 3,000,000 | | |
| **S.128 I/I Local Financial Assistance** | | | | | | | | | |
| Phases 11 & 12 | **3** | **FY19** | **3** | Aug-18 | Aug-25 | 90,000,000 | 63,700,000 | 26,300,000 | |
| **S. 542 Carroll Water Treatment Plant** | | | | | | | | | |
| HVAC Equipment Replacement | **2** | **FY19** | **2** | Jul-19 | May-22 | 2,300,000 | | 2,300,000 | |
| CWTP Chemical Pipe System Pipe, Pumps and Tank Replacement | **2** | **FY19** | **2** | Jul-27 | Jun-29 | 4,000,000 | | 4,000,000 | |
| CWTP Water Pump Replacement | **2** | **FY19** | **2** | Jul-27 | Jul-30 | 2,000,000 | | 2,000,000 | |
| Ozone Generator Replacement | **2** | **FY19** | **2** | Oct-27 | Oct-30 | 20,000,000 | | 20,000,000 | |
| Ultra Violet Reactor Replacement | **2** | **FY19** | **2** | Oct-32 | Oct-34 | 10,000,000 | | 10,000,000 | |
| **S. 623 Dam Projects** | | | | | | | | | |
| Sudbury/Foss Dam Impr/Wach North Dike Overtopping Protection Design CA/RI | **2** | **FY19** | **2** | Oct-24 | Oct-29 | 210,000 | 302,960 | | |
| Sudbury/Foss Dam Improvements/Wachusett North Dike Overtopping Protection Construction | **2** | **FY19** | **2** | Oct-26 | Oct-28 | 1,600,000 | 1,693,325 | | |
| **S.617 Sudbury/Weston Aqueduct Repairs** | | | | | | | | | |
| Farm Pond Inlet Chamber and Gate House - Rehabilitation Design CA/RI | **3** | **FY19** | **3** | Oct-24 | Oct-29 | 400,000 | | 400,000 | |
| Farm Pond Inlet Chamber and Gate House - Rehabilitation Construction | **3** | **FY19** | **3** | Oct-26 | Oct-28 | 2,000,000 | | 2,000,000 | |
| Waban Arches Rehabilitation Design CA/RI | **3** | **FY19** | **3** | Oct-23 | Oct-28 | 300,000 | | 300,000 | |
| Waban Arches Rehabilitation Construction | **3** | **FY19** | **3** | Oct-25 | Oct-27 | 1,200,000 | | 1,200,000 | |
| **S.621 Watershed Land** | | | | | | | | | |
| Watershed Land Acquisition | **3** | **FY19** | **3** | Apr-06 | Jun-23 | 5,000,000 | | 5,000,000 | |
| **S.693 NHS Revere & Malden Pipeline** | | | | | | | | | |
| Sections 13 & 48 Rehabilitation Design CA/RI | **3** | **FY19** | **3** | Jul-24 | Jul-29 | 2,150,000 | | 2,150,000 | |
| Sections 13 & 48 Rehabilitation Construction | **3** | **FY19** | **3** | Jul-26 | Jul-28 | 10,750,000 | | 10,750,000 | |
| **S.712 Cathodic Protection Distribution Mains** | | | | | | | | | |
| Cathodic Protection Western System Design/CA/RI | **3** | **FY19** | **2** | Jul-19 | Jun-23 | 930,000 | 909,000 | 21,000 | **Condition determined to be worse than when Master Plan Priority Ratings assigned.** |
| Cathodic Protection Western System Construction | **3** | **FY19** | **2** | Jul-21 | Jun-23 | 4,300,000 | 3,762,000 | 538,000 | **Condition determined to be worse than when Master Plan Priority Ratings assigned.** |
| Cathodic Protection Metropolitan System Design/CA/RI | **3** | **FY19** | **2** | Jul-20 | Jun-26 | 9,900,000 | 4,602,000 | 5,298,000 | **Condition determined to be worse than when Master Plan Priority Ratings assigned.** |
| Cathodic Protection Metropolitan System Construction | **3** | **FY19** | **2** | Jul-22 | Jun-26 | 47,100,000 | 8,831,000 | 38,269,000 | **Condition determined to be worse than when Master Plan Priority Ratings assigned.** |
| **S.763 Distribution Systems Facilities Mapping** | | | | | | | | | |
| Water System Hydraulic Model | **4** | **FY19** | **4** | Jul-19 | Jun-20 | 500,000 | 500,000 | | |
| **FY19 Master Plan Totals - 17 projects** | | | | | | **$229,640,000** | **$97,631,649** | **$132,194,636** | |

# Master Plan Priority Ratings - Wastewater

**Priority One** **Critical/Emergency** Risk moderate to high/Consequence very high

*Projects which:*

Resolve emergencies or critical threats to public health or worker health and safety

Prevent imminent failure of the system and significant loss of service

---

**Priority Two** **Essential Projects** Risk variable/Consequences high

*Projects which are essential to:*

Critical facility assessment

Fix existing reliability or capacity problems during dry weather flow conditions

Reduce sanitary sewer overflows from the MWRA system

Address facilities in poor condition where the ability to provide uninterrupted service or adequate flow is compromised.

Upgrade or maintain emergency backup facilities in poor condition

Meet minimum hydraulic performance requirements and service needs

Implement MWRA's approved CSO control plan

Maintain wastewater effluent and residuals quality

To comply with mandated legal, regulatory or statutory requirements

---

**Priority Three** **Necessary Projects** Risk moderate to high/Consequence moderate to low

*Projects which are necessary to*:

Improve public health and worker safety

Restore the system's infrastructure where it is seriously deteriorated

Improve hydraulic performance

Significantly improve the effectiveness, efficiency, or reliability of system operations and service delivery including where appropriate, the ability to monitor the system

Maintain consumer confidence

To comply with other legal, regulatory or statutory requirements

---

**Priority Four** **Important Projects** Risk moderate/Consequences low

*Projects which are important to:*

Maintain the integrity of the system's infrastructure

Produce significant cost savings or revenue gains for MWRA

Monitor system needs and plan appropriate longer-term responses

Provide acceptable working conditions at field sites and at maintenance support facilities

Implement the regional I/I plan

---

**Priority Five** **Desirable Projects** Risk/Consequence both low

*Projects which are desirable because they would:*

Yield worthwhile cost savings, revenue gains, or efficiency improvements for MWRA

Protect the long term value and usefulness of system assets

Solve future problems and conditions which are expected to arise in the latter half of the planning period

Be beneficial towards the improved operation of a local system

# Master Plan Priority Ratings - Water

**Priority One** **Critical/Emergency** Risk moderate to high/Consequence very high

*Projects which:*

Resolve emergencies or critical threats to public health or worker health and safety

Prevent imminent failure of the system and significant loss of service

---

**Priority Two** **Essential Projects** Risk variable/Consequences high

*Projects which are essential to:*

Critical facility assessment

Fix existing reliability problems related to "single points of failure"

Upgrade or maintain emergency back-up facilities in operational condition

Address facilities in poor condition where the ability to provide uninterrupted service, sanitary protections or adequate flow is compromised.

Meet minimum hydraulic performance requirements and service needs including adequate distribution storage in areas with a critical shortfall of storage

To comply with mandated legal, regulatory or statutory requirements

---

**Priority Three** **Necessary Projects** Risk moderate to high/Consequences moderate to low

*Projects which are necessary to*:

Improve public health and worker safety

Restore the system's infrastructure where it is seriously deteriorated

Significantly improve the effectiveness, efficiency, or reliability of system operations and service delivery including where appropriate, the ability to monitor the system

Preserve water quality during distribution

Maintain consumer confidence

To comply with other legal, regulatory or statutory requirements

---

**Priority Four** **Important Projects** Risk moderate/Consequence low

*Projects which are important to:*

Maintain the integrity of the system's infrastructure

Improve hydraulic performance or add distribution storage

Produce significant cost savings or revenue gains for MWRA

Monitor system needs and plan appropriate longer-term responses

Provide acceptable working conditions at field sites and at maintenance support facilities

Maintain efforts to manage system demands

Provide broader environmental benefits

---

**Priority Five** **Desirable Projects** Risk/Consequence both low

*Projects which are desirable because they would:*

Yield worthwhile cost savings, revenue gains, or efficiency improvements for MWRA

Protect the long term value and usefulness of system assets

Solve future problems and conditions which are expected to arise in the latter half of the planning period

Be beneficial towards the improved operation of a local system

# APPENDIX 6

# Municipality and Project Reference by Municipality

# APPENDIX 6
# PROJECT/MUNICIPALITY(s)

| Project | Number/ Project | Community(s) Served |
|---|---|---|
| 104 | Braintree-Weymouth Relief Facilities | Braintree, Hingham, Holbrook, Randolph, Weymouth, Quincy |
| 128 | Infiltration/Inflow Local Financial Assistance Program | All Wastewater Communities |
| 130 | Siphon Structure Rehabiliation | All Wastewater Communities |
| 131 | Upper Neponset Valley Sewer System | Dedham, Boston, Brookline, Newton |
| 132 | Corrosion and Odor Control Study | All Wastewater Communities |
| 136 | West Roxbury Tunnel | Ashland, Framingham, Natick, Wellesley, Dedham, Boston, Brookline, Newton, Nedham, and |
| 137 | Wastewater Central Monitoring | All Wastewater Communities |
| 139 | South System Relief Project | Boston, Milton |
| 141 | Wastewater Process Optimization | All Wastewater Communities |
| 142 | Wastewater Metering System Equipment Replacement | All Wastewater Communities |
| 145 | Interception & Pumping Facility Asset Protection | All Wastewater Communities |
| 146 | D.I. Cross Harbor Tunnel | All Wastewater Communities |
| 147 | Randolph Trunk Sewer Relief | Braintree & Randolph |
| 206 | Deer Island Treatment Plant Asset Protection | All Wastewater Communities |
| 210 | Clinton Wastewater Treatment Plant | Clinton |
| 211 | Laboratory Services | All MWRA Communities |
| 271 | Residuals Asset Protection | All Wastewater Communities |
| 324 | CSO Support | Boston, Cambridge, Chelsea, Revere, Somerville |
| 339 | North Dorchester Bay & Reserve Channel Conduits/CSO | Boston |
| 340 | South Dorchester Bay Sewer Separation (Fox Point) | Boston |
| 341 | South Dorchester Bay Sewer Separation (Commercial Pt.) | Boston |
| 346 | Cambridge CAM002-004 Sewer Separation | Cambridge |
| 347 | East Boston Branch Sewer Relief | Boston, Chelsea, Everett |
| 355 | MWR003 Gate and Siphon | Boston, Cambridge |
| 356 | Fort Point Channel Sewer Separation | Boston |
| 357 | Charles River CSO Controls | Boston, Brookline, Cambridge |
| 358 | Morrissey Boulevard Drain | Boston |
| 359 | Reserved Channel Sewer Separation | Boston |
| 360 | Brookline Sewer Separation | Brookline |
| 361 | Bulfinch Triangle Sewer Separation | Boston |
| 542 | Carroll Water Treatment Plant | All Water Customers (except Chicopee, Wilbraham, South Hadley Fire District #1, Worcester, Clinton, and Leominster) |
| 543 | Quabbin Water Treatment Plant | South Hadley, Chicopee, Wilbraham |
| 545 | Blue Hills Covered Storage | Boston, Canton, Milton, Norwood, Quincy, Brookline, Dedham, Westwood, Stoughton |
| 550 | Low Service Storage Near Spot Pond | Cambridge, Charlestown, Chelsea, East Boston, Everett, Malden, Medford, Somerville |
| 555 | Carroll Water Treatment Plant Asset Protection | All Water Customers (except Chicopee, Wilbraham, South Hadley Fire District #1, Worcester, Clinton, and Leominster) |
| 597 | Winsor Dam Hydroelectric | All Water Communities |
| 604 | MetroWest Tunnel | All Water Communities (except South Hadley Fire District #1, Chicopee, Wilbraham, Worcester, Clinton, and Leominster) |
| 616 | Quabbin Transmission System | Chicopee, South Hadley, Wilbraham |
| 617 | Sudbury/Weston Aqueduct Repairs | All Water Communities (except South Hadley Fire District #1, Chicopee, Wilbraham, Worcester, Clinton, and Leominster) |
| 618 | Peabody Pipeline Project | Peabody |
| 621 | Watershed Land | All Water Communities |
| 622 | Cosgrove Tunnel Redundancy | All Water Customers (except Chicopee, Wilbraham, South Hadley Fire District #1, Worcester, Clinton, and Leominster) |
| 623 | Dam Projects | All Water Communities |
| 625 | Metro Tunnel Redundancy | All Water Customers (except Chicopee, Wilbraham, South Hadley Fire District #1, Worcester, Clinton, and Leominster) |
| 628 | Metro Redundancy Interim Improvements | All Water Customers (except Chicopee, Wilbraham, South Hadley Fire District #1, Worcester, Clinton, and Leominster) |
| 630 | Watershed Division Capital Improvements | All Water Communities |
| 677 | Valve Replacement | All Water Communities |
| 692 | Northern High Service Section 27 Improvements | Lynn, Marblehead, Nahant, Swampscott |
| 693 | Northern High Service Pipe Improvements - Revere/Malden | Boston, Lynn, Malden, Marblehead, Nahant, Peabody, Reading, Revere, Saugus, Winthrop, Wakefield, Melrose, Lynnfield, Swampscott, Stoneham, Medford |
| 702 | New Connecting Mains - Shaft 7 to WASM 3 | Arlington, Bedford, Belmont, Boston, Lexington, Medford, Newton, Somerville, Waltham, Watertown, Winchester |
| 704 | Rehabilitation of Other Pump Stations | Arlington, Bedford, Belmont, Boston, Brookline, Canton, Lexington, Milton, Norwood, Waltham, Watertown, Winchester |
| 708 | Northern Extra High Service - New Pipelines | Arlington, Bedford, Lexington, Waltham |
| 712 | Cathodic Protection of Distribution Mains | All Water Communities |
| 713 | Spot Pond Supply Mains Rehabilitation | Arlington, Boston, Cambridge, Chelsea, Everett, Malden, Medford, Somerville |
| 719 | Chestnut Hill Connecting Mains | Boston, Brookline, Newton |
| 721 | Southern Spine Distribution Mains | Boston, Brookline, Canton, Milton, Norwood, Quincy, Dedham, Westwood, Stoughton |

# APPENDIX 6
# PROJECT/MUNICIPALITY(s)

| Project | Number/ Project | Community(s) Served |
|---|---|---|
| 722 | NIH Redundancy & Covered Storage | Reading, Stoneham, Wakefield, Winchester, Woburn |
| 723 | Northern Low Service Rehab. - Sections 8 | Chelsea, Boston, Everett |
| 727 | SEH Redundancy & Storage | Boston, Brookline, Canton, Milton, Norwood, Dedham, Westwood, Stoughton |
| 730 | Weston Aqueduct Supply Mains | Weston, Newton, Boston, Watertown, Cambridge, Waltham, Belmont, Arlington, Somerville |
| 731 | Lynnfield Pipeline | Lynnfield, Saugus |
| 735 | Section 80 Rehabilitation | Wellesley and Needham |
| 753 | Central Monitoring System | All Water Communities |
| 763 | Distribution Systems Facilities Mapping | All Water Communities |
| 765 | Local Water Pipeline Imp. Loan Program | All Water Communities |
| 766 | Waterworks Facility Asset Protection | All Water Communities |
| 881 | Centralized Equipment Purchase | All MWRA Customers |
| 925 | Technical Assistance | All MWRA Customers |
| 931 | Business Systems Plan | All MWRA Customers |
| 932 | Environmental Remediation | All MWRA Customers |
| 933 | Capital Maintenance Planning/Development | All MWRA Customers |
| 934 | MWRA Facilities Management | All MWRA Customers |
| 935 | Alternative Energy Initiatives | All MWRA Customers |
| 940 | Application Improvement Program | All MWRA Customers |
| 942 | Information Security Program ISP | All MWRA Customers |
| 944 | Information Technology Management Program | All MWRA Customers |
| 946 | IT Infrastructure Program | All MWRA Customers |

# APPENDIX 7

# MWRA Completed Projects

# Appendix 7

**MWRA Completed Projects**
**(as of June 30, 2019)**

| Project | Total Cost ($000) | Completion Date | Summary |
|---|---|---|---|
| **Wastewater** | $5,273,856 | | |
| **Waterworks** | $1,789,011 | | |
| **Business and Operations Support** | $67,174 | | |
| **MWRA Total** | $7,130,041 | | |

**Bolded** items represent projects added since the last document.

*Italicized* items represent a change in value to a closed project due to a determination that past retainage values no longer represent a liability to the Authority.

| **Wastewater System Improvements** | | | |
|---|---|---|---|
| Boston Harbor Project | $3,512,332 | Nov-01 | BHP constructed to minimize the pollution of Boston Harbor. The new Deer Island Primary and Secondary Treatment Facilities are the largest components of the Project to comply with the requirements of the federal Clean Water Act and to improve the harbor for |
| S.101 Wastewater Metering System Upgrade | $7,516 | Dec-93 | Construction of system to provide accurate flow data. |
| S.102 Quincy Pump Facilities | $25,907 | Sep-03 | Constructed 3 new pump station and rehabbed force mains to ensure continuous pumping to treatment facilities. |
| S.103 Hingham Pump Station | $3,027 | Apr-92 | Elimination of untreated sewage discharges. |
| S.104 Braintree-Weymouth Relief Facilities | $227,909 | Jun-10 | Project reduces overflows into Weymouth Fore River during wet weather events. |
| S.105 New Neponset Valley Relief Sewer | $30,300 | Jul-96 | Relief facilities to correct structural and hydraulic deficiencies in the New Neponset Valley Interceptor Sewer System. |
| S.106 Wellesley Extension Replacement Sewer | $64,359 | Jan-96 | Construction of a replacement sewer and rehabilitation of sections of existing sewer lines to alleviate capacity restraints, improve the water quality of the Charles River, protect aquifers, and reduce back-ups in Needham and Dedham. |
| S.107 Framingham Extension Relief Sewer | $47,856 | Sep-04 | Installation of a new force main and gravity sewer and construction of a new pump station. |
| S.108 Alewife Brook Pkwy Pump St Rehab | $1,465 | May-95 | Replacement of equipment, construction of building addition and wet well modifications. |
| S.110 East Boston Pump Facilities | $48,234 | Jan-93 | Constructed to eliminate sewage back-ups. |
| S.112 Charlestown Pump Station Replacement | $32,533 | Apr-93 | New 93 mgd pump station to increase pumping efficiency and eliminate overflows to the Mystic River. |
| S.115 Reading Pump Station Replacement and Extension Relief Sewer | $412 | Sep-87 | Elimination of surcharges, reduction in staff requirements, and correction of safety hazards. |

# Appendix 7

| | | | |
|---|---|---|---|
| S.118 Bell Isle Siphon Rehabilitation | $79 | Apr-89 | Reduction of salt water infiltration and increase in system capacity. |
| S.127 Cummingsville Replacement Sewer | $8,999 | Jul-08 | Replacement and rehabilitation of existing sewers to provide additional capacity for upstream communities. |
| S.129 North Metropolitan Trunk Sewer | $11,997 | Mar-99 | Rehabilitation of a 19,700 linear-foot 100-year old sewer line. |
| S.131 Upper Neponset Valley Sewer System | $54,175 | Mar-08 | Project anticipated to eliminate interceptor backups during wet weather events. |
| S.136 West Roxbury Tunnel | $10,314 | Jun-11 | Investigate and rehabilitate West Roxbury Tunnel Sewer. |
| S.138 Sewerage System Mapping | $281 | Apr-04 | Updated and new GIS maps of sewer system. |
| S.143 Regional I/I Management Planning | $169 | Jun-03 | Reduction in infiltration and inflow water entering the MWRA system. |
| S.178 Deer Island Pump and Power Station Upgrade | $32,952 | Feb-91 | Constructed to prevent sewage surcharges and overflows in the upstream sewer system by improving flows to Deer Island Tunnel System and Plant. |
| S.179 Deer Island Remote Headworks Improvements | $26,081 | Jul-99 | Facility rehabilitation restored headworks capacity. |
| S.180 D.I. Sedimentation Tank System Improvements | $1,684 | Jul-89 | Restoration of operating efficiency by replacing 80 inlet sluice gates and baffles, rehabilitation of control building and other improvements. |
| S.181 D.I. Intermediate Upgrade | $9,474 | Jun-92 | Upgrade of the old Deer Island treatment plant. |
| S.184 Nut Island Immediate Upgrade | $1,206 | Dec-86 | Upgrade or replacement of equipment, including switch gear, sludge cross collectors and replacement of electric distribution substation to accommodate increased flows to Deer Island Treatment Plant. |
| S.185 Clinton Wastewater Treatment Plant | $36,747 | Sep-92 | Upgrade existing plant to improve water quality and met standards by rehabbing and new equipment. |
| S.187 Deer Island Sludge Thickeners Rebuilding | $114 | Sep-88 | Ensuring efficient operation of Deer Island treatment plant digesters. |
| S.189 DI Dual Fuel Engine | $281 | Jan-06 | Overhaul of five diesel engines. |
| S.190 Deer Island Electrical Equipment Upgrade | $28 | Mar-88 | Restoration of system operating efficiency. |
| S.191 DI Chlorination Facility Rehab | $4 | Mar-89 | Provision of effective disinfection operation and safe working environment. |

| | | | |
|---|---|---|---|
| S.194 Nut Island Intermediate Upgrade | $1,507 | Dec-92 | Improvements to ensure effective operation of the Nut Island treatment plant. |
| S.196 Other Wastewater | $92 | Apr-90 | Removal of hazardous materials from wastewater facilities and creation of on-going safety management programs. |
| S.197 Deer Island Treatment Plant Outfall Repair | $1,300 | Sep-97 | Repair of effluent discharge Outfall 002. |
| S.198 Boston Harbor Performance Certification | $1,275 | Dec-02 | Certification required for continuous federal grant and loan programs during construction. |
| S.200 DI Plant Optimization | $33,427 | Sep-08 | Capital investment to optimize the operation of the Deer Island Treatment Plant. Remaining initiatives rolled into DI Plant Asset Protection. |
| S.211 Laboratory Services | $2,212 | Feb-12 | Upgrade and restore the Central Laboratory |
| S.261 Residuals | $172,056 | Dec-01 | Phase 1 Feb - 92 - construction of the Residuals Treatment Facility at ore River Staging Area (FRSA). Termination of the sludge discharge to Boston Harbor. Phase 2 Dec-01 - To expand the residuals processing plate at the FRSA in Quincy to provide the capacity to process the sludge quantities produced by Deer Island. |
| S.325 Fox Point CSO Facility | $152 | Apr-89 | Elimination of untreated sewage discharges. |
| S.326 Commercial Point CSO Facility | $7,117 | Feb-91 | Improvements to water quality by reducing wet weather overflows via construction of a screening and disinfection facility. |
| S.327 Southwest Corridor CSO | -$6 | Fall 86 | Elimination of combined sewer overflows. |
| S.330 St. Mary's Street CSO Modifications | $17 | Feb-87 | Identification of solution for storm water detention. |
| S.332 Somerville Marginal CSO Rehabilitation | $98 | Feb-89 | Elimination of inadequately treated sewage discharges. |
| S.335 Moon Island | $1 | | |
| S.338 Cottage Farm CSO Ventilation System Repairs | $133 | Sep-94 | Rehabilitation of HVAC duct work. |
| S.339 North Dorchester Bay | $221,510 | May-11 | Eliminate CSO discharges and provide a high level of storm water control. |
| S.340 South Dorchester Bay Sewer Separation (Fox Pt.) | $55,029 | Nov-06 | Eliminate CSO discharges to South Dorchester Bay |
| 341 Dorch Bay Sew Separ (Commercial Point) | $59,862 | Dec-16 | Eliminate CSO discharges to South Dorchester Bay |

| | | | |
|---|---|---|---|
| S.342 Neponset River Sewer Separation | $2,492 | Aug-02 | Elimination of CSO discharges to the Neponset River. |
| S.343 Constitution Beach Sewer Separation | $3,731 | Apr-02 | Elimination of CSO discharges at the Constitution Beach CSO Facility. |
| S.344 Stony Brook Sewer Separation | $44,319 | Sep-06 | Minimize CSO discharges to the Stony Brook conduit and the Back Bay Fens. |
| 346 Cambridge Sewer Separation | $104,552 | Jun-17 | Minimize CSO discharges to the Alewife Brook and upgrading connections to MWRA interceptors. |
| S.347 East Boston Branch Sewer Relief | $85,638 | Jul-10 | To increase hydraulic capacity and provide long-term structural integrity to MWRA's East Boston Branch Sewer. |
| S.348 BOS019 Storage Conduit | $14,288 | Mar-07 | To reduce CSO activations and annual volume to the Little Mystic Channel. |
| S.349 Chelsea Trunk Sewer | $29,779 | Jun-02 | To control CSO discharges at outfalls CHE002, CHE003, CHE004, and CHE008. |
| S.350 Union Park Detention Treatment Facility | $49,583 | Jun-07 | To reduce the frequency and impacts of CSO discharges from outfall BOS070. |
| S.351 BWSC Floatables Controls | $946 | Mar-02 | Limit the discharge of floatable materials from 5 BWSC combined sewer outfalls. |
| S.352 Cambridge Floatables Controls | $1,127 | Dec-08 | Limit the discharge of floatable materials from Cambridge CSO outfalls. |
| S.353 Upgrade Existing CSO Facilities | $22,385 | Aug-01 | Minimize CSO impacts to the Lower Charles River, Upper Inner Harbor, Mystic/Chelsea Confluence, and South Dorchester Bay by upgrading 5 CSO treatment facilities. |
| S.354 Hydraulic Relief Projects | $2,295 | Aug-00 | Elimination of hydraulic restrictions between local and MWRA Systems. |
| S.355 MWR003 Gates & Siphon | $4,424 | Oct-15 | Minimize discharges to Alewife Brook as part of the MWRA's Alewife Brook CSO control plan. |
| S.356 Fort Point Channel Sewer Separation | $11,507 | Dec-10 | To minimize CSO discharges to Fort Point Channel by separating combined sewer systems tributary and implementing system optimization measures. |
| S.357 Charles River CSO Controls | $3,633 | Oct-11 | Implement wastewater system optimization measures, including structural and operational improvements. |
| S.358 Morrissey Boulevard Drain | $32,181 | Jun-09 | Reroute storm water from BOS087 area |
| 359 ReservedChannel Sewer Separation | $70,524 | Dec-15 | To minimize SCO discharges to the Reserved Channel by separating combined sewer systems in the area of South Boston. |
| S.360 Brookline Sewer Separation | $24,715 | Jul-13 | Minimize discharges to Charles River by separating combined sewer systems in several areas. |
| S.361 Bulfinch Triangle Sewer Separation | $9,032 | Jul-10 | Minimize discharges to Charles River by separating combined sewer systems in several areas. |
| S.402 Comprehensive Safety Action Project | $891 | Nov-90 | Correction of safety hazards at MWRA facilities and establishment ongoing safety management program. |

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| S.403 Sewerage Division Management Services | $1,930 | Dec-86 | Provision of engineering design and construction advice. |
| S.924 Harbor Environmental Studies | $1,666 | Jun-92 | Collection and study of harbor water quality data. |
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| **Sub-Total Wastewater System Improvements** | **$5,273,856** | | |

# Appendix 7

| Waterworks System Improvements | | | |
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| S.533 Local Sources of Supply | $2,112 | Jul-95 | Provision of assistance to communities to promote effective protection of existing local water supply sources and encourage development of additional local sources where feasible. |
| S.535 Reservoir Risk Assessment | $647 | Jun-92 | Development of maps and data to determine at risk areas. |
| S.537 Drinking Water Quality Improvement Wachusett | $8,330 | Oct-95 | To comply with Safe Drinking Water Act to strengthen quality standards for water supply from Wachusett. |
| S.538 Sudbury Reservoir Treatment Plant Study and EIR | $447 | Sep-92 | Evaluation of alternative uses of the Sudbury Reservoir. |
| S.539 Drinking Water Quality Improvement Quabbin | $307 | Nov-98 | To comply with Safe Drinking Water Act to strengthen quality standards for water supply from Quabbin. |
| S.541 Watershed Protection | $8,500 | Dec-03 | To develop watershed protection measures for the MWRA/MDC reservoir system. |
| S.542 Carroll Water Treatment Plant | $423,417 | Jun-05 | To provide high quality drinking water to MWRA communities and to ensure water meets the standards established by the federal Safe Drinking Water Act. |
| S.543 Quabbin Water Treatment Plant | $19,973 | Oct-14 | To improve the quality of drinking water to the three Chicopee Valley Aqueduct communities. |
| S.544 Norumbega Covered Storage | $106,674 | Jun-08 | Construction of a covered 115 million gallon reinforced concrete storage tank to meet the drinking water quality standards mandated by the federal Safe Drinking Water Act. |
| S.545 Blue Hills Covered Storage | $40,083 | Apr-10 | To ensure sufficient distribution storage for MWRA's Southern High Service Area. |
| S.547 Fells Covered Storage | $18,004 | Jun-00 | Covered storage for Northern High Service System. |
| S.548 Nash Hill Covered Storage | $14,296 | Jul-99 | To improve the quality of drinking water to the three Chicopee Valley Aqueduct communities. |
| S. 550 Spot Pond Storage Facility | $60,126 | Dec-15 | Storage facility required to meet state and federal drinking water guidelines and provides 1 day's water demand. |
| S.598 Wachusett Reservoir By-pass Tunnel | $15 | Jan-89 | Evaluation of the option of constructing a tunnel by-pass. |
| S.599 Dam Control Valve Replacement | $1,763 | Jul-98 | Valve replacement at Sudbury Reservoir in Southborough and Wachusett Dam. |
| S.600 Oakdale Power Station Generator Repair | $893 | Sep-91 | Repair of substation metering and transformer systems. |

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| S.601 Sluice Gate Rehab | $9,158 | Jun-05 | Installation of motorized gates and 12 facilities rehabilitated. |
| S.602 Hultman – Weston Aqueduct Transfer for Hydropower | $593 | May-89 | Production of approximately 3,700,000 kW hours per year of electricity. |
| S.603 Transmission Maintenance Facility | $5,025 | May-93 | Construction of new waterworks maintenance facility in Southborough. |
| S.604 MetroWest Tunnel | $697,254 | Jun-03 | To provide transmission redundancy for the Hultman Aqueduct ensuring reliable water delivery and providing sufficient hydraulic capacity to support the new Carroll Water Treatment Plant and covered storage distribution facilities. |
| S.605 Echo Bridge Rehabilitation | $356 | Sep-92 | Repair and cleaning of bridge façade and construction of new surface topping. |
| S.606 Norumbega Chlorination Facility | $10 | Mar-89 | Provision of a new water disinfection facility. |
| S.607 Weston Reservoir Chlorination Facility | $2,539 | Jun-93 | Replacement of obsolete facility with new 4,000 sq. ft.. chlorination and ammonia feed facility. |
| S.615 Chicopee Valley Aqueduct. Redundancy | $8,666 | Apr-08 | To provide redundancy for water service for the three communities supplied by the Chicopee Valley Aqueduct (CVA) in case of a CVA failure or shutdown. |
| S.620 Wachusett Reservoir Spillway Improvement | $9,287 | Jul-10 | Provide the necessary improvements to the Wachusett Reservoir Dam. |
| S.675 Water Distribution Master Plan | $1,178 | Mar-93 | Development of data base and recommendations for master plan. |
| S.676 Water Meter Modernization | $12,482 | Jun-90 | Rehab of 139 revenue meters |
| S.678 Boston Low Service Pipe & Valve Rehab | $23,691 | Sep-03 | Improve the condition and operability of the pipelines serving the Boston Low Service System. |
| S.679 Nonantum Road Pipe Rehabilitation | $2,153 | Mar-97 | Rehabilitation and/or replacement of deteriorated pipeline. |
| S.680 Orient Heights Booster Pump Station | $3 | Sep-90 | Construction of a booster pump station to increase pressure throughout the Orient Height distribution system. |

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| S.681 Southern Service Improvements | $14,450 | Oct-99 | Reliability and capability improvements to pipelines and pump stations serving the Southern service area. |
| S.683 Heath Hill Road Pipe Replacement | $19,358 | Oct-07 | Repair and improve pipelines and valves in Southern High and Southern Extra High Service areas. |
| S.684 Commonwealth Ave Pump Station | $8,503 | Dec-99 | Modernize and improve station serving a major portion of Newton. |
| S.685 Ward Street Pump Station | $24 | Aug-89 | Evaluation of the feasibility of pump station rehabilitation. |
| S.686 Dudley Road Pump Station | $55 | Jun-91 | Evaluation of the feasibility of pump station rehabilitation. |
| S.687 Lexington St Pump Station Rehabilitation | $3,985 | Jun-99 | Installation of larger capacity pumping units, backup power generation, and various electrical upgrades. |
| S.688 Northern Intermediate High Pipelines | $973 | Nov-88 | Increase in pipe capacity and pressure. |
| S.689 James L. Gillis Pump Station Rehab | $33,138 | May-02 | To improve and modernize pumping facilities. |
| S.690 Northern Low Service Pipeline Replacement | $714 | Aug-99 | Repair of Section 16W with replacement and pipe slip lining methods. |
| S.691 Northern High Service Improvements - Lynn Pipeline | $17,271 | Jun-99 | Installation of a new primary supply line for the northeast section of the Northern High Service System. |
| S.701 Northern Extra High Service – Bedford Pipeline | $71 | Jan-92 | Development of a plan to supply water to Bedford. |
| S.706 Northern High Service - Construction Mains from Section 91 | $2,360 | Jun-02 | To integrate the new Section 91 pipeline with the existing grid network, improving service pressures and reliability to community meters. |
| 713 Spot Pond Supply Mains Rehabilitation | $65,489 | Dec-16 | To improve the condition of carrying capacity and valve operability on the two long supply mains from Chestnut Hill to Spot Pond. |

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| S.714 Southern Extra High Sections 41 & 42 | $3,657 | Dec-00 | To increase hydraulic capacity of the mains that carry water to the Bellevue Tanks. |
| S.715 Newton Service Improvements | $5,762 | Nov-99 | New supply to Newton's Oak Hill Tank replacing an antiquated pump station and providing some system redundancy in the area. |
| S.716 Water Main Relocation in Chelsea River | $10,648 | Nov-00 | Relocation of the Section 8 water main over the Chelsea River. |
| S.720 Warren Cottage Line Rehabilitation | $1,205 | Dec-02 | To improve the carrying capacity and internal condition of the Warren Cottage Line. |
| S.725 Hydraulic Model Update | $598 | Jun-07 | To modernize MWRA hydraulic and water quality modeling capabilities. |
| 730 Weston Aqueduct Supply Mains | $80,403 | Dec-16 | To improve the condition of carrying capacity of these major supply lines and the quality of the water supplied to the low, High, Intermediate, and Extra High pressure zones. |
| S.731 Lynnfield Pipeline | $5,626 | Dec-12 | Replace undersized water main to meet Lynnfield's high water demand |
| S.732 Walnut St. & Fisher Hill Pipeline Rehab. | $2,716 | Mar-09 | Improve water quality and hydraulic capacity of the pipeline serving City of Boston. |
| S.754 Domestic Device Retrofit | $9,928 | Dec-93 | Installation of water saving devices to reduce demand. |
| S.755 Leak Detection Survey | $751 | Aug-90 | Provision of data on the magnitude and location of water leaks. |
| S.756 Asbestos Abatement | $562 | Aug-90 | Elimination of asbestos in MWRA facilities. |
| S.757 PCB Abatement | $432 | Aug-91 | Replacement of equipment with unacceptable levels of PCB concentrations. |
| S.758 Rehabilitation of Existing Facilities | $14,173 | Nov-02 | Upgrade various facilities in need of significant capital improvement. |
| S.759 Municipal Toilet Replacement | $127 | Dec-90 | Reduction in water consumption. |
| S.760 Chestnut Hill Pump Station REH | $559 | Oct-94 | Rehab of pump station. |
| S.764 Local Water Infrastructure Rehabilitation Assistance Program | $7,488 | Jun-04 | To provide financial support to MWRA waterworks communities to replace, rehabilitate, and maintain their waterworks system infrastructures. |
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| **Sub-Total Water System Improvements** | **$1,789,011** | | |

# Appendix 7

| **Business & Operations Support** | | | |
|---|---|---|---|
| S.901 Charlestown Headquarters | $4,548 | Jun-91 | Provision of office equipment at MWRA headquarters. |
| S.921 Management Information Service | $21,423 | Dec-92 | Enhancement to information systems to support more effective management of MWRA business activities. |
| S.922 Fore River Preservation | $4,946 | Nov-97 | Modify FRSA for on-going construction and operational support. |
| S.929 Affirmative Action | $403 | Mar-91 | Evaluation of minority participation in the MWRA procurement process. |
| S.930 MWRA Facility - Chelsea | $9,813 | Mar-08 | To improve MWRA operations by consolidating facilities. |
| S.931 Business System Planning | $24,563 | Jun-11 | Develop, improve, and procure management information systems. |
| S.932 Environmental Remediation | $1,479 | Oct-10 | Implement remedial programs necessary to protect the environment and to ensure compliance with the Clean State Initiative. |
| **Sub-Total Business & Operations Support** | **$67,174** | | |

# APPENDIX 8

# Expected Useful Life of Capital Projects

## APPENDIX 8

## EXPECTED USEFUL LIFE OF CAPITAL PROJECTS

The estimated useful life of the MWRA's capital projects are summarized below:

| Type of Capital Improvement | Estimated Useful Life (in years) |
|---|---|
| Buildings (includes all substantial above ground structures or enclosures) | 40 |
| Mechanical Equipment (includes pumps, chains, fans, HVAC, valves, etc.) | 20 |
| Electrical Equipment (motors, generators, motor control centers, lighting, conduit, etc) | 20 |
| Control Systems (computers, SCADA, PLCs, programming, etc) | 10 |
| Water Pipes | 50 – 75 |
| Water Pipe appurtenances (blow offs, air valves) | 40 |
| Sewer Pipes – gravity | 50 |
| Sewer Pipes – pressure | 50 |
| Sewer Pipe appurtenances (manholes, chambers) | 50 |
| Tunnels – Water | 100 |
| Tunnels – Wastewater | 100 |
| Tunnel appurtenances (shafts, control valves) | 40 |
| Distribution Reservoirs – above ground | 40 |
| Distribution Reservoirs – below ground | 75 -100 |
| Dams and Dam improvements | 100 |
| Motor Vehicles | 10 – 15 |
| Furniture and Fixtures | 5 – 15 |
| Leasehold Improvements | Period of lease |
| Study | 5 |
| Design – if constructed | 20 |
| Design – if not used | 5 |
| Inflow/Infiltration - Repair | 20 |
| Inflow/Infiltration - Replacement | 50 |
| Covered Storage | 50 |