FISCAL YEAR 2021

Capital Improvement Program

MASSACHUSETTS WATER RESOURCES AUTHORITY

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September 2020

Louis M. Taverna, Chairman
MWRA Advisory Board
100 First Avenue – 4th Floor
Boston, MA 02129

Dear Chairman Taverna:

This letter transmits to the Advisory Board the MWRA's Capital Improvement Program (CIP) for Fiscal Year 2021. The MWRA Board of Directors approved the FY21 CIP at its June 24, 2020 meeting. The FY21 CIP represents an update to the FY20 CIP approved by the Board in June 2019 and includes the latest cost estimates, revised schedules, and new projects. The FY21 CIP spending falls within the FY19-23 approved spending cap of $984.8 million.

The FY21 Capital Improvement Program projects $266.2 million in spending for FY21, of which $153.5 million supports Wastewater System Improvements, $90.3 million supports Waterworks System Improvements, and $22.4 million is for Business and Operations Support.

The projects with significant spending in FY21 include Deer Island Clarifier Rehabilitation Phase 2, Chelsea Creek Headworks Upgrades, Prison Point CSO Facility Rehabilitation, Nut Island Odor Control and HVAC Improvements, Northern Intermediate High Sections 89 and 29 Replacement, and Deer Island Gravity Thickener Rehabilitation.

Asset Protection accounts for the largest share of capital expenditures for the FY19-23 period. The FY21 CIP includes $570.5 million for asset protection initiatives, representing over 54% of total MWRA spending in this timeframe. Water System Redundancy project spending totals $206.8 million in the same FY19-23 period, accounting for over 19% of total spending.

The FY21 Capital Program 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

FY21 Operating Budget ($ in millions)

Direct Expenses	$252.2
Indirect Expenses	$57.3
Capital Finance	$481.9
Total Operating Budget	$791.4
Revenues*	$791.4

**97.2% 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: $8.7 billion since 1984
- Total Current Indebtedness $4.9 billion
- FY21 CIP Budget: $266.2 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*

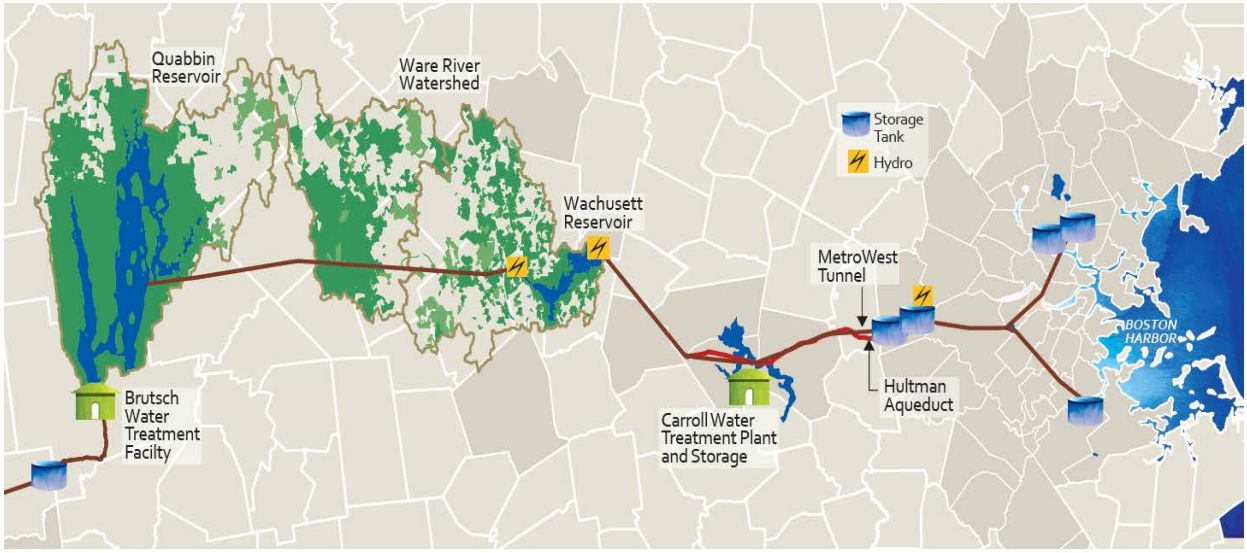
Wastewater System

- 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 FY20.

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.

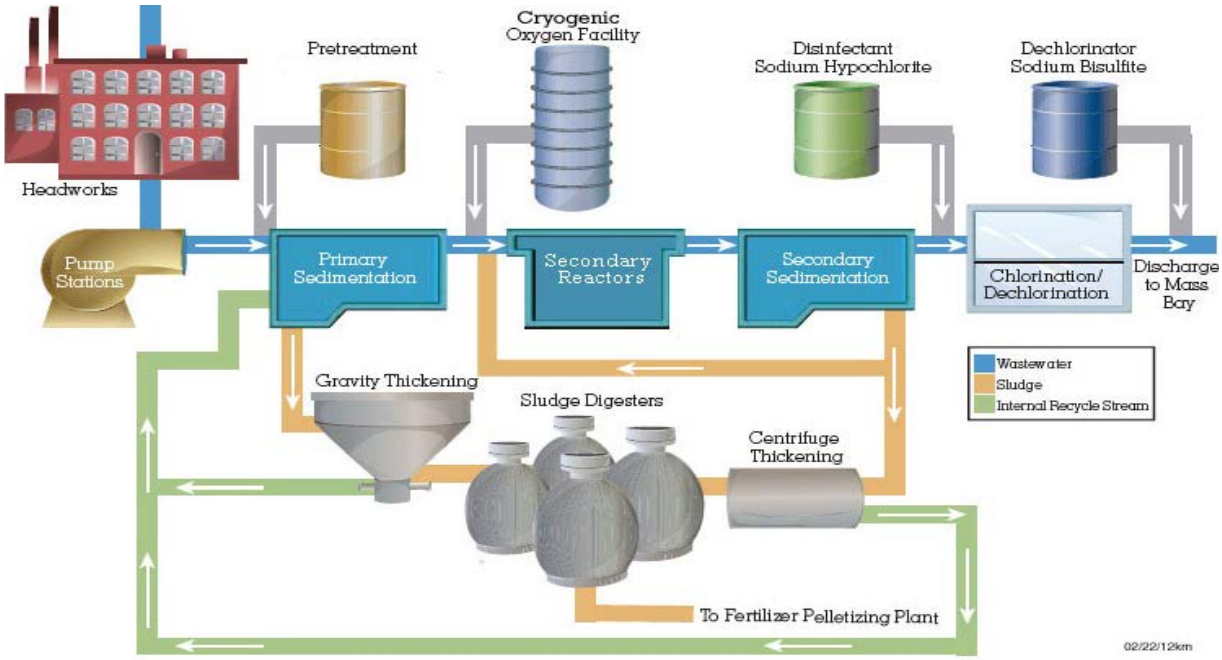
Water for most MWRA communities is treated at the Carroll Water Treatment Plant in Marlborough, Massachusetts. Water from the Quabbin and Wachusett Reservoirs enters the plant through the Cosgrove or Wachusett Aqueduct. The treated water leaves the plant through the MetroWest Water Supply Tunnel and 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.

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 $8.7 billion to improve the wastewater and waterworks systems serving its 61 customer communities with projected future spending of $4.1 billion. 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 nearly 70% of life spending to date:

- Boston Harbor Project - $3.8 billion
- Combined Sewer Overflow - $913 million
- MetroWest Tunnel - $697 million
- Carroll Water Treatment Plant - $424 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 facilitate planned maintenance where major sections of the water delivery system assets can be taken off-line. Long-term water redundancy will be the largest single future CIP initiative with estimated spending in excess of $1.5 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 FY21 CIP Budget 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 June 30, 2020, MWRA's total debt was $4.9 billion. The Authority's capital finance (including debt service) obligation as a percent of total expenses has increased from 36% in 1990 to 60.9% in the Final FY21 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.

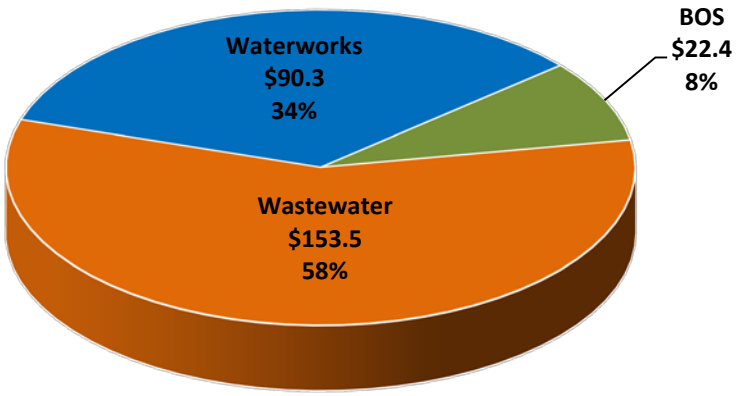
To arrive at the FY21 CIP, the Authority identified the needs of the capital programs taking into account the recommendations of the Master Plan. The long-term strategy for capital work is identified in the Authority's Master Plan which was published in 2006, updated in 2013, and in 2018. The Master Plan serves as a road map for inclusion of projects in the CIP in every budget cycle.

The FY21 CIP represents an update to the FY20 CIP approved by the MWRA Board in June 2019. 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.

FY21 Capital Spending

The FY21 Final Capital Improvement Program projects $266.2 million spending for FY21, of which $153.5 million supports Wastewater System Improvements, $90.3 million supports Waterworks System Improvements, and $22.4 million is for Business and Operations Support. Capital spending continues to target asset protection to preserve the integrity of the Authorities operating assets and the initial funding in preparation for the next major redundancy initiative.

FY21 Spending



FY21 spending includes $65.2 million for community assistance programs, which are a combination of loan and partial grant programs, with net expenditures of $32.0 million for the local Infiltration/Inflow Program and net expenditures of $33.2 million for the Local Water Pipeline Program. In response to the COVID-19 pandemic and in an effort to ease financial hardship, member communities are able to defer loan repayments due in FY21 and FY22 which will provide some cash flow relief and improve financial flexibility.

The table below lists project contracts with spending greater than $5.0 million in FY21 and totals $127.4 million or 47.9% of projected spending for the year. When local community assistance programs are excluded, projected spending with spending greater than $5.0 million drops to $81.7 million or 30.7% of projected FY21 spending.

Project	Contract	Projected FY21 Expenditures $s in millions
Corrosion & Odor Control	NI Odor Ctrl HVAC Imp Constr Ph 2	$20.0
Facility Asset Protection	Chelsea Creek Upgrades - Construction	$17.7
Local Water System Assistance Program	LWSAP Phase 3 Distributions	$16.0
Facility Asset Protection	Prison Point Rehab - Construction	$15.7
DI Treatment Plant Asset Protection	Clarifier Rehab Phase 2 - Construction	$14.5
Local Water System Assistance Program	Local Water System Assistance Loans	$11.2
I/I Local Financial Assistance	Phase X Grants	$7.5
SEH Redundancy & Storage	Redundancy Pipeline Sect 111 - Constr 3	$7.3
DI Treatment Plant Asset Protection	Gravity Thickener Rehab	$6.6
I/I Local Financial Assistance	Phase XI Grants	$6.0
Local Water System Assistance Program	Lead Service Line Replace Loans	$5.0
	Total Contracts > $5.0 million	**$127.4**
	% of FY21 Spending	**47.9%**
	Excluding Community Loan Programs	**$81.7**
	% of FY21 Spending	**30.7%**
	Total Projected FY21 Spending	**$266.2**

Nut Island Odor Control and HVAC Improvements - Construction Phase 2 - $20.0 million ($57.6 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.

Chelsea Creek Headworks Upgrade Construction - $17.7 million ($83.3 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.

Prison Point Rehabilitation Construction - $15.7 million ($41.8 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.

Southern Extra High Redundancy Section 111 Phase 3 Construction - $7.3 million ($20.4 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.

Deer Island Wastewater Treatment Plant Asset Protection and Residuals:

Clarifier Rehabilitation Phase 2 Construction - $14.5 million ($137.2 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.

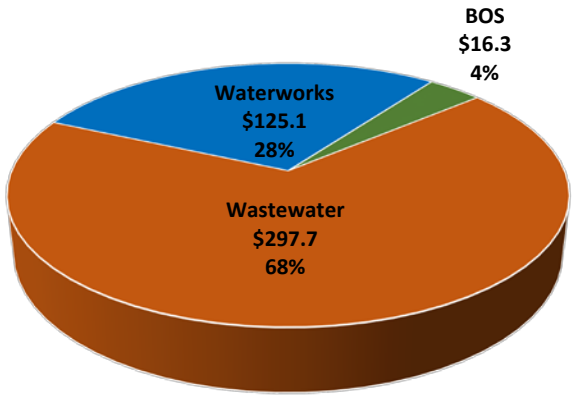
Gravity Thickener Rehabilitation - $6.6 million ($19.9 million total construction cost). This project involves installing catwalks around the perimeter of several tanks, removing concrete blocks in the effluent channels, and modifying the sludge thickener roofing to improve staff access and operating efficiency.

Major Planned Contract Awards for FY21

In Fiscal Year 2021, 74 contracts totaling $439.1 million are projected to be awarded. The largest ten projected contract awards total $312.1 million and account for 71.1% of expected awards and are presented in the following table.

Project	Subphase	Notice to Proceed	Total Contract Amount $s in Millions
DI Treatment Plant Asset Protection	Clarifier Rehabilitation Phase 2 - Construction	Sep-20	$137.2
Facility Asset Protection	Prison Point Rehab - Construction	Sep-20	$41.8
DI Treatment Plant Asset Protection	Fire Alarm System Replacement - Construction	Jan-21	$28.8
Facility Asset Protection	Ward St & Columbus Park Headworks Des/CA	Jul-20	$22.0
NIH Redundancy & Storage	Section 89 & 29 Repl - Construction	Jul-20	$21.3
New Connecting Mains-Shaft 7	CP3-Section 23,24,47, Rehabilitation	Sep-20	$14.7
Metro Redundancy Interim Improvements	WASM 3 CP-1	Jul-20	$13.0
Central Monitoring System	CWTP SCADA Upgrade Construction	Dec-20	$13.0
DI Treatment Plant Asset Protection	MCC & Switchgear Replace Construction	Sep-20	$11.2
Cathodic Protection Of Distribution Mains	Cathodic Protection Metropolitan System Des/CA	Jan-21	$9.2
Top 10 Contracts			**$312.1**
% of Total Planned Awards			**71.1%**
74 Contract Awards Planned			**$439.1**

Of the 74 planned awards, 29 are Wastewater totaling $297.7 million, followed by 34 Waterworks awards for $125.1 million and finally 11 Business and Operations & Support for $16.3 million.



New Projects

The FY21 Draft Final CIP adds $55.0 million in new projects of which Waterworks projects total $50.3 million and Wastewater projects total $4.7 million. Most of the projected spending is beyond FY23 at $47.8 million. Projected new project spending over the FY19-23 timespan is $7.2 million.

$s millions			
Program	**Total Contract Amount**	**FY19-23 Expenditures**	**Expenditures Beyond FY23**
Total Waterworks Projects	$ 50.3	$ 3.3	$ 47.0
Total Wastewater Projects	$ 4.7	$ 3.9	$ 0.8
Total Projects	$ 55.0	$ 7.2	$ 47.8

The top three new Waterworks projects include the Phase 2 painting of Bellevue, Park Circle and Walnut Hill Water Tanks at $14.0 million, Cosgrove Tunnel Rehabilitation Design at $10.0 million, and Beacon Street Line Rehabilitation at $6.9 million. The largest new Wastewater project is a new roof at Deer Island with an estimated cost of $2.0 million.

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

MWRA Future Capital Spending

Every year, the MWRA updates its anticipated future spending. The FY21 Final CIP projects total MWRA future spending of $4.1 billion. This is an increase of $210.2 million over the FY20 Final CIP transmitted to the Board of Directors in June 2019, with most of the additional spending in years beyond FY23.

Incremental Change in FY21 CIP
($s in millions)

Division	FY20 Final Future Spending	FY21 Final Future Spending	$ Change	% Change
Total Wastewater	$ 1,658.1	$ 1,698.3	$ 40.2	2.4%
Total Waterworks	$ 2,188.3	$ 2,352.8	$ 164.4	7.5%
Business & Operations Support	$ 64.0	$ 69.6	$ 5.6	8.8%
Total MWRA	$ 3,910.4	$ 4,120.6	$ 210.2	5.4%

Of the $210.2 million future spending added to the CIP for FY21, a net of $155.2 million (Net of New Projects) 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 $64.0 million for the Metropolitan Tunnel Construction due primarily to

inflation, $12.6 million for Nut Island Corrosion & Odor HVAC Improvements Construction, $12.0 million for Northern Extra High Service CP-1 NEH Improvements, $10.6 million for Ward Street and Columbus Park Headworks Design, $10.0 million for North Main Pump Station VFD Replacements, and $9.0 million for the Cryogenics Plant Equipment Replacement. Cost estimates may also decrease. The largest decrease was $48.1 million for Deer Island HVAC Equipment Replacement Design due to revised scope/cost followed by an $18.8 million decrease for Northern Low Service Sections 50/57 Water and Sections 21/20/19 Sewer reflecting updated cost estimates.

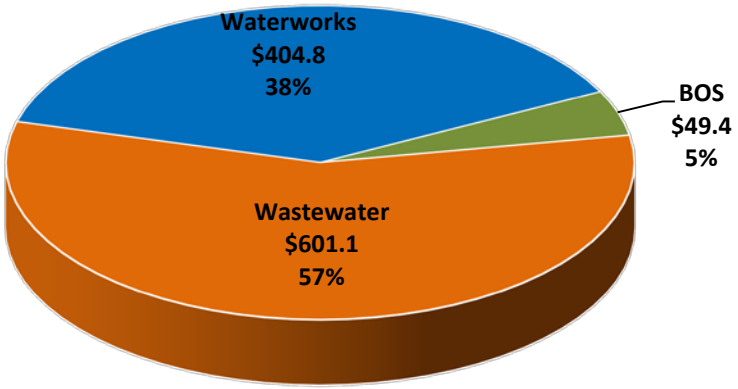
FY19-23 Capital Expenditures

The FY21 CIP contains future spending (beyond FY19) estimated at $4.1 billion with 19-23 spending projected at $1,055.2 million. The table below represents the projected spending by the major project categories:

	Future Spending Beyond FY19	FY19	FY20	FY21	FY22	FY23	Total FY19-23	Beyond 23
Wastewater System Improvements	**$1,698.3**	**$74.8**	**$96.6**	**$153.5**	**$143.4**	**$132.8**	**$601.1**	**$1,172.0**
Interception & Pumping	612.9	23.1	34.9	74.2	57.8	31.1	221.2	414.8
Treatment	810.1	10.0	17.3	38.5	56.7	78.5	201.1	619.1
Residuals	103.4	0.8	10.9	3.7	0.5	0.8	16.8	87.5
CSO	8.9	1.2	2.0	5.0	1.7	0.1	10.0	0.1
Other Wastewater	162.9	39.6	31.5	32.0	26.6	22.3	152.0	50.5
Waterworks System Improvements	**$2,352.8**	**$65.6**	**$53.6**	**$90.3**	**$98.3**	**$96.9**	**$404.8**	**$2,013.6**
Drinking Water Quality Improvemer	57.3	0.8	1.5	2.8	8.1	3.2	16.4	41.7
Transmission	1,785.8	9.9	13.5	25.1	39.0	42.9	130.4	1,665.4
Distribution & Pumping	538.8	36.6	26.2	24.6	31.7	44.4	163.4	412.0
Other Waterworks	(29.2)	18.4	12.5	37.9	19.5	6.4	94.6	(105.5)
Business & Operations Suppport	**69.6**	**2.4**	**8.0**	**22.4**	**10.2**	**6.3**	**49.4**	**22.6**
Total MWRA	**$4,120.6**	**$142.9**	**$158.3**	**$266.2**	**$251.9**	**$236.0**	**$1,055.2**	**$3,208.3**

Spending over the FY19-23 period totals $1,055.2 million with Wastewater projects accounting for $601.1 million of total period spending or 57% and Waterworks planned spending following at $404.8 million or 38%. 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:

FY19-23 Spending



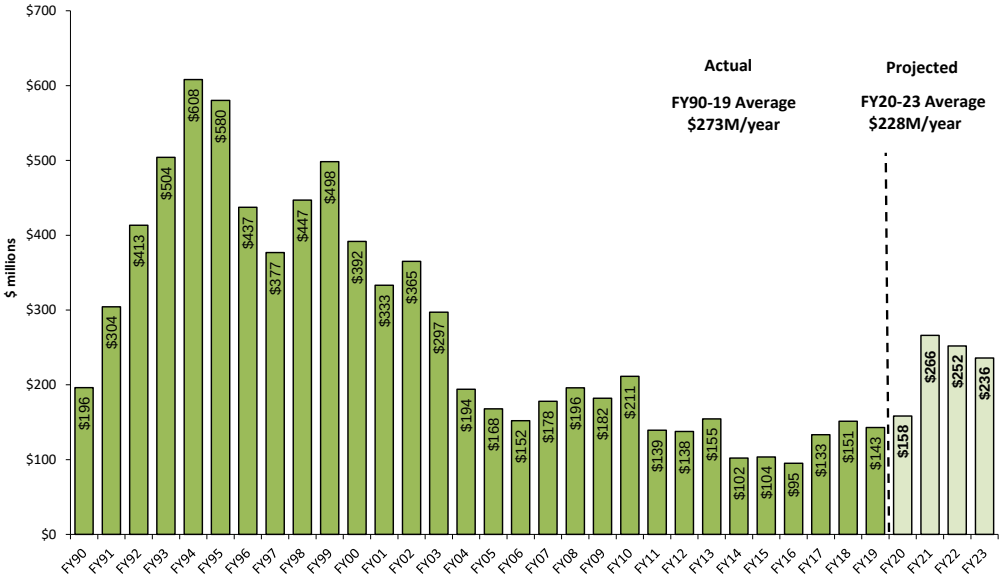
It is important to emphasize that the majority of spending within the Wastewater and Waterworks programs is concentrated in several larger projects with significant spending in the FY19-23 timeframe. Project contracts with expenditures greater than $15.0 million for the FY19-23 Cap total $631.7 million and are listed in the table below. This total includes local community assistance programs, and accounts for nearly 60% of total spending. When loan program funding is excluded, top spending projects greater than $15.0 million drops to $318.6 million or 30.6% of FY19-23 spending. The FY19-23 timeframe is dominated by several large projects with the top five construction projects totaling $246.8 million and accounting for 23.4% of FY19-23 spending. Large construction initiatives include the Clarifier Rehabilitation at Deer Island, Nut Island Odor Control & HVAC Improvements, and Chelsea Creek Upgrades at $75.3 million (total cost $137.2 million), $59.9 million (total cost $59.9 million, and $51.4 million (total cost $83.4 million), respectively between FY19-23.

Project	Contract	Projected FY19-23 Expenditures $s in millions
Local Water Pipeline Improvement	LWSAP Phase 3 Distributions	$85.6
DI Treatment Plant Asset Protection	Clarifier Rehab Phase 2 - Construction	$75.3
Local Water Pipeline Improvement	Local Water System Assistance Loans	$59.9
Corrosion & Odor Control	NI Odor Ctrl HVAC Imp Constr Ph 2	$57.6
Facility Asset Protection	Chelsea Creek Upgrades - Construction	$51.8
I/I Local Financial Assistance	Phase XI Grants	$46.5
Facility Asset Protection	Prison Point Rehab - Construction	$41.8
I/I Local Financial Assistance	Phase X Grants	$33.2
I/I Local Financial Assistance	Phase XII Grants	$26.1
I/I Local Financial Assistance	Phase IX Grants	$23.6
Local Water Pipeline Improvement	Lead Service Line Replace Loans	$22.7
SEH Redundancy and Storage	Redundancy Pipeline Sect 111 - Constr 3	$20.4
NIH Redundancy & Storage	Section 89 & 29 Redun Const. Phase 2	$19.8
DI Treatment Plant Asset Protection	Gravity Thickener Rehab	$19.5
NIH Redundancy & Storage	Section 89 & 29 Repl - Constr	$16.7
DI Treatment Plant Asset Protection	Fire Alarm System Replacement - Construc	$15.8
I/I Local Financial Assistance	Phase XI Loans	$15.5
	Total Contracts > $15.0 million	**$631.7**
	% of FY19-23 Spending	**59.9%**
	Excluding Community Loan Programs	**$318.6**
	% of FY21 Spending	**30.2%**
	Total Projected FY19-23 Spending	**$1,055.2**

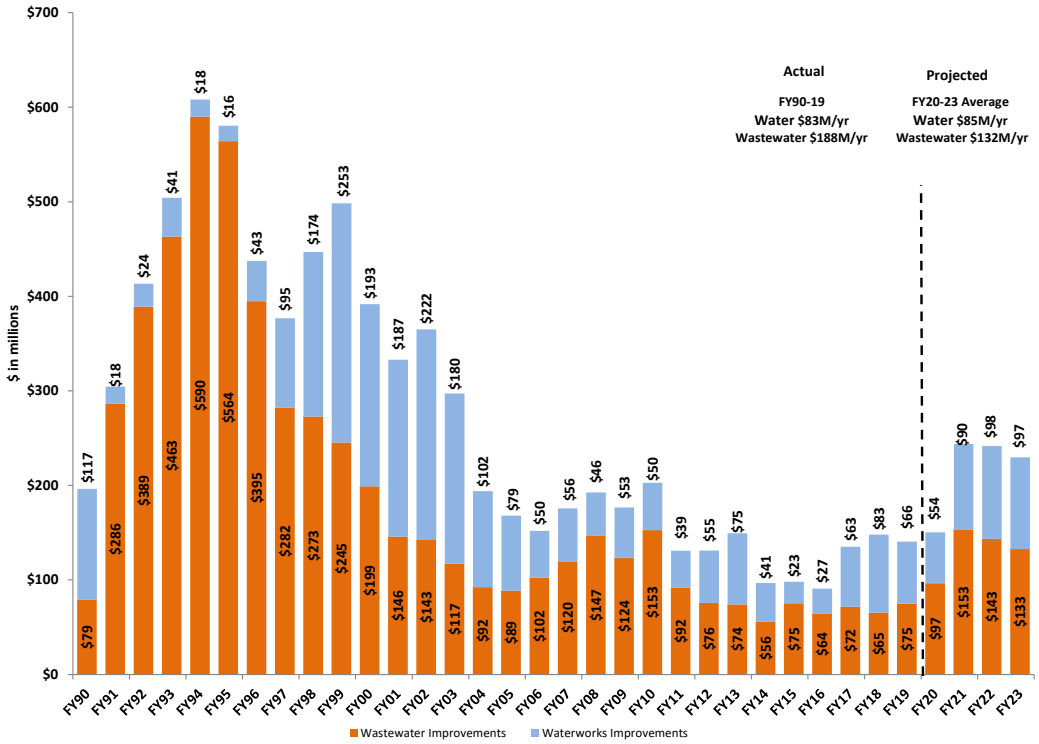
Historical and Projected Spending

The following two charts below capture the historical CIP spending through FY19 and projects spending through FY23 based on the FY21 CIP both overall at the MWRA level and by utility. Average total annual CIP spending through FY19 was $273 million. Average annual CIP spending for the proposed FY20-23 is projected to be $228 million. Average annual CIP spending through FY19 was $83 million for Waterworks and $188 million for Wastewater. Average annual CIP spending for the proposed FY20-23 is projected to be $85 million for Waterworks and $132 million for Wastewater.

Total Annual CIP Spending



Total Annual CIP Spending
By Utility



The FY21 Final CIP includes approximately $2.0 billion in future expenditures for asset protection and $1.9 million for redundancy, including $1.5 billion for the critical redundancy of the Metropolitan Tunnels System to be completed over a seventeen-year period. The initial contract for Program Support Services began in April 2019 and Preliminary Design and MEPA Review is expected to commence in May 2020.

	Total FY19-23	Total FY24-28
Wastewater System Improvements	**$601.1**	**$1,044.7**
Interception & Pumping	221.2	356.4
Treatment	201.1	550.0
Residuals	16.8	30.9
CSO	10.0	0.1
Other Wastewater	152.0	107.3
Waterworks System Improvements	**$404.8**	**$791.8**
Drinking Water Quality Improvements	16.4	13.5
Transmission	130.4	365.3
Distribution & Pumping	163.4	349.7
Other Waterworks	94.6	63.3
Business & Operations Suppport	**49.4**	**22.6**
Total MWRA	**$1,055.2**	**$1,859.1**

The table to the left depicts CIP projected spending for the FY19-23 period and FY24-28 period by major program categories for Wastewater Systems Improvements, Waterworks System Improvements and Business and Operations Support. Spending during the FY19-23 timeframe is planned to be $1.1 billion. Wastewater System's $601.1 million in spending is led by Deer Island Asset Protection ($193.0 million), Facility Asset Protection ($144.3 million), and Corrosion & Odor Control ($62.1 million) which combine to account for over 81% of Division expenditures. Similarly, Waterworks Division FY19-23 spending of $404.8 million includes these major spenders: the Metro Redundancy Interim Improvement ($65.9 million), NIH Redundancy & Storage ($45.6 million), and Southern Extra High Redundancy & Storage ($38.5 million) which combine for over 37% of Division spending. Additionally, Wastewater and Waterworks spending include local community spending of $152.0 million for the I/I loan and grant program and $54.2 million for the water pipeline loan program.

FY24-28 spending of nearly $1.9 billion is dominated by asset protection projects and water redundancy initiatives totaling $1.3 billion and $386.6 million, respectively, accounting for 88.5% of planned expenditures. Top Wastewater spenders include Deer Island Asset Protection $540.9 million and Facility Asset Protection $285.8 million. Top Water Division spenders include Metropolitan Tunnel Redundancy ($197 million) and Metro Redundancy Interim Improvement ($95 million). The Metropolitan Tunnel Redundancy project is expected to drive Beyond FY28 spending with planned expenditures of $1.3 billion. Redundancy project spending accelerates in the FY24-28 window.

Asset Protection and Water System Redundancy

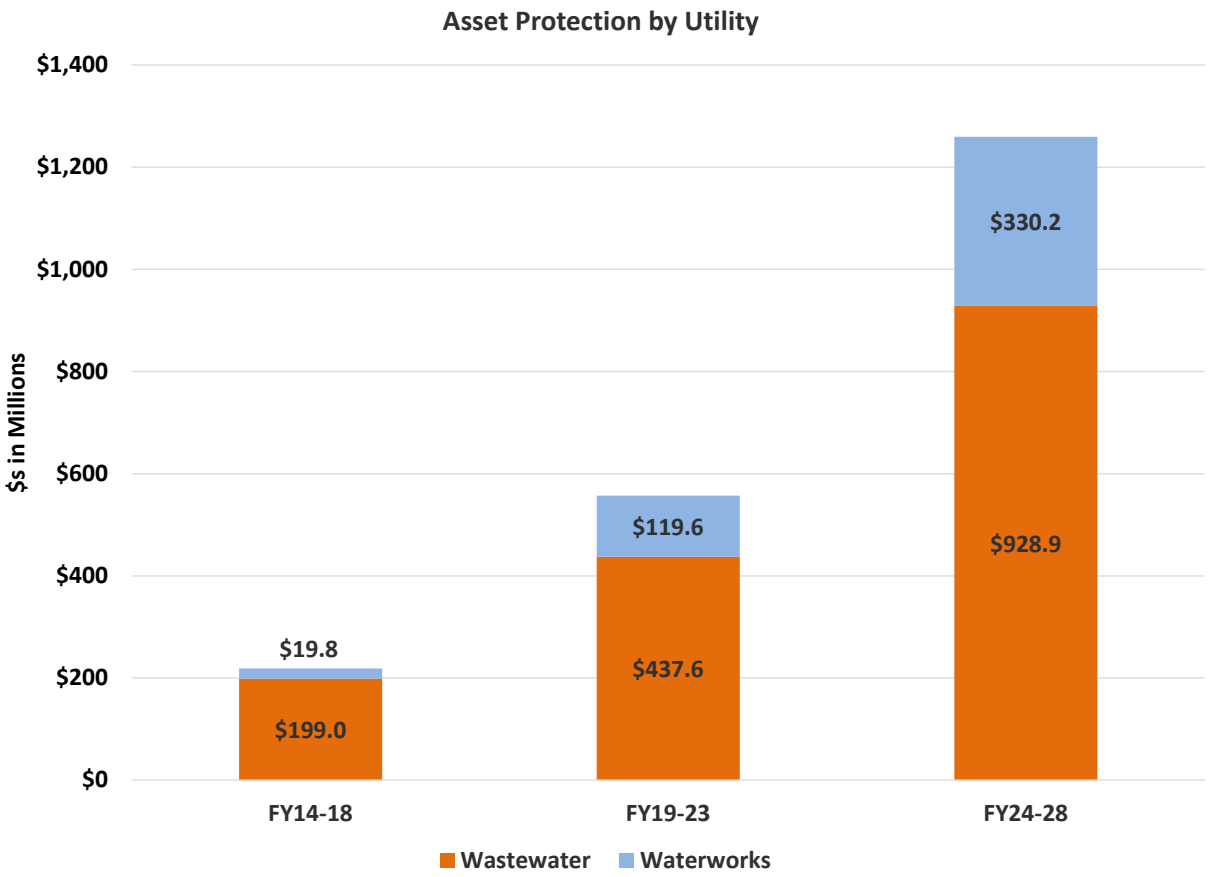
Asset Protection accounts for the largest share of capital expenditures for the FY19-23 period. The FY21 CIP includes $570.5 million for asset protection initiatives, representing over 54% of total MWRA spending. Wastewater and Waterworks Asset Protection are $437.6 million and $119.6 million, respectively. Deer Island Treatment Plant Asset Protection alone accounts for

$193.0 million in spending. Spending for water system redundancy projects total $206.8 million in the same FY19-23 period, accounting for 20% of total spending.

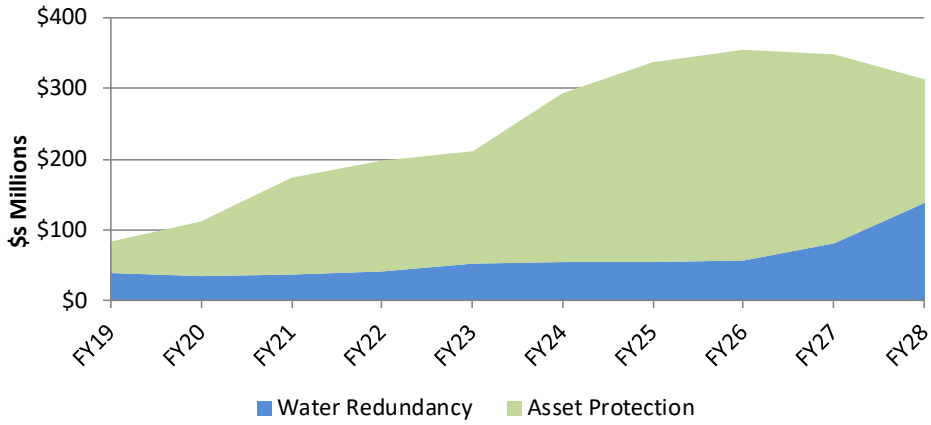
Changing nature of the CIP by Category

Project Category	Total Contract	FY19-23	FY24-28
Asset Protection	$3,069.3	$570.5	$1,259.2
Water Redundancy	$3,108.3	$206.8	$386.6
CSO	$887.8	$10.0	$0.1
Other	$1,471.8	$267.9	$213.3
Total	**$8,537.3**	**$1,055.2**	**$1,859.1**
Asset Protection	**36.0%**	**54.1%**	**67.7%**
Water Redundancy	**36.4%**	**19.6%**	**20.8%**
CSO	10.4%	1.0%	0.0%
Other	17.2%	25.4%	11.5%
Total	100.0%	**100.0%**	**100.0%**

In terms of utility spending, wastewater asset protection accounts for nearly 42% of the FY19-23 projected spending at $437.6 million of which $193.0 million is designated for the Deer Island Wastewater Treatment Plant and $244.6 million for headworks, pump stations, residuals facility, and pipelines. The $120.0 million targeted for waterworks asset protection and includes $54.3 million for water pipelines.



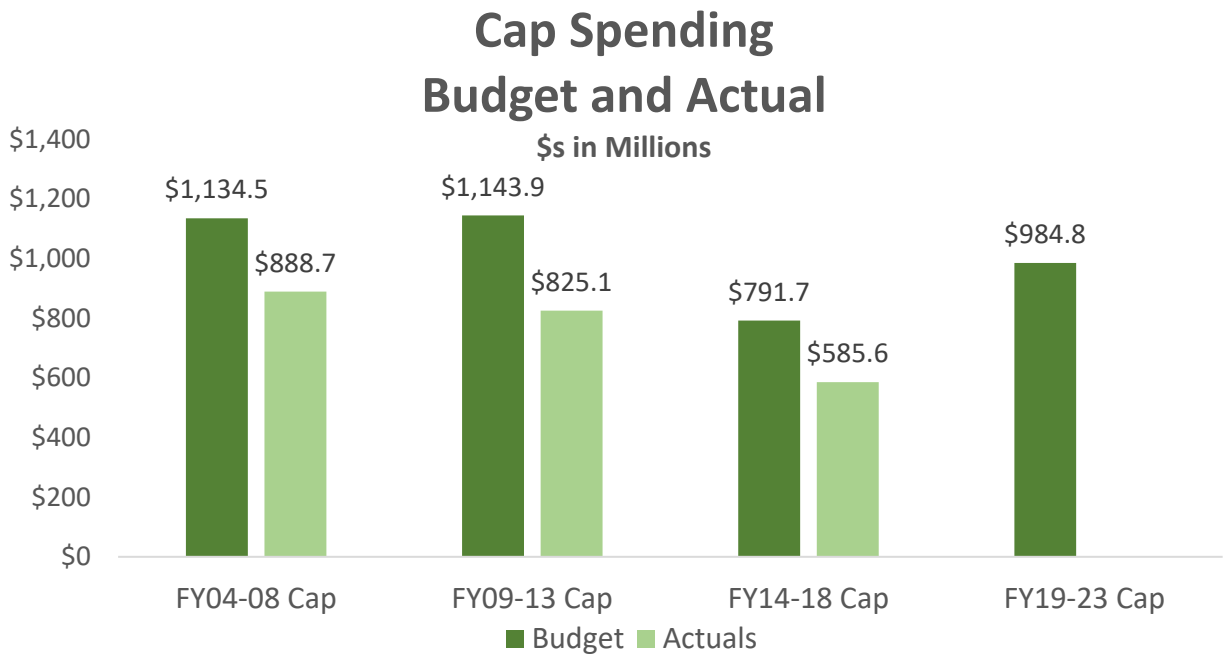
As illustrated in the following graph, the next two waves of spending over the FY19-23 period and the FY24-28 period will be for asset protection and water redundancy. This reflects MWRA's commitment to maintaining its physical plant and addressing the need for water system redundancy in some critical service areas. Total asset protection spending for FY19-23 is projected at $570.5 million or 54.1% of projected spending. Similarly, water redundancy spending for FY19-23 is projected at $206.8 million or 19.6% of projected FY19-23 spending. For the FY24-28 period, asset protection expenditures increased to $1.2 billion or 67.7% of period spending. Similarly, redundancy expenditures increased to $386.6 million, 20.8% of period spending.



FY19-23 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 $912.0 million. The Authority's main focus going forward is asset protection and water system redundancy. The FY21 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 $1.5 billion over a seventeen-year period. However, the FY19-23 period includes only $23.9 million related to that tunnel project.

The FY21 Final FY19-23 cap cash flow totals $905.1 million, $79.7 million under the approved Cap of $984.8 million. Annual cash flows for the proposed Cap period are shown below in millions:

		FY19	FY20	FY21	FY22	FY23	Total FY19-23
FY21 Final	Projected Expenditures	$142.9	$158.3	$266.2	$251.9	$236.0	$1,055.2
	I/I Program	(39.6)	(31.5)	(32.0)	(26.6)	(22.3)	(152.0)
	Water Loan Program	(13.8)	(5.8)	(33.2)	(9.7)	8.3	(54.2)
	MWRA Spending	**$89.4**	**$121.0**	**$201.0**	**$215.7**	**$222.0**	**$849.1**
	Contingency	0.0	0.0	12.1	14.2	15.1	41.5
	Inflation on Unawarded Construction	0.0	0.0	1.4	5.2	8.1	14.6
	Chicopee Valley Aqueduct Projects	(0.0)	0.0	0.0	0.0	0.0	(0.0)
	FY21 Final FY19-23 Spending	**$89.4**	**$121.0**	**$214.5**	**$235.0**	**$245.2**	**$905.1**

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.

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

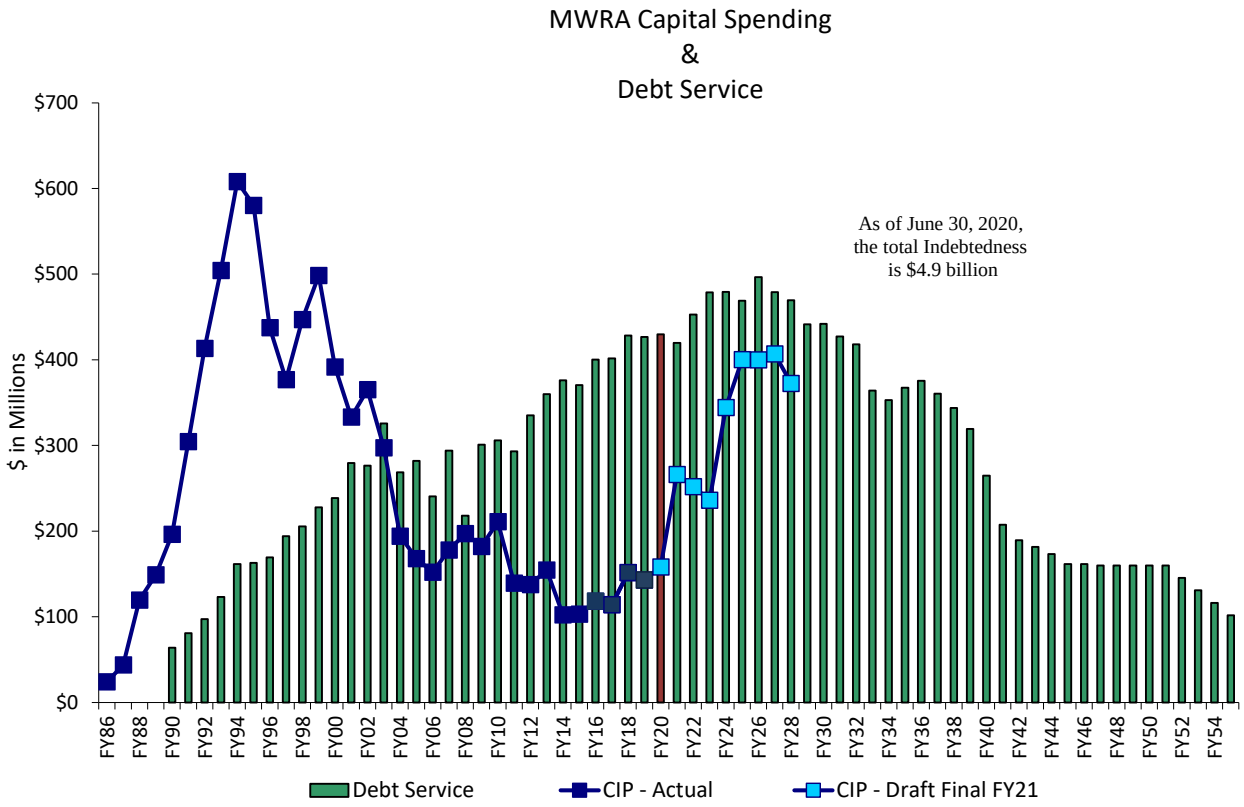
plant through local pipelines to customers' taps. The water loan program was established in 1998 and over 546 miles of pipeline have been improved. Similarly, on the wastewater side, the local financial assistance program provides MWRA sewer communities funding to perform local infiltration and inflow "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 $152.0 million in funding is projected to be distributed to MWRA wastewater communities and $54.2 million is projected to be distributed to MWRA water communities. In response to the Covid pandemic and to provide some financial relief to member communities, the MWRA allowed for the deferral of I/I and water loan repayments in FY21 and FY22. Deferred payments will be amortized over a five-year period.

	FY19	FY20	FY21	FY22	FY23	FY19-23
I/I Financial Assistance (Net of repayments)	$39.6	$31.5	$32.0	$26.6	$22.3	$152.0
Local Water System Assistance (Net of Repayments)	$13.8	$5.8	$33.2	$9.7	($8.3)	$54.2

MWRA Capital Improvement Spending and Debt Service

As of June 30, 2020, MWRA's total debt is $4.9 billion, which is $156.6 million less than the MWRA's total debt as of June 30, 2019. 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

FINAL
FISCAL YEAR 2021

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

Sub-phase	Scope	Status
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
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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$241,415	$227,909	$13,505	$341	$417	$1,797	$11,913	$0

Project Status 5/20	94.6%	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$240,104	$241,415	$1,311	Apr-26	Apr-26	None	$1,832	$1,797	($35)

Explanation of Changes

- Project cost changed due to Braintree/Weymouth Improvements – Construction updated cost estimate.
- Project spending changed due to updated cashflow for Braintree Weymouth Improvements Design/Construction Administration.

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, ESDC, REI and construction of improvements at high priority siphon locations. Scope includes 41 structures.	Active
Phase 2 Design/CS/RI and Construction	Design, ESDC, and construction of improvements at high priority siphon locations. Scope anticipated to include 40 structures.	Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$14,668	$940	$13,728	$108	$1,165	$3,520	$10,208	$0

Project Status 5/20	6.7%	Status as % is approximation based on project budget and expenditures. Initial Planning subphase was completed in 1998. Design began in April 2020.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$12,127	$14,668	$2,541	Dec-26	Dec-26	None	$4,478	$3,520	($958)

Explanation of Changes

- Project cost and spending changed due to updated design and construction cost estimates.
- Spending changed due to updated cost estimate and updated schedules and cashflows for Phase 1 Design/Construction Administration and Construction contracts.

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.

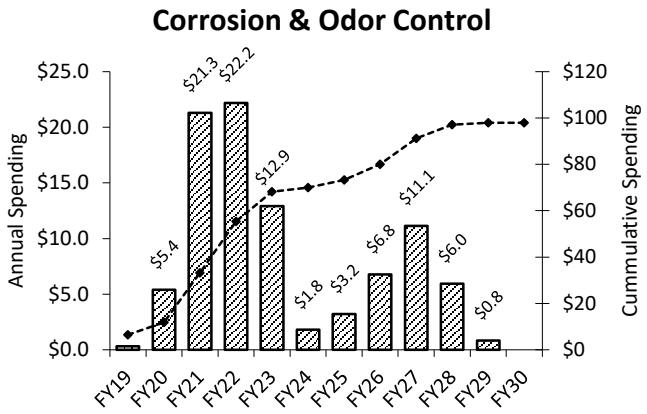
The Corrosion and Odor Control program has recently been expanded to include odor control and mechanical/ electrical modification to the downstream Nut Island Headworks.

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 being exceeded.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$97,949	$6,491	$91,458	$5,392	$21,278	$62,051	$28.878	$840



Project Status 5/20	10.8%	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 and construction began in FY20 Q3.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$84,132	$97,949	$13,817	Nov-27	Nov-27	None	$42,407	$62,051	19,644

Explanation of Changes

- Project cost change primarily due to award of Nut Island Headworks Odor Control and HVAC Improvements Construction, amendment for Nut Island Headworks Odor Control and HVAC 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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$11,314	$10,314	$1,000	$0	$0	$0	$1,000	$0

Project Status 5/20	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$11,314	$11,314	$0	Jun-24	June-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 and improve upon existing communication systems, with an emphasis on wireless options. It is critical to have alternative communication means to ensure facility data, including important facility alarms from unstaffed facilities can reach the Operations Control Center.	Active
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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$27,482	$19,810	$7,672	$174	$130	$1,226	$6,474	$0

Project Status 5/20	72.5%	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$27,482	$27,482	$0	Oct-31	Oct-31	None	$1,926	$1,226	($700)

Explanation of Changes

- Spending changed primarily due to updated schedule for Wastewater Redundant Communications contract as well as updated cashflow for Wastewater SCADA/PLC Upgrades Design and Programming Services .

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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$4,939	$3,439	$1,500	$0	$0	$0	$1,500	$0

Project Status 5/20	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$8,933	$1,519	$7,414	$190	$291	$701	5,154	$1,577

Project Status 5/20	19.4%	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$10,327	$8,933	($1,394)	Jun-31	Jun-31	None	$702	$701	($1)

Explanation of Changes

- Project cost changed due to Somerville Sewer Design and Construction contracts being deleted since work will be done as part of the new CSO Control Reduction studies if determined to be needed.

CEB Impacts

- $75,000 for Eutrophication modeling to be done in-house starting in FY23.

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. Partial implementation at five WW OM sites in Boston, is being implemented by in-house Engineering and Maintenance.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$21,938	$6,736	$15,202	$1,336	$4,487	$7,391	$0	$8,823

Project Status 5/20	35.6%	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 early FY21.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$22,628	$21,938	($690)	Dec-30	Dec-30	None	$7,662	$7,391	($271)

Explanation of Changes

- Project cost and spending changed due to updated cost estimate for Wastewater Meter Equipment reflecting earlier purchased telog equipment, reduction of scope for Meter Power Install Construction, and Meter Power REI work deleted.

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 sewage 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 Ward Street and Columbus Park 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, Construction, and REI	Rehabilitation of Melrose, Malden Sections 41,42,49,54 and 65.	Active

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
Ward Street and Columbus Park. Headworks Upgrade Design/ESDC, REI Services, and Ward Street Headworks Construction and Columbus Park Headworks Construction	Upgrade to include replacement/upgrades to the screens, grit and screenings collection and conveyance systems, odor control, HVAC, mechanical, plumbing, instrumentation, and electrical systems, as well an antenna tower for Columbus Park Headworks.	Active
Hayes Pump Station Rehab Design, Construction, and REI	The Hayes Pump Station was constructed in 1987. Due to its age, all major facility components require replacement or rehabilitation including the following: sluice/slide gates, climber screen and grinder system, pumps, valves, instrumentation, motor control center, and emergency generator. The odor control system will be redesigned with the odor control fan relocated outside of the Reading Pump Station. The architectural, fire protection, and building code requirements identified in the previous Code Evaluation Technical Memorandum will be constructed or waivers pursued where applicable. Hazardous materials identified from previous testing will be abated during construction. The project will also improve site drainage.	Active
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	Active
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. Scope may also include facility specific plans for a failure at MWRA facilities.	Active

Sub-phase	Scope	Status
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, two vehicle fuel tanks will be replaced at the Lonergan Intake Lower Garage and two vehicle fuel tanks at Southborough Facilities. Vehicle fuel dispensing systems to be replaced at these two facilities, as well as at Weston Reservoir. For Phase 3, four tanks will be replaced at four facilities.	Active
Interceptor Renewal No. 3 Dorchester Interceptor Sewer Design CA/RI and Construction	Rehabilitation of Dorchester Interceptor Sewer Sections 240, 241, and 242.	Active
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

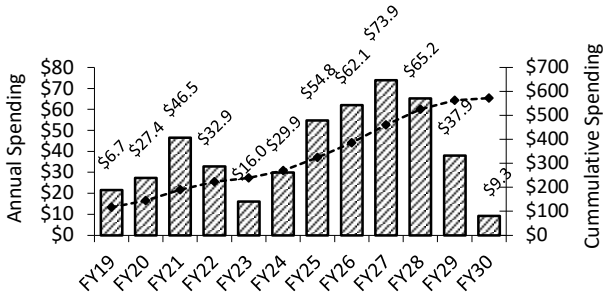
Sub-phase	Scope	Status
Remote Headworks Shaft Study	At each of the four remote Headworks, Chelsea Creek, Ward Street, Columbus Park and Nut Island, the wastewater is discharged into a vertical shaft connected to a tunnel that conveys the sewage to the Deer Island Treatment Plant. A past inspection of 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. The Remote Headworks Shaft Study was completed and evaluated the condition and rehabilitation needs of the four effluent shafts and connecting structures receiving flow from the remote headworks facilities, and the three shafts located at Deer Island. The Study recommendations will be carried forward under the upcoming Columbus Park and Ward Street Headworks Rehabilitation design and construction subphase. A smaller projectwas designed under the current study to remove grating in the three older Headworks and replace the shaft covers. Constrcution will commence under this CIP subphase.	Completed
Remote Headworks Shaft Access Improvements Construction, and ESDC & REI	Removal of grating/ associated supports and shaft cover replacement at the following remote headworks; Chelsea Creek, Ward Street and Columbus Park. This project will allow for improved access to the shafts at the remote headworks for rehabilitation techniques outlined in the Final Shaft Study Report and designed under the upcoming Ward Street and Columbus Park Headworks Upgrade design and construction subphase.	Active
Remote Headworks Upgrades Design 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, and electrical systems; PCB removal; and antenna towers at Chelsea Creek and Columbus Park. Chelsea Creek Headworks Upgrade construction is ongoing, and will be followed by design, construction and REI contracts for Ward Street and Columbus Park Headworks. Chelsea Creek Headworks REI is being performed under a separate contract.	Active

Sub-phase	Scope	Status
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.	Future
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 Design 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
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 was designed by in-house engineering staff to rehabilitation the sewers. The construction contract was awarded in January 2020 with a 6-month contract duration. Construction was completed in June 2020.	Completed

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$572,379	$116,626	$455,753	27,364	$46,460	$144,301	$285,823	$47,204

I&P Asset Protection



Project Status 5/20	24.6%	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 March 2019. Fuel Oil Tank Replacement Phase 1 Construction commenced in March 2020. Dorchester Interceptor Sewer Rehabilitation was awarded in March 2020. Interceptor Renewal 7 Malden/Melrose Design/ESDC was awarded in June 2020.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$542,832	$572,379	$29,457	Nov-30	Nov-30	None	$135,633	$144,301	$8,668

Explanation of Changes

- Project cost changed primarily due to updated cost estimates for Ward St. & Columbus Park Headworks - Design/Construction Administration, Interceptor Renewal 7 Malden & Melrose Study/Design/Construction Administration, Resident Engineering/Inspection and Construction, Remote Headworks Shaft Access Improvements Construction and EDSC/REI (scope change), Wiggins Pump Station Design/Construction, Hayes Pump Station Rehabilitation Design, and Prison Point Rehabilitation Design/CA/RI, and Construction. Also, award greater than budget for Sections 191 and 192 Charles River Valley Sewer and Interceptor Renewal Reading Extension Design, change orders for Chelsea Creek Upgrades, as well as inflation adjustments on unawarded contracts. This was partially offset by lower than budgeted award for Interceptor Renewal 3 Dorchester Interceptor Construction.

- Spending change primarily due updated cost estimates , change orders, and inflation adjustments listed above, rescheduled Notice-to-Proceed dates for Columbus Park Headworks Construction, Sections 4, 5, 6, and 186 Design CA/RI and Construction, and Hayes Pump Station Construction and REI.

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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$5,000	$0	$5,000	$0	$0	$0	$5,000	$0

Project Status 5/20	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$698	$0	$698	$0	$0	$262	$436	$0

Project Status 5/20	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$698	$698	$0	Jun-22	Jun-24	24 mos.	$698	$262	($436)

Explanation of Changes

- Project spending and schedule changed due to rescheduled notice-to-proceed date.

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 *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 replace DI's cathodic protection systems as required. Design will be performed under the Digester & Storage Tank Rehab Design in FY21, construction in FY23-26.	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 15 year life cycle. After a condition assessment in October 2019, 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; construction phase to commence in FY21and approximately every 20 years thereafter.	Active
Bidirectional Radio Repeater System Upgrade 1 and 2	Install a bidirectional radio amplification system in throughout Deer Island to maintain emergency radio communications for Boston/Winthrop Fire Departments to meet current safety code. Equipment for Phase 1 was completed in FY20. Phase 2 Construction to commence in FY21.	Active

Sub-phase *Equipment Replacement:*	**Scope**	**Status**
HVAC Equipment Replacement – Design/ESDC, HVAC Control System Replacement, HVAC Fume Hoods Replacement, HVAC Mechanical Equipment Replacement Construction and REI	Replace the system-wide HVAC control system due to obsolescence. Redesign is required to include three separate construction contracts to ensure competitive bidding. . Redesign to begin FY21.	Active
Centrifuge Replacements – Design & Construction	Replace the sludge centrifuges are at the end of their useful life or after a catastrophic failure. Centrifuges thicken secondary waste sludge before it goes to the digesters. Units have a 25 to 30-year life. Design to commence in FY24.	Future
Cryogenics Plant Equipment Replacement – Design & Construction	Design and construction to the exiting compressors, cold boxes, lox tanks and appurtances due to end of useful life and obsolescence. Replacement of 3 chillers was necessary in FY16; see below. Remaining plant overhaul work to commence in FY23-26 with future rehab and upgrade work occurring every 20 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 in FY20 in two phases; construction to be complete in FY23.	Future

Sub-phase *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 February 2014, Phase 3 has been include in Contract 7395.	Future
Eastern Seawall Design/ESDC/REI & Construction	Design and construction of repairs to the base of the seawall from tidal damage, exposing rebar. Seawall condition is monitored on a biannual basis. Design was awarded in FY20, construction scheduled for FY22-25.	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
DITP Roofing Replacement	**Replacement of the following rubber roofs that are in need of replacement: Cryogenics, Residuals (Mod #1 and #2 Vestibule Roof), Gravity Thickener Buildings), Garage Building, Reception Training (slate tiles), and Admin Lab Building.**	**Future**

Sub-phase *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 Design & Construction (including future cycles from the Master Plan)	Replace substation equipment. Phase 1-Bus duct 2 &22 replacement completed October 2001: Phase 2 completed by March 2007; Phase3 completed in August 2011. Phase 4 completed in June 2016; Phase-5 design to commence in FY23.	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 (FY16-22); 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. 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 FY24-26.	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. (Tanks have been in service for 26 years; Hypo tanks 1 & 3 were relined in 2007, tanks 2 & 4 in 2008). Added the replacement of the Gravity Thickener overflow pipe in this project.	Active
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 construction for FY22-26.	Future

Sub-phase *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 FY20-22. In FY17, the design scope was revised to include replacement of switchgear in the Admin/Lab building. Construction is scheduled for FY20-FY23.	Active
Combustion Turbine Generator (CTG) Rebuilds	Rebuilds of the combustion turbines in the Thermal Power Plant. Scheduled for FY24-27 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. A condition assessment and LCCA is presently being performed to determine future repair/replacement options.	Future

Sub-phase 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. Completed by the end of FY19.	Completed
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 awarded in FY20.	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. Funding now runs from FY24 to FY30.	Future

Sub-phase *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 Design/ESDC and Construction	Based on condition assessments, expect to start replacing tanks beginning in FY26.	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
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

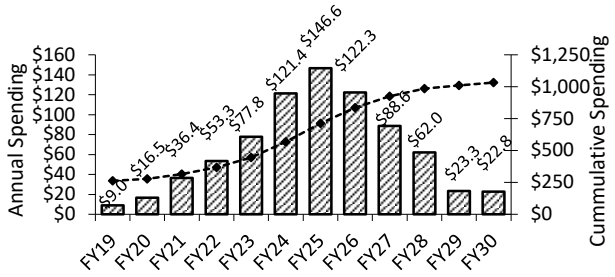
Sub-phase *Specialties:*	**Scope**	**Status**
Gravity Thickener Improvements - Construction	This subphase was eliminated in FY08, and the scope was included with the Primary Clarifier Rehab work above. Made a stand-alone project again in FY09. The first phase (6966) involved replacing failed fiberglass 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. Project completion expected in FY21.	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 FY25-29.	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 FY20-25.	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 late FY21, construction and REI scheduled for FY23 to FY28.	Future

Sub-phase *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 commenced in FY19, and will be followed by design in FY22 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 FY25-26.	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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$1,055,309	$261,375	$793,934	$16,526	$36,365	$192,954	$540,906	$69,090

DI Asset Protection



Project Status 5/20	25.8%	Status as % is approximation based on project budget and expenditures. Several previously completed phases for this project are included in the Completed Project list. 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, CHP Alternatives Analysis, Gas Protection System Replacement Phase 1, Chemical Storage Tanks Relining and Digester Piping. Contracts scheduled to begin in FY21 are: Eastern Seawall Design (awarded in June 2020), SSPS VFD Replacement Design, MCC and Switchgear Replacement, FY21 awards include : Clarifier Rehabilitation Phase 2 Construction & REI, Fire Alarm Replacement, Odor Control Rehab Design, Digester and Storage Tank Rehab Design, Dystor Membrane Replacement, Cryogenics Plant Equipment Replacement Design among others.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$993,149	$1,055,309	$62,160	Jan-31	Jan-31	None	$273,449	$192,954	($80,495)

Explanation of Changes

- Project cost change primarily due to updated cost estimates for Clarifier Rehab Phase 2 Construction, North Main Pump Station VFD Replacement, HVAC Equipment Replacement Construction, Cryogenics Plant Equipment Replacement Construction, Odor Control Rehab Construction, Digester/Storage Tank Rehab Construction, Electrical Equipment Upgrade 6 Design/ESDC, Fire Alarm Replacement Construction, Eastern Seawall Design and Construction, Chemical Pipe Replacement Design and Construction, and Motor Control Center and Switchgear Replacement Construction. Also, greater than budgeted contract awards for Chemical Tank and Digester Pipe and Gas Protection System Replacement Phase 1 partially offset by lower than budgeted awards for As-Needed Design Contracts 9-1, 9-2 and 9-3, and incorporation of Expansion Joint Repair Construction 3 contract into Clarifier Rehabilitation Phase 2 contract. Also, new project that was added for Deer Island Treatment Plant Roofing Replacement as well as inflation adjustments on unawarded contracts.

- Spending change primarily due to updated Notice-to-Proceed and Substantial Completion dates for HVAC Replacement contracts, Hydroturbine Replacement Construction, Eastern Seawall Construction, Replace Hypo and Bisulfite Tanks, Digester and Storage Tank Rehab Design, South System Pump Station 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 FY23-24), HVAC Equipment Replacement of $140,000 ($50,000 in FY29 and $90,000 in FY30 and $40,000 for outside lab testing

in FY22-23), Future SSPS VFD Replacements ($120,000 beginning in FY29), and Hydroturbine Replacements ($100,000 in FY30). 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

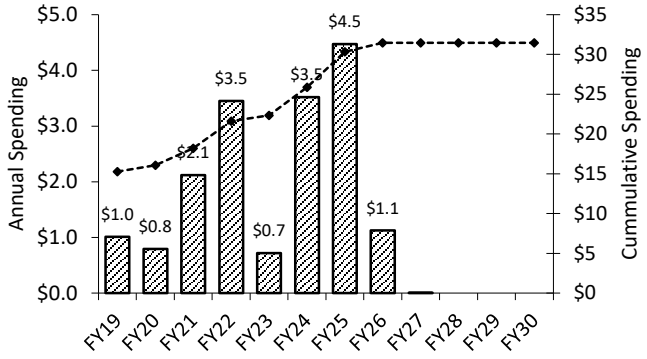
Sub-phase	Scope	Status
Clinton Soda Ash Replacement	The soda ash delivery system needed for pH control in the activated sludge process was replaced. Completed August 2008.	Completed
Clinton Permanent Standby Generator	Install a permanent standby generator at the Clinton Wastewater Treatment Plant. Completed 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.	Completed
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
Screw Pumps Replacement Phase 1 and 2 and Valves and Pipe 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 are scheduled to be replaced in FY21-FY23; and the valves and pipe replacements are scheduled in FY20-21.	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. Work to commence in FY21.	Future
Clinton Storage Facility	A new facility to be built for parts storage, (valves, pumps, motors, etc.) receiving freight deliveries, and PVC pipe storage. Design commenced in FY20.	Future
Clinton SCADA Upgrades	Replace existing plant control system with a PLC based system. Existing system is obsolete and cannot attain spare parts. System is over 20 years old.	In Progress
Clinton Fire Alarm Replacement	**Replace existing plant fire alarm system with a new compliant system. Existing system is obsolete and cannot attain spare parts. System is over 20 years old.**	**Future**
Clinton Landfill Cell #1 Closure	**Closure of Clinton Landfill Cell #1 since it has reached its capacity. Cell will be capped and will include proper drainage. This is regulated per Dep – 310 CMR 19 (Mass Solid Waste Management Facility Regulations.**	**Future**

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$31,487	$15,274	$16,213	$795	$2,122	$8,096	$9,126	$0

Clinton Wastewater Treatment Plant



Project Status 5/20	51.0%	Status as % is approximation based on project budget and expenditures. Phosphorus Reduction Construction completed by March 2018. The Clinton Roofing Rehab work was completed in September 2019. Valve and Pipe Replacement was awarded in May 2020. Screw Pumps Replacement Phase 1 is expected to commence in early FY21.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$26,712	$31,487	$4,775	Jun-25	Jan-26	7 mos.	$5,574	$8,096	$2,522

Explanation of Changes

- Project cost change due to new project added for Landfill Cell #1 Closure, Fire Alarm Replacement, and SCADA Upgrades, updated cost estimate for Screw Pumps Replacement Phase 2 Construction and Clinton Rehab Design/Engineering Services During Construction/Resident Engineering Inspection, and change orders for Clinton Roofing Rehabilitation.

- Project schedule and spending changed due to new projects listed above.

CEB Impacts

- The projects are required to replace obsolete equipment and systems. The plant influent screw pump and valve and pipe replacements 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

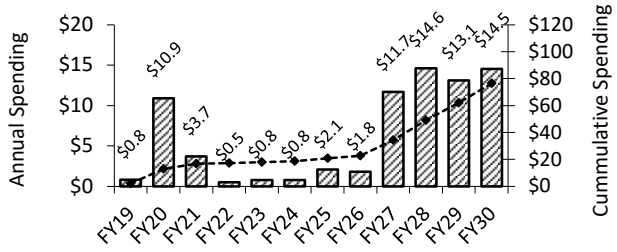
Sub-phase	Scope	Status
Condition Assessment/ Reliability Study	Evaluate the condition of the entire facility at the mid-point of the current contract and then assess other residuals processing options and regulatory changes which may provide cost-saving opportunities. First phase work (present condition 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 $10.5M is allocated in the Final FY21 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 $3.4M were used from the Residuals Phase 2 Construction Phase.	Active
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 $71.6M 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 commenced in FY20 and will be completed in FY21.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$105,470	$2,070	$103,400	$10,903	$3,711	$16,760	$30,935	$56,539

Residuals Asset Protection



Project Status 5/20	13.1%	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. Pellet Pipe Relocation contract commenced in August 2019.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$103,982	$105,470	$1,488	Apr-32	Apr-32	None	$15,212	$16,760	$1,548

Explanation of Changes

- Project cost and spending changed primarily due to award for Pellet Pipe Relocation being greater than budgeted, and change orders for Mechanical Improvements/Electrical/Drum Dryer Replacement and Pellet Pipe Relocation contracts.

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). 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. In turn, DEP issued 5-year variances for these water bodies on August 30, 2019, effective through August 31, 2024. These variances, issued to MWRA and the City of Cambridge (Charles River, Alewife Brook/Upper Mystic River) and the City of Somerville (Alewife Brook/Upper Mystic River) also required public notification of CSO discharges, the evaluation of additional CSO mitigation projects defined in the variances, and the development of updated CSO control plans for these waters, among other CSO and CSO impact mitigation requirements.

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 beginning 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 and 3 treated @ Somerville Marginal	7.3 3.5	• Cambridge/Alewife Sewer Separation • MWR003 Gate and Rindge Siphon Relief • Interceptor Connections/Floatables • Connection/Floatables at Outfall SOM01A • Somerville Baffle Manhole Separation • Cambridge Floatables Control (portion)	110.0
Mystic River/Chelsea Creek Confluence and Chelsea Creek	4 untreated and 39 treated @ Somerville Marginal	1.1 57.1	• Somerville Marginal CSO Facility Upgrade • Hydraulic Relief at BOS017 • BOS019 Storage Conduit • Chelsea Trunk Sewer Replacement • Chelsea Branch Sewer Relief • CHE008 Outfall Repairs • East Boston Branch Sewer Relief (portion)	92.0
Charles River (including Stony Brook and Back Bay Fens)	3 untreated and 2 treated @ Cottage Farm	6.8 6.3	• Cottage Farm CSO Facility Upgrade • Stony Brook Sewer Separation • Hydraulic Relief at CAM005 • Cottage Farm Brookline Connection and Inflow Controls • Brookline Sewer Separation • Bulfinch Triangle Sewer Separation • MWRA Outfall Closings and Floatables Control • Cambridge Floatables Control (portion)	88.9
Inner Harbor	6 untreated and 17 treated @ Prison Point	9.1 243.0	• Prison Point CSO Facility Upgrade • Prison Point Optimization • East Boston Branch Sewer Relief (portion)	47.5
Fort Point Channel	3 untreated and 17 treated @ Union Park	2.5 71.4	• Union Park Treatment Facility • BOS072-073 Sewer Separation and System Optimization • BWSC Floatables Control • 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 • Pleasure Bay Storm Drain Improvements • 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) • Commercial Pt. CSO Facility Upgrade (interim improvement) • South Dorchester Bay Sewer Separation	126.6
Neponset River	Eliminate		• Neponset River Sewer Separation	2.4
Regional			• Planning, Technical Support and Land Acquisition	55.2
TOTAL **Treated**		**410** **381**		**912.5**

*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 mitigation 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. Includes additional inflow removal by BWSC from its Dorchester Interceptor system following the closing of CSO outfalls.
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, project evaluations required by conditions in CSO variances, and the acquisition of land, easements and construction permits required for CSO project implementation.

Expenditure Forecast (in $000s) and Program Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$912,524	$903,593	$8,932	$2,039	$5,035	$10,042	$86	$0

Program Status 5/20	99.0%	Status as % is approximation based on project budget and expenditures. MWRA and the CSO communities completed the remaining Long-Term CSO Control 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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$911,052	$912,524	$1,472	Apr-22	Apr-22	None	$8,655	$10,041	$1,386

Explanation of Changes

- Project cost and spending changed primarily due to amendment for CSO Performance Assessment.

CEB Impacts

- $500,000 for South Boston CSO Tunnel Inspection/Cleaning and Outfalls Inspection in FY27.

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 other infiltration/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.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$63,625	$59,862	$3,763	$0	$3,763	$3,763	$0	$0

Project Status 5/20	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$63,625	$ 63,625	$0	Jun-21	Jun-21	None	$3,763	$3,763	$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 project evaluations required by conditions in CSO variances, 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 and project evaluations required by conditions in CSO variances.

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.

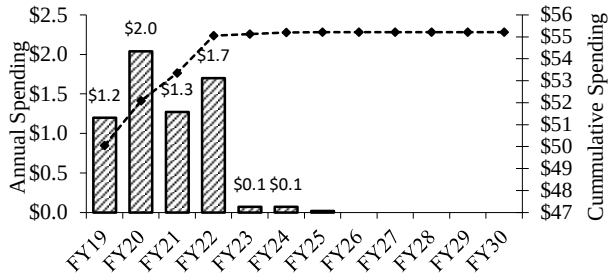
Scope

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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$55,210	$50,041	$5,169	$2.039	$1,272	$6,279	$86	$0

CSO Support



Project Status 5/20	92.7%	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. Five-year CSO variances issued by DEP effective September 1, 2019 include conditions requiring additional CSO control measures for the Lower Charles River and the Alewife Brook/Upper Mystic River, including but not limited to the evaluation of CSO optimization measures and the evaluation of alternatives that may provide further control of treated discharges from the Somerville-Marginal CSO Facility (outfalls MWR205 and SOM007/MWR205A).

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$53,738	$55,210	$1,472	Apr-22	Apr-22	None	$4,893	$6,279	$1,386

Explanation of Changes

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

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

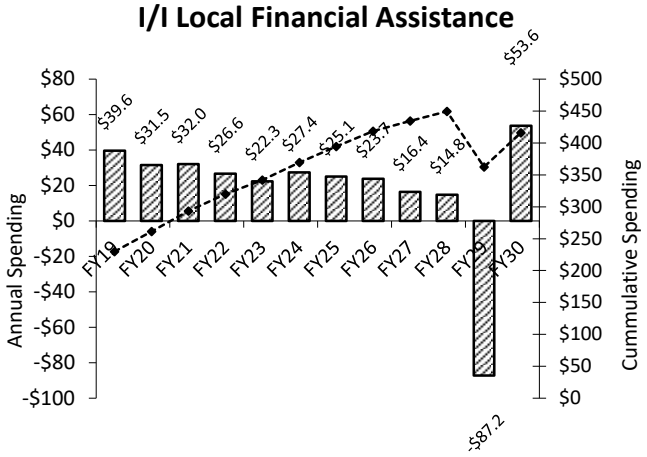
MWRA's Deer Island Wastewater Treatment Plant receives flow from 43 communities. The collection system encompasses 230 miles of MWRA interceptors and over 5,300 miles of community sewers. These sewers are of varying size, shape, age, material, depth, and conditions. All contribute some quantity of infiltration 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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$392,585	$229,685	$162,900	$31,460	$32,008	$152,017	$107,295	($56,763)

Project Distribution Status 5/20	57.8%	Through May 2020, MWRA has distributed $227.7 million in grants and $211.76 million in interest-free loans to fund 605 separate projects in 43 communities under the I/I Local Financial Assistance Program.



Project Repayment Status 5/20	47.8%	Through May 2020, a total of $176.0 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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$392,585	$392,585	$0	Jun-40	Jun-40	None	$142,251	$152,017	$9,766

Explanation of Changes

- Project spending changed primarily due to updated cash flows.

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 replaced the off-line Spot Pond Reservoir in Stoneham and 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 began in April 2019 and the Preliminary Design and MEPA Review contract was awarded in May 2020.

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

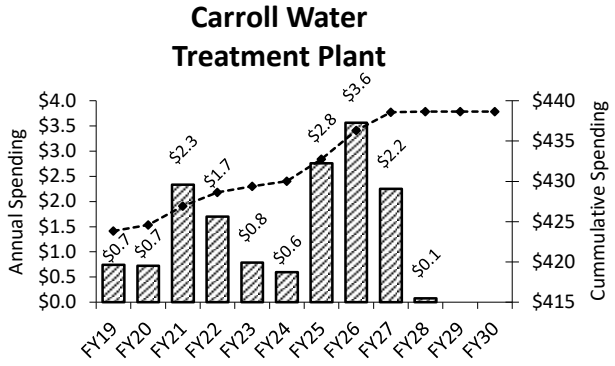
Sub-phase	Scope	Status
Study 1	Investigation of the potential impacts of SDWA amendments on the MWRA system and evaluation of the need, feasibility, and benefits of improved treatment processes.	Completed
Study 2	Evaluation of alternative filtration, disinfection, and corrosion control processes to determine 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
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

Sub-phase	Scope	Status
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
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

Sub-phase	Scope	Status
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.	Completed
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	Continuation of as-needed engineering technical assistance for ancillary modifications design and plant optimization.	Completed
Technical Assistance No. 9 and No. 10	Continuation of as-needed engineering technical assistance for ancillary modifications design and plant optimization.	Active
Technical Assistance No. 11 and No. 12	**The next two phases of as-needed engineering technical assistance for ancillary modifications design and plant optimization.**	**Future**

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$438,652	$423,860	$14,791	$725	$2,331	$6,285	$9,250	$0



Project Status 5/20	96.8%	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.Technical Assistance 11 and 12 are expected to commence in January 2021.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$436,138	$438,652	$2,514	Dec-26	Dec-26	None	$3,772	$6,285	$2,513

Explanation of Changes

- Project cost and spending changed primarily due to new projects that were added for As-Needed Technical Assistance 11 and 12, and updated cost estimates for Ancillary Modifications Construction 2 and Existing Facilities Modifications Construction 7.

CEB Impact

- Expect $100,000 in FY28 for utilities for the Wachusett Algae Facility.

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.

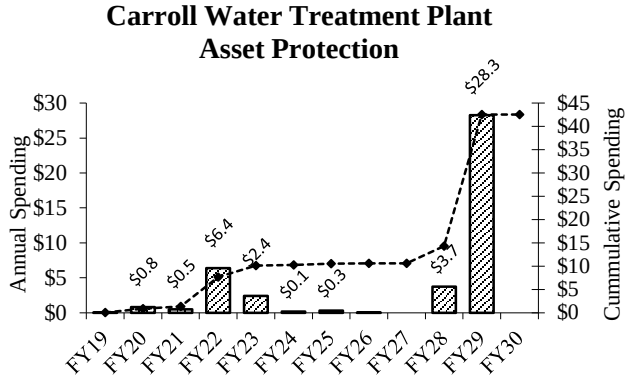
Scope

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
Soda Ash & Ammonia 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 (7642)	Replace the generator/alternator on emergency generator No. 1 due to failure.	Active
Corrosion Control Pipe Loop Study (7737)	**Conduct a corrosion control study using a pipe loop at the Carroll Water Treatment Plant to evaluate alternatives for Lead and Copper rule compliance.**	**Future**

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$42,563	$26	$42,536	$800	$487	$10,092	$4,200	$28,271



Project Status 5/20	1.8%	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$41,208	$42,563	$1,355	Oct-34	Oct-34	None	$9,062	$10,092	$1,030

Explanation of Changes

- Project cost changed due to updated cost estimates for Carroll Water Treatment Plant Chemical System Pipe Pumps Replacement, Soda Ash and Ammonia Equipment Replacement and new project added for Corrosion Control Pipe Loop Study.

- Spending changed primarily due to updated cost estimates and new project listed above and accelerated schedule for Carroll Water Treatment Plant Control Room Fire Suppression System.

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 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

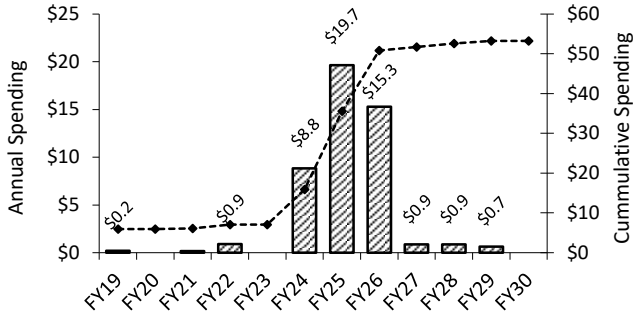
Sub-phase	Scope	Status
Quabbin Aqueduct & Winsor Power Station Preliminary Design (7114)	Preliminary design of improvements at Shafts 1, 2, 9 and 12 of the Quabbin Aqueduct and the Winsor Power Station.	Completed
Shaft 12 Isolation Gate Design CA/RI (7509) and Construction (7197)	Installation of a gate 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), and Shaft 2 Construction (7198)	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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$53,203	$5,938	$47,265	$0	$183	$1,304	$45,513	$653

Winsor Station/Pipeline Improvements



Project Status 5/20	11.2%	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$49,559	$53,203	$3,644	Jan-26	Jan-26	None	$204	$1,304	$1,100

Explanation of Changes

- Project cost change primarily due to inflation adjustments for Quabbin Aqueduct and Winsor Power Station Construction, Shaft 12 Isolation Gate Construction and Quabbin Aqueduct TV Inspection contracts, and updated cost estimate for Shaft 2 Construction.

- Project spending change due to updated cost estimate for Shaft 2 Construction.

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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$700,184	$697,182	$3,002	$0	$0	$0	$3,002	$0

Project Status 5/20	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	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), Construction (7697) and REI (7716)	Make structural improvements to the Bastion including a new roof, repairs of the concrete walls, and drainage and ventilation systems.	Active
Wachusett Lower Gatehouse Pipe Replacement Construction (7380) and REI (7727)	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 pipes in the Lower Gatehouse to isolate the pipes from the broken Equalizer pipe.	Active
Wachusett Lower Gatehouse Building Rehab Constr. (7698) and REI (7726)	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

Wachusett Dam Bridge Crane Removal (7780)	Demolition of old bridge crane that must be removed from the Wachusett Dam Lower Gatehouse as it represents a safety hazard.	

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$22,246	$8,670	13,576	$410	$2,046	$11,099	$2,455	$25

Project Status 5/20	41.1%	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. Wachusett Dam Lower Gate House Interim Pipe Repair commenced in October 2019.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$19,032	$22,246	$3,214	Jan-27	Jan-27	None	$8,168	$11,099	$2,931

Explanation of Changes

- Project cost and spending changed due to updated cost estimates for Wachusett Lower Gatehouse Pipe Replacement Construction and Resident Engineering/Inspection (REI), Wachusett Bastion Rehabilitation REI, Wachusett Lower Gatehouse Building Rehabilitation REI, and Wachusett Dam Bridge Crane Removal. Also, award of Wachusett Dam Lower Gate House Interim Pipe Repair was greater than budgeted.

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 in Siphon Chambers 3 and 4 blow-off valves along the Weston Aqueduct and an air valve on the Sudbury River Pipe Bridge. 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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$12,496	$2,627	$9,869	$0	$1,514	$2,341	$7,257	$667

Project Status 5/20	21.0%	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. Weston Aqueduct Sluice Gates Construction is expected to commence in FY21.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$11,507	$12,496	$989	Oct-28	Oct-28	None	$1,464	$2,341	$877

Explanation of Changes

- Project cost and spending changed due to updated cost estimate for Weston Aqueduct Gatehouse Rehabilitation, and Weston Aqueduct Sluice Gates Construction, as well as inflation adjustment for Sudbury Short-term Repairs contract.

- Project spending changed due to updated cost estimate listed above.

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.

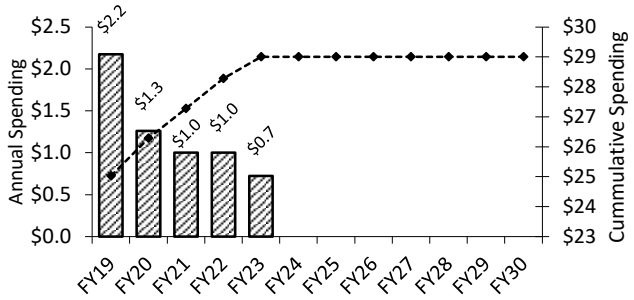
Scope

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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$29,000	$25,020	$3,980	$1,259	$1,000	$6,154	$0	$0

Watershed Land



Project Status 5/20	89.8%	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$29,000	$29,000	$0	Jun-23	Jun-23	None	$5,600	$6,154	$554

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.

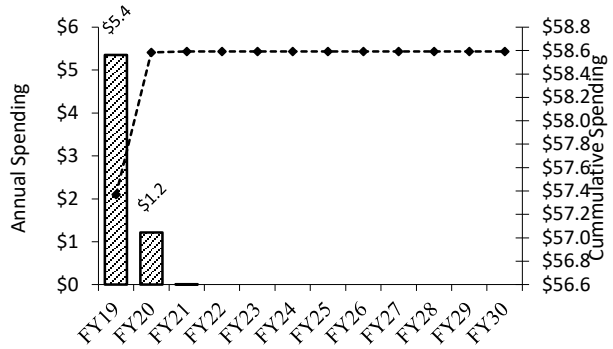
Scope

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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$58,592	$57,369	$1,223	$1,216	$7	$6,574	$0	$0

Cosgrove Tunnel Redundancy



Project Status 5/20	100.0%	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$59,146	$58,592	($554)	Feb-19	Feb-19	None	$7,128	$6,574	($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.	Active

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.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY23
$7,023	$3,139	$3,884	$215	$643	$3,861	$46	$0

Project Status 5/20	45.9%	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. Quinapoxet Dam Removal Design/ESDC commenced in November 2019.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$6,048	$7,023	$975	Dec-22	Mar-23	3 mos.	2,890	$3,861	$971

Explanation of Changes

- Project cost and spending increased due to award of Quinapoxet Dam Removal Design/Engineering Services During Construction was greater than budgeted amount, and updated cost estimate for Quinapoxet Dam Removal – Construction contract. Also, amendment for Sudbury Foss Dam Design/Construction Administration/Resident Inspection 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*
☑ *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 movement along geological faults. A rupture of piping or a valve failure at critical surface connections points on 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, activation of emergency supplies with a boil-water order 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 have assisted 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.

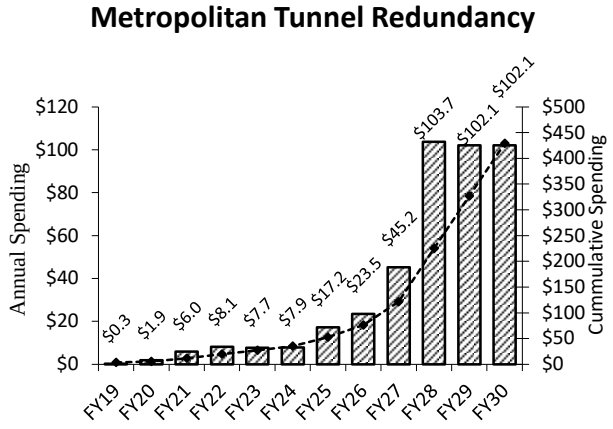
Scope

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, geotechnical investigation, permitting and MEPA environmental review of the Northern and Southern Tunnels.	Active
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 and quality assurance testing.	Future
Final Design/Engineering Services During Construction (7556)	Final Design and Engineering Services During Construction of the Northern and Southern Tunnels, 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 Tunnels.	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 acquisition and possible Owner Controlled Insurance Program for the Northern and Southern Tunnels.	Future

Sub-phase	Scope	Status
Program Support Services (7655)	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
Technical Assistance	The Technical Assistance contract will provide technical analysis, real estate support, fieldwork and other support to the Tunnel Program to address technical needs in a timely fashion as they arise.	Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$1,506,963	$3,716	$1,503,246	$1,900	$5,985	$23,945	$197,424	$1,282,137



Project Status 5/20	0.4%	Status as % is approximation based on project budget and expenditures. Program Support Services commenced in April 2019. Preliminary Design and MEPA Review was awarded in May 2020.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$1,421,750	$1,506,963	$85,213	Apr-42	Apr-42	None	$24,313	$23,945	($368)

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 Technical Assistance which was broken out from Administration, Legal and Public Outreach phase, and award less than budget for Preliminary Design & MEPA Review.

CEB Impacts

- $400,000 in FY22 for salaries, benefits, and other expenses associated with the project management of the Metro Tunnel Redundancy and $250,000 in FY25 for rock storage shed.

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.

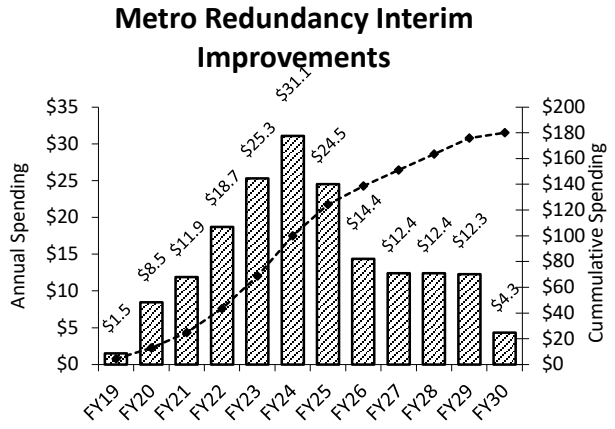
Scope

Sub-phase	Scope	Status
CP1 Shafts 6,8,9A (7561), CP2 Shaft 5 (7671) and REI (7702), CP3 Shafts 7,7B,7C,7D (7670) and REI (7703)	This project will provide strengthening of pipe directly connected to the tunnel system, cathodic protection for pipe connections to prevent further corrosion, replacement of nuts on valve connections if found to be at risk .	Future
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, possible installation of variable frequency drives on motors to regulate discharge pressures and installation of additional valves to allow isolation of the tunnel without operating old valves that are directly connected to the tunnel.	Active

Sub-phase	Scope	Status
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 W16 at Medford Square. Construction will include cleaning and cement mortar lining, some sliplining and some pipe replacement.	Active
Low Service PRV Improvements 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
Shafts 5 Building Improvements Design/CA (7599), Construction (7600), and REI (7673)	Electrical and architectural improvements at Shafts 5 & 9 buildings in Weston and Somerville. Including improvements to dewatering systems inside shafts, Building Code and Hazardous Material Evaluations at each of these sites are 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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$180,056	$4,340	$175,716	$8,460	$11,865	$65,860	94,787	$16,572



Project Status 5/20	6.8%	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. WASM SPSM/PRV Design/CA commenced in July 2018. 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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$177,348	$180,056	$2,708	Jun-26	Jul-29	37 mos.	$92,636	$65,860	($26,776)

Explanation of Changes

- Project cost changed primarily due to inflation adjustments on unawarded contracts, updated cost estimates for WASM 3 CP-1 and CP1 Shafts 6,8, 9A contracts, and change orders for Commonwealth Avenue Pump Station Redundancy Design/CA/RI and Commonwealth Avenue Pump Station Improvements-Construction.
- Project schedule changed due to updated Weston Aqueduct Supply Mains CP-3 schedule.
- Project spending changed due to updated projects costs listed above, updated schedules for WASM 3 Rehab CP-1, 2, and 3, Waltham Water Pipeline, Shafts 5 & 9 Improvements, and CP3 Shafts 7, 7B, 7C, and 7D contracts. Also, updated cash flow for WASM 3 MEPA/Design/CA/RI.

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. DCR will use professional engineering consultants to complete repair designs.

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 Water Supply Construction	**Project to supply water to the Quabbin Reservoir buildings.**	**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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$24,083	$0	$24,083	$0	$1,825	$9,254	$14,829	$0

Project Status 5/20	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$21,900	$24,083	$2,183	Mar-26	Mar-26	None	$7,840	$9,254	$1,414

Explanation of Changes

- Project cost changed primarily due to new project that was added for Quabbin Water Supply and updated cost estimate for River Road Improvements at Wachusett.

- Project spending changed due to project cost changes listed above as well as updated schedule for the Maintenance Garage/Wash Bay/Storage Building Construction contract.

CEB Impacts

- $100,000 for lab work in FY24 during the Quabbin Administration Building Rehabilitation.

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 considered an option to purchase more water from the MWRA, however, this option has been cancelled.

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.	Completed

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$1,448	$1,430	$18	$18	$0	$389	$0	$0

Project Status 5/20	100%	Status as % is approximation based on project budget and expenditures. Design/ESDC/REI was awarded in May 2017 and was cancelled in September 2019.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$1,509	$1,448	($61)	Aug-20	Sep-19	(11) mos.	$450	$389	($61)

Explanation of Changes

- Project cost, schedule and spending changed due to Peabody Pipeline Design/ESDC/REI contract was 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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$22,279	$12,016	$10,263	$0	$0	$0	$6,747	$3,515

Project Status 5/20	53.9%	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY19	FY20	Chge.
$21,655	$22,279	$624	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
Section 27 Design/CA, Construction and REI (7721, 6333, 7722)	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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY23
$1,668	$124	$1,545	$0	$2	$28	$1,517	$0

Project Status 5/20	7.4%	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$1,326	$1,668	$342	Nov-25	Nov-25	None	$27	$28	$1

Explanation of Changes

- Project cost change due to separate phases added for Section 27 Rehab Design/CA and REI. Also, inflation

adjustment on Section 27 Rehab Construction contract.

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.

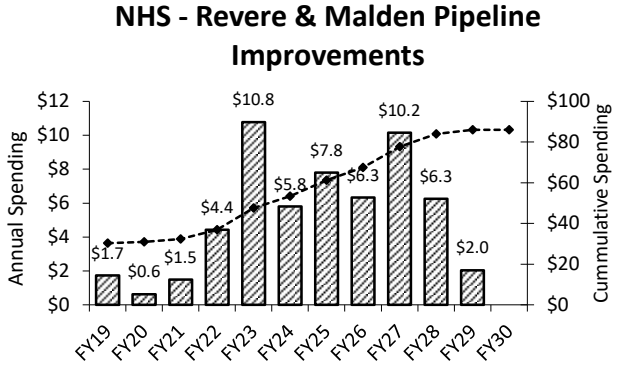
Scope

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 Improvements Design CA (7485), and REI (7682)	Design /Construction Administration and Resident Inspection for Sections 53 and 99 Improvements.	Active/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
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

Sub-phase	Scope	Status
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/Active/Future
Section 56 Demolition Construction (7536)	Section 56 Construction Pipe Demolition at General Edwards Bridge.	Completed
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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$86,011	$30,301	$55,710	$628	$1,500	$19,062	$36,349	$2,039



Project Status 5/20	35.9%	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 completed in May 2018. Section 56 Pipe Demolition on General Edwards Bridge was substantially completed in May 2019. Section 56 Replacement/Saugus Design/CA commenced in November 2019.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$82,804	$86,011	3,207	Jul-28	Jul-28	None	$10,344	$19,062	$8,718

Explanation of Changes

- Project cost changed primarily due to updated cost estimates for Sections 14, 53 and 99 REI and Sections 53 and 99 Connections Design/ Construction Administration contracts. Also, Section 56 Replacement/Saugus Design/CA award was greater than budgeted.

- Spending changed due to updated schedules for Section 56 Replacement Construction and REI, Section 56 Replacement award was greater than budgeted, and schedule shifts for CP-3 Section 99 Construction, Sections 14, 53, and 99 REI, and CP-2 Section 14 Construction contracts.

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.

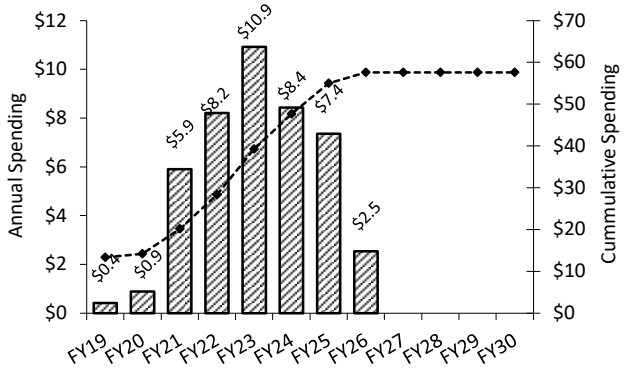
Scope

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 11,000 feet of 20-inch Section 24 and Section 47; Replacing 3,600 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 2,325 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 and 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 or 24-inch diameter pipeline.	Future
Section 75 Extension Construction CP-1 (7484)	Addition of approximately 4,000 feet of new 30-inch diameter pipe to extend Section 75 easterly to Section 24 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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$57,572	$13,332	$44,239	$885	$5,900	$26,320	$18,327	$0

New Connecting Mains



Project Status 5/20	24.2%	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$56,376	$57,572	$1,196	Dec-25	Dec-25	None	$25,839	$26,320	$481

Explanation of Changes

- Project cost changed primarily due to updated cost estimate for Section 23, 24,47 Rehab, as well as inflation on unawarded contracts.

- Spending changed due to updated cost estimate listed above as well as inflation adjustment 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.

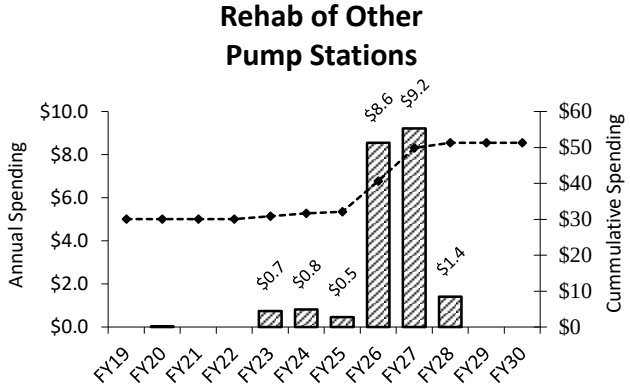
Scope

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
Technical Assistance	As-Needed Technical Assistance work needed.	Active
Pump Station Rehabilitation Design CA (7526), Construction (7527), and REI (7720)	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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$51,290	$30,058	$21,233	$33	$0	$780	$20,453	$0



Project Status 5/20	58.7%	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$50,258	$51,290	$1,032	May-27	May-27	None	$1,247	$780	($467)

Explanation of Changes

- Project cost changes due to adding contract for Pumping Station Resident Engineering/Inspection and deleting Pumping Station Rehabilitation Evaluation phase.

- Project spending changed due to Pumping Station Rehabilitation Evaluation phase being deleted.

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 provide redundancy in the Northern Extra High (NEH) system and improve hydraulic service and reliability for major portions of the NEH system. Existing lines are undersized and frequently experience pressure problems. Improvements will include construction of two new pipe segments and rehabilitation of existing mains.

Project History and Background

The Northern Extra High (NEH) Pressure Zone serves the communities of Waltham, Lexington, Bedford (via Lexington), Belmont, Winchester, and Arlington. The existing pipelines are old and many are not large enough to meet maximum day plus fire flow service goals. Construction of new pipelines as well as replacement and rehabilitation of existing pipelines will improve system reliability and redundancy as well as system pressures, and will result in better fire protection and reduced pumping costs. Improvements will include new pipelines to interconnect Section 45 (in the vicinity of Meter 47) to Section 63 (in the vicinity of Meter 136) and interconnect Section 83 (in the vicinity of Meter 183) to Section 45 (in the vicinity of Meter 47). The improvements will also include replacement of Section 63, Section 34, and Section 45, as well as rehabilitation and replacement of Section 61. These pipe sections are key components of the NEH Service System, are undersized, and are past their useful life. The improvements will also include a new meter for Lexington and Belmont as well as various improvements to existing meters in the NEH pressure zone, which will improve service reliability and redundancy as well as improve flows to communities.

Scope

Sub-phase	Scope	Status
NEH Improvements Design/ESDC (7404) and REI (7724)	Design and engineering services during construction and REI Services for CP-1 and CP-2.	Future
CP-1 NEH Improvements (6522)	Construction to include new pipe section interconnecting Meters 47 and 136 as well as Replacement of Section 63.	Future
CP-2 NEH Improvements (7725)	Construction to include new pipe section interconnecting Meters 183 and 47 as well as replacement of Sections 34 and 45 and replacement of Section 61. 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
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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$40,180	$3,632	$36,548	$6	$518	$2,525	$33,850	$173

Project Status 5/20	9.0%	Status as % is approximation based on project budget and expenditures. Construction of a portion of Section 45 was completed in September 2001. NEH Improvements Design/ESDC is scheduled to begin in November 2020.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$10,874	$40,180	$29,306	Jul-26	Nov-27	16 mos.	$447	$2,525	$2,078

Explanation of Changes

- Project cost, schedule and spending changed due to project repackaged and rescheduled with updated cost estimates for two construction contracts.

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 new cathodic protection systems at Shafts E & L to replace the old systems.	Completed
Cathodic Protection (Shafts N and W) Construction (7610)	Construction to replace the existing cathodic protection systems in order to maintain pipe and steel storage tanks integrity for Shafts N and W.	Future

Sub-phase	Scope	Status
CP-1 Cathodic Protection (Metro System) Design/CA and Construction (7611/7612), and REI (7679) and CP-2 Construction (7715)	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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY20
$63,483	$979	$62,504	$181	$308	$12,066	$51,148	$0

Project Status 5/20	1.8%	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 was substantially complete in August 2019.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$66,704	$63,483	($3,221)	Jan-27	Jan-27	None	$9,740	$12,066	$2,326

Explanation of Changes

- Project cost changed primarily due to Cathodic Protection West Design/Construction Administration and REI phases were deleted since work will be done through As-Needed Design and REI contracts.
- Spending changed due to Cathodic Protection Metropolitan System project repackaged and rescheduled with updated cost estimates for two construction contracts partially offset by deleted contracts 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. Bridge inspection needs to be done before scope of repairs/painting can be developed. (A portion of CIP 7483 to be used for replacement of rods and inspection of bridge.)	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

Sub-phase	Scope	Status
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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$66,289	$65,489	$800	$0	$0	$800	$0	$0

Project Status 5/20	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$66,289	$66,289	$0	May-23	May-23	None	$800	$800	$0

Explanation of Changes

- N/A.

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, Construction (6995/6982/7705)	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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$38,945	$18,287	$20,659	$0	$0	$0	$20,648	$11

Project Status 5/20	47.0%	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$33,827	$38,945	$5,118	Dec-27	Dec-27	None	$0	$0	$0

Explanation of Changes

- Project increased due to inflation adjustments for Chestnut Hill Final Connections work.

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.	Active

Sub-phase	Scope	Status
Section 22 Design/ESDC (7120)	Design/ESDC for Section 22 and Section 21.	Future
Section 22 Construction (6844) and REI (7723)	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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$90,585	$36,683	$53,902	$740	$852	$3,241	$50,423	$238

Project Status 5/20	41.3%	Status as % is approximation based on project budget and expenditures. Section 22 Rehabilitation Alternatives Analysis and Environmental Permitting was awarded in July 2019.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$80,308	$90,585	$10,277	May-27	May-27	None	$3,271	$3,241	($30)

Explanation of Changes

- Project cost increased due to inflation adjustments for Section 22 Construction and Sections 20 & 58, Design and Construction. Also, new subphase for Section 22 REI.

- Project spending changed primarily due to Section 22 Rehabilitation Alternative Analysis and Environmental Permitting was awarded less than budgeted.

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

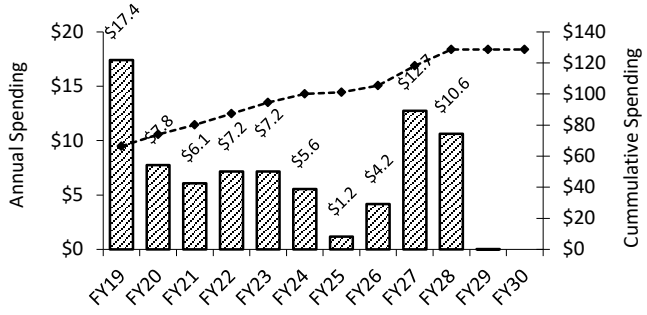
Sub-phase	Scope	Status
Design CA/RI and Construction Section 89/29 Redundancy Phases 1A, 1B, 1C & 2	Contract 6906 includes design and CA/RI for the redundant pipeline Section 110 (approximately 7 miles) consisting of 4 construction contracts. Phase 1 includes Phase 1A West Street Section 110 Woburn/Reading (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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$128,729	$66,302	$62,428	$7,764	$6,084	$45,574	$34,250	$10

Project Status 5/20	57.2%	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 was substantially complete in June 2020.

NIH Redundancy and Storage



Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$121,188	$128,729	$7,541	Jan-28	Jan-28	None	$41,066	$45,574	$4,508

Explanation of Changes

- Project cost increased primarily due to updated cost estimate for Section 89 & 29 Replacement Construction, change orders for Section 89/29 Redundancy Construction Phase 2, and inflation adjustments for NIH Storage contracts.
- Project spending changed primarily due to updated cost estimate for Section 89 & 29 Replacement Construction and change orders for Section 89/29 Redundancy Construction Phase 2.

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, Construction, and REI – Section 8 and 57 (7092/6322/7719)	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, Construction and REI (7405/6962/7718)	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 Rehabilitation Design CA/RI (7540) and Construction (7541)	Design, CA/RI and construction of rehabilitation of: 600 feet of 20-inch cast iron Northern High System water pipe; and 2,500 feet of 48-inch steel Northern Low System water pipe and associated valves and structures located in Medford, MA.	Active/Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$60,945	$4,907	$56,038	$557	$1,171	$13,194	$44,664	$133

Project Status 5/20	8.7%	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$69,584	$60,945	($8,639)	Jul-28	Jul-28	None	$29,898	$13,194	($16,704)

Explanation of Changes

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

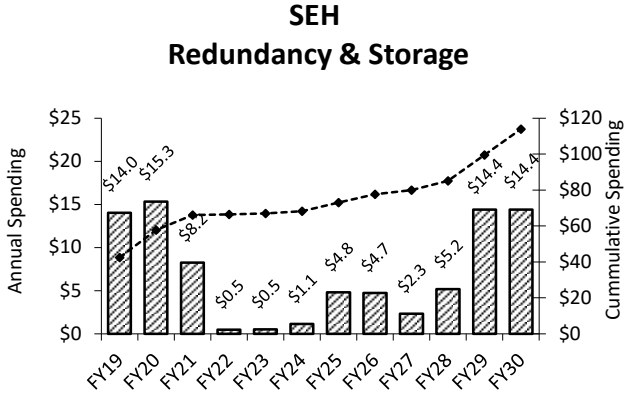
Scope

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/ESDC, Constr. and REI (7112/7113/7706)	Rehab of Sections 77 & 88 after redundant pipeline is in place.	Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$141,243	$42,462	$98,781	$15,311	$8,227	$38,522	$18,114	$56,162



Project Status 5/20	40.3%	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$132,426	$141,243	$8,817	Dec-35	Dec-35	None	$37,378	$38,522	$1,144

Explanation of Changes

- Project cost Increased primarily due to inflation adjustments on unawarded contracts, and change orders for Redundancy Pipeline Section 111 Construction 2 and 3, and new subphase added for Sections 77 and 88 REI.
- Project spending changed primarily due to change orders for Redundancy Pipeline Section 111 Construction 2 and 3, partially offset by updated schedule for Section 77 and 88 Rehabilitation Design/Engineering Services During Construction.

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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$80,457	$80,403	$54	$54	$0	$54	$0	$0

Project Status 5/20	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$80,457	$80,457	$0	Dec-16	Dec-16	None	$54	$54	$0

Explanation of Changes

- N/A.

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 Repair 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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$16,024	$1,925	$14,099	$0	$3	$858	$13,240	$0

Project Status 5/20	12.0%	Status as % is approximation based on project budget and expenditures. Section 80 Repair Construction was substantially complete in June 2018.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$13,552	$16,024	$2,472	Jul-26	Jul-26	None	$706	$858	$152

Explanation of Changes

- Project cost and spending changed primarily due to inflation adjustments on Section 80 Rehabilitation Design/Construction Administration and Construction.

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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$42,082	$21,197	$20,885	$1,066	$3,500	$16,960	$4,418	$0

Project Status 5/20	52.8%	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$39,002	$42,082	$3,080	Oct-28	Oct-28	None	$10,203	$16,960	$6,757

Explanation of Changes

- Project cost and spending changed primarily due to updated cost estimate for CWTP SCADA Upgrade Construction.

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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$2,799	$1,036	$1,763	$0	$231	$1,183	$580	$0

Project Status 5/20	37.0%	Status as % is approximation based on project budget and expenditures. Water System hydraulic Model is expected to begin in October 2020.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$2,799	$2,799	$0	Oct-23	Oct-24	12 mos.	$1,549	$1,183	($366)

Explanation of Changes

- Project schedule and spending shifted due to updated schedule for the Records Development project.

CEB Impacts

- None 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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$0	$154,098	($154,098)	$5,834	$33,180	$54,163	$4,819	($199,255)

***Total Loan Distributions less Loan Repayments.**

Project Distribution Status 5/20	54.4%	Through May 2020, MWRA has distributed $448.7 million in loans to fund 466 projects in 42 communities under the Local Water System Financial Assistance Program.

Project Repayment Status 5/20	34.9%	Through May 2020, a total of $287.4 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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$0	$0	$0	May-46	May-46	None	$37,498	$54,163	$16,665

Explanation of Changes

- Spending change is primarily due to updated cash flows for Lead Service Loans and Phase 3 Local Water Supply Assistance Program distributions and repayments as well as Phase 1, Phase 2 and CVA repayments.

CEB Impact

- The annual interest paid for the Commercial Paper program supporting the Local Water System Assistance Program initiative is $1.45 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) REI (7676), Phase 2 Constr. (7727) and REI (7728)	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

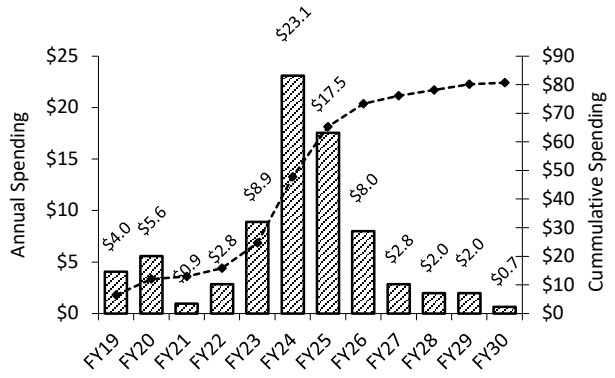
Sub-phase	Scope	Status
Design and Construction Cosgrove Valve Replacement (7064/7065)	Replacement of isolation sluice gates at Cosgrove Intake to improve reliability for emergency shut down of Cosgrove facility and to isolate new sliding sleeve valves to facilitate preventive maintenance and any future 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
Fells/Loring Road 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 Phase 1 Design/CA (7542, Construction (7453), and REI (7707) and Phase 2 Design/CA (7708) Construction (7709) and REI (7710)	Replace five older Venturi meters and seven above ground cabinets in Boston. Remove fire flow bypasses of four additional water meters and 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

Sub-phase	Scope	Status
Generator Docking Station (7025) and REI (7024)	To install an electrical switchboard at 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 Design/ESDC (7711), Construction (7694), and REI (7712)	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
Water Tanks Paint Phase 1 Design/ESDC, Construction, REI Bellevue 2/Deer Island/Turkey Hill (7739, 7740, 7748, 7741)	**Rehabilitate Bellevue 2, Deer Island, and Turkey Hill storage facilities including repaint, replace cathodic protection and other improvements.**	**Future**
Water Tanks Paint Phase 2 Design/ESDC, Construction, REI Bellevue 1/Park Circle/Walnut Hill (7742, 7743, 7744)	**Rehabilitate Bellevue 1, Park Circle, and Walnut Hill storage facilities including repaint, replace cathodic protection and other improvements.**	**Future**
Cosgrove Tunnel Rehabilitation Design/ESDC (7738)	**Repairs need to the Cosgrove Tunnel as a result of an inspection in 2003. This project would be for the design and engineering services during construction for these repairs.**	**Future**
Beacon Street Line Rehabilitation Design/ESDC, Construction, REI (7729, 7730, 7731)	**Rehabilitation of the remaining portion of the Beacon Street line near the Chestnut Hill area.**	**Future**

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$108,639	$6,425	$102,214	$5,572	$942	$22,274	$53,447	$30,534

Waterworks Facilities Asset Protection



Project Status 5/20	10.0%	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. Cosgrove Roof Replacement was substantially complete in September 2019. Gillis PS/Cottage Farm CSO Roof Replacement NTP issued in July 2019. Bellevue Hill II and Turkey Hill Tanks Repainting were substantially complete in October 2019. Generator Docking Station construction was substantially complete in April 2020

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$41,884	$108,639	$66,755	Jul-26	Jul-41	180 mos.	$24,776	$22,274	($2,502)

Explanation of Changes

- Project cost changed due to new projects that were added for Water Tank Painting/Improvements, Cosgrove Tunnel Rehab Design/ESDC, Beacon St Line, updated cost estimates for Masonry/Structural Repairs Bellevue 1/Arlington Heights Tanks, Water Meter Vault Manhole Phases 1 and 2, Steel Tank Improvements Phases 1 and 2, change orders for Generator Docking Station and Cosgrove Intake Roof Replacement as well as inflation adjustments on unawarded contracts.

- Project spending changed primarily due to updated cost estimates, restructuring and rescheduling of several projects including Masonry/Structural Repairs Bellevue 1/Arlington Heights, Steel Tank Improvements, and Water Meter Vault Manhole Improvements.

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.	Completed
FY19-23 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.	Active
FY11-13 Vehicle Purchases	Vehicle purchases planned for FY11-13.	Completed
FY14-18 Vehicle Purchases	Vehicle purchases planned for FY14-18.	Completed

Sub-phase	Scope	Status
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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$42,711	$22,820	$19,891	$1,678	$2,712	$9,914	$10,940	$0

Project Status 5/20	56.2%	Status as % is approximation based on project budget and expenditures. Purchase and installation of security equipment is in process and will continue into FY24.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$39,090	$42,711	$3,621	Jun-28	Jun-28	None	$10,453	$9,914	($539)

Explanation of Changes

- Project cost changed primarily due to updated cost estimates for Vehicle Purchases, Contaminant Monitoring Equipment, and Security Equipment and Installation.

- Project spending changed due to updated cost estimates for Security Equipment and Installation, Contaminant Monitoring Equipment and FY19-23 Vehicle Purchases phases and updated cash flow for Major laboratory instrumentation.

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 FY19	Remaining Balance	FY20	FY21	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$1,125	$1,125	$0	Jun-22	Jun-23	12 mos.	$1,125	$1,125	$0

Explanation of Changes

- Project schedule shifted to reflect continuation of contracts for an additional year.

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.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$26,385	$15,457	$10,928	$2,592	$4,570	$12,184	$0	$0

Project Status 5/20	65.0%	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 and contracts 18 and 19 are expected to commence in July 2020.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
27,587	$26,385	($1,202)	Jul-22	Jul-22	None	$13,386	$12,184	($1,202)

Explanation of Changes

- Project cost and spending changed primarily due to updated cost estimates for Contracts 17, 18 and 19.

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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$3,071	$371	$2,700	$0	$0	$1,075	$1,625	$0

Project Status 5/20	12.1%	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$2,971	$3,071	$100	Dec-21	Aug-24	32 mos.	$2,600	$1,075	($1,525)

Explanation of Changes

- Project cost, schedule and spending changed due to updated cost estimates and schedules for DI Administration Building Demolition work.

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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$23,700	$18,184	$5,516	$0	$0	($234)	$5,516	$0

Project Status 5/20	76.7%	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$23,364	$23,700	$336	Dec-24	Dec-24	None	($234)	($234)	$0

Explanation of Changes

- Project cost changed due to inflation adjustment on Future Renewable Energy contract.

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 1,100 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 1,482 desktops, 168 laptops, 60 physical servers, 250 virtual machines, 200 tablets, 266 smartphones, 19 Wide Area Network circuits and associated ancillary equipment, as well as the almost 1.2 petabytes (PB) of data managed and protected by MIS.

S. 940 Applications Improvements Program

Project Purpose

To develop, improve, and procure information technology (IT) 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.

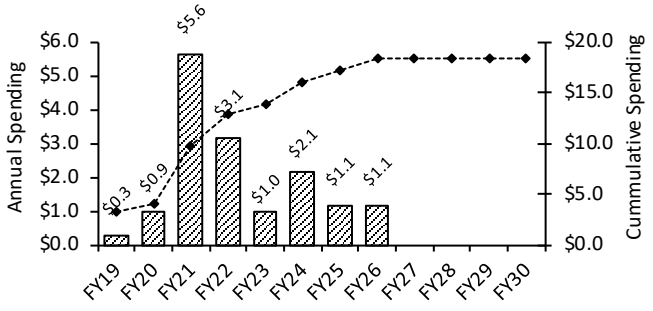
Sub-phase	Scope	Status
GIS Applications & Integration	Expand role of GIS technology for scientific, environmental and engineering applications. This project will assess the current state of the GIS Program and make recommendations for improvements.	Planned FY21
Lawson Upgrade	Upgrade current Infor application system to version 11 and implement these additional application modules: Global Human Resources which will provide the latest enhancements to the Employee Safety, Position Budgeting, Benefits, Employee Relations, Absence and Occupational Health Modules And Work Force Management which will provide a new time entry and tracking system	Active
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.	Active
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.	Complete
	Phase II will leverage lessons learned from Phase I and implement ELN for the Wastewater Labs.	Future
MAXIMO Interface Enhancements	The MWRA utilizes a custom interface to synchronize the Maximo Enterprise Asset Management (EAM) and Infor/Lawson Enterprise Resource Planning (ERP) systems. Enhancements are being done in an effort to build on the existing interface by streamlining process flows, enhancing functionality, and adding data validation for optimal performance and transaction integrity.	Active
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.	Future
HOML	Harbor outfall monitoring loading application provides a web portal for outside contractors to load Boston Harbor sampling data used to submit NPDES reports to EPA by ENQUAL group	Future
Archiving & 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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY23
$18,249	$3,157	$15,092	$580	$5,367	$10,971	$4,385	$0

Application Improvements Program



Project Status 5/20	17.5%	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		
FY20	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**	**FY20**	**FY21**	**Chge.**
$13,093	$18,249	$5,156	Sep-25	Sep-25	None	$6,290	$10,971	$4,681

Explanation of Changes

- Project cost and spending changed primarily due to an updated cost estimate for Lawson Upgrade including work transferred from AP Invoice Automation as well as a revised cost estimate for Enterprise Content Management.

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
MSSP	New contract for Managed Security Service Provider (MSSP) and Security infrastructure technology refresh.	Future
ITSM Access Management	Implementation of additional technologies to manage and monitor user access to IT assets and services.	Active
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.	Active
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.	Active
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.	Active
America's Water Infrastructure Act (AWIA) cybersecurity Risk and Resiliency Assessment	Assess the risks and resiliencies that can be identified within the Cyber Security Program's existing protections by a third party. Phase 1 tests all Internet-facing computing devices and services, as well as the internal financially-connected computing devices and services, as required by AWIA. Phase 2 tests all other internal devices and services. Final report after each phase will highlight desired improvements that MWRA will evaluate for implementation, in order to maximize MWRA's cyber security posture for protecting Authority operations and support functions.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$5,506	$1,708	$3,798	$762	$3,036	$3,798	$0	$0

Project Status 5/20	32.7%	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$5,506	$5,506	$0	Jun-21	Jun-21	None	$3,798	$3,798	$0

Explanation of Changes

- N/A.

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 FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$200	$0	$200	$0	$160	$200	$0	$0

Project Status 5/20	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		
FY20	FY20	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$200	$200	$0	Jun-20	Nov-21	17 mos.	$200	$200	$0

Explanation of Changes

- Project schedule changed primarily due to updated completion date for IT Project Management Methodology contract.

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 1,482 desktops, 168 laptops, 60 physical servers, 250 virtual machines, 200 tablets, 266 smartphones, 19 Wide Area Network circuits and associated ancillary equipment, as well as almost 1.2 petabytes (PB) 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.

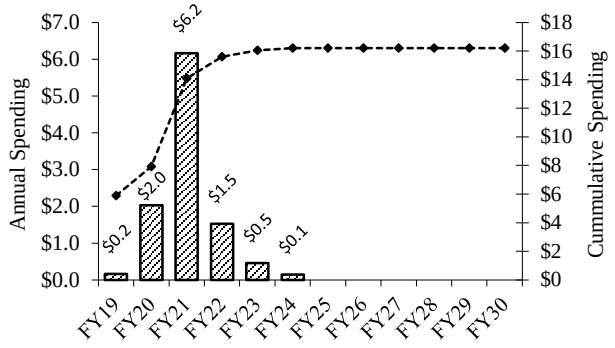
Sub-phase	Scope	Status
IT Infrastructure Upgrades	Server upgrades will be performed in FY18-FY20 These upgrades will use specifications developed for server hardware and software including the ability to implement greater virtualization as well as take advantage of opportunities to standardize operating systems, and hardware, for greater ease of support.	Active
Cabling	Replacement of older Ethernet and fiber cabling to support PBX replacement.	Future
SAN 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.	Active
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

Sub-Phase	Scope	Status
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
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.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY19	Remaining Balance	FY20	FY21	FY19-23	FY24-28	Beyond FY28
$16,202	$5,890	$10,312	$2,028	$6,158	$10,325	$146	$0

IT Infrastructure Program



Project Status 5/20	39.1%	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		
FY20	FY21	Chge.	FY20	FY21	Chge.	FY20	FY21	Chge.
$16,202	$16,202	$0	Dec-23	Dec-23	None	$10,321	$10,325	$4

Explanation of Changes

- N/A.

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 FY21 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 FY19

Payments through FY19 include actual and accrued expenditures since the inception of the contract through the end of FY19.

Remaining Balance

Remaining Balance is calculated by subtracting Payments through FY19 from the Contract Amount. This amount is then spread in the columns to the right, for FY20-23, FY24-28 and Beyond FY28.

APPENDIX 2
FY21 FIVE-YEAR CIP BY MAJOR PROGRAM CATEGORY
FY21 by Quarters

CAPITAL IMPROVEMENT PROGRAM													
EXPENDITURE FORECAST FY2019-2023													
($000)													
	Total Contract Amount	Project Payments Thr. FY19	Balance as of 6/30/19	FY19	FY20	QI FY21	QII FY21	QIII FY21	QIV FY21	FY21	FY22	FY23	5-Year Total FY19-23
Wastewater System Improvements	3,834,477	2,136,167	1,698,310	74,850	96,628	25,905	29,648	43,231	54,686	153,471	143,405	132,764	601,118
Waterworks System Improvements	4,529,816	2,177,062	2,352,754	65,647	53,634	22,966	15,077	20,560	31,698	90,301	98,320	96,859	404,761
Business & Operations Support	173,001	103,438	69,563	2,408	8,001	2,561	4,252	5,980	9,600	22,394	10,222	6,334	49,359
Total MWRA	8,537,294	4,416,667	4,120,627	142,905	158,263	51,433	48,977	69,772	95,984	266,166	251,947	235,957	1,055,238
Contingency	212,020		212,020							12,147	14,213	15,094	41,454
Total MWRA w/ Contingency	8,749,314	4,416,667	4,332,647	142,905	158,263	51,433	48,977	69,772	95,984	278,313	266,160	251,051	1,096,691

Massachusetts Water Resources Authority
Capital Improvement Program
FY21 Final Expenditure Forecast
$000s

Program / Project / Contract	Contract No.	Notice to Proceed	Substantial Completion	Total Contract Amount	Payments through FY19	Remaining Balance	FY20	FY21	FY22	FY23	FY19-FY23	FY24-FY28	Beyond FY28
Total MWRA				**8,537,295**	**4,416,667**	**4,120,628**	**158,263**	**266,165**	**251,948**	**235,957**	**1,055,237**	**1,859,102**	**1,349,193**
Wastewater				**3,834,477**	**2,136,167**	**1,698,310**	**96,628**	**153,470**	**143,405**	**132,764**	**601,117**	**1,044,735**	**127,308**
Interception & Pumping				**1,238,478**	**625,548**	**612,931**	**34,905**	**74,228**	**57,819**	**31,149**	**221,248**	**356,387**	**58,443**
102 Quincy Pump Facilities		**completed project**		**25,907**	**25,907**								
104 Braintree-Weymouth Relief Facilities				**241,415**	**227,909**	**13,505**	**341**	**417**	**417**	**417**	**1,797**	**11,913**	
Geotechnical - Marine	10001_5333	Nov-91	Apr-92	443	443								
Geotechnical - Land	10044_5332	Nov-91	Mar-92	8	8								
Facilities Planning - Phase 1	10045_5311	Oct-81	Dec-90	331	331								
EIR - Phase 1	10046_5312	Nov-84	Oct-90	514	514								
Design 1/CS/RI	10047_5313	Nov-94	Jun-06	18,882	18,882								
Land Acquisition	10048_5314	Mar-97	Jun-10	12,842	12,842								
Tunnel Construction/Rescue	10049_5315	Jun-99	Jul-03	83,191	83,191								
Intermediate Pump Station - Construction	10050_5316	Dec-00	Apr-05	47,445	47,445								
North Weymouth Relief Interceptor	10051_5303	Mar-01	Jun-02	4,705	4,705								
HDD Siphon - Construction	10052_5373	Jul-03	May-07	16,357	16,357								
B-W Replacement Pump Station	10054_5375	Jan-05	Apr-08	17,728	17,728								
Design - Rehab	10055_5308	Sep-88	Dec-89	24	24								
Construction - Rehab	10056_5309	Jan-92	Dec-96	255	255								
Final Environmental Impact Report (EIR)/Facility Plan	10057_5324	Apr-91	Aug-93	1,111	1,111								
Design 2/CS/RI	10058_5331	Apr-95	Dec-11	14,999	14,999								
Rehabilitation of Section 624 - Construction	10060_5310	Jul-10	Dec-10	2,506	2,506								
Technical Assistance	10061_5951	Nov-84	Apr-07	144	144								
Sedimentation Testing	10251_6016	Sep-94	Apr-96	96	96								
Legal	10263_6072	Jul-95	Apr-08	849	849								
Hazardous Waste	10265_6074	Jul-95	Apr-07	8	8								
Marine Pipeline - Design	10278_6119	Feb-97	Aug-97	1,100	1,100								
Mill Cove Siphon - Construction	10302_6368	Aug-97	Jun-98	2,749	2,749								
Community Technical Assistance	10354_6631	Jul-99	Apr-07	1,111	1,111								
Geotechnical Consultant	10375_6766	Sep-00	Mar-03	56	56								
IPS/RPS Communication System	10378_6792	Dec-02	Apr-08	225	225								
Wetlands Replication	10470_7290			26	26								
Mill Cove Siphon Sluice Gates - Design	10479_7326	Apr-24	Apr-27	889		889						889	
Mill Cove Sluice Gates - Construction	10480_7327	Aug-25	Apr-26	2,256		2,256						2,256	
B/W Improvements - Construction	10493_7366	Sep-23	Sep-25	8,000		8,000						8,000	
B/W Improve - Design/CS	19567_7435	Dec-18	Dec-23	2,085	205	1,880	341	417	417	417	1,797	288	
B/W Improvements - REI	19568_7683	Sep-23	Sep-25	480		480						480	
105 New Neponset Valley Relief Sewer		**completed project**		**30,300**	**30,300**								
106 Wellesley Extension Replacement Sewer		**completed project**		**64,359**	**64,359**								
107 Framingham Extension Relief Sewer		**completed project**		**47,856**	**47,856**								
127 Cummingsville Replacement Sewer		**completed project**		**8,999**	**8,999**								

Massachusetts Water Resources Authority
Capital Improvement Program
FY21 Final Expenditure Forecast
$000s

Program / Project / Contract	Contract No.	Notice to Proceed	Substantial Completion	Total Contract Amount	Payments through FY19	Remaining Balance	FY20	FY21	FY22	FY23	FY19-FY23	FY24-FY28	Beyond FY28
130 Siphon Structure Rehabilitation				**14,668**	**940**	**13,728**	**108**	**1,165**	**1,160**	**1,087**	**3,520**	**10,208**	
Planning	10253_6017	Jan-96	Nov-98	938	938								
Land Acquisition	10280_6165	Aug-21	Aug-23	50	2	48			25	23	48		
Design/CS/RI	10293_6224	Apr-20	Sep-24	2,855		2,855	108	1,165	1,135	314	2,722	133	
Construction	10294_6225	Apr-22	Sep-23	3,960		3,960				750	750	3,210	
Phase 2 - Land Acquisition	10600_7684	Dec-24	Dec-26	50		50						50	
Phase 2 - Design CS/RI	10601_7685	Jul-23	Dec-27	2,855		2,855						2,855	
Phase 2 - Construction	10602_7686	Jul-25	Dec-26	3,960		3,960						3,960	
131 Upper Neponset Valley Sewer System		**completed project**		**54,174**	**54,174**								
132 Corrosion & Odor Control				**97,949**	**6,491**	**91,457**	**5,392**	**21,278**	**22,169**	**12,900**	**62,051**	**28,878**	**840**
Planning/Study	10279_6137	Jan-97	Dec-98	587	587								
Land Acquisition	10323_6549	Aug-02	Jun-05	28	23	5	5				16		
Legal	10325_6551	Dec-00	Jul-08	2	2								
Design/CS/RI	10327_6553	Aug-02	Jun-05	1,788	1,788								
Interim Corrosion Control	10373_6743	Jul-00	Dec-01	621	621								
FES/FERS Biofilters - Design	10406_6919	Jul-23	May-26	1,271		1,271						1,271	
FES/FERS Biofilters - Construction	10456_7215	Dec-24	Dec-25	2,080		2,080						2,080	
System-wide Odor Control - Study	10491_7364	Jan-24	Jan-26	1,000		1,000						1,000	
Nut Island Mechanical & Electrical Upgrades - Design/CA	10492_7365	Jul-23	Nov-28	4,800		4,800						3,960	840
Nut Island System-wide Odor Control - Evaluation	10495_7494	Sep-15	Feb-17	487	487								
Nut Island Mechanical & Electrical Upgrades - Construction	10496_7495	Nov-25	Nov-27	20,000		20,000						20,000	
Nut Island Odor Control & HVAC Improvements - Design/CA/REI	10497_7517	Mar-17	Nov-23	7,280	2,983	4,297	471	1,278	1,169	1,252	4,470	127	
Nut Island Odor Control & HVAC Improvements - Phase 2	10498_7548	Feb-20	Dec-22	57,565		57,565	4,917	20,000	21,000	11,648	57,565		
Nut Island Mechanical & Electrical Upgrades - REI	10580_7635	Nov-25	Nov-27	440		440						440	
136 West Roxbury Tunnel				**11,314**	**10,314**	**1,000**						**1,000**	
Inspection	10299_6230	Jul-98	Sep-99	344	344								
Tunnel Easements & Permits	10329_6566	Mar-10	Dec-15	54	54								
Legal	10330_6567	Apr-00	Mar-10	2	2								
Land Acquisition	10331_6568	Apr-00	Mar-10	440	440								
Construction	10332_6569	Jun-01	Jun-02	6,674	6,674								
Design/CS/RI	10333_6570	Apr-00	Jun-03	1,417	1,417								
Technical Assistance	10366_6709	Nov-99	Mar-10	8	8								
Tunnel - Design	10400_6897	Feb-09	Jun-11	1,375	1,375								
Tunnel Inspection	10401_6898	Sep-23	Jun-24	1,000		1,000						1,000	
137 Wastewater Central Monitoring				**27,482**	**19,810**	**7,672**	**174**	**130**	**447**	**447**	**1,226**	**6,474**	
Planning	10301_6232	Jan-98	Jul-99	563	563								
Design and Integration Services	10319_6532	Jun-02	Jul-10	6,344	6,344								
Construction 1 (CP1)	10320_6533	Mar-06	Jan-08	7,662	7,662								
Construction 2 (CP2)	10321_6534	Feb-08	Jul-09	5,139	5,139								
Technical Assistance	10322_6535	Sep-02	Jul-10	7	7								
Equipment Prepurchase	10398_6861	Apr-05	Dec-09	65	65								
Wastewater Redundant Communications	10490_7363	Jul-21	Mar-25	700		700			187	187	374	326	
Design & Programming Services	10551_7578	Apr-18	Oct-27	3,470	28	3,442	71	80	160	160	499	2,971	
Construction	10552_7579	Dec-23	Oct-31	1,420		1,420						1,420	
Equipment/Hardware	10553_7580	Jun-18	Oct-27	2,110		2,110	102	50	100	100	352	1,758	

Massachusetts Water Resources Authority
Capital Improvement Program
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139 South System Relief Project				**4,939**	**3,439**	**1,500**						**1,500**	
Archdale - CS/RI	10309_6419	Nov-98	Aug-99	5	5								
Archdale - Construction	10310_6420	May-99	Aug-99	211	211								
Sections 70 & 71 High Level Sewer (HLS) - Evaluation	10318_6519	Sep-98	Oct-99	215	215								
Outfall 023 - Design	10345_6595	Jun-99	Sep-99	1	1								
Outfall 023 - Cleaning	10346_6596	Apr-00	Nov-00	1,098	1,098								
Land Acquisition/Easements	10347_6605	Apr-99	Apr-05	5	5								
Sections 70 & 71 HLS - Construction	10349_6611	Jun-99	Oct-99	417	417								
Milton Financial Assistance	10350_6616	Oct-99	Jun-00	1,488	1,488								
Outfall 023 - Structural Improvements	10386_6801	Jan-24	Dec-25	1,500		1,500						1,500	
141 Wastewater Process Optimization				**8,933**	**1,519**	**7,414**	**190**	**291**	**203**		**701**	**5,154**	**1,577**
Planning	10367_6733	Aug-01	Aug-04	930	930								
North System Hydraulic Study	10412_6930	Nov-11	Jun-15	561	561								
Hydraulic Modeling Engineering Design and Construction	19401_7412	Mar-19	Jun-31	7,442	28	7,414	190	291	203		712	5,154	1,577
142 Wastewater Meter System - Equipment Replacement				**21,938**	**6,736**	**15,202**	**1,336**	**4,487**	**556**		**7,391**		**8,823**
Planning / Study / Design	10371_6739	Jul-17	Mar-22	3,858	1,598	2,260	850	854	556		3,272		
Equipment Purchase & Installation	10379_6793	Nov-03	Jun-08	5,138	5,138								
Wastewater Metering Asset Protection/Equipment Purchase	10451_7191	Aug-20	Dec-30	12,942		12,942	486	3,633			4,119		8,823
143 Regional I/I Management & Planning		**completed project**		**169**	**169**								
145 Facility Asset Protection				**572,379**	**116,626**	**455,754**	**27,364**	**46,460**	**32,867**	**16,036**	**144,301**	**285,823**	**47,204**
Prison Point HVAC Upgrades - Construction	10380_6795	Dec-10	Dec-13	2,764	2,764								
Remote Headworks Heating System Upgrades	10381_6796	May-05	May-06	1,175	1,175								
Alewife Brook Pump Station Rehab - Construction	10382_6797	Jan-16	Apr-19	13,508	13,423	85	85				3,734		
Rehab of Section 93A Lexington	10383_6798	Jul-03	Apr-04	1,566	1,566								
Chelsea Creek Headworks Upgrades - REI	10387_6802	Nov-16	Feb-21	3,447	1,534	1,913	766	1,147			2,582		
Technical Assistance	10392_6829	Jul-02	Mar-22	177	155	22	22				79		
Sections 80 & 83	10394_6842	Apr-07	Sep-07	365	365								
Section 160	10395_6843	Jun-07	Dec-08	1,581	1,581								
Survey	10396_6857	Nov-04	May-05	11	11								
Permits	10397_6858	May-03	May-25	15	15								
Remote Headworks Concept Plan	10399_6886	May-08	Sep-09	670	670								
Construction CB1 Sections 26 & 27	10418_6936	Sep-25	Sep-27	30,000		30,000						30,000	
Alewife Brook Pump Station Rehab - Design/CA	10419_6937	Apr-10	Oct-11	223	223								
Prison Point HVAC Upgrades - Design	10420_6938	Jan-08	Mar-13	441	441								
93 A Force Main Replacement	10423_6987	May-06	Jan-07	462	462								
Mill Brook Valley Sewer Section 79 & 92	10424_7004	Jun-04	Mar-05	542	542								
Hingham Pump Station Isolation Gate - Construction	10427_7033	Sep-11	May-12	125	125								
Alewife Brook Pump Station - Final Design/CA/REI	10428_7034	Mar-12	Feb-20	2,265	2,101	164	164				630		
Caruso Pump Station Improvements - Design/CA/REI	10431_7037	Aug-12	Jun-17	865	861	4	4				4		
Land/Easements	10440_7073	Jul-03	Jun-10	155	103	51	51				51		
Nut Island Headworks Fire Alarm/Wire Conduit	10444_7144	Jun-09	Dec-09	285	285								
Chelsea Creek Headworks Upgrades - Construction	10445_7161	Nov-16	Nov-20	83,367	43,712	39,655	21,988	17,666			51,837		
Hayes Pump Station Rehab - Design	10446_7162	Sep-20	Sep-25	2,540		2,540		492	656	656	1,804	736	
Interceptor Renewal 1, Reading Extension - Design/CA/REI	10447_7163	Aug-15	Jun-19	934	952						242		
Interceptor Renewal 1, Reading Extension - Construction	10448_7164	Aug-17	Dec-18	1,935	1,935						962		
Chelsea Creek Headworks Upgrades - Design/CA	10455_7206	Jul-10	Oct-21	10,316	8,775	1,541	865	576	100		2,955		
Interceptor Renewal 7, Malden & Melrose - Study/Design/CA	10457_7216	Jun-20	Jan-26	2,600		2,600		720	720	720	2,160	440	
Interceptor Renewal 7, Malden & Melrose - Construction	10458_7217	Jan-23	Jan-25	8,100		8,100						8,100	
Remote Headworks & Deer Island Shaft Study	10463_7237	Sep-18	Jun-20	1,372	62	1,310	1,310				1,372		
Interceptor Renewal 3, Dorchester Interceptor Sewer - Construction	10467_7279	Apr-20	Sep-21	4,707		4,707		4,200	507		4,707		
Construction CB2 Sections 23 & 24	10468_7280	Sep-27	Sep-29	30,000		30,000						8,400	21,600
Cottage Farm Fuel System Upgrade	10469_7281	Jun-12	Apr-13	497	497								
Nut Island Electrical & Grit/Screenings Conveyance - Design	10477_7312	Mar-11	May-16	1,230	1,230								

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Nut Island Electrical & Grit/Screenings Conveyance - Construction	10478_7313	Jul-13	May-15	5,192	5,192								
Interceptor Renewal 5, New Neponset Valley Sewer 607-610 - Construction	10481_7328	Jul-25	Jul-27	13,200		13,200						13,200	
Interceptor Renewal No. 6, Chelsea Sections 12/14/15/62	10482_7329	Aug-26	Aug-28	11,000		11,000						9,708	1,292
Prison Point/Cottage Farm Pump &Gearbox Rebuilds /ESDC	10483_7330	Feb-14	Dec-16	315	315								
Somerville/Marginal Influent Gates & Stop-Log Replacement	10484_7344	Jul-11	Nov-11	367	367								
Prison Point Rehab - Design/CA/RI	10486_7359	Aug-16	Sep-23	4,140	1,697	2,443	228	684	684	684	2,578	163	
System Relief & Contingency Planning	10487_7360	Dec-20	Dec-23	500		500		56	167	167	389	111	
DeLauri Pump Station Screens & Security Upgrades	10488_7361	Feb-18	Feb-19	1,343	1,289	54	54				1,150		
Caruso Pump Station Improvements - Construction	10489_7362	Mar-16	Jun-17	4,417	4,417								
Hayes Pump Station Rehabilitation - Construction	10500_7375	Sep-22	Sep-24	10,000		10,000				2,400	2,400	7,600	
Section 156 Rehabilitation - Design/Build	10503_7393	Jul-11	Jul-12	2,563	2,563								
Cambridge Branch Sections 26, 27 - Design/ ESDC	10504_7410	Sep-23	Sep-28	6,000		6,000						5,688	312
Sections 4, 5, 6, 186 - Design CA/RI	10505_7421	Jul-23	Jul-29	2,004		2,004						1,559	445
Sections 4, 5, 6, 186 - Construction	10506_7422	Jul-25	Jul-27	7,400		7,400						7,400	
Sections 4, 5, 6, 186 - Study	10507_7423	Feb-17	May-18	906	906								
Ward Street & Columbus Park Headworks - Design/CA	10510_7429	Jul-20	Jul-29	22,000		22,000		2,070	2,760	2,760	7,590	13,800	610
Ward Street Headworks - Construction	10511_7430	Jan-24	Jan-28	61,287		61,287						61,287	
Chelsea Screenhouse Upgrades	10512_7431	Aug-15	Sep-16	4,953	4,953								
Prison Point/Cottage Farm Pump & Gearbox Rebuilds	10515_7452	Oct-13	Nov-15	6,439	6,439								
Prison Point Piping Rehabilitation	10518_7459	Oct-16	Sep-17	462	462						262		
Prison Point Rehabilitation - Construction	10519_7462	Sep-20	Sep-22	41,780		41,780		15,700	22,580	3,500	41,780		
Cottage Farm Rehab - Construction	10520_7463	Jul-23	Jul-25	12,773		12,773						12,773	
Chelsea Screenhouse Upgrades - ESDC/REI	10521_7490	Sep-15	Sep-17	863	863						14		
Cottage Farm Rehabilitation - Design/CA/REI	10522_7508	Jul-21	Jul-26	2,555		2,555			425	625	1,050	1,505	
Chelsea Headworks/Caruso Pump Station Utilities	10523_7510	Jul-16	Jun-20	26	11	16	16				16		
Cambridge Branch 23, 24, 26, 27 - Study	10524_7511	Oct-16	Jan-18	512	512								
Interceptor Renewal 3, Dorchester Interceptor Sewer - Design CA/RI	10525_7512	Apr-17	May-22	1,496	546	950	127	412	379	32	1,133		
Cambridge Branch Sections 23, 24 - Design/ESDC	10526_7513	Sep-25	Sep-30	6,000		6,000						3,206	2,794
Interceptor Renewal 6, Chelsea Sections 12/14/15/62 - Design CA/REI	10527_7514	Aug-24	Aug-29	2,200		2,200						1,925	275
Interceptor Renewal 5, New Neponset Valley Sewer 607-610 - Design/CA	10528_7515	Sep-23	Sep-28	3,000		3,000						3,000	
Quincy/Hingham Pump Station Fuel Storage Upgrade - Construction	10529_7534	Jul-17	Mar-18	529	529								
Deer Island Shaft - Design/CA	10530_7549	Dec-23	May-27	800		800						800	
Remote Headworks Shaft Access Improvements - Construction	10531_7550	Sep-20	Jun-21	2,500		2,500		1,750	750		2,500		
Wiggins Terminal Pump Station - Design/Construction	10533_7552	Jul-21	Jul-23	1,767		1,767			640	1,127	1,767		
Fuel Oil Tank Replacement - Phase 1 Construction	10535_7554	Mar-20	Oct-21	1,433		1,433	205	819	409		1,433		
Fuel Oil Tank Replacement - Phase 2 Construction	10536_7555	May-21	Nov-22	2,302		2,302			1,333	969	2,302		
Columbus Park Headworks - Construction	10537_7587	Jul-24	Jul-28	61,287		61,287						57,465	3,822
Ward Street & Columbus Park Headworks - REI	10538_7636	Jan-24	Oct-28	7,161		7,161						6,407	754
Fuel Oil Tank Replacement - Phase 3 Construction	10539_7637	Mar-22	Jul-23	2,000		2,000			471	1,412	1,882	118	
Hayes Pump Station Rehabilitation - REI	10540_7668	Sep-22	Sep-24	500		500				146	146	354	
Pump Stations & CSO Facility Rehabilitation - Construction	10545_7688	Nov-23	Nov-30	37,500		37,500						25,300	12,200
Pump Stations & CSO Facility Rehabilitation - Design/CA/REI	10546_7689	Nov-21	Nov-31	7,500		7,500			150	500	650	3,750	3,100
Interceptor Renewal 7, Malden & Melrose - REI	10547_7751	Jan-23	Jan-25	1,300		1,300				270	270	1,030	
Remote Headworks Shaft Access Improvements - ESDC/REI	10548_7781	Dec-20	Sep-22	250		250		45	136	68	250		
Sections 191 & 192 Rehabilitation	54012_7643	Jan-20	Jul-20	1,619		1,619	1,497	123			1,619		
146 Deer Island Cross Harbor Tunnel				**5,000**		**5,000**						**5,000**	
Deer Island Cross Harbor Tunnels Inspection	10454_7199	Jul-24	Jun-29	5,000		5,000						5,000	
147 Randolph Trunk Sewer Relief				**698**		**698**				**262**	**262**	**436**	
Study	10461_7220	Jul-22	Jun-24	698		698				262	262	436	

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Treatment				**1,121,328**	**311,181**	**810,147**	**17,321**	**38,487**	**56,734**	**78,483**	**201,050**	**550,032**	**69,090**
182 Deer Island Primary and Secondary Treatment		**completed project**		**(958)**	**(958)**								
200 Deer Island Plant Optimization		**completed project**		**33,279**	**33,279**								
206 Deer Island Treatment Plant Asset Protection				**1,055,309**	**261,375**	**793,934**	**16,526**	**36,365**	**53,283**	**77,765**	**192,954**	**540,906**	**69,090**
DITP Roof Replacements	18045_6196	Jun-10	Jun-11	2,300	2,300								
Digester Storage Tank Rehabilitation - Construction	19161_6240	Jul-23	Jan-27	40,000		40,000						40,000	
DISC Application	19162_6241			125	125								
Pump Packing Replacement	19176_6422	Sep-03	Jun-08	732	732								
Demineralizer Construction	19177_6423	Jul-00	Dec-00	51	51								
Odor Control Rehabilitation - Construction	19188_6538	Sep-24	Mar-28	39,300		39,300						37,751	1,549
Odor Control Rehabilitation - REI	19191_6592	Sep-24	Jun-28	4,276		4,276						3,800	476
Equipment Condition Monitoring	19193_6594	May-04	Jan-05	1,777	1,777								
North Main Pump Station (NMPS) & WTF Valve & Piping - ESDC/RE	19194_6598	Dec-14	Oct-18	1,487	1,487								
Expansion Joint Repair - Design	19204_6668	Apr-99	Oct-04	149	149								
Expansion Joint Repair - Construction 1	19205_6669	Aug-02	Nov-03	305	305								
Expansion Joint Repair - Construction 2	19217_6704	Aug-12	Feb-14	1,894	1,894								
As-needed Design Phase 6-1	19220_6721	May-09	Oct-12	1,911	1,911								
As-needed Design Phase 6-2	19221_6722	May-09	Aug-12	1,744	1,744								
Eastern Seawall - Design/ESDC/REI	19222_6723	Jun-20	Feb-25	2,900		2,900		245	886	741	1,873	1,027	
Eastern Seawall - Construction 1	19223_6724	Jun-22	Jun-25	7,300		7,300				1,233	1,233	6,067	
Barge Berth Rehabilitation - Design/ESDC/REI	19224_6725	Apr-23	Aug-28	1,451		1,451						1,440	11
Barge Berth Rehabilitation - Construction	19225_6726	Feb-25	Aug-27	7,256		7,256						7,256	
Rip-rap Material DITP	19226_6727	Mar-17	Jun-17	227	227								
Digester Gas Flare No. 4 - Design	19227_6728	Oct-23	Jul-27	636		636						636	
Digester Gas Flare No. 4 - Construction	19228_6729	Apr-25	Jul-26	1,315		1,315						1,315	
Combined Heat & Power (CHP) - Design/ESDC/REI	19229_6730	Dec-21	Dec-29	5,580		5,580				1,795	1,795	3,595	190
Roof Replacement - Phase I	19230_S464	Mar-09	Mar-10	2,750	2,750								
Drive Chain Replacement	19231_6742	Oct-01	Jul-03	264	264								
Busduct Replacement (2+22)	19236_6763	Jan-01	Oct-01	196	196								
Reline Hypochlorite Tanks 1 & 3	19237_6764	May-07	Nov-07	1,691	1,691								
Combustion Turbine Generator (CTG) Modifications	19238_6765	Mar-01	May-02	482	482								
Electrical Equipment Upgrades - Construction 2	19239_6767	Apr-05	Feb-07	1,913	1,913								
Document Format Conversion	19241_6791	May-07	Jun-19	68	68								
Outfall Modification - Inspection	19243_6811	Dec-01	Jul-02	174	174								
Secondary Clarifier Access	19244_6812	Sep-01	Jul-02	275	275								
Transformer Replacement	19245_6813			1,703	1,703								
Digested Sludge (DSL) Pump Replacement - Phase 2	19246_6821	Jan-16	Jul-17	2,672	2,672								
Co-Digestion Design/Build	19247_6822	Aug-24	Feb-26	5,000		5,000						5,000	
Reline Hypochlorite Tanks 2 & 4	19250_6849	Apr-08	Oct-08	2,242	2,242								
Chemical Pipe Replacement - Design	19252_6851	Dec-22	Mar-27	1,700		1,700				425	425	1,275	
Chemical Pipe Replacement - Construction	19253_6852	Mar-24	Mar-26	4,500		4,500						4,500	
Electrical Equipment Upgrades - Construction 3	19256_6855	Feb-08	Aug-11	15,174	15,174								
Winthrop Terminal Facility (WTF) VFD Replacement - Constructior	19258_6875	Jun-16	Sep-21	11,957	6,599	5,358	3,598	1,260	500		8,342		
Heat Loop Pipe Replacement - Construction 1	19259_6876	Mar-05	Dec-05	615	615								
Secondary Reactor VFDs	19260_6877	May-05	Aug-16	3,232	3,232								
Grit Air Handler Replacements	19264_6881	Jul-08	Jun-10	2,029	2,029								
CEMS Equipment Replacement	19265_6882	Nov-05	Mar-06	100	100								
Heat Loop Pipe Replacement - Construction 2	19266_6883	Dec-06	Feb-08	1,488	1,488								
PICS Replacement - Construction	19267_6884	Jul-11	Sep-15	1,230	1,230								
Primary & Second Clarifier Rehabilitation - Construction	19268_6899	Feb-09	Feb-12	58,613	58,613								
Electrical Equipment Upgrades - Construction 4	19270_6901	May-13	May-16	7,831	7,831								
NMPS VFD Replacement - Design/ESDC	19271_6902	Dec-07	Apr-12	1,278	1,278								
NMPS VFD Replacement - Construction	19272_6903	Dec-11	Mar-16	24,432	24,432								

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Fire Alarm System Replacement - Design	19273_6904	Dec-15	Aug-25	2,329	751	1,577	162	200	363	194	952	658	
CHP Alternatives Study	19274_6963	Apr-19	Nov-20	1,150		1,150	972	177			1,150		
CHP - Construction	19275_6964	Apr-24	Apr-28	83,000		83,000						83,000	
Primary & Secondary Clarifier Rehabilitation - Design	19276_6965	Mar-09	Sep-13	1,678	1,678								
Gravity Thickener Improvements - Construction	19277_6966	Apr-10	Jun-12	929	929								
Steam Turbine Generator (STG) System Modifications - Design	19278_6967	Jun-09	Apr-11	(44)	(44)								
Electrical Equipment Upgrades 3 - REI	19279_6968	Feb-08	Nov-11	1,112	1,112								
NMPS Motor Control Center (MCC) - Construction	19283_6972	Jan-12	Apr-13	914	914								
STG System Modifications - Construction	19284_6973	May-10	Apr-11	2,120	2,120								
Digester Chiller Replacement	19287_7005	Sep-05	May-06	635	635								
Dystor Tank Membrane Replacement	19288_7006	Sep-04	Oct-05	640	640								
Fire Alarm System Replacement - Construction	19289_7051	Jan-21	Apr-24	28,750		28,750		186	7,786	7,786	15,757	12,993	
Digester & Storage Tank Rehabilitation - Design/ESDC	19290_7052	Jun-21	Aug-28	4,055		4,055			1,014	686	1,700	2,355	
Digester & Storage Tank Rehabilitation - REI	19291_7053	Jan-23	Jan-28	4,092		4,092				245	245	3,847	
Thickened Primary Sludge Pump Replacement - Construction	19292_7054	Oct-13	Jun-14	27	27								
Digester Modules 1 & 2 Pipe Replacement	19293_7055	Aug-11	Aug-14	7,096	7,096								
Cathodic Protection - Construction	19294_7056	Jan-23	Jan-26	6,817		6,817				214	214	6,604	
Centrifuge Backdrive Replacement	19295_7057	Feb-13	Mar-15	3,965	3,965								
Switchgear Relay Replacement - Construction	19297_7059	Jul-21	Jul-24	8,000		8,000			1,860	2,480	4,340	3,660	
Power Consultant Recommendations - Design	19298_7060	Jan-06	Jul-09	2,097	2,097								
Power System Improvements - Construction	19299_7061	Jan-09	May-17	10,117	10,117								
NMPS VFD Replacements - REI	19300_7062	Dec-12	Jun-16	740	740								
Heat Loop Pipe Replacement - Construction 3	19301_7063	Jun-09	Jun-11	11,410	11,410								
Odor Control Rehabilitation - Design/ESDC	19303_7088	Mar-21	Mar-28	4,542		4,542			933	933	1,867	2,590	86
Sodium Hypochlorite Tank Liner Removal	19304_7089	May-06	Sep-06	196	196								
As-needed Design Phase 5-1	19305_7090	Aug-07	Aug-09	955	955								
As-needed Design Phase 5-2	19306_7091	Jul-07	Jul-09	1,056	1,056								
HVAC Equipment Replacement - REI	19307_7094	Oct-22	Oct-27	3,000		3,000				1,200	1,200	1,800	
HVAC Equipment Replacement - Design/ESDC	19309_7111	Mar-14	Nov-19	1,424	1,424						35		
HVAC Design/ESDC	19310_7110	Sep-20	Sep-27	2,100		2,100		300	500	300	1,100	1,000	
Deer Island As-needed Technical Design	19311_7121	Jul-23	Jun-30	20,250		20,250						15,000	5,250
Radio Repeater System Upgrade - Phase 1	19312_7122	Oct-18	Jul-20	243		243	243				243		
Digester Sludge Pump Replacement - Construction	19313_7123	Oct-09	Dec-14	1,871	1,871						78		
Electrical Equipment Upgrades 5 - Construction	19314_7124	Dec-24	Dec-27	23,162		23,162						23,162	
Miscellaneous VFD Replacements FY19-FY23	19315_7125	Oct-20	Jun-25	4,496		4,496		600	600	819	2,019	2,477	
South System Pump Station (SSPS) VFD Replacement - Design/ESDC/REI	19316_7126	Sep-20	Sep-28	4,464		4,464		940	770	878	2,587	1,877	
SSPS VFD Replacement - Construction	19317_7127	Sep-22	Sep-27	20,553		20,553				5,051	5,051	15,502	
NMPS VFD Replacement - Design/ESDC/REI	19318_7128	Jun-24	Dec-31	4,420		4,420						2,768	1,652
NMPS VFD Replacement - Construction	19319_7129	Dec-26	Dec-30	35,000		35,000						6,771	28,229
Electrical Equipment Upgrades 5 - Design/ESDC/REI	19320_7130	Dec-22	Dec-28	4,308		4,308				287	287	3,857	164
Miscellaneous VFD Replacements FY18	19321_7131	Oct-17	Jun-18	483	446	37	37				33		
DI Switchgear Replacement - Design/ESDC/REI	19322_7132	Jul-23	Jul-28	4,500		4,500						4,459	41
DI Switchgear Replacement - Construction	19323_7133	Jul-25	Jul-27	16,000		16,000						16,000	
Radio Repeater System Upgrade - Phase 2	19324_7134	May-21	May-24	2,500		2,500			1,500	600	2,100	400	
DI Dystor Membrane Replacements	19325_7135	Nov-20	Mar-21	4,000		4,000		1,000	1,000		2,000		2,000
DI CTG Rebuilds	19326_7136	Jul-23	Jul-26	8,000		8,000						8,000	
Centrifuge Replacements - Design/ESCD/REI	19327_7137	Dec-23	Jun-28	4,160		4,160						4,122	38
DI Centrifuge Replacements - Construction	19328_7138	Jun-25	Jun-27	16,640		16,640						16,640	
Cryogenics Plant Equipment Replacement - Design	19329_7139	Mar-21	Sep-27	3,255		3,255		100	195	781	1,077	2,168	11
Cryogenics Plant Equipment Replacement - Construction	19330_7140	Jun-23	Sep-26	24,000		24,000						24,000	
Hypochlorite & Bisulfite Tanks Replacement	19332_7142	Jul-25	Jul-29	20,000		20,000						12,500	7,500
Gas Protection System Replacement - Phase 1	19333_7167	Sep-19	Oct-21	1,403		1,403	412	591	400		1,403		
Personnel Dock Rehabilitation	19334_7168	Feb-17	Oct-17	1,368	1,368								
Gas Protection System Replacement - Phase 2	19335_7169	Apr-21	Apr-23	2,500		2,500			1,250	1,250	2,500		
East/West Odor Control Air Handler Replacement	19336_7170	Jun-25	Jun-30	2,000		2,000						2,000	
PICS Fiber Loop Replacement	19338_7172	Jul-23	Jun-26	12,462		12,462						12,462	
NMPS & WTF Butterfly Valve Replacements	19339_7275	Jun-14	Sep-17	17,514	17,514								

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Chemical Tank and Digester Pipe	19345_7373	Aug-19	Dec-21	8,485		8,485	2,000	4,000	2,485		8,485		
Clarifier W3H Flush System	19346_7374	Jul-12	Jul-13	1,262	1,262								
Clarifier Rehabilitation Phase 2 - Design	19347_7394	Jan-15	May-25	2,675	1,184	1,492	195	272	304	310	1,086	410	
Clarifier Rehabilitation Phase 2 - Construction	19348_7395	Sep-20	Jan-25	137,200		137,200		14,475	21,775	39,000	75,250	61,950	
Scum Skimmer Replacement	19349_7396	Oct-13	Oct-16	20,394	20,394								
Clarifier Rehabilitation Phase 2 - REI	19351_7397	Sep-20	Jan-26	3,000		3,000		675	831	830	2,336	664	
Cryogenics Chillers Replacement	19352_7398	Oct-14	Oct-16	3,218	3,218								
As-Needed Design 7-1	19353_7399	Oct-12	Oct-15	1,547	1,547								
As-Needed Design 7-2	19354_7400	Oct-12	Apr-16	1,061	1,061								
Thermal Power Plant (TPP) Boiler Controls Replacement	19355_7401	Nov-14	Nov-16	1,620	1,620								
Electrical Equipment Upgrades 6 - Construction	19557_7414	Dec-27	Dec-31	20,000		20,000						417	19,583
Fuel Pipe Abandonment	19558_7415	Aug-12	Jan-13	230	230								
Electrical Equipment Upgrades 4 - REI	19559_7416	May-14	Oct-16	858	858								
MCC Switchgear Replacement - Design/ESDC/REI	19560_7419	Jan-17	Feb-24	2,480	723	1,757	210	514	428	462	1,730	143	
MCC Switchgear Replacement - Construction	19561_7420	Sep-20	Feb-23	11,200		11,200		1,881	4,470	4,849	11,200		
Roof Replacement Phase 3	19562_7424	Sep-13	Jul-14	610	610								
Fire System Replacement - REI	19563_7426	Jan-21	Aug-24	2,139		2,139		298	596	596	1,490	649	
Gravity Thickener Center Column Replacement	19564_7427	Jan-13	Jan-14	825	825								
Gravity Thickener Rehabilitation	19565_7428	May-18	Feb-21	19,896	5,522	14,373	7,791	6,582			19,488		
As-Needed Design 7-3	19566_7434	Oct-12	Apr-16	950	950								
As-Needed Design 8-1	19600_7501	Jul-16	Jul-19	623	599	25	25				179		
As-Needed Design 8-2	19601_7502	Jul-16	Jul-19	794	786	8	8				411		
As-Needed Design 8-3	19602_7503	Jul-16	Mar-21	1,068	781	287	94	193			660		
Hydroturbine Replacement - Design/ESDC/REI	19603_7570	Jul-22	Jul-29	1,860		1,860				310	310	1,540	10
Hydroturbine Replacement - Construction	19604_7571	Jul-24	Jul-28	9,300		9,300						9,200	100
As-Needed Design 9-1	19605_7644	Jul-19	Jul-22	1,600		1,600	453	506	468	173	1,600		
As-Needed Design 9-2	19606_7645	Sep-19	Sep-22	1,600		1,600	196	518	518	368	1,600		
As-Needed Design 9-3	19607_7646	Sep-19	Sep-22	1,600		1,600	131	518	518	433	1,600		
DITP Roofing Replacement	19609_7734	Jan-21	Jun-22	2,000		2,000		333	1,333	334	2,000		
HVAC Control System Replacement	19610_7745	Oct-22	Oct-26	20,000		20,000				2,000	2,000	18,000	
HVAC Fume Hoods Replacement	19611_7746	May-23	Aug-26	17,000		17,000				100	100	16,900	
HVAC Mechanical Equipment Replacement	19612_7747	May-23	Aug-26	20,000		20,000				100	100	19,900	
Sodium Hypochlorite & Bisulfite Tanks - Design/ESDC	19613_7749	Jul-23	Jul-30	3,000		3,000						2,105	895
Electrical Equipment Upgrades 6 - Design/ESDC	19614_7750	Dec-25	Dec-31	4,000		4,000						2,695	1,305
Co-Digestion Temporary Facilities	26073_7148	Sep-13	Jun-15	434	434								
210 Clinton Wastewater Treat Plant				**31,487**	**15,274**	**16,213**	**795**	**2,122**	**3,451**	**718**	**8,096**	**9,126**	
Clinton Soda Ash Replacement	19302_7075	Nov-07	Aug-08	267	267								
Clinton Permanent Standby Generator	19308_7095	Feb-07	Nov-07	230	230								
Clinton Concrete Repair - Design	19340_7276	Feb-13	Dec-13	63	63								
Clinton Digester Cleaning & Rehabilitation	19341_7277	May-10	Apr-17	3,443	3,443								
Clinton Aeration Efficiency Improvement	19342_7278	Apr-12	Feb-13	1,865	1,865								
Clinton WWTP Rehabilitation - Design/ESDC/REI	19343_7371	Dec-21	Jun-26	1,500		1,500			792	208	1,000	500	
Valves and Pipe Replacement	19344_7372	May-20	Sep-21	500		500		300	200		500		
Phosphorus Reduction - Design/ESDC	19350_7377	Nov-13	Mar-19	1,436	1,436						20		
Phosphorus Reduction - Construction	19400_7411	Mar-16	Mar-18	7,558	7,550	8	8				972		
Clinton Roofing Rehabilitation	19405_7450	Sep-18	Sep-19	812	25	788	788				812		
Clinton WWTP Rehabilitation - Construction	19406_7451	Jun-23	Jun-25	4,376		4,376						4,376	
NGRID Gas Line	19407_7528	Apr-16	Jun-17	396	396								
Screw Pump Replacement Phase 2 - Construction	19408_7591	Jun-23	Jun-25	3,500		3,500						3,500	
Digester Cover Replacement	19409_7648	Oct-20	Mar-22	600		600		360	240		600		
Equipment Storage Building	19410_7693	Dec-20	Apr-22	292		292		100	192		292		
Screw Pump Replacement	19411_7704	Jul-20	Jul-22	2,000		2,000		720	960	320	2,000		
Clinton Fire Alarm Replacement	19412_7735	Jan-21	Jul-22	900		900		142	568	190	900		
Clinton SCADA Upgrades	19413_7736	Jan-24	Jan-26	750		750						750	
Landfill Cell No. 1 Closure	19414_7754	Dec-20	Feb-22	1,000		1,000		500	500		1,000		

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211 Laboratory Services		**completed project**		**2,212**	**2,212**								
Residuals				**169,281**	**65,880**	**103,400**	**10,903**	**3,711**	**518**	**795**	**16,760**	**30,935**	**56,539**
261 Residuals		**completed project**		**63,811**	**63,811**								
271 Residuals Asset Protection				**105,470**	**2,070**	**103,400**	**10,903**	**3,711**	**518**	**795**	**16,760**	**30,935**	**56,539**
Residuals Facility Plan / EIR	26069_7143	Jan-22	Jan-25	1,000		1,000			56	333	389	611	
Residuals Facility Upgrades - Design	26070_7145	May-21	Nov-23	1,157		1,157			462	462	924	233	
Condition Assessment/Technology & Regulatory Review	26072_7147	May-09	Jan-14	832	832								
Residuals Phase 2 - Design	26074_7149	Feb-24	Jul-32	15,000		15,000						9,186	5,814
Residuals Phase 2 - Construction	26075_7150	Apr-26	Apr-32	71,629		71,629						20,904	50,725
Sludge Tank & Silo Coating	26076_7151	Sep-17	Sep-18	767	697	70	70				509		
Residuals Electrical/Mechanical Improvements & Dryer Drum Replacement	26078_7153	Jun-19	Dec-20	10,584	541	10,043	8,947	1,097			10,437		
Pellet Conveyance Piping - Relocation	26079_7173	Aug-19	Dec-20	4,500		4,500	1,886	2,615			4,500		
CSO				**912,524**	**903,592**	**8,932**	**2,039**	**5,035**	**1,701**	**71**	**10,042**	**86**	
MWRA Managed				**433,534**	**433,534**								
339 North Dorchester Bay		**completed project**		**221,510**	**221,510**								
347 East Boston Branch Sewer Relief		**completed project**		**85,637**	**85,637**								
348 BOS019 Storage Conduit		**completed project**		**14,288**	**14,288**								
349 Chelsea Trunk Sewer		**completed project**		**29,779**	**29,779**								
350 Union Park Detention Treatment Facility		**completed project**		**49,583**	**49,583**								
353 Upgrade Existing CSO Facilities		**completed project**		**22,385**	**22,385**								
354 Hydraulic Relief Projects		**completed project**		**2,295**	**2,295**								
355 MWR003 Gate & Siphon		**completed project**		**4,424**	**4,424**								
357 Charles River CSO Controls		**completed project**		**3,633**	**3,633**								
Community Managed				**423,780**	**420,017**	**3,763**		**3,763**			**3,763**		
340 Dorchester Bay Sewer Separation (Fox Point)		**completed project**		**55,029**	**55,029**								
341 Dorchester Bay Sewer Separation (Commercial Point)				**63,625**	**59,862**	**3,763**		**3,763**			**3,763**		
Design	32650_6154	Jun-96	Dec-16	16,410	16,410								
Construction	32665_6248	Apr-99	Dec-16	43,451	43,451								
Dorchester Interceptor Inflow Removal Construction	32750_7576	Jul-19	Jun-21	3,763		3,763		3,763			3,763		
342 Neponset River Sewer Separation		**completed project**		**2,492**	**2,492**								
343 Constitution Beach Sewer Separation		**completed project**		**3,731**	**3,731**								
344 Stony Brook Sewer Separation		**completed project**		**44,319**	**44,319**								
346 Cambridge Sewer Separation		**completed project**		**104,552**	**104,552**								

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351 BWSC Floatables Controls		**completed project**		**946**	**946**								
352 Cambridge Floatables Control		**completed project**		**1,127**	**1,127**								
356 Fort Point Channel Sewer Separation		**completed project**		**11,507**	**11,507**								
358 Morrissey Boulevard Drain		**completed project**		**32,181**	**32,181**								
359 Reserved Channel Sewer Separation		**completed project**		**70,524**	**70,524**								
360 Brookline Sewer Separation		**completed project**		**24,715**	**24,715**								
361 Bulfinch Triangle Sewer Separation		**completed project**		**9,032**	**9,032**								
324 CSO Support				**55,210**	**50,041**	**5,169**	**2,039**	**1,272**	**1,701**	**71**	**6,279**	**86**	
Technical Assistance	32400_5790	Feb-94	Dec-95	228	228								
Planning/EIR	32401_5791	Mar-88	Sep-90	10,769	10,769								
Master Planning	32403_5716	Mar-92	Sep-04	21,763	21,763								
Technical Assistance - Geotech	32407_5970	Jun-90	Jun-92	61	61								
Modeling	32409_5795	May-92	Mar-95	300	300								
SOP Program	32411_5767	Jan-94	May-01	773	773								
Watershed Planning	32645_6036	Dec-94	Apr-01	877	877								
Technical Review	32648_6150	Jul-96	Aug-24	585	529	56		13	13	13	39	17	
Land Acquisition/Easement	32658_6169	Jul-96	Aug-24	12,915	12,850	66	10	13	14	14	56	15	
System Assessment	32691_6372	May-97	Aug-24	255	69	186		44	44	44	132	54	
Somerville Marginal In-System Storage	32748_7539	Aug-18	Aug-21	1,400		1,400			1,400		1,400		
CSO Performance Assessment	32749_7572	Nov-17	Apr-22	5,284	1,823	3,461	2,029	1,202	230		4,652		

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Other Wastewater				**392,866**	**229,966**	**162,900**	**31,460**	**32,008**	**26,634**	**22,266**	**152,017**	**107,295**	**(56,763)**
128 I/I Local Financial Assistance				**392,585**	**229,685**	**162,900**	**31,460**	**32,008**	**26,634**	**22,266**	**152,017**	**107,295**	
Community I/I Grants	10232_5300			5,800	5,800								
Community I/I Loans	10233_5393			17,278	17,278								
Community I/I Loan Repayments	10234_5394			(17,278)	(17,278)								
Phase II - Grants	10273_6084	May-93	May-06	10,129	10,129								
Phase II - Loans	10274_6085	May-93	May-06	30,386	30,386								
Phase II - Repayments	10282_6170	May-94	May-11	(30,386)	(30,386)								
Phase III - Grants	10315_6505			16,650	16,650								
Phase III - Loans	10316_6506			20,350	20,350								
Phase III - Repayments	10317_6507			(20,350)	(20,350)								
Public Participation	10348_6609	Feb-99	Jun-02	6	6								
Phase IV - Grants	10368_6736	Nov-99	May-10	18,000	18,000								
Phase IV - Loans	10369_6737	Nov-99	May-10	22,000	22,000								
Phase IV - Repayments	10370_6738	Nov-00	May-15	(22,000)	(22,000)								
Phase V - Grants	10407_6925	Aug-04	May-12	18,000	18,000								
Phase V - Loans	10408_6926	Aug-04	May-12	22,000	22,000								
Phase V - Repayments	10409_6927	Aug-05	May-17	(22,000)	(22,000)								
Phase VI - Grants	10441_7107	Nov-06	Jun-21	18,000	18,000						472		
Phase VI - Loans	10442_7108	Nov-06	Jun-21	22,000	22,000						576		
Phase VI - Repayments	10443_7109	Nov-07	Jun-26	(22,000)	(20,379)	(1,621)	(677)		(287)	(271)	(1,943)	(385)	
Phase VII - Grants	10471_7293	Aug-09	Jun-21	18,000	17,264	736	238	499			736		
Phase VII - Loans	10472_7294	Aug-09	Jun-21	22,000	21,100	900	290	609			900		
Phase VII - Repayments	10473_7295	Aug-10	Jun-26	(22,000)	(18,672)	(3,328)	(1,058)		(747)	(578)	(3,714)	(945)	
Phase VIII - Grants	10474_7296	Aug-12	Jun-21	18,000	16,084	1,916	746	630	540		2,389		
Phase VIII - Loans	10475_7297	Aug-12	Jun-21	22,000	19,658	2,342	912	770	660		2,920		
Phase VIII - Repayments	10476_7298	Aug-13	Jun-26	(22,000)	(15,096)	(6,904)	(1,853)		(1,403)	(1,283)	(7,289)	(2,365)	
Phase IX - Grants	10560_7464	Jul-14	Jun-21	60,000	38,149	21,851	5,248	4,125	3,750	3,000	23,565	5,728	
Phase IX - Loans	10561_7465	Jul-14	Jun-21	20,000	12,716	7,284	1,749	1,375	1,250	1,000	7,855	1,909	
Phase IX - Repayments	10562_7466	Jul-15	Jun-31	(20,000)	(3,541)	(16,459)	(1,561)		(2,112)	(1,882)	(6,863)	(7,764)	(3,141)
Phase X - Grants	10563_7467	Jul-16	Jun-25	60,000	22,619	37,381	5,064	7,500	7,500	6,000	33,216	11,318	
Phase X - Loans	10564_7468	Jul-16	Jun-25	20,000	7,540	12,460	1,688	2,500	2,500	2,000	11,072	3,773	
Phase X - Repayments	10565_7469	Jul-16	Jun-35	(20,000)	(1,038)	(18,962)	(754)		(1,348)	(1,601)	(4,210)	(9,516)	(5,744)
Phase XI - Grants	10566_7620	Aug-18	Aug-24	75,000	18,595	56,405	8,438	6,000	7,500	6,000	46,534	28,466	
Phase XI - Loans	10567_7621	Aug-18	Aug-24	25,000	6,198	18,802	2,813	2,000	2,500	2,000	15,511	9,489	
Phase XI - Repayments	10568_7622	Aug-19	Aug-34	(25,000)	(98)	(24,903)	(570)		(1,177)	(1,427)	(3,272)	(9,966)	(11,762)
Phase XII - Grants	10569_7623	Aug-19	Aug-25	75,000		75,000	8,133	4,500	6,000	7,500	26,133	45,000	3,867
Phase XII - Loans	10570_7624	Aug-19	Aug-25	25,000		25,000	2,711	1,500	2,000	2,500	8,711	15,000	1,289
Phase XII - Repayments	10571_7625	Aug-20	Aug-35	(25,000)		(25,000)	(98)		(492)	(692)	(1,281)	(7,446)	(16,273)
I/I Loans Only	10572_7640	Jul-23	Jun-30	100,000		100,000						30,000	70,000
I/I Loans Only Repayments	10573_7641	Jul-24	Jun-40	(100,000)		(100,000)						(5,000)	(95,000)
138 Sewerage System Mapping Upgrades		**completed project**		**281**	**281**								

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Waterworks				**4,529,816**	**2,177,062**	**2,352,754**	**53,634**	**90,301**	**98,320**	**96,859**	**404,761**	**791,755**	**1,221,885**
Drinking Water Quality Improvements				**708,070**	**650,743**	**57,328**	**1,525**	**2,818**	**8,058**	**3,205**	**16,377**	**13,450**	**28,271**
542 Carroll Water Treatment Plant (CWTP)				**438,652**	**423,860**	**14,791**	**725**	**2,331**	**1,700**	**785**	**6,285**	**9,250**	
Study 1	53293_5023	Jan-88	Feb-89	444	444								
Study 2	53294_5024	Jul-90	Mar-94	2,368	2,368								
EIR / Conceptual Design	53296_5042	Nov-93	Jul-95	5,808	5,808								
Technical Assistance	53300_5997	Jan-88	Jun-00	101	86	16	16				27		
Wachusett Water Treatment Plant (WTP) - Design/CS/RI	53301_5017	Oct-96	Sep-06	46,606	46,606								
Permit Fees	53304_5157	Jul-93	Nov-19	90	90						3		
Cryptosporidium Inactivation Study	53367_6118	Feb-97	May-00	150	150								
Management Support - Design	53371_6134	Apr-97	Apr-00	1,730	1,730								
AWWARF Study	53375_6182	Dec-96	Sep-03	650	650								
Emergency Discharge Reservoir Water Management Study	53376_6206	Nov-98	Sep-02	1,454	1,454								
Wachusett and Cosgrove Intakes - CP1	53377_6207	Jun-00	Jun-03	15,489	15,489								
Construction Management / RI	53378_6208	Aug-98	Sep-06	31,438	31,438								
Cosgrove Disinfection - Phase II	53390_6365	Apr-98	May-99	2,169	2,169								
Cosgrove Disinfection - Phase I	53391_6397	Jul-97	Oct-97	150	150								
Distribution Water Consultant	53392_6401	Jul-97	Jun-98	3	3								
Immediate Disinfection - MECO	53393_6406	Jul-97	Jul-97	10	10								
Cosgrove Disinfection Fac. - Underwater	53406_6479	Jan-98	Jun-98	217	217								
Community Chlorine Analyzers	53410_6485	Apr-98	Jun-98	49	49								
Wachusett Aqueduct Interim Rehabilitation - CP2	53412_5522	Dec-00	Oct-02	23,400	23,400								
Sitework & Storage Tanks - CP3	53413_6488	Mar-99	Nov-02	67,368	67,368								
Treatment Facilities - CP4	53414_6489	Dec-00	Jul-05	145,761	145,761								
Late Sitework - CP6	53416_6491	Jul-04	Jan-06	4,088	4,088								
OCIP	53418_6494	Mar-99	Dec-07	5,107	5,107								
Professional Services	53419_6495	Sep-98	Oct-05	2,752	2,752								
Marlboro MOA	53420_6497	Sep-98	Jun-05	5,859	5,859								
CWTP- MECO	53421_6520	Sep-98	Mar-05	128	128								
Site Security Services	53425_6613	May-99	Mar-05	1,264	1,264								
Existing Facilities Modifications - CP7	53426_6650	Aug-15	May-21	8,882	7,082	1,800		675	900	225	1,952		
CSX Crossing	53427_6670	Aug-01	Dec-01	65	65								
Wachusett Algae - Design CS/RI	53428_6671	Jul-24	Dec-27	450		450						450	
Public Health Research	53432_6691	Jul-00	Jun-07	1,703	1,703								
Security Equipment	53435_6756	Jun-00	Jun-00	571	571								
Cosgrove Screens, CP8 - Construction	53437_6773	Aug-03	Aug-04	3,238	3,238								
AWWARF - Evaluation Ozone & UV	53443_6815	Jul-01	Jan-04	302	302								
Fitout / Construction	53445_6827	Oct-03	Nov-21	713	587	126	76		50		165		
Wachusett Algae - Construction	53448_6889	Feb-25	Dec-26	1,800		1,800						1,800	
CWTP Ultraviolet Disinfection - Design/ESDC/REI	53450_6923	Jul-08	Apr-15	4,351	4,351								
CWTP Ultraviolet Disinfection - Construction	53451_6924	Apr-11	Feb-14	31,057	31,057								
As-needed Technical Assistance 1	53452_6939	Jan-06	Jun-08	491	491								
Existing Facilities Modifications, CP7 - Design	53453_6951	Jul-05	Apr-15	965	965								
As-needed Technical Assistance	53455_6989	Jan-06	Jun-08	702	702								
Ancillary Modifications - Construction 1	53456_7084	Jul-06	Jun-08	160	160								
Ancillary Modifications - Construction	53457_7085	Jan-09	Jul-21	6,112	5,256	856		856			1,214		
Ancillary Modifications - Design 3	53458_7192	Mar-08	Sep-10	299	299								
Ancillary Modifications - Design 4	53459_7208	Mar-08	Sep-10	527	527								
Technical Assistance 5	53464_7315	Sep-10	Mar-13	255	255								
Technical Assistance 6	53465_7316	Sep-10	Mar-13	408	408								
CWTP Storage Tank Roof Drainage System	53470_7376	Jan-24	Nov-26	7,000		7,000						7,000	
Technical Assistance 7	75530_7406	Jun-13	Nov-15	594	594								
Technical Assistance 8	75531_7407	Jan-16	Jun-18	419	419								
Technical Assistance 9	75601_7543	Jul-18	Dec-20	682	47	635	380	255			682		

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Technical Assistance 10	75602_7544	Jul-18	Dec-20	750	141	609	254	355			750		
Technical Assistance 11	75603_7713	Jan-21	Dec-22	750		750		95	375	280	750		
Technical Assistance 12	75604_7714	Jan-21	Dec-22	750		750		95	375	280	750		
543 Quabbin Water Treatment Plant		**completed project**		**19,973**	**19,973**								
544 Norumbega Covered Storage Facility		**completed project**		**106,674**	**106,674**								
545 Blue Hills Covered Storage		**completed project**		**40,083**	**40,083**								
550 Spot Pond Covered Storage Facility		**completed project**		**60,126**	**60,126**								
555 Carroll Water Treatment Plant (CWTP) Asset Protection				**42,563**	**26**	**42,536**	**800**	**487**	**6,358**	**2,420**	**10,092**	**4,200**	**28,271**
CWTP Control Room Fire Suppression System	54000_7592	Jul-24	Jul-25	325		325						325	
CWTP Asset Protection Study	54001_7593	Oct-22	Oct-23	465		465				365	365	100	
Liquid Oxygen (LOX) Yard Redundancy	54002_7594	Jul-21	Jul-22	670		670			650	20	670		
CWTP Water Pump VFD Replacement	54003_7595	Oct-22	Oct-23	186		186				140	140	46	
Ozone Generator Re-Build	54004_7596	Jul-21	Oct-22	930		930			880	50	930		
CWTP Chemical System Pipe Pumps Replacement	54005_7597	Jul-21	Jun-23	2,200		2,200			1,100	1,100	2,200		
Soda Ash & Ammonia Equipment Replacement	54006_7598	Mar-21	Apr-22	2,700		2,700		200	2,500		2,700		
HVAC Equipment Replacement	54007_7605	Sep-19	Jan-23	1,755		1,755	410	50	650	645	1,755		
Water Pump Replacement	54008_7606	Jul-27	Jul-30	2,000		2,000						486	1,514
Ozone Generator Replacement	54009_7607	Oct-27	Oct-30	20,000		20,000						3,243	16,757
Ultraviolet Reactor Replacement	54010_7608	Oct-32	Oct-34	10,000		10,000							10,000
CWTP Emergency Generator No. 1 Replacement	54011_7642	Feb-19	May-20	417	26	390	390				417		
Corrosion Control Pipe Loop Study	54013_7737	Mar-21	Mar-22	500		500			400	100	500		
CWTP Parapet Wall Repairs	54014_7755	Dec-20	Jun-21	415		415		237	178		415		

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Transmission				**2,620,958**	**835,114**	**1,785,844**	**13,459**	**25,069**	**39,046**	**42,904**	**130,392**	**365,312**	**1,300,053**
597 Winsor Station Pipeline				**53,203**	**5,938**	**47,265**		**183**	**917**		**1,304**	**45,513**	**653**
Preliminary Permit, Study & Licensing	60032_6276	Nov-97	Jun-99	39	39								
Quabbin Aqueduct TV Inspection	60033_6277	Jul-23	Oct-24	3,466		3,466						3,466	
Hatchery Pipeline - Design/ESDC/RI	60077_7017	Aug-13	Mar-19	909	909						131		
Quabbin Aqueduct & Winsor Power Station (WPS) Upgrades - Design/CA/RI	60087_7114	Feb-10	Aug-15	838	838								
Quabbin Aqueduct & WPS Upgrades - Construction	60088_7115	Jan-24	Jan-26	20,657		20,657						20,657	
Shaft 12 Isolation Gates - Construction	60095_7197	Jan-24	Jan-26	17,692		17,692						17,692	
Shaft 2 - Construction	60096_7198	Feb-21	Feb-22	1,100		1,100		183	917		1,100		
Winsor Station Chapman Valve Repair	60101_7212	Feb-09	Nov-09	416	416								
Purchase of Sleeve Valves	60105_7234	Jul-08	May-09	368	368								
Hatchery Pipeline - Construction	60106_7235	Mar-16	Sep-17	2,568	2,568						58		
Quabbin Aqueduct & WPS Upgrades - Final Design/CA/RI	60140_7460	Jan-24	Jan-29	4,350		4,350						3,698	653
Shaft 12 Isolation Gates - Design/CA/RI	60141_7509	Mar-17	Dec-18	799	799						15		
601 Sluice Gate Rehabilitation		**completed project**		**9,158**	**9,158**								
604 MetroWest Tunnel				**700,184**	**697,182**	**3,002**						**3,002**	
Study	59794_5043	Jun-84	Oct-89	415	415								
Design/EIR - Tunnel/ESDC	59795_5044	Apr-92	Mar-07	37,939	37,939								
Sudbury Pipe Bridge - Construction	59796_5048	Nov-91	Jun-92	296	296								
West Tunnel Segment - CP1	59798_6054	Apr-97	Apr-03	147,774	147,774								
Construction Management/Resident Inspection	59799_5284	May-95	Apr-04	39,428	39,428								
Technical Assistance	59804_5976	Jun-84	Jun-98	131	131								
Land Acquisition	59805_5139	Oct-95	Jul-13	6,259	6,259								
Hultman Study	59806_5141	Apr-95	Mar-05	1,864	1,864								
DEP Permit Fees	60012_6037	Oct-94	Sep-14	58	56	2						2	
Middle Tunnel Segment - CP2	60013_6055	Jun-96	Apr-03	245,809	245,809								
MHD Salt Sheds - CP5	60014_6056	Sep-96	Jun-97	1,314	1,314								
Shaft 5A - CP3	60015_6059	Aug-97	Aug-98	5,816	5,816								
Local Supply Contingency - Design/CA/RI	60017_6063	May-96	Oct-99	859	859								
Community Technical Assistance	60018_6067	Jun-95	Apr-99	297	297								
Professional Services	60020_6117	Nov-95	Dec-03	731	731								
OCIP	60021_6122	Jun-96	May-06	26,022	26,022								
Hultman Leak Repair	60022_6128	Aug-96	May-97	307	307								
Framingham MOU	60023_6129	May-96	Dec-03	2,444	2,444								
Local Supply Contingency - Construction	60024_6130	Jun-97	Dec-03	4,298	4,298								
Local Supply Contingency - Legal/Easements	60025_6131	Apr-97	Jun-02	9	9								
Hultman Repair Bands	60026_6140	Aug-96	Dec-96	28	28								
Loring Road Storage Tanks - CP-8	60029_6203	Sep-97	Nov-00	41,368	41,368								
Testing & Disinfection - CP7	60030_6204	Jan-03	Oct-03	3,612	3,612								
Upper Hultman Rehabilitation - CP6B	60031_6205	Apr-12	Jun-13	5,849	5,849								
Southboro MOA	60038_6366	May-97	Jun-03	255	255								
Weston MOA	60039_6367	Apr-96	Oct-04	1,006	1,006								
East Tunnel Segment - CP3A	60040_6374	Nov-98	Sep-02	56,263	56,263								
Hultman Investigation and Repair	60042_6430	Jun-99	Nov-00	1,604	1,604								
Hultman Repair Bands 98-99	60043_6492	Apr-99	Jun-99	116	116								
Wayland MOA	60053_6762	Jun-00	Dec-02	35	35								
Equipment Prepurchase	60054_6777	Jun-05	Mar-06	198	198								
Hultman Rehabilitation - CP9	60058_6856	Nov-05	Dec-06	3,257	3,257								
Interim Disinfection	60059_6872	Jan-03	Oct-05	1,245	1,245								
Hultman Interconnection - Final Design/CA/R	60066_6911	Sep-05	Sep-14	5,732	5,732								
Lower Hultman Rehabilitation -CP6A	60073_6975	Sep-09	May-13	52,289	52,289								
Hultman Interconnection - Resident Inspection Services	60083_7082	Jan-10	Jan-15	1,870	1,870								
CP6 Easements	60085_7105	Jan-08	Apr-14	33	33								

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CP6A Demolition	60086_7106	Sep-08	Jan-09	57	57								
Valve Chamber & Storage Tank Access Improvements - Design	60109_7283	Jul-23	Mar-28	600		600						600	
Valve Chamber & Storage Tank Access Improvements - Construction	60160_7476	Mar-25	Mar-27	2,400		2,400						2,400	
Shaft 5A/5 Surface Piping Cathodic Protection	60161_7477	Nov-16	Jun-17	142	142								
Hultman Leak Shaft 5A	60162_7507	Mar-16	May-16	153	153								
615 Chicopee Valley Aqueduct Redundancy		**completed project**		**8,666**	**8,666**								
616 Quabbin Transmission System				**22,246**	**8,670**	**13,576**	**410**	**2,046**	**4,818**	**3,822**	**11,099**	**2,455**	**25**
Facilities Inspection	60055_6828	Oct-05	Oct-07	1,005	1,005								
Oakdale High Line Replacement - Construction	60068_6940	Mar-21	Sep-21	465		465		165	300		465		
Equipment Pre-purchase	60075_7007	Feb-05	Jun-08	534	534								
Oakdale Phase 1A Electrical - Design	60103_7229	Oct-09	Jul-14	776	776								
Oakdale Phase 1A Electrical - Construction	60104_7230	Apr-12	Jul-13	2,260	2,260								
Ware River Intake Valve Replacement - Design	60108_7282	Sep-22	Sep-27	300		300			50	50	100	200	
Rehabilitate Wachusett Bastion - Design	60113_7333	May-20	Jun-24	768	3	765		175	205	205	588	180	
Rehabilitate Oakdale Turbine	60135_7378	May-26	Jan-27	1,000		1,000						1,000	
Wachusett Lower Gatehouse Interim Pipe Repair	60136_7379	Oct-19	Jun-20	410		410	410				410		
Wachusett Lower Gatehouse Pipe Replacement - Construction	60137_7380	Jan-21	Jul-22	4,111		4,111		1,000	1,500	1,611	4,111		
Ware River Intake Valve Replacement - Construction	60138_7487	Sep-22	Sep-24	900		900				150	150	750	
CVA Motorized Screens Replacement - Construction	60139_7488	Jan-17	Aug-17	1,210	1,210								
Oakdale Turbine Rehabilitation - Design	60201_7545	May-25	Jun-29	200		200						175	25
Rehabilitate Wachusett Bastion - Construction	60225_7697	Dec-21	Jul-23	2,000		2,000			400	1,500	1,900	100	
Wachusett Lower Gatehouse Building Rehabilitation - Construction	60226_7698	Mar-21	Jul-22	2,200		2,200		550	1,650		2,200		
Rehabilitate Wachusett Bastion - REI	60227_7716	Dec-21	Jul-23	350		350			140	160	300	50	
Wachusett Lower Gatehouse Pipe Replacement - REI	60228_7717	Jan-21	Jul-22	250		250		106	144		250		
Wachusett Lower Gatehouse Building Rehabilitation - REI	60229_7726	Jan-22	Jan-23	250		250			104	146	250		
Wachusett Dam Bridge Crane Removal	60230_7780	Feb-21	Dec-21	375		375		50	325		375		
Oakdale Valves - Phase 1 Construction	75491_6690	Oct-05	Jun-06	1,811	1,811								
Oakdale Valves - Phase 1 Study & Design	75496_6831	Apr-04	Jun-07	1,070	1,070								
617 Sudbury/Weston Aqueduct Repairs				**12,496**	**2,627**	**9,870**		**1,514**	**432**		**2,341**	**7,257**	**667**
Sudbury Aqueduct Inspection	60056_6838	Aug-05	Oct-06	370	370								
Technical Assistance	60057_6839	Sep-09	Dec-11	25	25								
Sudbury Short-Term Repairs	60076_7016	Jul-23	Jun-24	602		602						602	
Sudbury Short-Term Repairs - Phase 2	60110_7317	Jul-23	Jul-24	2,098		2,098						2,098	
Weston Aqueduct Sluice Gates - Construction	60130_7369	Sep-20	May-21	1,946		1,946		1,514	432		1,946		
Rosemary Brook Building Repair	60150_7472	Mar-16	May-18	1,749	1,749						386		
Evaluation of Farm Pond Buildings - Waban Arches	60151_7473	Jul-16	Jul-18	218	218						9		
Waban Arches Rehabilitation - Design/CA/RI	60153_7616	Oct-23	Oct-28	300		300						288	12
Waban Arches Rehabilitation - Construction	60154_7617	Oct-25	Oct-27	1,200		1,200						1,200	
Farm Pond Inlet Chamber & Gatehouse - Design	60155_7618	Oct-24	Oct-29	400		400						305	95
Farm Pond Inlet Chamber & Gatehouse - Construction	60156_7619	Oct-26	Oct-28	2,000		2,000						1,440	560
Weston Aqueduct Gatehouse Rehabilitation	60157_7700	Jan-24	Jan-25	1,324		1,324						1,324	
Hazardous Material Sudbury Aqueduct	75486_6617	Apr-99	May-05	265	265								
620 Wachusett Reservoir Spillway Improvements		**completed project**		**9,287**	**9,287**								
621 Watershed Land				**29,000**	**25,020**	**3,980**	**1,259**	**1,000**	**1,000**	**721**	**6,154**		
Land Acquisition	60081_7069	Apr-06	Jun-23	29,000	25,020	3,980	1,259	1,000	1,000	721	6,154		

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622 Cosgrove Tunnel Redundancy				**58,592**	**57,369**	**1,223**	**1,216**	**7**			**6,574**		
Wachusett Aqueduct Pump Station - Design/ESDC/RI	60090_7156	Feb-12	May-20	8,106	6,914	1,192	1,192				1,624		
Wachusett Aqueduct Pump Station - Construction	60091_7157	Mar-16	Feb-19	50,471	50,449	22	22				4,941		
Permits/Easements	60124_7354	Aug-15	Jun-21	15	6	9	2	7			9		
623 Dam Projects				**7,023**	**3,139**	**3,884**	**215**	**643**	**1,266**	**1,714**	**3,861**	**46**	
Dam Safety Modifications & Repairs - Construction	60094_7194	Aug-11	Sep-12	2,055	2,055								
Dam Safety Modifications & Repairs - Design/ESDC	60100_7211	Sep-09	Jun-14	1,061	1,061								
Dam Permits	60118_7346	Jul-18	Dec-21	1		1		1			1		
Quinapoxet Dam Removal - Design/ESDC	60119_7347	Nov-19	Dec-23	425		425	43	212	64	63	382	43	
Quinapoxet Dam Removal - Construction	60120_7348	Oct-21	Mar-23	1,300		1,300			433	867	1,300		
Sudbury/Foss Dam Improvements - Design CA/RI	60190_7614	Mar-19	Jun-23	481	23	458	172	111	96	77	478	3	
Sudbury/Foss Dam Improvements - Construction	60191_7615	Oct-20	Sep-22	1,600		1,600		320	640	640	1,600		
Quinapoxet Dam Removal - REI	60192_7690	Oct-21	Mar-23	100		100			33	67	100		
625 Metropolitan Tunnel Redundancy				**1,506,963**	**3,716**	**1,503,246**	**1,900**	**5,985**	**8,100**	**7,700**	**23,945**	**197,424**	**1,282,137**
Water Transmission Redundancy Plan	60035_6273	Oct-08	Sep-11	1,397	1,397								
Preliminary Design & MEPA Review	60092_7159	May-20	Nov-23	15,693		15,693		4,085	5,600	4,700	14,385	1,308	
Tunnel Construction	60107_7291	Jan-27	Jan-40	1,046,665		1,046,665						98,741	947,924
Sudbury Aqueduct - MEPA Review	60122_7352	Oct-12	Jun-17	2,073	2,073						13		
Construction Management	60126_7356	Jul-25	Jan-40	124,617		124,617						23,232	101,385
Tops of Shafts Surface Construction	60127_7357	Jan-34	Jan-40	44,233		44,233							44,233
Administration, Legal & Public Outreach	60170_7516	Jan-24	Jan-40	140,523		140,523						37,100	103,423
Tops of Shafts Rehabilitation - Design/CA/RI	60172_7521	Apr-38	Apr-43	1,344		1,344							1,344
Tops of Shafts Rehabilitation - Construction	60173_7522	Apr-40	Apr-42	5,620		5,620							5,620
Final Design/ESDC	60174_7556	Jan-24	Jan-40	95,540		95,540						24,985	70,555
Technical Assistance	60175_7557	Jan-22	Dec-26	4,107		4,107			400	800	1,200	2,907	
Shaft 7 Buildings - Design CA/RI	60176_7558	Apr-38	Apr-43	1,179		1,179							1,179
Shaft 7 Buildings - Construction	60177_7559	Apr-40	Apr-42	6,475		6,475							6,475
Program Support Services	60178_7655	Apr-19	Mar-28	17,498	247	17,251	1,900	1,900	2,100	2,200	8,347	9,151	
628 Metropolitan Redundancy Interim Improvements				**180,056**	**4,340**	**175,716**	**8,460**	**11,865**	**18,720**	**25,312**	**65,860**	**94,787**	**16,572**
CP1 Shafts 6, 8, 9A	60202_7561	Apr-20	Oct-21	4,177		4,177		2,638	1,539		4,177		
Chestnut Hill Emergency Pump Station Improvements - Construction	60203_7562	Jul-21	Jul-23	13,554		13,554			4,879	6,505	11,384	2,170	
WASM/SPSM West PRV - Construction	60204_7563	Nov-20	Nov-22	7,116		7,116		1,138	3,415	2,563	7,116		
Easements/Permits	60206_7573	Apr-19	Jun-27	300	1	299	29	50	50	50	180	120	
Chestnut Hill Emergency Pump Station Improvements - Design/CA	60207_7574	Apr-19	Oct-24	2,074	18	2,056	296	400	400	400	1,514	560	
WASM/SPSM West PRV - Design/CA	60208_7575	Jul-18	Jul-23	2,849	304	2,546	490	593	637	637	2,660	189	
Shafts 5 & 9 Building Improvements - Design/CA	60209_7599	Sep-20	Oct-24	750		750		131	225	225	581	169	
Shafts 5 & 9 Building Improvements - Construction	60210_7600	Sep-22	Oct-23	3,000		3,000				1,500	1,500	1,500	
Chestnut Hill Emergency Pump Station Improvements - REI	60212_7669	Jul-21	Jul-23	572		572			205	274	479	93	
CP3 Shafts 7, 7B, 7C, 7D	60213_7670	Apr-22	Apr-23	2,500		2,500				2,307	2,307	193	
CP2 Shafts 5, 9	60214_7671	Oct-21	Oct-22	2,500		2,500			833	1,667	2,500		
Waltham Water Pipeline REI	60215_7672	Jan-23	Dec-24	1,040		1,040				130	130	910	
Shafts 5 & 9 Building Improvements - REI	60216_7673	Sep-22	Oct-23	286		286				143	143	143	
WASM/SPSM West PRV -REI	60217_7674	Nov-20	Nov-22	995		995		199	477	319	995		
CP1 Tops of Shafts - REI	60219_7696	May-20	Oct-21	250		250		153	97		250		
CP2 Tops of Shafts - REI	60220_7702	Oct-21	Oct-22	250		250			115	135	250		
CP3 Tops of Shafts - REI	60221_7703	Apr-22	Apr-23	250		250				230	230	20	
WASM 3 - MEPA/Design/CA/RI	68166_6539	Jul-13	Jun-27	15,513	2,624	12,889	1,042	1,000	1,300	1,300	5,251	6,497	1,750
WASM 3 Rehabilitation, CP-2	68170_6543	Jul-23	Jul-25	29,402		29,402						29,402	
WASM 3 Rehabilitation, CP-1	68171_6544	Jul-20	Dec-23	13,000		13,000		3,023	3,628	3,628	10,279	2,721	
WASM 3 Rehabilitation, CP-3	68172_6545	Jul-25	Jul-29	45,357		45,357						30,536	14,821
Waltham Water Pipeline - Construction	68333_7457	Jan-23	Dec-24	20,745		20,745				2,593	2,593	18,152	
Waltham Water Pipeline - Design/CA	68334_7547	Jan-21	Dec-25	3,000		3,000		176	706	706	1,588	1,412	
Commonwealth Ave Pump Station Improvements - Design/CA/RI	75580_7523	Jan-17	Jun-22	3,061	1,144	1,917	945	811	162		2,238		
Commonwealth Ave Pump Station Improvements - Construction	75581_7524	Feb-19	Jun-21	7,515	250	7,265	5,659	1,554	52		7,515		

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630 Watershed Division Capital Improvements				**24,083**		**24,083**		**1,825**	**3,793**	**3,636**	**9,254**	**14,829**	
Quabbin Administration Building Rehabilitation - Design/ CA/R	60300_7564	Mar-22	Mar-27	2,800		2,800			57	688	745	2,055	
Quabbin Administration Building Rehabilitation - Constructior	60301_7565	Mar-24	Mar-26	12,000		12,000						12,000	
Quabbin Administration Building Rehabilitation - Conceptual Design Report	60302_7569	Oct-20	Oct-21	250		250		115	135		250		
Maintenance Garage/Wash Bay/Storage Building - Construction	60303_7577	Jun-21	Jun-23	3,900		3,900			1,560	1,872	3,432	468	
Maintenance Garage/Wash Bay/Storage Building - Design/CA/RI	60304_7677	Jun-20	Jun-24	1,000		1,000		270	323	322	915	85	
River Rd Improvements-Wachusett	60305_7701	Sep-20	Nov-21	3,033		3,033		1,415	1,618		3,033		
Quabbin Water Supply - Design/CA/RI	60306_7752	Jan-21	Jun-23	250		250		25	100	100	225	25	
Quabbin Water Supply - Construction	60307_7753	Jun-22	Jun-23	850		850				654	654	196	
Distribution And Pumping				**1,039,781**	**500,961**	**538,820**	**26,178**	**24,561**	**31,678**	**44,392**	**163,412**	**349,730**	**62,281**
618 Peabody Pipeline Project				**1,448**	**1,430**	**18**	**18**				**389**		
Peabody Pipeline - Design/ESDC/REI	60063_6895	Jun-17	Sep-19	1,444	1,425	18	18				389		
Easements	60064_6896	Jun-17	Feb-20	4	4								
677 Valve Replacement				**22,279**	**12,016**	**10,263**						**6,747**	**3,515**
Construction 1	67559_5126	Nov-95	Nov-96	718	718								
Technical Assistance	67560_5124	Oct-95	May-10	125	125								
Equipment Purchase	68005_6088	Oct-95	Jun-18	1,112	1,112								
Construction 2	68012_6105	Nov-97	Jul-99	1,357	1,357								
Construction 3	68039_6278	Feb-00	Aug-01	1,338	1,338								
Construction 4	68079_6345	May-02	Oct-03	1,540	1,540								
Construction 5	68080_6346	Mar-04	Jul-05	1,389	1,389								
Construction 6	68126_6435	May-07	Dec-08	1,572	1,572								
Construction 7	68127_6436	Apr-11	Apr-13	2,859	2,859								
Permits	68239_6859	Jan-02	Jun-29	3	3								
Easements	68240_6860	Jan-02	Jun-29	6	6								
Construction 8	68300_7195	Jan-26	Jun-28	4,276		4,276						3,873	403
Construction 9	68307_7236	Jun-27	Jun-29	4,276		4,276						1,606	2,670
Phase 8 - Design/CA/RI	68330_7417	Jan-24	Jun-30	855		855						733	122
Phase 9 - Design/CA/RI	68331_7418	Jun-25	Jun-30	855		855						535	320
678 Boston Low Service - Pipe & Valve Rehabilitation		**completed project**		**23,691**	**23,691**								
683 Heath Hill Road Pipe Replacement		**completed project**		**19,358**	**19,358**								
689 James L. Gillis Pump Station Rehabilitation		**completed project**		**33,419**	**33,419**								
692 Northern High Service (NHS) - Section 27 Improvements				**1,668**	**124**	**1,545**		**2**	**13**	**13**	**28**	**1,517**	
Section 27 Rehabilitation- Construction	67769_6333	Mar-24	Nov-25	1,279	27	1,252						1,252	
Easements	68192_6589	Apr-16	Jun-22	23		23			11	11	23		
Technical Assistance	68211_6712	Oct-99	Jun-22	64	60	5		2	1	1	5		
Surveying	68229_6809	Jun-01	Mar-17	37	37								
Section 27 Rehabilitation - Design/CA	68390_7721	Mar-23	Nov-26	150		150						150	
Section 27 Rehabilitation - REI	68391_7722	Mar-24	Nov-25	115		115						115	

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693 NHS - Revere & Malden Pipeline Improvements				**86,011**	**30,301**	**55,710**	**628**	**1,500**	**4,428**	**10,767**	**19,062**	**36,349**	**2,039**
Revere & Malden - Design/CS/RI	67780_5185	May-88	Sep-94	1,786	1,786								
Revere Beach - Construction	67781_5186	Aug-92	Oct-94	6,314	6,314								
Malden Section 53 - Construction	67782_5176	Apr-92	Sep-94	10,026	10,026								
Revere Section 53 - Construction	67784_5177	Sep-08	Aug-09	2,938	2,938								
Control Valves - Construction	67785_5191	Jun-88	Aug-89	949	949								
Deer Island Pipeline Cleaning & Lining - Construction	67786_5179	Jun-90	Sep-90	158	158								
Winthrop Cleaning & Lining - Construction	67787_5178	Jun-90	Aug-90	575	575								
CP-1 Section 53 Connections - Construction	67790_6335	Jan-23	Jun-25	9,650		9,650				1,922	1,922	7,728	
Technical Assistance	67791_5986	Jul-06	Mar-18	246	246								
Linden Square - Construction	67792_5238	Apr-91	Nov-91	1,849	1,849								
Linden Square - Construction Administration	67793_5239	Apr-91	Nov-91	125	125								
Road Restoration - Design/CA/RI	67996_6033	Nov-94	Dec-95	77	77								
Road Restoration - Construction	67997_6034	Jul-95	Jun-96	1,714	1,714								
Malden Section 53 - Landscaping	68020_6113	Apr-96	Jun-96	20	20								
Sidewalk Restoration	68033_6183	Sep-96	Oct-96	54	54								
Section 14 Water Pipe Relocation (Malden)	68257_6957	Jul-17	May-18	1,556	1,554	2	2				54		
CP-3 Section 99 Connections -Construction	68258_6958	Jan-25	Jun-27	8,500		8,500						8,500	
Easements	68265_6978	Jul-06	Dec-20	30		30	4	26			30		
Permits	68280_7049	Apr-05	Mar-22	5	2	3		2			3		
Section 56 Replacement/Saugus River - Design/CA	75545_7454	Nov-19	Feb-24	3,346		3,346	360	800	756	756	2,671	675	
Sections 53 and 99 Connections - Design/CA	75548_7485	Feb-20	Jul-29	4,985		4,985	168	672	572	572	1,984	2,860	141
Section 56 Replacement/Saugus River - Construction	75549_7486	Feb-22	Feb-23	9,750		9,750			3,000	6,750	9,750		
Section 56 Replacement/Saugus River - Feasibility Study	75565_7500	Dec-15	Jun-17	225	225								
Section 56 Pipe Demolition - Construction	75570_7536	Oct-18	May-19	1,781	1,687	94	94				1,781		
Sections 13 & 48 Rehabilitation - Design/CA/RI	75571_7602	Jul-24	Jul-29	2,150		2,150						1,972	178
Sections 13 & 48 Rehabilitation - Construction	75572_7603	Jul-26	Jul-28	10,750		10,750						9,030	1,720
Section 56 Replacement/Saugus River - REI	75573_7681	Feb-22	Feb-24	520		520			100	420	520		
Sections 14, 53 & 99 - REI	75574_7682	Jan-23	Jun-27	3,131		3,131				347	347	2,784	
CP2 Section 14 - Construction	75577_7699	Jan-25	Jun-27	2,800		2,800						2,800	
702 New Connecting Mains - Shaft 7 to WASM 3				**57,572**	**13,332**	**44,239**	**885**	**5,900**	**8,208**	**10,919**	**26,320**	**18,327**	
Routing Study	67846_5163	Aug-94	Nov-96	397	397								
Watertown MOU	68035_6199	Jun-94	Sep-97	167	167								
CP1- Design/CA/RI	68110_6383	Sep-98	Jul-11	3,533	3,533								
Des/CA/RI DP2/4 Meter 120	68111_6384	Aug-02	Oct-08	1,278	1,278								
CP3 (Sections 23, 24, 47) - Final Design/CA/RI	68112_6385	Jul-16	Jun-22	3,507	1,871	1,636	25	550	1,061		1,898		
CP1 A & B - Easements	68114_6387			17	17								
CP3 - Easements	68115_6388	Jan-18	Dec-18	28		28	10	18			28		
CP5 - Easements	68117_6390	Dec-06	Jan-11	22	22								
CP3-Sections 23, 24, 47 Rehabilitation	68119_6392	Sep-20	Apr-22	14,700		14,700		4,268	5,690	4,742	14,700		
CP5 - Northeast Segment	68121_6394	Aug-09	Nov-11	5,903	5,903								
CP3 - Clean & Line Sections 59 & 60 - Construction	68174_6548	Dec-23	Dec-25	9,476		9,476						9,476	
CP2 -Easements	68175_6547	May-17	May-25	33		33	3	14	8	2	27	6	
Replacement of Sections 25, 75, 59 & 60 - Design/CA	68255_6955	Jan-19	Jun-26	6,452	145	6,307	847	1,049	800	800	3,641	2,810	
Section 25 Replacement - Construction CP-2	68256_6956	Apr-22	Apr-24	4,157		4,157			400	1,900	2,300	1,857	
Section 75 Extension - Construction CP-1	68350_7484	Apr-22	Apr-24	4,185		4,185			200	2,125	2,325	1,860	
Sections 25, 75, 59, & 60 - REI	68351_7680	Apr-22	Dec-25	3,718		3,718			50	1,350	1,400	2,318	

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704 Rehab of Other Pump Stations				**51,290**	**30,058**	**21,233**	**33**			**747**	**780**	**20,453**	
Preliminary Design	67885_5153	Aug-94	Mar-96	351	351								
Design/CS/RI	68017_6110	May-97	Nov-04	2,546	2,546								
Construction II & C	68072_6304	Jan-00	Feb-01	639	639								
Rehab of 5 Pump Stations	68102_6375	Oct-06	Jun-10	21,848	21,848								
Technical Assistance	68178_6556	Jul-99	May-27	33		33	33				33		
Legal	68179_6557	Jul-99	Jan-10	6	6								
Proprietary Equipment Purchases	68204_6676	Jun-99	Jan-10	158	158								
Design 2 CS/RI	68266_6980	Dec-04	Jun-11	4,510	4,510								
Pump Station Rehabilitation - Design/CA	75583_7526	May-22	May-28	3,940		3,940				747	747	3,193	
Pump Station Rehabilitation - Construction	75584_7527	May-25	May-27	15,760		15,760						15,760	
Pump Station Rehabilitation - REI	75585_7720	May-25	May-27	1,500		1,500						1,500	
706 NHS - Connecting Mains from Section 91		**completed project**		**2,360**	**2,360**								
708 Northern Extra High Service (NEH) - New Pipelines				**40,180**	**3,632**	**36,548**	**6**	**518**	**1,000**	**1,000**	**2,525**	**33,850**	**173**
Design/CA/RI	67970_5242	Sep-94	Jun-01	588	588								
Construction	67972_6340	Aug-99	Sep-01	3,032	3,032								
CP-1 NEH Improvements	68162_6522	Jul-23	Sep-25	18,000		18,000						18,000	
Public Participation	68176_6554	Jul-15	Dec-20	5		5	2	2			5		
Legal	68177_6555	Jul-15	Dec-20	5		5	1	4			5		
Technical Assistance	68210_6707	Nov-10	Dec-20	18	8	10	2	8			10		
PLC Equipment Purchases	68215_6749	Dec-99	Dec-00	4	4								
Permits	68281_7050	Nov-10	Dec-20	5		5	1	4			5		
NEH Improvements Design - ESDC	75528_7404	Nov-20	Nov-28	6,823		6,823		500	1,000	1,000	2,500	4,150	173
NEH Improvements - REI	75595_7724	Jul-23	Nov-27	1,800		1,800						1,800	
CP-2 NEH Improvements	75596_7725	Apr-24	Nov-27	9,900		9,900						9,900	
712 Cathodic Protection Of Distribution Mains				**63,483**	**979**	**62,504**	**181**	**308**	**2,927**	**7,940**	**12,066**	**51,148**	
Planning Phase I	68002_6058	Apr-95	Dec-97	108	108								
Cathodic Protection Testing & Evaluation Program	68129_6438	Aug-15	Aug-17	129	129								
Cathodic Protection Shafts E & L	68131_6440	Jan-19	Aug-19	891	709	181	181				891		
Technical Assistance	68216_6751	Jan-00	May-09	33	33								
Cathodic Protection Shafts N & W	68381_7610	Aug-21	Aug-22	4,300		4,300			941	941	1,882	2,418	
Cathodic Protection Metro System - Design/CA	68382_7611	Jan-21	Jul-28	9,207		9,207		308	1,986	1,986	4,280	4,927	
CP1 Cathodic Protection Metro System - Construction	68383_7612	Jan-23	Jan-25	23,550		23,550				4,906	4,906	18,644	
Cathodic Protection Metro System - REI	68385_7679	Jan-23	Jan-27	1,716		1,716				107	107	1,609	
CP2 Cathodic Protection Metro System - Construction	68386_7715	Jan-25	Jan-27	23,550		23,550						23,550	
713 Spot Pond Supply Mains Rehabilitation				**66,289**	**65,489**	**800**			**600**	**200**	**800**		
Section 4 Webster Ave Bridge Pipe Rehabilitation - Design	60114_7334	Oct-13	Mar-17	642	642								
Section 4 Webster Ave Bridge Pipe Rehabilitation - Construction	60115_7335	May-15	Dec-16	3,792	3,792								
Walnut St Bridge Truss -Construction	60145_7483	Oct-21	May-23	800		800			600	200	800		
Preliminary Design & Design/CA/RI	68038_6223	Sep-98	Oct-08	10,869	10,869								
Easements & Paving - CP1	68059_6316	May-00	Mar-02	143	143								
North (Medford/Melrose), CP1 - Construction	68060_6317	May-00	Jan-02	6,597	6,597								
Easements - CP2	68106_6379	May-02	Jun-06	50	50								
Easements - CP3	68107_6380	Apr-04	Nov-07	80	80								
Middle (Medford/Somerville), CP 2 - Construction	68108_6381	Jun-02	Jul-06	22,177	22,177								
South (Cambridge/Boston), CP 3 - Construction	68109_6382	Oct-04	Apr-08	17,590	17,590								
Early Valve Replacement Contract	68150_6475	Sep-98	Jan-00	2,387	2,387								
Easements - CP4	68151_6476	Sep-06	May-09	1	1								
Early Valve Equipment Purchase	68153_6483	May-98	Nov-01	161	161								
Easements - CP5	68225_6784	Jul-14	Jun-20	74	74								
CA/RI - CP3	68274_7003	Sep-04	Apr-09	925	925								
714 Southern Extra High Sections 41 & 42		**completed project**		**3,657**	**3,657**								

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719 Chestnut Hill Connecting Mains				**38,945**	**18,287**	**20,659**						**20,648**	**11**
Pump Station Potable Connection - Design/CA/RI	68026_6141	Mar-00	Dec-04	1,360	1,360								
Preliminary Engineering	68051_6301	Jan-05	Apr-06	457	457								
Easements	68053_6303	Apr-03	Dec-07	81	81								
Emergency Pump Relocation - Construction	68155_6501	Feb-99	Mar-01	6,502	6,502								
Emergency Pump Relocation - Design/CA/RI	68157_6503	May-98	May-01	1,121	1,121								
Boston Paving	68180_6558	Jul-99	Dec-07	133	133								
Legal	68182_6560	Jul-99	Jun-08	1	1								
BECo Emergency Pump Construction	68199_6623	Sep-99	Jun-00	431	431								
Pump Station Potable Connection - Construction	68203_6651	Apr-02	Dec-03	7,132	7,132								
Equipment Pre-purchase	68230_6814	Apr-01	Oct-01	154	154								
Demolition of Garages	68231_6820	Feb-02	May-02	72	72								
Utilities	68244_6869	Jun-02	Aug-02	44	44								
Chestnut Hill Final Connections - Construction	68267_6982	Jul-25	Dec-27	15,928		15,928						15,928	
Chestnut Hill Final Connections - Design/ESDC	68268_6995	Jul-23	Dec-28	3,181		3,181						3,170	11
Chestnut Hill Gatehouse No. 1 Repairs - Construction	75521_7382	Nov-17	Apr-18	800	800								
Chestnut Hill Final Connections - REI	75591_7705	Jul-25	Dec-27	1,551		1,551						1,551	
720 Warren Cottage Line Rehabilitation		**completed project**		**1,205**	**1,205**								
721 Southern Spine Distribution Mains				**90,585**	**36,683**	**53,902**	**740**	**852**	**887**	**763**	**3,241**	**50,423**	**238**
Sections 21, 43 & 22 - Design	68083_6290	Sep-00	May-13	7,115	7,115								
Sections 21, 43 & 22 - Easements	68084_6291	Mar-02	May-12	107	107								
Section 22 South - Construction	68085_6292	Jul-03	Jun-05	4,993	4,993								
Sections 20 & 58 - Design	68089_6296	Jun-23	May-28	4,120		4,120						3,882	238
Sections 20 & 58 - Easements	68090_6297	Sep-21	Sep-25	35		35			5	9	14	21	
Sections 20 & 58 - Construction	68091_6298	Sep-25	May-27	19,387		19,387						19,387	
Adams Street Bridge	68122_6396	Jul-98	Dec-99	154	154								
Southern High Public Participation	68193_6601	Oct-98	May-99	15	15								
Southern High Extension Study	68194_6602	Sep-98	May-99	242	242								
Boston Paving	68228_6787			3	3								
Section 22 - Construction	68235_6844	Apr-25	Apr-27	23,661		23,661						23,661	
Section 107 Phase 1 - Construction	68236_6845	Jul-07	Jan-09	6,184	6,184								
Legal	68237_6846	May-04	May-27	5	1	4	1	1			2	2	
Technical Assistance	68238_6847	Feb-04	Oct-05	28	28								
Contract 1A - Construction	68247_6885	Nov-03	Jun-05	2,859	2,859								
Section 107 Phase 2 - Construction	68290_7099	Jan-10	Jan-12	14,847	14,847								
Milton Pressure Regulator Valve	68291_7104	Jun-06	Nov-06	135	135								
Section 22 - Design/ESDC	68298_7120	Oct-22	Apr-28	2,325		2,325				355	355	1,970	
Section 22 Rehabilitation Alternative Analysis/Environmental Permitting	68299_7155	Sep-19	Sep-22	2,870		2,870	739	851	881	399	2,870		
Section 22 - REI	68415_7723	Apr-25	Apr-27	1,500		1,500						1,500	

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722 Northern Intermediate High (NIH) Redundancy & Storage				**128,729**	**66,302**	**62,428**	**7,764**	**6,084**	**7,160**	**7,160**	**45,574**	**34,250**	**10**
Concept Plan	53454_6954	Feb-06	Aug-10	797	797								
Easements	68093_6306	Jul-17	Jun-20	469	429	40	40				40		
Section 89/29 Redundancy - Design/CA/RI	68252_6906	Mar-11	Aug-20	6,791	5,855	936	479	457			1,620		
Purchase Mobile Pump Unit	68276_7026	Jul-09	Jan-10	291	291								
Short Term Improvements - Design/CA/RI	68277_7045	Sep-09	May-15	821	821								
Permits	68278_7047	Jan-10	Dec-18	5	1	4	1	1	1	1	5		
Technical Assistance	68279_7048	Jan-10	Dec-18	18		18	3	6	3	3	15	3	
West St Pipe Reading Construct ruction Phase1A	68282_7066	Jun-14	May-15	1,910	1,910								
Section 89/29 Redundancy Construction Phase 2	68283_7067	Sep-17	Jun-20	25,237	18,859	6,378	6,253	125			19,781		
NIH Storage - Construction	68284_7068	Jan-26	Jan-28	24,100		24,100						24,100	
Section 89/29 Replacement - Design/ESDC	68294_7116	Apr-18	Dec-23	3,949	1,187	2,761	987	500	500	500	3,530	274	
Section 89/29 Replacement - Construction	68295_7117	Jul-20	Dec-23	21,300		21,300		4,566	6,085	6,085	16,736	4,564	
Gillis Pump Station Improvements	68309_7260	Jul-13	Dec-14	2,093	2,093								
Reading/Stoneham Interconnections	68310_7261	Aug-11	Oct-12	3,467	3,467								
NIH Storage - Design	68316_7311	Jan-24	Jan-29	4,890		4,890						4,880	10
Section 89/29 Redundancy - Phase 1B Construction	68317_7471	Jan-16	May-18	12,375	12,375						127		
Section 89/29 Redundancy - Phase 1C Construction	68318_7478	Jan-17	Sep-18	18,280	18,280						2,235		
Reading Reimbursement	68319_7590	Jun-17	Sep-17	(62)	(62)								
Section 89/29 Replacement - RE/RI Services	68320_7633	Jul-20	Dec-23	2,000		2,000		429	571	571	1,571	429	
723 Northern Low Service Rehabilitation - Section 8				**60,945**	**4,907**	**56,038**	**557**	**1,171**	**5,617**	**3,896**	**13,194**	**44,664**	**133**
Easements	68094_6321	Jul-15	Jul-27	80		80	3	18	10	10	41	39	
Section 8 & 57 Construction	68095_6322	Jul-26	Jul-28	31,084		31,084						31,084	
Rehabilitate Sections 37 & 46 Chelsea/East Boston - Construction	68262_6962	Jul-25	Jun-27	3,200		3,200						3,200	
Permits	68263_6977	Jul-05	Jul-27	299	285	14		3	2	2	6	8	
Technical Assistance	68264_6979	Jul-05	Jul-17	44	44								
Section 97A - Construction	68275_7021	Oct-08	Oct-09	1,992	1,992								
Sections 8 & 57 - Design/CA	68287_7092	Jul-23	Jul-29	6,217		6,217						6,084	133
Rehabilitate Sections 37 & 46 Chelsea/East Boston - Design/CA/RI	75529_7405	Jul-23	Jun-28	1,049		1,049						1,049	
Sections 50 & 57 Water Rehabilitation - Design/ESDC	75610_7540	Jul-17	May-22	5,980	2,586	3,395	555	1,150	1,006	685	5,347		
Sections 50 & 57 Water Rehabilitation - Construction	75611_7541	Jul-21	Jul-23	8,000		8,000			4,600	3,200	7,800	200	
Rehabilitate Sections 37 & 46 Chelsea/East Boston - REI	75613_7718	Jul-25	Jul-27	1,500		1,500						1,500	
Sections 8 & 57 - REI	75614_7719	Jul-26	Jul-28	1,500		1,500						1,500	
725 Hydraulic Model Update		**completed project**		**598**	**598**								
727 Southern Extra High (SEH) Redundancy & Storage				**141,243**	**42,462**	**98,781**	**15,311**	**8,227**	**471**	**496**	**38,522**	**18,114**	**56,162**
Concept Plan/Preliminary Design/Environmental Review	53397_6452	Feb-07	Feb-14	633	633								
Redundancy Pipeline Phase 1 - Design/CA/RI	53398_6453	Feb-14	Aug-21	7,677	5,558	2,120	928	793	399		3,074		
Redundancy Pipeline Section III Phase 1 - Construction	53399_6454	Jul-16	Sep-18	12,567	12,567						159		
Redundancy/Storage Phase 2 - Final Design/CA/RI	68135_6444	Jan-26	Dec-31	7,848		7,848						4,237	3,611
University Avenue Water Main	68136_6445	Mar-08	Nov-08	6,137	6,137								
Sections 77 & 88 Rehabilitation - Design/ESDC	68292_7112	Jul-22	Jun-26	1,734		1,734				416	416	1,318	
Sections 77 & 88 Rehabilitation - Construction	68293_7113	Jul-24	Jul-26	7,459		7,459						7,459	
Easements/Agreements	68305_7226	Jul-14	Jul-27	300	12	288	5	36	21	30	92	196	
Permits/Utilities	68306_7227	Aug-08	Jul-27	300	14	286	27	75	50	50	210	84	
Redundancy/Storage Phase 2 - Construction	68308_7245	Jan-28	Dec-30	39,238		39,238						3,269	35,969
Phase 3, 2nd Tank - Construction	68311_7262	Jan-33	Dec-35	13,819		13,819							13,819
Phase 3, 2nd Tank - Design	68312_7263	Jan-31	Dec-36	2,764		2,764							2,764
Redundancy Pipeline Section 111 - Construction 2	68555_7504	Oct-17	May 20	18,823	13,890	4,932	4,932				14,177		
Redundancy Pipeline Section 111 - Construction 3	68556_7505	Aug-18	Nov-20	20,394	3,652	16,742	9,419	7,323			20,394		
Sections 77 & 88 - REI	68557_7706	Jun-23	Jun-25	1,551		1,551						1,551	

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730 Weston Aqueduct Supply Mains (WASM)				**80,457**	**80,403**	**54**	**54**				**54**		
Newton Water Mains - Construction	59774_5034	Apr-95	Oct-96	669	669								
Technical Assistance	59776_5975	Mar-95	Oct-18	186	186								
WASM 4 - Design/CA/RI	67865_5147	Mar-95	Sep-07	5,978	5,978								
WASMs 1 & 2 - Design/CA/RI	68027_6142	Jun-97	Jul-06	5,060	5,060								
Appraisal / Easement	68030_6174	Mar-95	Oct-18	449	449								
WASM 1, 2 & 4 - Auburndale	68031_6175	Jun-97	Nov-98	4,001	4,001								
Meter 103 - Construction	68032_6176	Oct-96	Jul-98	61	61								
WASMs 1 & 2 - Newton	68041_6280	Mar-00	Jun-02	9,219	9,219								
WASMs 1 & 2 - Boston	68042_6281	Feb-03	Jun-05	7,039	7,039								
WASMs 2 & 4 - Newton	68069_6312	Apr-98	Mar-01	8,282	8,282								
WASM 4 - Allston & Western Ave. Sewer	68070_6313	Feb-02	Dec-04	17,331	17,331								
Section 36/Watertown Section/Waltham Connection - Design/CA/RI	68167_6540	Jan-11	May-17	2,011	2,011								
Section 28, Arlington - CP1	68173_6546	Aug-09	Feb-11	2,304	2,304								
Survey	68245_6870	Dec-01	Oct-25	89	89								
Arlington Pipe Work	68269_6996	Dec-09	May-10	401	401								
WASM3 Section 12 Replacement - Construction	68272_7000	Oct-04	Sep-05	2,114	2,114								
WASM3 Section 12 Replacement - Design	68273_7001	May-04	Aug-06	265	265								
Section 28 - Design/CA/RI	68285_7083	Oct-06	Apr-11	867	867								
Watertown Section Rehabilitation	68301_7222	May-13	Dec-13	2,818	2,764	54	54				54		
Section 36/W11/S 9-A11 Valve	68332_7448	Nov-14	Dec-16	11,314	11,314								
731 Lynnfield Pipeline		**completed project**		**5,626**	**5,626**								
732 Walnut St. & Fisher Hill Pipeline Rehabilitation		**completed project**		**2,717**	**2,717**								
735 Section 80 Rehabilitation				**16,024**	**1,925**	**14,099**			**367**	**491**	**858**	**13,240**	
Section 80 Rehabilitation - Construction	68249_6891	Jul-23	Jul-26	10,741		10,741						10,741	
Section 80 Rehabilitation - Design/CA	68250_6892	Jul-21	Jul-27	2,497		2,497			366	490	856	1,641	
Section 80 Repair - Construction	68410_7532	Dec-16	Jun-18	1,908	1,908								
Permits	68411_7533	Oct-16	Jun-24	27	17	10			1	1	2	8	
Section 80 Rehabilitation - REI	68412_7675	Jul-23	Jul-26	850		850						850	

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Other Waterworks				**161,008**	**190,245**	**(29,237)**	**12,472**	**37,853**	**19,538**	**6,358**	**94,580**	**63,263**	**(168,721)**
753 Central Monitoring System				**42,082**	**21,197**	**20,885**	**1,066**	**3,500**	**6,400**	**5,501**	**16,960**	**4,418**	
Study	75300_5025	Mar-84	Sep-86	190	190								
Design	75301_5026	Oct-87	Jan-92	2,651	2,651								
Equipment Prepurchase	75302_5027	Oct-87	Dec-93	2,162	2,162								
SCADA Implementation	75303_5028	Aug-96	Mar-17	2,101	2,035	66	66				66		
Communications Structures	75304_5160	Nov-92	May-93	161	161								
Construction & Start-up Services	75305_5173	Jul-92	Aug-98	352	352								
Construction 1	75306_5171	Nov-97	Nov-98	209	209								
Operations Center - Construction	75308_5849	Sep-92	Jun-94	1,499	1,499								
Technical Assistance	75309_5987	Jul-92	Dec-97	386	386								
Waterworks SCADA/PLC Upgrades	75310_5218	Oct-16	Oct-31	189	189								
Microwave Equipment	75474_6125	Mar-96	Dec-01	782	782								
Microwave Communication System-Wide Backbone	75488_6653	Sep-01	Jun-02	1,694	1,694								
Monitoring & Control - Study & Design	75489_6654	Dec-99	Sep-04	1,808	1,808								
Microwave Communication for Waterworks Facilities	75494_6816	Sep-02	Jul-04	1,957	1,957								
Ludlow Communications	75495_6825	Sep-01	Oct-01	41	41								
Quabbin Power, Communication & Security - Construction	75512_7338	Feb-16	Apr-17	3,512	3,512								
Quabbin Power, Communication & Security - Design	75540_7461	Sep-14	Sep-18	799	799								
Utility Fees and Permits	75541_7475	Jul-14	Dec-17	264	264								
CWTP SCADA Upgrades - Design/Programming RE	75630_7581	Jan-19	Jul-23	4,652	507	4,145	1,000	1,000	1,400	700	4,607	45	
CWTP SCADA Upgrades - Construction	75631_7582	Dec-20	May-23	13,000		13,000		2,500	5,000	4,500	12,000	1,000	
Other Design and Programming Services	75632_7583	Jul-22	Oct-28	2,880		2,880				240	240	2,640	
Other Equipment/Hardware	75634_7585	Dec-22	Oct-28	794		794				61	61	733	
763 Distribution Systems Facilities Mapping				**2,799**	**1,036**	**1,763**		**231**	**654**	**298**	**1,183**	**580**	
Planning and Design	75458_5162	Feb-95	Dec-98	936	936								
Data Purchase	75476_6152	Nov-95	Aug-96	100	100								
Records Development	75484_6525	Oct-22	Oct-24	763		763				183	183	580	
Update of Record Drawings	75600_7489	Jul-21	Jul-22	500		500			385	115	500		
Water System Hydraulic Model	75650_7613	Oct-20	Sep-21	500		500		231	269		500		
764 Local Water Infrastructure Rehab		**completed project**		**7,488**	**7,488**								
765 Local Water System Assistance Program				**0**	**154,098**	**(154,098)**	**5,834**	**33,180**	**9,653**	(8,328)	**54,163**	**4,819**	**(199,255)**
Community Repayment	75493_6759	Aug-01	Jun-23	(222,318)	(208,327)	(13,990)	(5,902)		(3,292)	(2,562)	(19,992)	(2,234)	
Local Water System Assistance Loans	75513_7339	Aug-10	Jun-20	200,000	159,471	40,529	11,601	11,180	17,748		59,869		
Local Water System Assistance Repayments	75514_7340	Aug-11	Jun-30	(200,000)	(56,510)	(143,490)	(15,739)		(21,476)	(21,359)	(72,666)	(70,523)	(14,394)
CVA Loans	75515_7350	Nov-10	Jun-20	10,000	5,573	4,427	1,000	1,000	1,000	1,427	4,427		
CVA Repayments	75516_7351	Nov-11	Jun-30	(10,000)	(1,888)	(8,112)	(557)		(869)	(875)	(2,859)	(4,097)	(1,714)
Lead Service Line Replacement Loans	75517_7529	Aug-16	May-36	100,000	11,567	88,433	5,150	5,000	5,000	5,000	22,738	25,000	43,283
Lead Service Line Replacement Repayments	75518_7530	Aug-17	May-46	(100,000)	(1,517)	(98,483)	(878)		(2,495)	(2,995)	(7,285)	(21,198)	(70,917)
Local Water System Assistance Phase 3 Distributions	75620_7567	Aug-17	May-26	278,000	23,684	254,316	13,100	16,000	20,000	20,000	85,571	150,000	35,216
Local Water System Assistance Phase 3 Repayments	75621_7568	Aug-18	May-36	(278,000)	(721)	(277,279)	(1,892)		(5,904)	(7,904)	(16,421)	(78,049)	(183,530)
Local Water System Assistance Phase 3 CVA Loans	75622_7588	Aug-17	May-26	14,000	500	13,500				1,000	1,000	8,000	4,500
Local Water System Assistance Phase 3 CVA Repayments	75623_7589	Aug-18	Aug-36	(14,000)	(50)	(13,950)	(50)		(60)	(60)	(220)	(2,080)	(11,700)

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766 Waterworks Facility Asset Protection				**108,639**	**6,425**	**102,214**	**5,572**	**942**	**2,831**	**8,887**	**22,274**	**53,447**	**30,534**
Meter Vault Manhole Retrofits - Design	75490_6689	Jul-22	Mar-26	555		555				110	110	445	
Steel Tank Improvements - Design/CA	75497_6832	Jul-20	Apr-25	3,600		3,600		558	744	744	2,046	1,554	
Gillis Pump Station/Cottage Farm CSO Roof Replacements	75500_6888	Jul-19	Jul-20	586		586	586				586		
Waltham Bridge Pipe Replacement	75501_6910	Mar-04	Sep-04	238	238								
Permits and Legal Fees	75502_6920	Mar-04	Jun-18	16	11	5	3	2			5		
Technical Assistance	75503_6921			9	9						9		
Cosgrove Intake Roof Replacement	75505_7022	Nov-18	Sep-19	1,011	275	736	736				1,011		
Generator Docking Station - REI	75507_7024	Jul-19	May-20	209		209	193	16			209		
Generator Docking Station	75508_7025	Apr-19	Apr-20	1,211	18	1,193	1,193				1,211		
Cosgrove Valve Replacement - Construction	75509_7064	Jul-24	Jul-25	2,122		2,122						2,122	
Cosgrove Valve Replacement - Design	75510_7065	Jul-23	Dec-25	244		244						244	
Transformer at Cosgrove Intake Building	75511_7228	Jun-11	Jul-12	299	299								
Fells/Loring Rd Covered Storage Tank Rehab - Design/CA/RI	75524_7385	Jul-22	Jul-27	1,000		1,000				184	184	816	
Electrical Distribution Upgrades at Southborough	75535_7425	Jul-22	Jan-23	1,200		1,200			700	500	1,200		
Water Meter Upgrade Replacement & Meter Vault Manhole Retrofit CP-1	75536_7453	Dec-22	Dec-24	3,000		3,000				480	480	2,520	
Beacon Street Line Repair - Construction	75537_7458	Jun-16	Apr-17	1,441	1,441								
Beacon Street Line Repair - Design/CA/RI	75538_7474	Nov-14	Dec-17	394	394								
Meter Vault Manhole Retrofits - Construction	75550_7479	Jul-24	Mar-26	1,774		1,774						1,774	
Fells/Loring Rd Covered Storage Tank Rehab - Construction	75553_7482	Jul-24	Jul-26	4,000		4,000						4,000	
Water Meter Upgrade Replace & Meter Vault Manhole Retrofit - Design/CA	75554_7542	Dec-20	Dec-25	1,000		1,000		72	218	218	508	492	
Painting for Deer Island Water Storage Tank	75555_7601	Mar-19	Nov-19	2,440	550	1,890	1,890				2,440		
New Roofs at Water Pumping Stations - Construction	75556_7626	Jul-25	Jun-26	500		500						500	
New Roofs at Water Pumping Stations - Design/CA/RI	75558_7628	Jul-24	Jun-27	100		100						100	
Painting for Bellevue 2 & Turkey Hill Steel Water Storage Tanks	75559_7634	Aug-18	Sep-19	4,162	3,190	972	972				4,162		
Steel Tanks Improvements - REI	75560_7676	Nov-22	May-24	1,125		1,125				296	296	829	
Masonry/Structural Repairs Bellevue 1/Arlington Heights - Construction	75575_7694	Feb-22	Aug-24	4,000		4,000			251	1,552	1,803	2,197	
Water Meter Upgrade Replace & Meter Vault Manhole Retrofit Phase 1 - REI	75652_7707	Dec-22	Dec-24	1,500		1,500				240	240	1,260	
Water Meter Upgrade Replac & Meter Vault Manhole Retrofit Phase 2 - Design	75653_7708	May-21	May-26	1,000		1,000			211	230	441	559	
Water Meter Upgrade Replac & Meter Vault Manhole Retrofit CP-2 - Construct	75654_7709	May-23	May-25	3,000		3,000						3,000	
Water Meter Upgrade Replace & Meter Vault Manhole Retrofit Phase 2 - REI	75655_7710	May-23	May-25	1,500		1,500						1,500	
Masonry/Structural Repairs Bellevue 1/Arlington Heights - Design/ESDC	75656_7711	Oct-20	Aug-25	1,635		1,635		294	392	392	1,078	557	
Masonry/Structural Repairs Bellevue 1/Arlington Heights - REI	75657_7712	Feb-22	Aug-24	1,875		1,875			120	725	845	1,030	
Steel Tank Improvements Phase2 - Construction	75658_7727	Mar-23	Mar-24	2,600		2,600						2,600	
Steel Tank Improvements Phase 2 - REI	75659_7728	Mar-23	Mar-24	750		750						750	
Beacon St Line Rehabilitation - Design/ESDC	75660_7729	Jun-21	Jun-26	900		900			195	234	429	471	
Beacon St Line Rehabilitation - Construction	75661_7730	Jun-23	Jun-25	6,900		6,900						6,900	
Beacon St Line Rehabilitation - REI	75662_7731	Jun-23	Jun-25	1,500		1,500						1,500	
Cosgrove Tunnel Rehabilitation - Design/ESDC	75663_7738	Jul-24	Jul-29	10,000		10,000						7,376	2,624
Water Tanks Paint Phase 1 Bellevue 2/Deer Island/Turkey Hill - Design/ESDC	75664_7739	Jul-34	Jul-39	752		752							752
Water Tanks Paint Phase 1 Bellevue 2/Deer Island/Turkey Hill - Construction	75665_7740	Jul-36	Jul-38	4,080		4,080							4,080
Water Tanks Paint Phase 1 Bellevue 2/Deer Island/Turkey Hill - REI	75666_7741	Jul-36	Jul-38	1,545		1,545							1,545
Water Tanks Paint Phase 2 Bellevue 1/Park Circle/Walnut Hill - Design/ESDC	75667_7742	Jul-37	Jul-42	3,297		3,297							3,297
Water Tanks Paint Phase 2 Bellevue 1/Park Circle/Walnut Hill - Constructior	75668_7743	Jul-39	Jul-41	14,012		14,012							14,012
Water Tanks Paint Phase 2 Bellevue 1/Park Circle/Walnut Hill - RE	75669_7744	Jul-39	Jul-41	1,545		1,545							1,545
Water Tank Paint Phase 1 Deer Island - Construction	75670_7748	Jul-36	Jul-38	2,679		2,679							2,679
Steel Tank Improvements - Construction	77552_7493	Nov-22	May-24	11,333		11,333				2,982	2,982	8,351	

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Business & Operations Support				**173,001**	**103,438**	**69,563**	**8,001**	**22,394**	**10,222**	**6,334**	**49,359**	**22,612**	
881 Equipment Purchase				**42,711**	**22,820**	**19,891**	**1,678**	**2,712**	**1,851**	**2,711**	**9,914**	**10,940**	
Contaminant Monitoring Equipment	88108_7631	Sep-21	Jun-25	3,613		3,613		152	130	630	912	2,701	
Security Equipment & Installation	92374_6760	Jan-01	Jun-23	11,588	9,123	2,465	262	840	678	343	2,139	342	
ICP-MS Lab Testing Equipment	92379_6808	Oct-08	Dec-08	117	117								
High Lift Fork Loader (Lull)	92411_7239	Oct-10	Dec-10	121	121								
Ford Ramp Truck	92416_7246	Apr-10	Jun-10	122	122								
Street Sweeper	92417_7247	Jul-09	Sep-09	182	182								
Prior Vehicle Purchases	98454_7306	Jul-00	Jun-10	2,415	2,415								
FY11-13 Vehicle Purchases	98455_7307	Jul-09	Jun-13	2,361	2,361								
FY14-18 Vehicle Purchases	98456_7308	Jul-13	Jun-18	6,671	6,671								
FY19-23 Vehicle Purchases	98457_7309	Jul-18	Jun-23	6,085	947	5,138	1,253	1,480	855	1,550	6,085		
FY14-18 Major Lab Instrumentation	98458_7310	Jun-16	Jun-18	639	639								
Front-End Loader	98467_7325	Oct-10	Dec-10	121	121								
FY19-23 Major Lab Instrumentation	98495_7632	Jul-18	Jun-23	1,000		1,000	163	240	188	188	778	222	
FY24-28 Vehicle Purchases	98497_7695	Jul-23	Jun-28	7,675		7,675						7,675	
925 Technical Assistance				**1,125**		**1,125**		**391**	**366**	**368**	**1,125**		
Land Appraisal	77000_LAND			100		100		33	33	34	100		
Surveying	80000_SURV			125		125		58	33	34	125		
Hazardous Material	90000_HAZM			900		900		300	300	300	900		
930 MWRA Facility - Chelsea		**completed project**		**9,812**	**9,812**								
931 Business Systems Plan		**completed project**		**24,562**	**24,562**								
932 Environmental Remediation		**completed project**		**1,479**	**1,479**								
933 Capital Maintenance Planning/Development				**26,385**	**15,457**	**10,928**	**2,952**	**4,570**	**2,516**	**890**	**12,184**		
Inventory & Evaluation - 1 & 2	19175_6421	Apr-00	Jul-05	2,579	2,579								
As-Needed Design Contract 1	92387_6976	Mar-05	Sep-07	313	313								
As Needed Design Contract 2	92393_6988	Mar-05	Sep-07	318	318								
As-Needed Design Contract 5	92399_7070	Sep-08	Mar-11	558	558								
As-Needed Design Contract 3	92402_7101	Aug-07	Feb-10	579	579								
As-Needed Design Contract 4	92403_7102	Aug-07	Aug-09	247	247								
As-Needed Design Contract 6	92413_7242	Aug-08	Aug-10	704	704								
As-Needed Design Contract 7	92414_7243	Jan-10	Jul-12	980	980								
As-Needed Design Contract 8	92415_7244	Feb-10	Jun-13	1,044	1,044								
As-Needed CS/REI Contract 1	94491_7629	Sep-18	Sep-21	1,500	32	1,468	291	831	346		1,500		
As-Needed CS/REI Contract 2	94492_7630	Sep-18	Sep-21	1,500		1,500	250	1,000	250		1,500		
As-Needed Design Contract 9	98470_7390	Jul-11	Jan-14	1,610	1,610								
As-Needed Design Contract 10	98471_7391	Aug-11	Feb-14	1,868	1,868								
As-Needed Design Contract 11	98473_7436	Feb-14	Aug-15	432	432								
As-Needed Design Contract 12	98474_7437	Jan-14	Jul-16	722	722								
As-Needed Design Contract 13	98485_7456	Feb-14	Aug-16	683	683								
As-Needed Design Contract 14	98487_7496	Jun-16	Dec-18	921	898	22	22				242		
As-Needed Design Contract 15	98488_7497	Jun-16	Dec-18	1,207	1,207						321		
As-Needed Design Contract 16	98489_7498	Jun-18	Dec-20	2,432	455	1,977	1,226	751			2,432		
As-Needed Design Contract 17	98490_7604	Jun-18	Dec-20	1,940	229	1,711	1,163	548			1,940		
As-Needed Design Contract 18	98493_7691	Jul-20	Jul-22	2,125		2,125		720	960	445	2,125		
As-Needed Design Contract 19	98494_7692	Jul-20	Jul-22	2,125		2,125		720	960	445	2,125		

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934 MWRA Facilities Management & Planning				**3,071**	**371**	**2,700**			**208**	**867**	**1,075**	**1,625**	
Design/Engineering Services	92389_6983	May-21	Aug-25	700		700			208	227	435	265	
Facilities Construction	92390_6984	Aug-22	Aug-24	2,371	371	2,000				640	640	1,360	
935 Alternative Energy Initiatives				**23,700**	**18,184**	**5,516**					**(234)**	**5,516**	
Deer Island Solar	19285_6974	Sep-07	May-08	904	904								
DI Wind	92428_6974C	Nov-08	Apr-10	4,063	4,063								
Future Renewable Energy Projects	92430_7270	Oct-23	Dec-24	5,516		5,516						5,516	
Loring Road Hydro - Design	92432_6974E	Mar-08	Sep-09	2	2								
Technical Assistance - Solar	92439_7274	May-09	Nov-12	124	124								
Energy Advisory Consultant Services	92440_6974B	Jun-08	Jun-10	46	46								
Wind Power Feasibility Study	92441_OP67	Mar-07	Jun-10	346	346								
Deer Island Photovoltaic System Phase 1 - Construction	92442_7292	Sep-09	Mar-10	1,119	1,119								
Technical Assistance - Energy Efficiency	92443_7274A	May-09	Nov-13	463	463								
Technical Assistance - Solar II	92444_7274B	May-09	Nov-12	348	348								
Technical Assistance - Emerging Technology	92445_7274C	May-09	Dec-13	101	101								
Technical Assistance - Wind	92446_7274D	May-09	May-13	460	460								
Charlestown Wind - Construction	98450_7302	Feb-10	Oct-11	4,891	4,891						(234)		
John J. Carroll WTP Solar - Construction	98452_7304	Jan-10	Aug-11	2,367	2,367								
Loring Road Hydro - Construction	98459_6974F	Jan-10	May-11	1,882	1,882								
Deer Island Wind Phase II - Construction	98463_7321			37	37								
Fish Hatchery Pipeline Hydro	98465_7323	Mar-16	Sep-17	1,030	1,030								
940 Applications Improvements Program				**18,249**	**3,157**	**15,092**	**580**	**5,367**	**3,716**	**1,045**	**10,971**	**4,385**	
GIS Applications & Integration	92420_7251	Jan-14	Jun-21	350	22	328	100	178	50		328		
Lawson Upgrade	92435_7286	Jul-20	Jun-24	5,000		5,000		2,015	1,000	1,000	4,015	985	
Maximo Upgrade	92436_7287	Jul-15	Jun-19	2,520	2,520						86		
Pre-Treatment Information Management System (PIMS) Replace or Build	92437_7288	Jul-23	Sep-25	3,400		3,400						3,400	
SAP BO Migration	92469_7386	Jun-16	Dec-21	481	81	400	85	115	200		400		
Enterprise Content Management	98475_7438	May-20	Jun-22	3,000		3,000	209	1,396	1,396		3,000		
WQRS Aquarius	98478_7441	Jan-19	Dec-20	325	179	146	36	110			325		
Laboratory Information Management System (LIMS) Upgrade	98484_7447	Mar-15	Jun-22	654	354	300		150	150		300		
MAXIMO Interface Enhancements	98500_7649	Jul-20	Mar-21	655		655		655			655		
MAXIMO Upgrade	98501_7650	Dec-20	Jun-21	560		560		560			560		
Hyperion Pillar	98503_7652	Sep-20	Sep-21	350		350		188	162		350		
Harbor Outfall Monitoring Loading (HOML) Application	98504_7653	Jan-20	Jun-20	150		150	150				150		
Archiving & Data Management	98506_7656	Jul-21	Dec-21	545		545			545		545		
PI (OSI)	98606_7666	Jan-22	Dec-22	258		258			213	45	258		
942 Information Security Program (ISP)				**5,506**	**1,708**	**3,798**	**762**	**3,036**			**3,798**		
IT Security Infrastructure - Equipment	92434_7285	Sep-11	Jun-14	501	501								
Managed Security Service Provider (MSSP)	92500_7499	Jun-16	Dec-20	1,050	862	189	94	94			189		
ITSM Access Management	92501_7657	May-20	Jun-21	325		325		325			325		
MSSP/SIEM	92502_7658	Apr-21	Jun-21	2,600		2,600		2,600			2,600		
Active Directory	92503_7659	Jan-20	Sep-20	195		195	178	17			195		
XenMobile/XenApp WorxSpace	98476_7439	Apr-14	Mar-20	157	27	130	130				130		
Information Security Plan Implementation	98477_7440	Oct-19	Jun-20	360		360	360				360		
IT Security Program (ISP) Development	98483_7446	May-13	Jun-14	318	318								
944 Information Technology Management Program				**200**		**200**		**160**	**40**		**200**		
IT Project Management Methodology	98472_7408	Apr-19	Nov-21	200		200		160	40		200		

Massachusetts Water Resources Authority
Capital Improvement Program
FY21 Final Expenditure Forecast
$000s

Program / Project / Contract	Contract No.	Notice to Proceed	Substantial Completion	Total Contract Amount	Payments through FY19	Remaining Balance	FY20	FY21	FY22	FY23	FY19-FY23	FY24-FY28	Beyond FY28
946 IT Infrastructure Program				**16,202**	**5,890**	**10,312**	**2,028**	**6,158**	**1,526**	**454**	**10,325**	**146**	
IT System Architecture	92404_7200	Sep-12	Oct-15	1,009	1,009								
Cabling	92405_7201	Mar-11	Jun-21	5,066	1,066	4,001	1,333	2,001	667		4,001		
SAN Storage	92406_7203	Jul-13	Sep-21	2,059	1,041	1,018		1,012	6		1,018		
Oracle Database Appliance	92407_7204	Jul-13	Dec-21	761	581	180		165	15		180		
Servers Upgrades	92408_7205	Oct-13	Mar-23	1,165	462	703	359	118	118	108	860		
Near Field Communications	98480_7443	Jul-23	Dec-23	790	640	150	4				6	146	
Exchange Upgrades	98481_7444	Jun-16	Jun-20	190	8	182	182				182		
Enterprise Data Management	98482_7445	Jan-14	Dec-21	2,121	1,083	1,038			692	346	1,038		
NetScalers	98505_7654	Jun-20	Jun-21	100		100		100			100		
Telephone System Upgrade	98600_7660	Jun-20	Dec-20	447		447	149	298			447		
Core Switches	98601_7661	Jul-20	Sep-20	500		500		500			500		
Edge Switches	98602_7662	Jul-20	Dec-20	700		700		700			700		
Disaster Recovery	98603_7663	Jan-21	Sep-21	983		983		955	28		983		
Instrumentation & Controls IT	98604_7664	May-20	Mar-21	310		310		310			310		

APPENDIX 3

New Capital Projects Added During the FY21 CIP

Appendix 3
New Capital Projects Added to the FY21 CIP

Program	Project	Subphase	Contract Number	Total Contract Amount	NTP	SC	FY21	FY22	FY23	FY19-23	Beyond FY23	Total Expenditures
Treatment	DITP Asset Protection	DITP Roofing Replacement	7734	$ 2,000,000	Jan-21	Jun-22	$ 333,000	$ 1,333,000	$ 334,000	**$ 2,000,000**	$ -	**$ 2,000,000**
Treatment	Clinton Wastewater Treatment Plant	Clinton SCADA Upgrades	7736	$ 750,000	Jan-24	Jan-26	$ -	$ -	$ -	**$ -**	$ 750,000	**$ 750,000**
Treatment	Clinton Wastewater Treatment Plant	Clinton Fire Alarm Replacement	7735	$ 900,000	Jan-21	Jul-22	$ 142,000	$ 568,000	$ 190,000	**$ 900,000**	$ -	**$ 900,000**
Treatment	Clinton Wastewater Treatment Plant	Clinton Landfill Cell #1 Closure	7754	$ 1,000,000	Dec-20	Feb-22	$ 500,000	$ 500,000	$ -	**$ 1,000,000**	$ -	**$ 1,000,000**
Drinking Water Quality Improvements	Carroll Water Treatment Plant	Technical Assistance 11	7713	$ 750,000	Jan-21	Dec-22	$ 95,000	$ 375,000	$ 280,000	**$ 750,000**	$ -	**$ 750,000**
Drinking Water Quality Improvements	Carroll Water Treatment Plant	Technical Assistance 12	7714	$ 750,000	Jan-21	Dec-22	$ 95,000	$ 375,000	$ 280,000	**$ 750,000**	$ -	**$ 750,000**
Transmission	Watershed Division Capital Improvements	Quabbin Water Supply Design/CA/RI	7752	$ 250,000	Jan-21	Jun-23	$ 25,000	$ 100,000	$ 100,000	**$ 225,000**	$ 25,000	**$ 250,000**

Appendix 3
New Capital Projects Added to the FY21 CIP

Program	Project	Subphase	Contract Number	Total Contract Amount	NTP	SC	FY21	FY22	FY23	FY19-23	Beyond FY23	Total Expenditures
Transmission	Watershed Division Capital Improvements	Quabbin Water Supply Construction	7753	$ 850,000	Jun-22	Jun-23	$ -	$ -	$ 654,000	**$ 654,000**	$ 196,000	**$ 850,000**
Drinking Water Quality Improvements	Carroll Water Treatment Plant Asset Protection	Corrosion Control Pipe Loop Study	7737	$ 500,000	Mar-21	Mar-22		$ 400,000	$ 100,000	**$ 500,000**	$ -	**$ 500,000**
Other Waterworks	Waterworks Facilities Asset Protection	Beacon Street Line Rehabilitation Design/Engineering Services During Construction	7729	$ 900,000	Jun-21	Jun-26	$ -	$ 195,000	$ 234,000	**$ 429,000**	$ 471,000	**$ 900,000**
Other Waterworks	Waterworks Facilities Asset Protection	Beacon Street Line Rehabilitation Construction	7729	$ 6,900,000	Jun-23	Jun-25	$ -	$ -	$ -	**$ -**	$ 6,900,000	**$ 6,900,000**
Other Waterworks	Waterworks Facilities Asset Protection	Beacon Street Line Rehabilitation Resident Engineering Inspection	7731	$ 1,500,000	Jun-23	Jun-25	$ -	$ -	$ -	**$ -**	$ 1,500,000	**$ 1,500,000**
Other Waterworks	Waterworks Facilities Asset Protection	Cosgrove Tunnel Rehabilitation Design/ESDC	7738	$ 10,000,000	Jul-24	Jul-29	$ -	$ -	$ -	**$ -**	$ 10,000,000	**$ 10,000,000**

Appendix 3
New Capital Projects Added to the FY21 CIP

Program	Project	Subphase	Contract Number	Total Contract Amount	NTP	SC	FY21	FY22	FY23	FY19-23	Beyond FY23	Total Expenditures
Other Waterworks	Waterworks Facilities Asset Protection	Water Tanks Paint Phase 1 Design/ESDC Bellevue 2/Deer Island/Turkey Hill	7739	$ 751,707	Jul-34	Jul-39	$ -	$ -	$ -	**$ -**	$ 751,707	**$ 751,707**
Other Waterworks	Waterworks Facilities Asset Protection	Water Tanks Paint Phase 1 Construction Bellevue 2/Turkey Hill	7740	$ 4,079,988	Jul-36	Jul-38	$ -	$ -	$ -	**$ -**	$ 4,079,988	**$ 4,079,988**
Other Waterworks	Waterworks Facilities Asset Protection	Water Tank Paint Phase 1 Deer Island Construction	7748	$ 2,678,780	Jul-36	Jul-38	$ -	$ -	$ -	**$ -**	$ 2,678,780	**$ 2,678,780**
Other Waterworks	Waterworks Facilities Asset Protection	Water Tanks Paint Phase 1 Construction Bellevue 2/Deer Resident Engineering/Inspection	7741	$ 1,545,450	Jul-36	Jul-38	$ -	$ -	$ -	**$ -**	$ 1,545,450	**$ 1,545,450**
Other Waterworks	Waterworks Facilities Asset Protection	Water Tanks Paint Phase 2 Design/ESDC Bellevue 1/Park Circle/Walnut Hill	7742	$ 3,296,960	Jul-37	Jul-42	$ -	$ -	$ -	**$ -**	$ 3,296,960	**$ 3,296,960**
Other Waterworks	Waterworks Facilities Asset Protection	Water Tanks Paint Phase 2 Construction Bellevue 1/Park Circle/Walnut Hill	7743	$ 14,012,080	Jul-39	Jul-41	$ -	$ -	$ -	**$ -**	$ 14,012,080	**$ 14,012,080**

Appendix 3
New Capital Projects Added to the FY21 CIP

Program	Project	Subphase	Contract Number	Total Contract Amount	NTP	SC	FY21	FY22	FY23	FY19-23	Beyond FY23	Total Expenditures
Other Waterworks	Waterworks Facilities Asset Protection	Water Tanks Paint Phase 2 REI Bellevue 1/Park Circle/Walnut Hill	7744	$ 1,545,450	Jul-39	Jul-41	$ -	$ -	$ -	**$ -**	$ 1,545,450	**$ 1,545,450**
SUMMARY:												
Total Wastewater Projects				**$ 4,650,000**			**$ 975,000**	**$ 2,401,000**	**$ 524,000**	**$ 3,900,000**	**$ 750,000**	**$ 4,650,000**
Total Waterworks Projects				**$ 50,310,415**			**$ 215,000**	**$ 1,445,000**	**$ 1,648,000**	**$ 3,308,000**	**$47,002,415**	**$ 50,310,415**
Business & Operations Support				**$ -**			**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Projects				**$ 54,960,415**			**$ 1,190,000**	**$ 3,846,000**	**$ 2,172,000**	**$ 7,208,000**	**$47,752,415**	**$ 54,960,415**

APPENDIX 4

Overview of the FY21 Final CIP and Changes from the FY20 Final CIP

APPENDIX 4
Overview of the FY21 Final CIP and Changes from the Final FY20 CIP

Program and Project	FY20 Final				FY21 Final				Change from Final FY20			
	Total Budget Amount	FY19-23	FY24-28	Beyond 28	Total Budget Amount	FY19-23	FY24-28	Beyond 28	Total Budget Amount	FY19-23	FY24-28	Beyond 28
Total MWRA	**8,184,170**	**1,086,786**	**1,611,220**	**1,212,406**	**8,537,295**	**1,055,239**	**1,859,104**	**1,349,194**	**353,125**	**(31,551)**	**247,886**	**136,789**
Wastewater	**3,719,452**	**640,479**	**906,340**	**111,314**	**3,834,479**	**601,117**	**1,044,733**	**127,310**	**115,027**	**(39,362)**	**138,393**	**15,996**
Interception & Pumping	**1,193,347**	**195,338**	**337,111**	**58,498**	**1,238,479**	**221,249**	**356,386**	**58,444**	**45,132**	**25,911**	**19,275**	**(54)**
102 Quincy Pump Facilities	25,907	-	-	-	25,907	-	-	-	-	-	-	-
104 Braintree-Weymouth Relief Facilities	240,104	1,832	10,568	-	241,415	1,797	11,913	-	1,311	(35)	1,345	-
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	12,127	4,478	6,709	-	14,668	3,520	10,208	-	2,541	(958)	3,499	-
131 Upper Neponset Valley Sewer	54,174	-	-	-	54,174	-	-	-	-	-	-	-
132 Corrosion & Odor Control	84,132	42,407	34,705	840	97,949	62,051	28,878	840	13,817	19,644	(5,827)	-
136 West Roxbury Tunnel	11,314	-	1,000	-	11,314	-	1,000	-	-	-	-	-
137 Wastewater Central Monitoring	27,482	1,926	5,774	-	27,482	1,226	6,474	-	-	(700)	700	-
139 South System Relief Project	4,939	-	1,500	-	4,939	-	1,500	-	-	-	-	-
141 Wastewater Process Optimization	10,327	702	6,546	1,577	8,933	701	5,154	1,577	(1,394)	(1)	(1,392)	-
142 Wastewater Meter System-Equipment	22,628	7,662	-	9,242	21,938	7,391	-	8,823	(690)	(271)	-	(419)
143 Regional I/I Management Planning	169	-	-	-	169	-	-	-	-	-	-	-
145 Facility Asset Protection	542,832	135,633	265,309	46,839	572,379	144,301	285,823	47,204	29,547	8,668	20,514	365
146 D.I. Cross Harbor Tunnel Inspection	5,000	-	5,000	-	5,000	-	5,000	-	-	-	-	-
147 Randolph Trunk Sewer Relief	698	698	-	-	698	262	436	-	-	(436)	436	-
Treatment	**1,054,394**	**279,023**	**424,954**	**49,259**	**1,121,329**	**201,050**	**550,032**	**69,089**	**66,935**	**(77,973)**	**125,078**	**19,830**
182 DI Primary and Secondary	(958)	-	-	-	(958)	-	-	-	-	-	-	-
200 DI Plant Optimization	33,279	-	-	-	33,279	-	-	-	-	-	-	-
206 DI Treatment Plant Asset Protection	993,149	273,449	418,081	49,260	1,055,309	192,954	540,906	69,090	62,160	(80,495)	122,825	19,830
210 Clinton Wastewater Treat Plant	26,712	5,574	6,873	-	31,487	8,096	9,126	-	4,775	2,522	2,253	-
211 Laboratory Services	2,212	-	-	-	2,212	-	-	-	-	-	-	-
Residuals	**167,793**	**15,212**	**31,338**	**56,197**	**169,281**	**16,760**	**30,935**	**56,540**	**1,488**	**1,548**	**(403)**	**343**
261 Residuals	63,811	-	-	-	63,811	-	-	-	-	-	-	-
271 Residuals Asset Protection	103,982	15,212	31,338	56,197	105,470	16,760	30,935	56,540	1,488	1,548	(403)	343

APPENDIX 4
Overview of the FY21 Final CIP and Changes from the Final FY20 CIP

Program and Project	FY20 Final				FY21 Final				Change from Final FY20			
	Total Budget Amount	FY19-23	FY24-28	Beyond 28	Total Budget Amount	FY19-23	FY24-28	Beyond 28	Total Budget Amount	FY19-23	FY24-28	Beyond 28
CSO	**911,052**	**8,655**	**(1)**	**-**	**912,524**	**10,041**	**85**	**-**	**1,472**	**1,386**	**86**	**-**
340 Dorchester Bay Sewer Separation (Fox Point)	55,029	-	-	-	55,029	-	-	-	-	-	-	-
341 Dorchester Bay Sewer Separation (Commercial Point)	63,625	3,763	-	-	63,625	3,763	-	-	-	-	-	-
342 Neponset River Sewer Separation	2,492	-	-	-	2,492	-	-	-	-	-	-	-
343 Constitution Beach Sewer Separation	3,731	-	-	-	3,731	-	-	-	-	-	-	-
344 Stony Brook Sewer Separation	44,319	-	-	-	44,319	-	-	-	-	-	-	-
346 Cambridge Sewer Separation	104,552	-	-	-	104,552	-	-	-	-	-	-	-
351 BWSC Floatables Controls	946	-	-	-	946	-	-	-	-	-	-	-
352 Cambridge Floatables Control	1,127	-	-	-	1,127	-	-	-	-	-	-	-
356 Fort Point Channel Sewer Separation	11,507	-	-	-	11,507	-	-	-	-	-	-	-
358 Morrissey Boulevard Drain	32,181	-	-	-	32,181	-	-	-	-	-	-	-
359 Reserved Channel Sewer Separation	70,524	-	-	-	70,524	-	-	-	-	-	-	-
360 Brookline Sewer Separation	24,715	-	-	-	24,715	-	-	-	-	-	-	-
361 Bulfinch Triangle Sewer Separation	9,032	-	-	-	9,032	-	-	-	-	-	-	-
339 North Dorchester Bay	221,510	-	-	-	221,510	-	-	-	-	-	-	-
347 East Boston Branch Sewer Relief	85,637	-	-	-	85,637	-	-	-	-	-	-	-
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	-	-	-	4,424	-	-	-	-	-	-	-
357 Charles River CSO Controls	3,633	-	-	-	3,633	-	-	-	-	-	-	-
324 CSO Support	53,738	4,893	-	-	55,210	6,279	86	-	1,472	1,386	86	-
Other Wastewater	**392,866**	**142,251**	**112,938**	**(52,640)**	**392,866**	**152,017**	**107,295**	**(56,763)**	**-**	**9,766**	**(5,643)**	**(4,123)**
128 I/I Local Financial Assistance	392,585	142,251	112,938	(52,640)	392,585	152,017	107,295	(56,763)	-	9,766	(5,643)	(4,123)
138 Sewerage System Mapping Upgrade	281	-	-	-	281	-	-	-	-	-	-	-
Total Waterworks	**4,299,729**	**398,370**	**688,857**	**1,101,095**	**4,529,816**	**404,762**	**791,760**	**1,221,888**	**230,087**	**6,392**	**102,903**	**120,793**
Drinking Water Quality	**704,202**	**12,834**	**13,125**	**28,271**	**708,071**	**16,377**	**13,450**	**28,271**	**3,869**	**3,543**	**325**	**-**
542 Carroll Water Treatment Plant	436,138	3,772	9,250	-	438,652	6,285	9,250	-	2,514	2,513	-	-
543 Quabbin Water Treatment Plant	19,973	-	-	-	19,973	-	-	-	-	-	-	-
544 Norumbega Covered Storage	106,674	-	-	-	106,674	-	-	-	-	-	-	-
545 Blue Hills Covered Storage	40,083	-	-	-	40,083	-	-	-	-	-	-	-
550 Spot Pond Storage Facility	60,126	-	-	-	60,126	-	-	-	-	-	-	-
555 CWTP Asset Protection	41,208	9,062	3,875	28,271	42,563	10,092	4,200	28,271	1,355	1,030	325	-

APPENDIX 4
Overview of the FY21 Final CIP and Changes from the Final FY20 CIP

Program and Project	FY20 Final				FY21 Final				Change from Final FY20			
	Total Budget Amount	FY19-23	FY24-28	Beyond 28	Total Budget Amount	FY19-23	FY24-28	Beyond 28	Total Budget Amount	FY19-23	FY24-28	Beyond 28
Transmission	**2,522,587**	**150,245**	**337,716**	**1,209,433**	**2,620,959**	**130,394**	**365,315**	**1,300,055**	**98,372**	**(19,851)**	**27,599**	**90,622**
597 Winsor Station Pipeline	49,559	204	42,969	653	53,203	1,304	45,513	653	3,644	1,100	2,544	-
601 Sluice Gate Rehabilitation	9,158	-	-	-	9,158	-	-	-	-	-	-	-
604 MetroWest Tunnel	700,184	-	3,002	-	700,184	-	3,002	-	-	-	-	-
615 Chicopee Valley Aqueduct Redundancy	8,666	-	-	-	8,666	-	-	-	-	-	-	-
616 Quabbin Transmission System	19,032	8,168	2,172	25	22,246	11,099	2,455	25	3,214	2,931	283	-
617 Sudbury/Weston Aqueduct Repairs	11,507	1,464	7,144	667	12,496	2,341	7,257	667	989	877	113	-
620 Wachusett Reservior Spillway Improvement	9,287	-	-	-	9,287	-	-	-	-	-	-	-
621 Watershed Land	29,000	5,600	554	-	29,000	6,154	-	-	-	554	(554)	-
622 Cosgrove/Wachusett Redundancy	59,146	7,128	-	-	58,592	6,574	-	-	(554)	(554)	-	-
623 Dam Projects	6,048	2,890	43	-	7,023	3,861	46	-	975	971	3	-
625 Metro Tunnel Redundancy	1,421,750	24,313	185,993	1,207,988	1,506,963	23,945	197,424	1,282,137	85,213	(368)	11,431	74,149
628 Metro Redundancy Interim Improvement	177,348	92,636	81,777	98	180,056	65,860	94,787	16,571	2,708	(26,776)	13,010	16,473
630 Watershed Division Capital Improvement	21,900	7,840	14,060	-	24,083	9,254	14,829	-	2,183	1,414	769	-
Distribution & Pumping	**981,767**	**161,266**	**297,468**	**58,675**	**1,039,778**	**163,412**	**349,731**	**62,281**	**58,011**	**2,146**	**52,263**	**3,606**
618 Peabody Pipeline	1,509	450	-	-	1,448	389	-	-	(61)	(61)	-	-
677 Valve Replacement	21,655	-	6,487	3,151	22,279	-	6,747	3,515	624	-	260	364
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	1,326	27	1,175	-	1,668	28	1,517	-	342	1	342	-
693 NHS - Revere & Malden Pipeline Improvement	82,804	10,344	42,000	1,898	86,011	19,062	36,349	2,039	3,207	8,718	(5,651)	141
702 New Connect Mains-Shaft 7 to WASM 3	56,376	25,839	17,612	-	57,572	26,320	18,327	-	1,196	481	715	-
704 Rehabilitation of Other Pump Stations	50,258	1,247	18,953	-	51,290	780	20,453	-	1,032	(467)	1,500	-
706 NHS-Connecting Mains from Section 91	2,360	-	-	-	2,360	-	-	-	-	-	-	-
708 Northern Extra High Service New Pipelines	10,874	447	6,795	-	40,180	2,525	33,850	173	29,306	2,078	27,055	173
712 Cathodic Protection Of Distrubution Mains	66,704	9,740	56,695	-	63,483	12,066	51,148	-	(3,221)	2,326	(5,547)	-
713 Spot Pond Supply Mains Rehabilitation	66,289	800	-	-	66,289	800	-	-	-	-	-	-
714 Southern Extra High Sections 41 & 42	3,657	-	-	-	3,657	-	-	-	-	-	-	-
719 Chestnut Hill Connecting Mains	33,827	-	15,534	6	38,945	-	20,648	11	5,118	-	5,114	5
720 Warren Cottage Line Rehabilitation	1,205	-	-	-	1,205	-	-	-	-	-	-	-
721 South Spine Distribution Mains	80,308	3,271	40,245	109	90,585	3,241	50,423	238	10,277	(30)	10,178	129
722 NIH Redundancy & Storage	121,188	41,066	31,215	11	128,729	45,574	34,250	10	7,541	4,508	3,035	(1)
723 Northern Low Service Rehabilitation Section 8	69,584	29,898	35,936	796	60,945	13,194	44,664	133	(8,639)	(16,704)	8,728	(663)
724 Northern High Service - Pipeline Rehabilitation	-	-	-	-	-	-	-	-	-	-	-	-
725 Hydraulic Model Update	598	-	-	-	598	-	-	-	-	-	-	-
727 Southern Extra High Redundancy & Storage	132,426	37,378	13,899	52,704	141,243	38,522	18,114	56,162	8,817	1,144	4,215	3,458
730 Weston Aqueduct Supply Mains	80,457	54	-	-	80,457	54	-	-	-	-	-	-
731 Lynnfield Pipeline	5,626	-	-	-	5,626	-	-	-	-	-	-	-
732 Walnut St. & Fisher Hill Pipeline Rehabilitation	2,717	-	-	-	2,717	-	-	-	-	-	-	-

APPENDIX 4
Overview of the FY21 Final CIP and Changes from the Final FY20 CIP

Program and Project	FY20 Final				FY21 Final				Change from Final FY20			
	Total Budget Amount	FY19-23	FY24-28	Beyond 28	Total Budget Amount	FY19-23	FY24-28	Beyond 28	Total Budget Amount	FY19-23	FY24-28	Beyond 28
733 NHS Pipeline Rehabilitation 13-18 & 48	-	-	-	-	-	-	-	-	-	-	-	-
734 Southern Extra High Pipelines-Sections 30, 39,40, & 44	-	-	-	-	-	-	-	-	-	-	-	-
735 Section 80 Rehabilitation	13,552	706	10,921	-	16,024	858	13,240	-	2,472	152	2,319	-
Other	**91,173**	**74,025**	**40,548**	**(195,286)**	**161,008**	**94,579**	**63,264**	**(168,721)**	**69,835**	**20,554**	**22,716**	**26,565**
753 Central Monitoring System	39,002	10,203	5,576	2,518	42,082	16,960	4,418	-	3,080	6,757	(1,158)	(2,518)
763 Distribution Systems Facilities Mapping	2,799	1,549	214	-	2,799	1,183	580	-	-	(366)	366	-
764 Local Water Infrastructure Rehabilitation Assistance Program	7,488	-	-	-	7,488	-	-	-	-	-	-	-
765 Local Water Pipeline Improvement Loan Program	-	37,498	20,033	(197,804)	-	54,163	4,819	(199,255)	-	16,665	(15,214)	(1,451)
766 Waterworks Facility Asset Protection	41,884	24,776	14,725	-	108,639	22,274	53,447	30,534	66,755	(2,502)	38,722	30,534
Business & Operations Support	**164,989**	**47,937**	**16,023**	**-**	**173,000**	**49,356**	**22,613**	**-**	**8,011**	**1,419**	**6,590**	**-**
881 Equipment Purchase	39,090	10,453	6,780	-	42,711	9,914	10,940	-	3,621	(539)	4,160	-
925 Technical Assistance	1,125	1,125	-	-	1,125	1,125	-	-	-	-	-	-
930 MWRA Facility - Chelsea	9,812	-	-	-	9,812	-	-	-	-	-	-	-
931 Business Systems Plan	24,562	(1)	-	-	24,562	(1)	-	-	-	-	-	-
932 Environmental Remediation	1,479	-	-	-	1,479	-	-	-	-	-	-	-
933 Capital Maintenance Planning	27,587	13,386	-	-	26,385	12,184	-	-	(1,202)	(1,202)	-	-
934 MWRA Facilities Management	2,971	2,600	-	-	3,071	1,075	1,625	-	100	(1,525)	1,625	-
935 Alternative Energy Initiatives	23,364	(234)	5,181	-	23,700	(234)	5,516	-	336	-	335	-
940 Applicat Improv Program	13,093	6,290	3,911	-	18,249	10,971	4,385	-	5,156	4,681	474	-
942 Info Security Program ISP	5,506	3,798	-	-	5,506	3,798	-	-	-	-	-	-
944 Info Tech Mgmt Program	200	200	-	-	200	200	-	-	-	-	-	-
946 IT Infrastructure Program	16,202	10,321	150	-	16,202	10,325	146	-	-	4	(4)	-

APPENDIX 5

Master Plan/CIP Status

Appendix 5
Master Plan/CIP Status

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
FY21 Budget Cycle									
S.206 DITP Asset Protection									
DITP Roofing Replacement	**3**	**FY21**	**3**	Jan-21	Jun-22	2,000,000	2,000,000	0	
210 Clinton Wastewater Treat Plant									
Clinton SCADA Upgrades	**3**	**FY21**	**3**	Jan-24	Jan-26	750,000	0	750,000	
Clinton Fire Alarm Replacement	**3**	**FY21**	**3**	Jan-21	Jul-22	900,000	900,000	0	
S.542 Carroll Water Treatment Plant									
Corrosion Control Pipe Loop Study	**3**	**FY21**	**3**	Mar-21	Mar-22	500,000	500,000	0	
Technical Assistance 11	**3**	**FY21**	**3**	Jan-21	Dec-22	750,000	750,000	0	
Technical Assistance 12	**3**	**FY21**	**3**	Jan-21	Dec-22	750,000	750,000	0	
FY21 Master Plan Totals - 5 projects						**$5,650,000**	**$4,900,000**	**$750,000**	
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 - 4 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

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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

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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

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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

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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 6
MUNICIPALITY/PROJECT(s)

Municipality Project Number/Project	
All MWRA COMMUNITIES	
211	Laboratory Services
881	Equipment Purchase
925	Technical Assistance
931	Business Systems Plan
932	Environmental Remediation
933	Capital Maintenance Planning/Development
934	MWRA Facilities Management
935	Alternatve Energy Initiatives
940	Application Improvement Program
942	Information Security Program ISP
944	Information Technology Management Program
946	IT Infrastructure Program
ALL WASTEWATER COMMUNITIES	
128	Infiltration/Inflow Local Financial Assistance Program
130	Siphon Structure Rehabiliation
132	Corrosion & Odor Control Study
137	Wastewater Central Monitoring
141	Wastewater Process Optimization
142	Wastewater Metering System Equipment Replacement
145	Interception & Pumping Facilities Asset Protection
146	D.I. Cross Harbor Tunnel
147	Randolph Trunk Sewer Relief
206	Deer Island Treatment Plant Asset Protection
271	Residuals Asset Protection
ALL WATER COMMUNITIES	
597	Winsor Dam Hydroelectric
621	Watershed Land
623	Dam Projects
630	Watershed Division Capital Improvements
677	Valve Replacement
712	Cathodic Protection of Distribution Mains
753	Central Monitoring System
763	Distribution Systems Facilities Mapping
765	Local Water Pipeline Improvement Loan Program
766	Watertown Facility Asset Protection
ALL WATER COMMUNITIES (except South Hadley, Chicopee, Wibraham, Worcester, Clinton, and Leominster)	
542	Carroll Water Treatment Plant
544	Norumbega Covered Storage
555	Carroll Water Treatment Asset Protection
604	MetroWest Tunnel
622	Cosgrove Tunnel Redundancy
625	Metro Tunnel Redundancy
628	Metro Redundancy Interim Improvements
Arlington	
702	New Connecting Mains - Shaft 7 to WASM 3
704	Rehabilitation of Other Pump Stations
708	Northern Extra High Service - New Pipelines
713	Spot Pond Supply Mains Rehabilitation
730	Weston Aqueduct Supply Mains

Municipality Project Number/Project	
Ashland	
136	West Roxbury Tunnel
Bedford	
702	New Connecting Mains - Shaft 7 to WASM 3
704	Rehabilitation of Other Pump Stations
708	Northern Extra High Service - New Pipelines
Belmont	
702	New Connecting Mains - Shaft 7 to WASM 3
704	Rehabilitation of Other Pump Stations
730	Weston Aqueduct Supply Mains
Boston	
131	Upper Neponset Valley Sewer System
136	West Roxbury Tunnel
139	South System Relief Project
324	CSO Support
339	North Dorchester Bay & Reserve Channel Conduits/CSO
340	South Dorchester Bay Sewer Separation (Fox Point)
341	South Dorchester Bay Sewer Separation (Commercial Pt.)
347	East Boston Branch Sewer Relief
355	MWR003 Gate and Siphon
356	Fort Point Channel Sewer Separation
357	Charles River CSO Controlls
358	Morrisey Boulevard Drain
359	Reserved Channel Sewer Separation
361	Bulfinch Triangle Sewer Separation
545	Blue Hills Covered Storage
550	Spot Pond Covered Storage
693	Northern High Service Pipe Improvements - Revere/Malden
702	New Connecting Mains - Shaft 7 to WASM 3
704	Rehabilitation of Other Pump Stations
713	Spot Pond Supply Mains Rehabilitation
719	Chestnut Hill Connecting Mains
721	Southern Spine Distribution Mains
723	Northern Low Service Rehab. - Sections 8 & 57
727	SEH Redundancy & Storage
730	Weston Aqueduct Supply Mains
Braintree	
104	Braintree-Weymouth Relief Facilities
147	Randolph Trunk Sewer Relief

APPENDIX 6
MUNICIPALITY/PROJECT(s)

Municipality	Project Number/Project
Brookline	
	131 Upper Neponset Valley Sewer System
	136 West Roxbury Tunnel
	357 Charles River CSO Controls
	360 Brookline Sewer Separation
	704 Rehabilitation of Other Pump Stations
	719 Chestnut Hill Connecting Mains
	721 Southern Spine Distribution Mains
	727 SEH Redundancy & Storage
Burlington	
	127 Cummingsville Replacement Sewer
Cambridge	
	324 CSO Support
	346 Cambridge CAM002-004 Sewer Separation
	355 MWR003 Gate and Siphon
	357 Charles River CSO Controls
	550 Spot Pond Covered Storage
	713 Spot Pond Supply Mains Rehabilitation
	730 Weston Aqueduct Supply Mains
Canton	
	545 Blue Hills Covered Storage
	704 Rehabilitation of Other Pump Stations
	714 Southern Extra High - Sections 41, 42, and 74
	721 Southern Spine Distribution Mains
	727 SEH Redundancy & Storage
Chelsea	
	324 CSO Support
	347 East Boston Branch Sewer Relief
	550 Spot Pond Covered Storage
	713 Spot Pond Supply Mains Rehabilitation
	723 Northern Low Service Rehab. - Sections 8 & 57
Lynn	
	692 Northern High Service Section 27 Improvements
	693 Northern High Service Pipe Improvements - Revere/Malden
Lynnfield	
	731 Lynnfield Pipeline
	693 Northern High Service Pipe Improvements - Revere/Malden
Malden	
	550 Spot Pond Covered Storage
	693 Northern High Service Pipe Improvements - Revere/Malden
	713 Spot Pond Supply Mains Rehabilitation

Municipality	Project Number/Project
Chicopee	
	543 Quabbin Water Treatment Plant
	615 Chicopee Valley Aqueduct Redundancy
	616 Quabbin Transmission System
	753 Central Monitoring System
Clinton	
	210 Clinton Wastewater Treatment Plant
Dedham	
	131 Upper Neponset Valley Sewer System
	136 West Roxbury Tunnel
	727 SEH Redundancy & Storage
Dover	
	136 West Roxbury Tunnel
Everett	
	347 East Boston Branch Sewer Relief
	550 Spot Pond Covered Storage
	713 Spot Pond Supply Mains Rehabilitation
	723 Northern Low Service Rehab. - Sections 8 & 57
Framingham	
	136 West Roxbury Tunnel
	617 Sudbury/Weston Aqueduct
Hingham	
	104 Braintree-Weymouth Relief Facilities
Holbrook	
	104 Braintree-Weymouth Relief Facilities
	617 Sudbury/Weston Aqueduct
Lexington	
	702 New Connecting Mains - Shaft 7 to WASM 3
	704 Rehabilitation of Other Pump Stations
Nahant	
	692 Northern High Service Section 27
	693 Northern High Service Pipe Improvements - Revere/Malden
Natick	
	136 West Roxbury Tunnel
	617 Sudbury/Weston Aqueduct Repairs
Needham	
	136 West Roxbury Tunnel
	735 Section 80 Rehabilitation

APPENDIX 6
MUNICIPALITY/PROJECT(s)

Municipality	Project Number/Project
Marblehead	
	692 Northern High Service Section 27
	693 Northern High Service Pipe Improvements - Revere/Malden
Medford	
	547 Fells Covered Storage
	550 Spot Pond Covered Storage
	702 New Connecting Mains - Shaft 7 to WASM 3
	713 Spot Pond Supply Mains Rehabilitation
	693 Northern High Service Pipe Improvements - Revere/Malden
Melrose	
	693 Northern High Service Pipe Improvements - Revere/Malden
Milton	
	545 Blue Hills Covered Storage
	704 Rehabilitation of Other Pump Stations
	721 Southern Spine Distribution Mains
	727 SEH Redundancy & Storage
Quincy	
	104 Braintree-Weymouth Relief Facilities
	545 Blue Hills Covered Storage
	721 Southern Spine Distribution Mains
	147 Randolph Trunk Sewer Relief
Reading	
	722 NIH Redundancy & Covered Storage
	693 Northern High Service Pipe Improvements - Revere/Malden
Revere	
	349 Chelsea Trunk Sewer
	693 Northern High Service Pipe Improvements - Revere/Malden
Saugus	
	693 Northern High Service Pipe Improvements - Revere/Malden
	731 Lynnfield Pipeline

Municipality	Project Number/Project
Newton	
	136 West Roxbury Tunnel
	702 New Connecting Mains - Shaft 7 to WASM 3
	719 Chestnut Hill Connecting Mains
	730 Weston Aqueduct Supply Mains
Norwood	
	545 Blue Hills Covered Storage
	704 Rehabilitation of Other Pump Stations
	714 Southern Extra High - Sections 41 and 42
	721 Southern Spine Distribution Mains
	727 SEH Redundancy & Storage
Peabody	
	618 Peabody Pipeline Project
	693 Northern High Service Pipe Improvements - Revere/Malden
	722 NIH Redundancy & Storage
Wilbraham	
	543 Quabbin Water Treatment Plant
	616 Quabbin Transmission System
	753 Central Monitoring System
Wakefield	
	722 NIH Redundancy & Covered Storage
	693 Northern High Service Pipe Improvements - Revere/Malden
Waltham	
	702 New Connecting Mains - Shaft 7 to WASM 3
	704 Rehabilitation of Other Pump Stations
	708 Northern Extra High Service - New Pipelines
	730 Weston Aqueduct Supply Mains
Watertown	
	702 New Connecting Mains - Shaft 7 to WASM 3
	704 Rehabilitation of Other Pump Stations
Wellesley	
	136 West Roxbury Tunnel
	617 Sudbury/Weston Aqueduct Repairs
	735 Section 80 Rehabilitation

APPENDIX 6
MUNICIPALITY/PROJECT(s)

Municipality	Project Number/Project
Somerville	
	550 Spot Pond Covered Storage
	702 New Connecting Mains - Shaft 7 to WASM 3
	713 Spot Pond Supply Mains Rehabilitation
	730 Weston Aqueduct Supply Mains
South Hadley	
	543 Quabbin Water Treatment Plant
	616 Quabbin Transmission System
	753 Central Monitoring System
Stoneham	
	722 NIH Redundancy & Covered Storage
	693 Northern High Service Pipe Improvements - Revere/Malden
Stoughton	
	714 Southern Extra High - Sections 41, 42, and 74
	721 Southern Spine Distribution Mains
	727 SEH Redundancy & Storage
Sudbury	
	617 Sudbury/Weston Aqueduct Repairs
Swampscott	
	692 Northern High Service Section 27
	693 Northern High Service Pipe Improvements - Revere/Malden
West Roxbury	
	131 Upper Neponset Valley Relief Sewer
	727 SEH Redundancy & Storage
Weston	
	617 Sudbury/Weston Aqueduct Repairs
	730 Weston Aqueduct Supply Mains
Westwood	
	721 Southern Spine Distribution Mains
	727 SEH Redundancy & Storage
	104 Braintree-Weymouth Relief Facilities
Winchester	
	702 New Connecting Mains - Shaft 7 to WASM 3
	704 Rehabilitation of Other Pump Stations
	722 NIH Redundancy & Covered Storage
Winthrop	
	693 Northern High Service Pipe Improvements - Revere/Malden
Woburn	
	722 NIH Redundancy & Storage

APPENDIX 7

MWRA Completed Projects

Appendix 7

MWRA Completed Projects
(as of June 30. 2020)

Project	Total Cost ($000)	Completion Date	Summary
Wastewater	$5,274,337		
Waterworks	$1,848,336		
Business and Operations Support	$67,174		
MWRA Total	$7,189,847		

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	$228,390	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.

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.

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.
Sub-Total Wastewater System Improvements	**$5,274,337**		

Appendix 7

Waterworks System Improvements			
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	$424,124	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.

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.
622 Cosgrove/Wachusett Redundancy	***$58,619***	***Feb-19***	***Design and construction of an emergency pump station to pump water from the Wachusett Aqueduct to the Carroll Water Treatment Plant.***
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.

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.

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.
Sub-Total Water System Improvements	**$1,848,336**		

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