FISCAL YEAR 2020

Proposed Capital Improvement Program

MASSACHUSETTS WATER RESOURCES AUTHORITY

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February 2019

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

Dear Chairman Taverna:

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

The FY20 Proposed Capital Improvement Program projects $249.8 million in spending for FY20, of which $169.7 million supports Wastewater System Improvements, $65.4 million supports Waterworks System Improvements, and $14.7 million is for Business and Operations Support. The projects with significant spending include Deer Island Clarifier Rehabilitation Phase 2, Deer Island HVAC Equipment Replacement projects, Chelsea Creek Headworks Upgrades, Prison Point CSO Facility Rehabilitation, Nut Island Odor Control and HVAC Improvements, and Southern Extra High Redundancy.

Asset Protection accounts for the largest share of capital expenditures for the FY19-23 period. The FY20 Proposed CIP includes $773.4 million for asset protection initiatives, representing over 71% of total MWRA spending in this timeframe. Water System Redundancy projects totals $213.2 million in the same FY19-23 period, accounting for nearly 20% of total spending.

The FY20 Proposed 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)788-2268.

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

FY19 Operating Budget ($ in millions)

Direct Expenses	$239.6
Indirect Expenses	$46.0
Capital Finance	$482.4
Total Operating Budget	$767.9
Revenues*	$767.9

**96.2% of Revenues raised from rate assessments*

Bond Ratings - General Revenue Bonds (senior/subordinate)

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

Capital Improvement Program

- Total CIP spending: $8.4 billion since 1984
- Total Current Indebtedness $4.9 billion
- FY19 CIP Budget: $179.2 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
- 12 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*

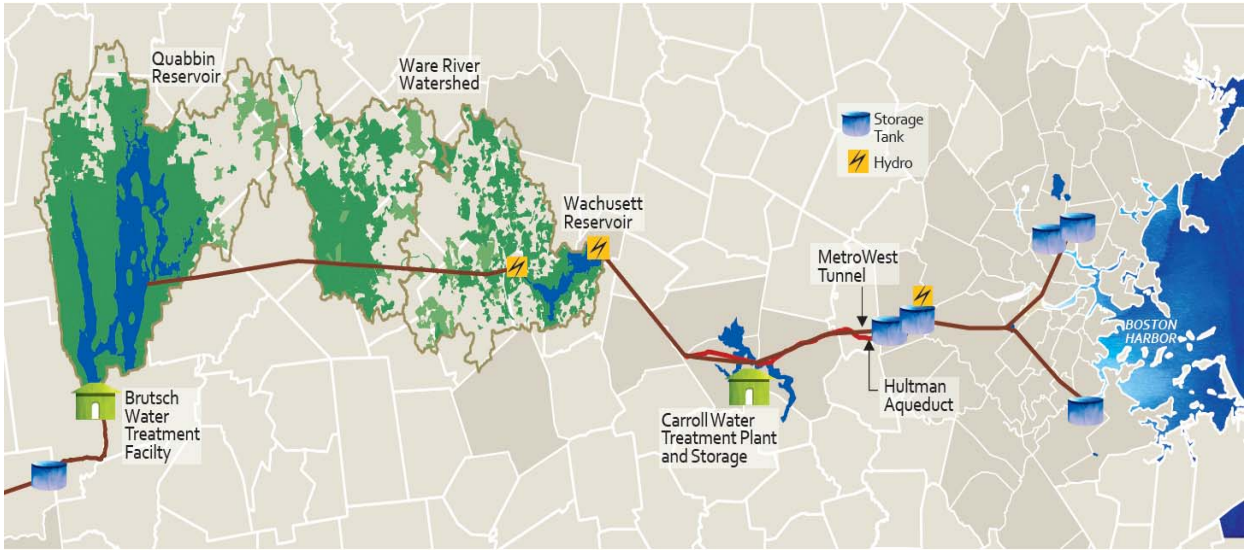
Wastewater System

- 240 miles of sewer pipelines and cross-harbor tunnels
- 11 pump stations
- 1 screening facility
- 4 CSO treatment/storage facilities
- 2 wastewater treatment plants
  - Deer Island Treatment Plant
  - Clinton Advanced Wastewater Treatment Plant
- 5 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

27% of MWRA's energy requirement was self-generated from renewable sources (biomass, hydro, wind, & solar assets) in FY18.

MWRA AT A GLANCE



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

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

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

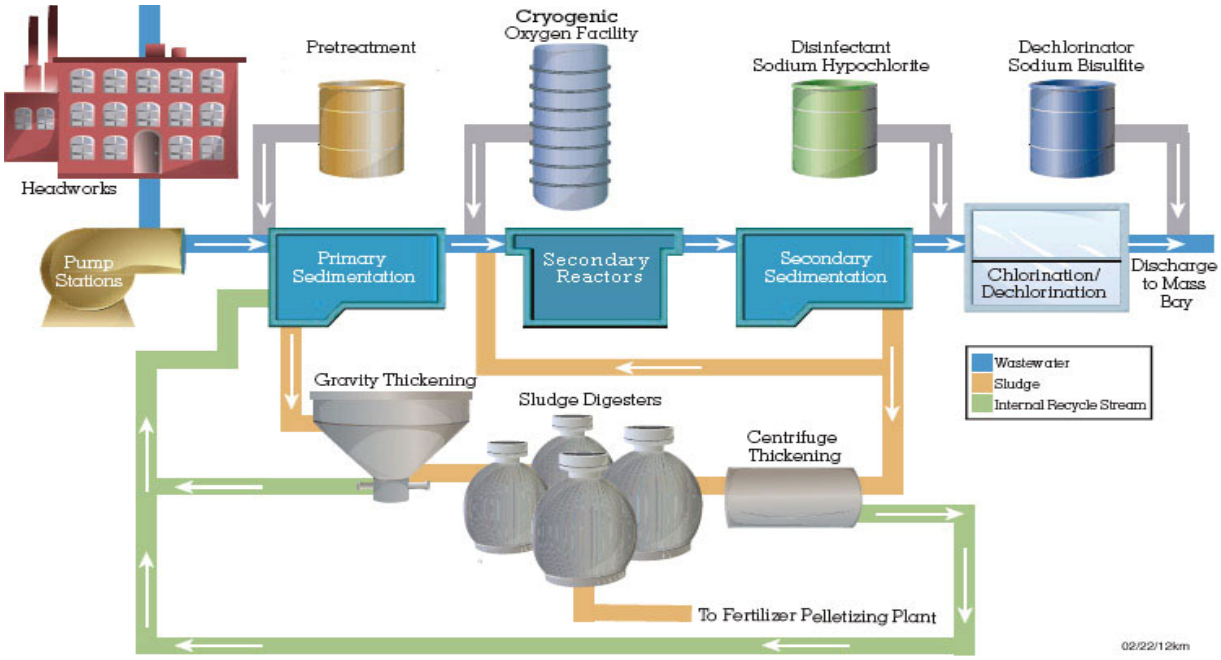
Water for most MWRA communities is treated at the Carroll Water Treatment Plant in Marlborough, Massachusetts. Water from the Quabbin and Wachusett Reservoirs enters the plant through the Cosgrove or Wachusett Aqueduct. The treated water leaves the plant through the MetroWest Water Supply Tunnel and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

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

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

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

MWRA AT A GLANCE – Wastewater System



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

The following describes the Deer Island treatment process:

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

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

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

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

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

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

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MWRA Capital Improvement Program Overview

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

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

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

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

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

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

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

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

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

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

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

Capital initiatives to date have been primarily funded through long-term borrowings, and the debt service on these outstanding bonds represents a significant and growing portion of the Authority's operating budget. As of December 31, 2019, MWRA's total debt was $4.9 billion. The Authority's capital finance (debt service) obligation as a percent of total expenses has increased from 36% in 1990 to 62.8% in the Final FY19 Current Expense Budget.

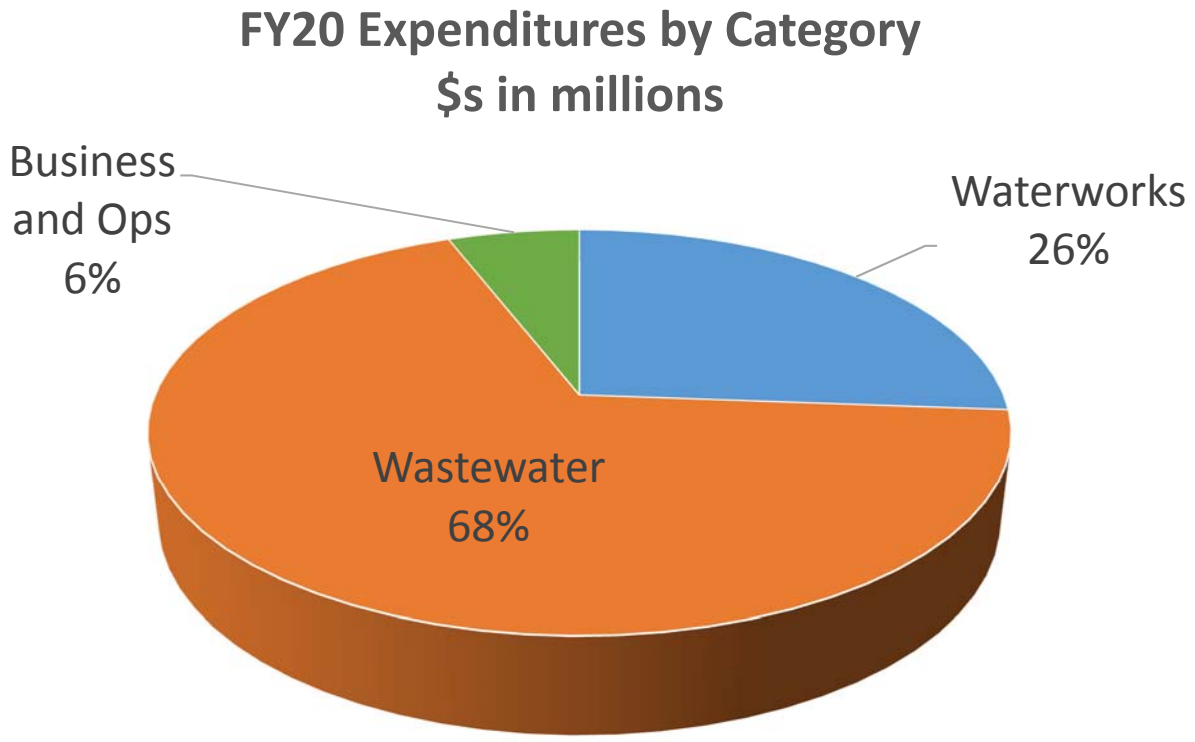
The MWRA's credit ratings of Aa1 from Moody's, AA+ from S&P, and AA+ from Fitch, reflect strong management of financial performance, application of operating surpluses to early debt defeasance, satisfactory debt service coverage ratios, well maintained facilities, comprehensive long-term planning of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

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

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

FY20 Spending

The FY20 Proposed Capital Improvement Program projects $249.8 million spending for FY20, of which $169.7 million supports Wastewater System Improvements, $65.4 million supports Waterworks System Improvements, and $14.7 million is for Business and Operations Support.

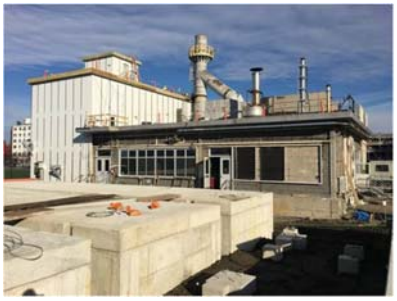


The FY20 Proposed CIP includes $35.4 million for community assistance programs, which are a combination of loan and partial grant programs, with net expenditures of $25.7 million for the local Infiltration/Inflow program and net expenditures of $9.7 million for the local water pipeline program.

Project contracts with spending greater than approximately $6 million in FY20, excluding local community assistance programs, total $104.7 million and account for nearly 42% of the total annual spending.

Project	Contract	Projected FY20 Expenditures $s in millions
DI Treatment Plant Asset Protection	Clarifier Rehab Phase 2 - Construction	$23.1
Facility Asset Protection	Chelsea Creek Upgrades - Construction	$19.3
Facility Asset Protection	Prison Point Rehabilitation Construction	$18.6
Local Water System Assistance Program	Phase 2 Loan Distributions	$16.0
Local Water System Assistance Program	Phase 3 Loan Distributions	$12.0
Corrosion & Odor Control	Nut Island Odor Control HVAC Improvement Construction Ph 2	$10.0
DI Treatment Plant Asset Protection	HVAC Equipment Replacement Construction	$8.0
SEH Redundancy & Storage	Redundancy Pipeline Sect 111 - Construction 3	$7.0
I/I Local Financial Assistance	Phase IX Grants	$7.5
I/I Local Financial Assistance	Phase X Grants	$7.5
Residuals Asset Protection	Residuals Electrical/Mechanical/Drum Dryer Replacement	$6.4
DI Treatment Plant Asset Protection	Gravity Thickener Rehabilitation	$6.3
New Connecting Mains -Shaft 7 to WASM 3	CP3 Sections 23, 24, 47 Rehabilitation	$6.0
	Total Contracts > $6.0 million	**$147.7**
	% of FY20 Spending	**59.1%**
	Excluding Community Loan Programs	**$104.7**
	% of FY20 Spending	**41.9%**
	Total Projected FY20 Spending	**$249.8**

Contracts with the highest spending for FY20 are described below:



Chelsea Creek Headworks Upgrade Construction - $19.3 million ($81.8 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 - $18.6 million ($36.3 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.

Nut Island Odor Control and HVAC Improvements - Construction Phase 2 - $10.0 million ($39.9 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

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Southern Extra High Redundancy Section 111 Phase 3 Construction - $7.0 million ($19.1 million total construction cost). This is a redundancy project for MWRA's Southern Extra High service area. This project will provide redundancy to Sections 77 and 88 serving Boston, Norwood, Stoughton, and Dedham-Westwood through construction of a redundant pipeline. Phase 1 was substantially complete in September 2018. Phase 2 and Phase 3 began in October 2017 and June 2018, respectively.

New Connecting Mains - Shaft 7 to WASM 3 – CP3 Sections 23, 24, 47 Rehabilitation - $6.0 million ($14.3 million total construction cost). This project includes cleaning and lining 21,950 linear feet of 20-inch diameter pipe (Sections 24 and 47) and 5,800 linear feet of 36-inch diameter pipe (Section 23).

Deer Island Wastewater Treatment Plant Asset Protection and Residuals:

Clarifier Rehabilitation Phase 2 Construction - $23.1 million ($135.0 million total construction cost). This project will rehabilitate the sludge removal system in the primary tanks and the aeration/recirculation systems in the secondary tanks. The influent gates, effluent launders and aeration systems, and concrete corrosion in primary clarifiers will also be addressed and repaired.

HVAC Equipment Replacement Construction - $8.0 million ($40.2 million total construction cost). Replace two obsolete HVAC control systems, reducing replacement parts and improving automation. Project includes central lab fume hoods and East/West Odor Control Handler replacements.

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

Residuals Electrical/Mechanical/Drum Dryer Replacement - $6.4 million ($8.6 million total construction cost). This project includes mechanical and electrical improvements to the Residuals Facility. Also, includes drum dryer replacements.

Total MWRA Future Spending

Every year, the MWRA updates its anticipated future spending. The FY20 Proposed CIP projects total MWRA future spending of $3.9 billion. This is an increase of $152.8 million over the FY19 Final CIP transmitted to the Board of Directors in June 2018, with most of the additional spending in years beyond FY19.

Incremental Change in FY20 Proposed CIP
($s in millions)

Division	FY19 Final CIP Future Spending (FY19-Beyond FY28)	FY20 Final CIP Future Spending (FY19-Beyond FY29)	$ Change	% Change
Wastewater	$ 1,533.5	$ 1,639.3	$ 105.8	6.9%
Water	$ 2,141.6	$ 2,176.3	$ 34.7	1.6%
Business & Operations Support	$ 50.3	$ 62.6	$ 12.3	24.5%
Total MWRA	$ 3,725.4	$ 3,878.2	$ 152.8	4.1%

Of the $152.8 million added to the CIP, a net of $63.9 million is due to revised construction cost estimates following completion of studies or engineering designs for the projects. Increased cost estimates may be due to updated cost estimates, such as $8.5 million for Hayes Pumping Station Rehabilitation contracts, $7.2 million for Section 101 Waltham Connection Contracts, $5.9 million for Siphon Structure Rehabilitation contracts $5.4 million for Ward Street Headworks Construction, $7.2 million for Section 101 Waltham Connection Construction, $5.1 million for Deer Island Clarifier Rehabilitation Phase 2 Construction, $4.6 million for Prison Point Rehabilitation Construction, and $4.0 million for Cathodic Protection REI contracts. Cost estimates may also decrease. The largest decrease was $15.2 million for Peabody Pipeline Construction as well as $11.2 million for Chestnut Hill Emergency Pumping Station Generator Construction which are not moving forward.

There were $54.5 million in new projects added in the FY19 CIP, which are described in the next section. The remaining increase is primarily due to projected inflation on unawarded contracts and schedule changes.

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

FY20 New Projects

The FY20 CIP adds $54.5 million in new projects of which $48.8 million are for Wastewater projects, $0.8 million are for Waterworks projects, and $5.0 million are for Business and Operations Support.

$s in millions

Project	Total Contract Amount	FY19-23 Spending
Wastewater	$ 48.8	$ 4.4
Waterworks	$ 0.8	$ 0.8
Business & Operations Support	$ 5.0	$ 5.0
Total New Projects	**$ 54.5**	**$ 10.2**

The following table shows new projects added by major programs:

$s in millions

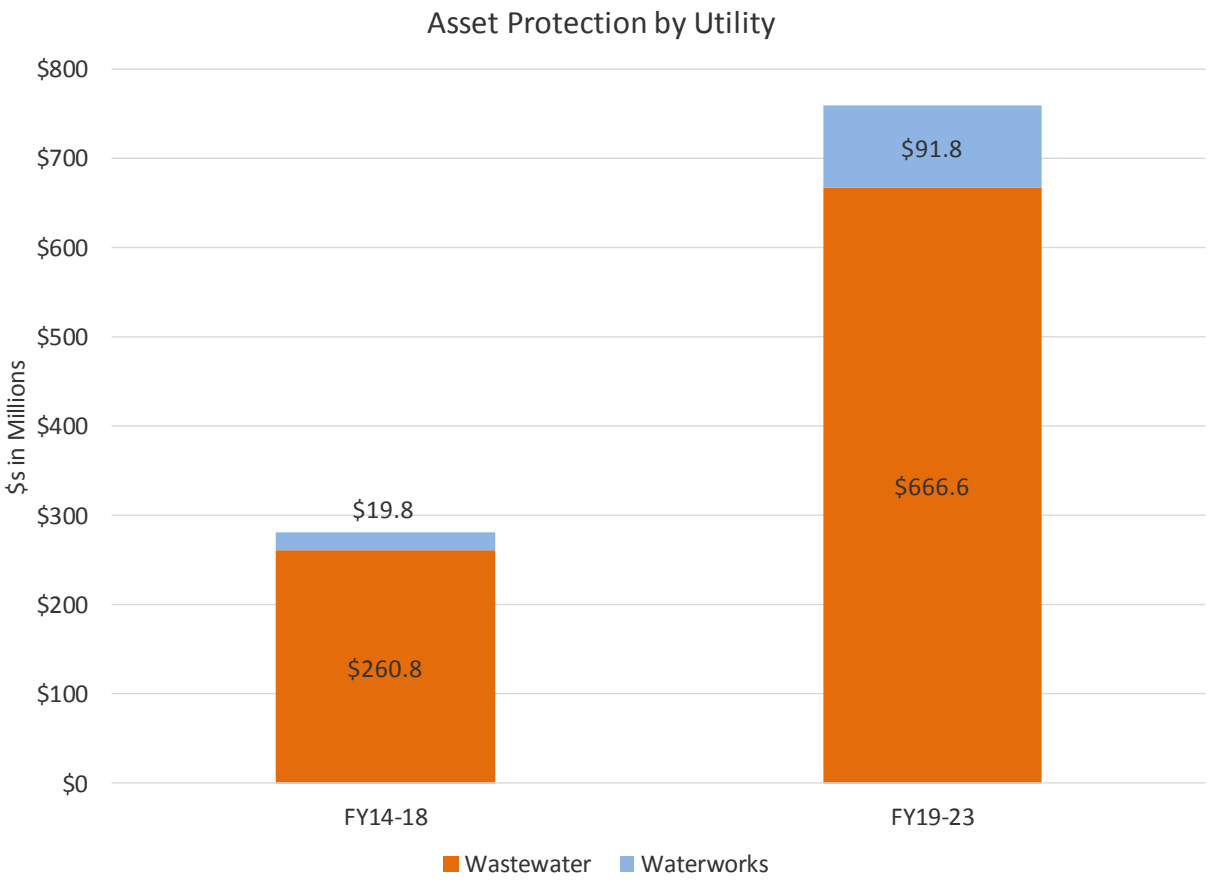
Project	Total Contract Amount	FY19-23
Pump Stations & CSO Facility Rehab Construction	$ 37.5	$ -
Pump Stations & CSO Facility Rehab Design/CA/REI	$ 7.5	$ 0.7
Deer Island As-Needed REI	$ 3.0	$ 3.0
Sections 191 & 192 Charles River Valley Sewer	$ 0.5	$ 0.5
Clinton Equipment & Supplies Storage Building	$ 0.3	$ 0.3
Carroll Water Treatment Plant Emergency Generator No.1 Replacement (Electric Portion)	$ 0.8	$ 0.8
As-Needed Design Contract 18	$ 2.5	$ 2.5
As-Needed Design Contract 19	$ 2.5	$ 2.5
Total New Projects	**$ 54.5**	**$ 10.2**

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

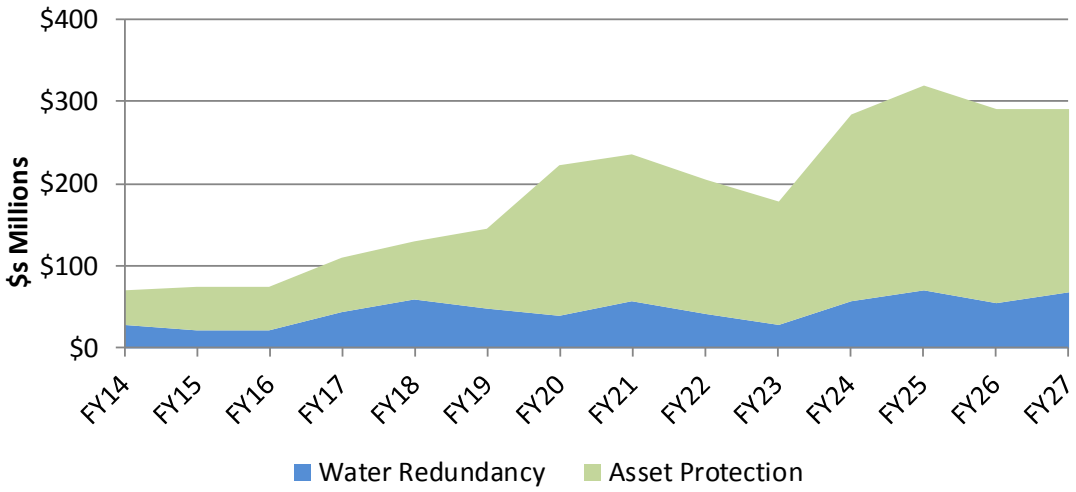
A complete list of new projects with cash flows and descriptions can be found in Appendix 3.

Asset Protection and Water System Redundancy

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



As illustrated by the following graph, the next two waves of spending over the FY19-23 Cap period and the FY24-28 Cap period will be for asset protection and water redundancy. This reflects MWRA's commitment to maintaining its physical plant and addressing the need for water system redundancy in some critical service areas. Total asset protection spending for FY19-23 is projected at $758.4 million or nearly 70% of projected spending. Similarly, water redundancy spending for FY19-23 is projected at $213.2 million or 19.7% of projected FY19-23 spending.



Future Spending

Asset Protection accounts for the largest share of capital expenditures for the FY19-23 period. The FY20 Proposed CIP includes $773.4 million for asset protection initiatives, representing over 71% of total MWRA spending in this timeframe. Wastewater and Waterworks Asset Protection are $666.6 million and $91.8 million, respectively. Deer Island Treatment Plant Asset Protection accounts for over $309 million in spending. Spending for water system redundancy projects totals $213.2 million in the same FY19-23 period, accounting for 19.7% of total spending.

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

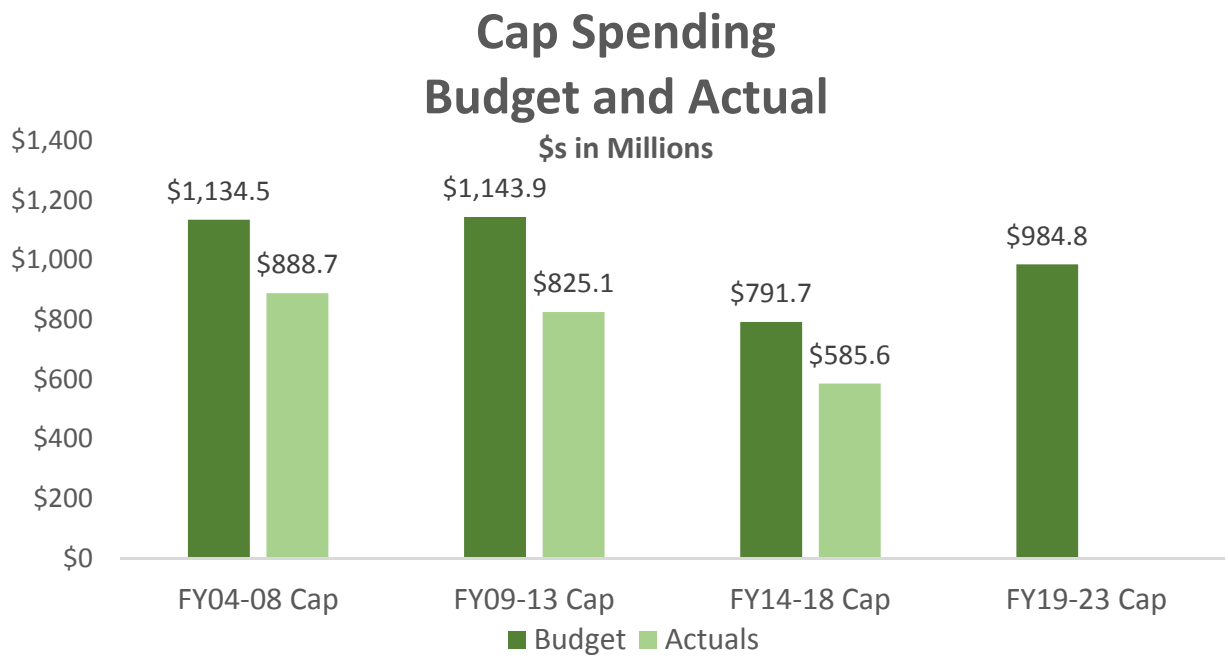
Project Category	FY14-18	FY19-23	FY24-28
Asset Protection	$284.6	$773.4	$1,095.4
Water Redundancy	174.6	213.2	$373.5
CSO	64.7	7.7	$0.0
Other	61.7	89.6	$109.5
Total	**$585.6**	**$1,083.9**	**$1,578.4**
Asset Protection	48.6%	71.4%	69.4%
Water Redundancy	29.8%	19.7%	23.7%
CSO	11.0%	0.7%	0.0%
Other	10.5%	8.3%	6.9%
Total	**100.0%**	**100.0%**	**100.0%**

FY19-23 Five-Year Spending Cap

The Five-Year Spending Cap

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

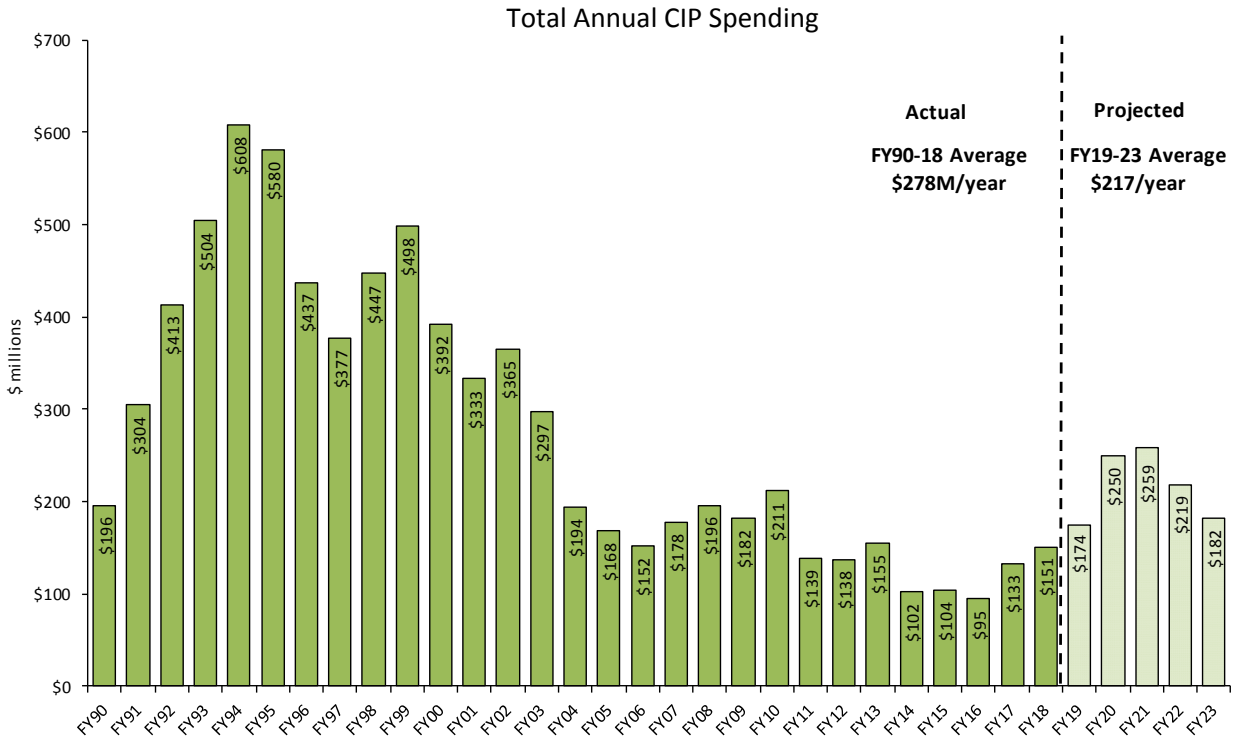
The most recent Cap (FY19-23) of $984.8 million is significantly higher than the prior Cap (FY14-18) of $791.7 million for a variety of reasons including increased spending on asset protection and the initial phases of the long-term redundancy program.

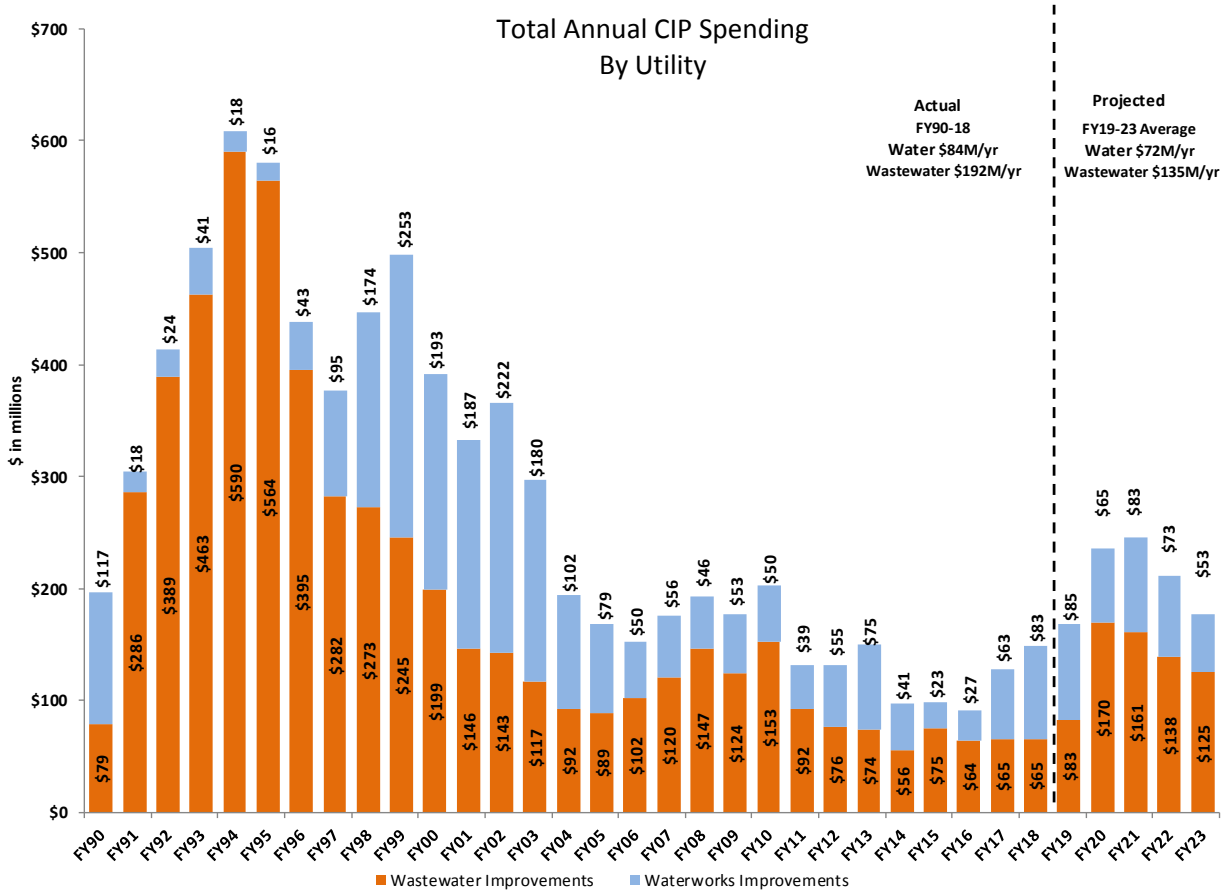


Today, the Authority is better positioned to reinvest in rehabilitation and replacement of aging facilities as result of conservative fiscal management which includes judicious control of expenses, and the fact that MWRA has implemented the practice of utilizing available funds resulting from positive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

It is important to note that the spending on capital programs is largely determined by the nature, magnitude, and number of upcoming projects. In the prior five-year Caps, specifically FY04-08 and FY09-13, the majority of spending was driven by court-mandated projects and building new facilities. During the FY14-18 Cap, the Authority reached substantial completion on its court-mandated CSO Control Plan at an approximate total cost of $910.0 million. The Authority's main focus going forward is asset protection and water system redundancy. The FY20 Proposed CIP includes approximately $1.0 billion in future expenditures for asset protection and continues to fund the critical redundancy for the Metropolitan Tunnels System at approximately $1.4 billion over a seventeen-year period. However, the FY19-23 period includes only $15.1 million related to the tunnels.

The following two charts below capture the historical CIP spending through FY18 and projects spending through FY23 based on the FY20 Proposed CIP both overall at the MWRA level and by utility. Average total annual CIP spending through FY18 was $278 million. Average annual CIP spending for the proposed FY19-23 Cap is projected to be $217 million. Average annual CIP spending through FY18 was $84 million for Waterworks and $192 million for Wastewater. Average annual CIP spending for the proposed FY19-23 Cap is projected to be $72 million for Waterworks and $135 million for Wastewater.





The FY20 Proposed CIP includes approximately $1.9 billion in future expenditures for asset protection and continues to fund the critical redundancy for the Metropolitan Tunnels System at approximately $1.4 billion over a seventeen-year period.

	Total FY19-23	Total FY24-28
Wastewater System Improvements	**$677.1**	**$855.9**
Interception & Pumping	203.3	331.9
Treatment	317.2	371.9
Residuals	14.0	31.7
CSO	7.7	-
Other Wastewater	134.8	120.5
Waterworks System Improvements	**$359.9**	**$706.9**
Drinking Water Quality Improvements	13.2	13.1
Transmission	131.6	357.9
Distribution & Pumping	140.3	298.6
Other Waterworks	74.7	37.3
Business & Operations Suppport	**47.0**	**15.6**
Total MWRA	**$1,083.9**	**$1,578.4**

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

Spending during the FY19-23 timeframe is planned to be $1.1 billion, including local community spending of $134.8 million for the I/I loan and grant program and $37.5 for the water pipeline loan program.

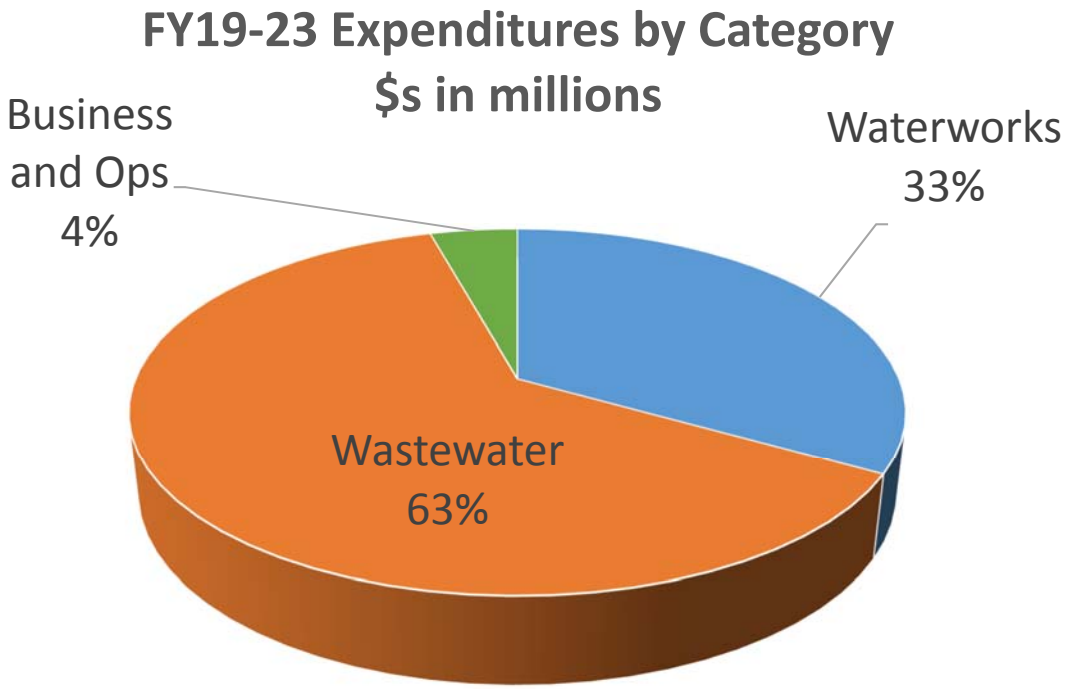
Annual cash flows for the proposed Cap period are shown below in millions:

		FY19	FY20	FY21	FY22	FY23	Total FY19-23
FY20 Proposed	Projected Expenditures	$174.3	$249.8	$258.7	$218.8	$182.3	$1,083.9
	I/I Program	(29.0)	(25.7)	(25.0)	(28.2)	(26.9)	(134.8)
	Water Loan Program	(22.4)	(9.7)	(5.2)	(4.4)	4.2	(37.5)
	MWRA Spending	**122.9**	**214.4**	**228.5**	**186.1**	**159.6**	**$911.6**
	Contingency	0.0	13.6	14.8	12.5	10.7	51.6
	Inflation on Unawarded Construction	0.0	2.1	5.5	6.2	7.6	21.4
	Chicopee Valley Aqueduct Projects	(0.0)	0.0	0.0	0.0	0.0	(0.0)
	FY19 Proposed FY19-23 Spending	**$122.9**	**$230.1**	**$248.8**	**$204.7**	**$178.0**	**$984.6**

The format of the Cap table has changed to account separately for MWRA spending, which excludes the local I/I grant and loan program and the local water pipeline loan spending which are both outside of MWRA's control. As in past Caps, contingency for each fiscal year is incorporated into the CIP to fund the uncertainties inherent to construction. The contingency budget is calculated as a percentage of budgeted expenditure outlays. Specifically, contingency is 7% for non-tunnel projects and 15% for tunnel projects. Inflation is added for unawarded construction contracts. Finally, the Cap excludes Chicopee Valley Aqueduct system projects.

The proposed FY19-23 cap cash flow totals $984.6 million, falling within the approved Cap of $984.8 million.

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



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

	FY19	FY20	FY21	FY22	FY23	Total FY19-23
Wastewater System Improvements	**$82.8**	**$169.7**	**$161.4**	**$138.5**	**$124.7**	**$677.1**
Interception & Pumping	39.7	65.3	50.0	28.8	19.5	203.3
Treatment	12.1	66.4	80.6	80.7	77.3	317.2
Residuals	0.5	8.3	3.5	0.7	1.0	14.0
CSO	1.4	4.0	2.3	0.0	0.0	7.7
Other Wastewater	29.0	25.7	25.0	28.2	26.9	134.8
Waterworks System Improvements	**$85.2**	**$65.4**	**$83.5**	**$73.2**	**$52.6**	**$359.9**
Drinking Water Quality Improvements	1.8	3.1	3.6	3.4	1.3	13.2
Transmission	10.5	15.2	40.0	36.8	29.0	131.6
Distribution & Pumping	43.6	31.3	28.2	21.0	16.3	140.3
Other Waterworks	29.3	15.8	11.7	12.0	5.8	74.7
Business & Operations Support	**6.4**	**14.7**	**13.9**	**7.1**	**5.0**	**47.0**
Total MWRA	**$174.3**	**$249.8**	**$258.7**	**$218.8**	**$182.3**	**$1,083.9**

It is important to emphasize that the majority of spending within the Wastewater and Waterworks programs is concentrated in several larger projects with significant spending in the FY19-23 timeframe. Project contracts with expenditures greater than $15 million for the FY19-23 Cap total $685.3 million, including local community assistance programs, account for nearly 63.2% of spending.

Project	Contract	Projected FY19-23 Expenditures $s in millions
DI Treatment Plant Asset Protection	Clarifier Rehabilitation Phase 2 - Construction	$125.0
Local Water Pipeline Improvement	Phase 3 Loans - Distributions	$85.3
Local Water Pipeline Improvement	Phase 2 Loans - Distributions	$59.9
Facility Asset Protection	Chelsea Creek Headworks Upgrades - Construction	$50.3
DI Treatment Plant Asset Protection	HVAC Equipment Replacement - Construction	$40.2
Corrosion & Odor Control	Nut Island Odor Control HVAC Improvements - Construction	$37.4
Facility Asset Protection	Prison Point Rehabilitation - Construction	$36.3
I/I Local Financial Assistance	Phase X Grants	$36.0
I/I Local Financial Assistance	Phase XI Grants	$35.0
I/I Local Financial Assistance	Phase IX Grants	$26.3
Local Water Pipeline Improvement	Lead Service Line Replacement Loans	$24.0
I/I Local Financial Assistance	Phase XII Grants	$21.0
Metro Redundancy Interim Improvements	WASM 3 Construction 1	$20.4
DI Treatment Plant Asset Protection	Gravity Thickener Rehabilitation	$19.3
SEH Redundancy and Storage	Redundancy Pipeline Sect 111 - Construction 3	$19.1
NIH Redundancy & Storage	Section 89 & 29 Redundancy - Construction 2	$18.3
NIH Redundancy and Storage	Section 89 & 29 Replacement - Construction	$16.0
DI Treatment Plant Asset Protection	Fire Alarm System Replacement - Construction	$15.5
	Total Contracts > $15.0 million	**$685.3**
	% of FY19-23 Spending	**63.2%**

The FY19-23 timeframe is dominated by several large projects with the top five construction projects totaling nearly $289.2 million and accounting for 26.7% of FY19-23 spending. Large initiatives include the Clarifier Rehabilitation at Deer Island and Chelsea Creek Upgrades at $125.0 and $50.3 million, respectively.

FY20 Anticipated Contract Awards

In Fiscal Year 2020, 54 contracts totaling $182.5 million are projected to be awarded. The largest fifteen projected contract awards total $145.7 million and account for nearly 80% of expected awards and are presented in the following table.

Project	Subphase	Total Contract Amount ($s in millions)
Facility Asset Protection	Prison Point Rehab - Construction	$36.3
DI Treatment Plant Asset Protection	Fire Alarm System Replacement - Construction	$22.0
Metropolitan Redundancy Interim Improvements	WASM 3 CP-1	$20.4
NIH Redundancy & Storage	Section 89 & 29 Replacement - Construction	$16.0
Facility Asset Protection	Ward St & Columbus Park Headworks Design/CA	$11.4
Metropolitan Tunnel Redundancy	Preliminary Design & MEPA Review	$9.3
DI Treatment Plant Asset Protection	Digester & Storage Tank Rehab Design/ESDC	$4.1
DI Treatment Plant Asset Protection	DI Dystor Membrane Replacements	$4.0
Wastewater Meter System-Equipment	WW Metering Asset Protect/Equipment Purchase	$4.0
Watershed Division Capital Improvements	Maintenance Garage/Wash Bay/Storage Building Construction	$3.9
DI Treatment Plant Asset Protection	As-Needed REI - 1	$3.0
Metropolitan Redundancy Interim Improvements	Section 101/Waltham Design/CA	$3.0
DI Treatment Plant Asset Protection	As-Needed Design 9-1	$2.8
DI Treatment Plant Asset Protection	As-Needed Design 9-2	$2.8
DI Treatment Plant Asset Protection	As-Needed Design 9-3	$2.8
Top 15 Contract Awards		**$145.7**

Community Loan Programs

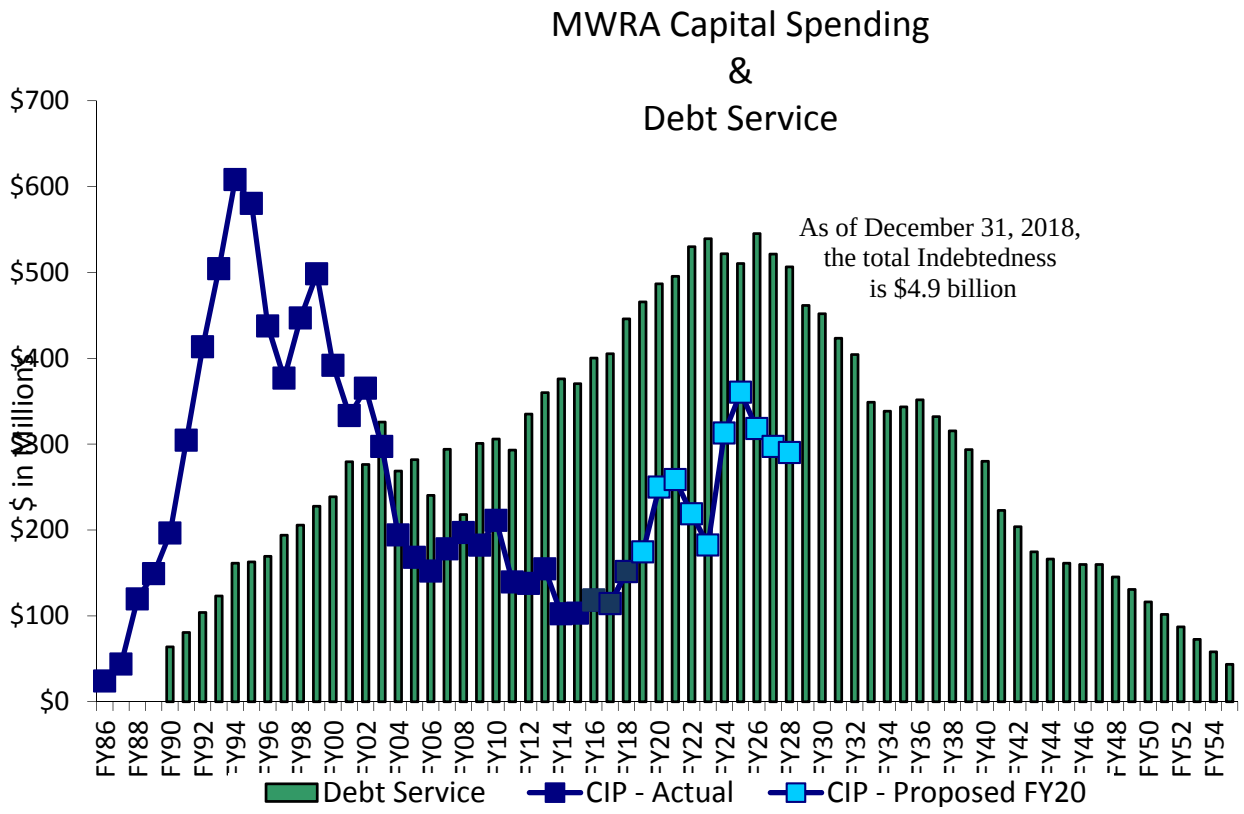
The MWRA offers its water and wastewater communities loan and grant opportunities for infrastructure preservation. Community loans are interest-free and repaid to MWRA over a 5-year or a 10-year period. On the water side, the program's goal is to improve local water system pipeline conditions to help maintain high water quality distribution from MWRA's treatment plant through local pipelines to customers' taps. The water loan program was established in 1988 and over 530 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 $134.8 million in funding is projected to be distributed to MWRA wastewater communities and $37.5 million is projected to be distributed to MWRA water communities.

	FY19	FY20	FY21	FY22	FY23	FY19-23
I/I Financial Assistance (net of repayments)	$29.0	$25.7	$25.0	$28.2	$26.9	$134.8
Local Water System Assistance (net of repayments)	$22.4	$9.7	$5.2	$4.4	($4.2)	$37.5

MWRA Capital Improvement Spending and Debt Service

As of December 31, 2018, MWRA's total debt is $4.9 billion, which is $113.5 million less than the MWRA's total debt as of December 31, 2017. 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.

CIP Review and Adoption Process

The Advisory Board will have 60 days from the transmittal of the FY20 Proposed CIP to review the budget and prepare comments and recommendations. During the review period, Advisory Board and MWRA staff will continue to meet and discuss the changes to the capital budget. The Advisory Board will then transmit its comments and recommendations to MWRA in the spring after its review. Staff will prepare draft responses to the Advisory Board's recommendations for discussion at the budget hearing. During the spring, MWRA will update the CIP to incorporate the latest information into the Final budget. In June, staff will present the FY20 Final to the Board for adoption.

Capital Improvement Program

PROPOSED FISCAL YEAR 2020

APPENDICES

MASSACHUSETTS WATER RESOURCES AUTHORITY

APPENDIX 1

Project Budget Summaries and Detail of Changes

Project Budget Summaries and Detail of Changes
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Wastewater System Improvements

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S. 104 Braintree-Weymouth Relief Facilities

Project Purpose and Benefits

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

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

Project History and Background

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

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

Scope

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

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$240,105	$227,705	12,400	$174	$417	$1,842	$10,558	$0

Project Status 12/18	94.8%	Status as % is approximation based on project budget and expenditures. Braintree-Weymouth Improvements Design/Construction Services commenced in December 2018.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$239,378	$240,105	$727	Apr-26	Apr-26	None	$1,814	$1,842	$28

Explanation of Changes

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

CEB Impacts

- None identified at this time.

S. 130 Siphon Structure Rehabilitation

Project Purpose and Benefits

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

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

Design and construction of improvements to headhouses and structures.

Project History and Background

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

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

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

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

Scope

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$12,127	$940	$11,187	$60	$460	$5,568	$5,619	$0

Project Status 12/18	7.7%	Status as % is approximation based on project budget and expenditures. Initial Planning subphase was completed in 1998. Design is expected to begin in April 2019.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$6,168	12,127	$5,959	Dec-21	Dec-26	60 mos.	$5,228	5,568	$340

Explanation of Changes

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

CEB Impacts

- None identified at this time.

S. 132 Corrosion and Odor Control

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

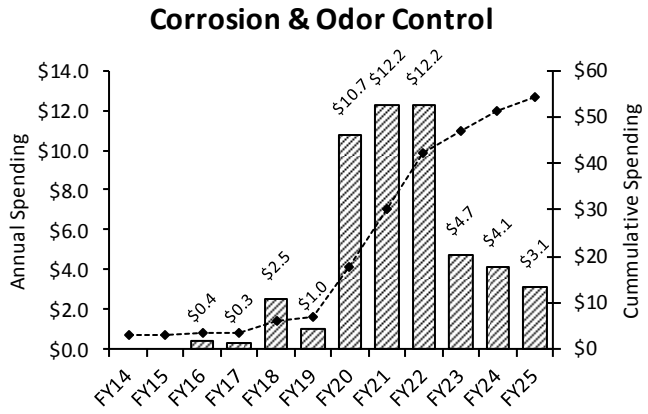
The Corrosion and Odor Control program has recently been expanded to include odor control and mechanical/ electrical modification to the downstream Nut Island Headworks.

Scope

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$79,017	$6,180	$72,837	$967	$10,749	$40,935	$31,062	$840



Project Status 12/18	8.0%	Status as % is approximation based on project budget and expenditures. Odor Control Evaluation was completed in February 2017. NI Odor Control & HVAC Design CA/REI commenced in March 2017.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$76,754	$79,017	$2,263	Nov-27	Nov-27	None	$41,502	$40,935	($567)

Explanation of Changes

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

- Project spending changed primarily due to updated schedules for Nut Island Headworks Odor Control and HVAC Improvements Design/CA/REI and Construction, partially offset by amendment listed above.

CEB Impacts

- None identified at this time.

S. 136 West Roxbury Tunnel

Project Purpose and Benefits

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

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

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

Project History and Background

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

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

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

Scope

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

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

Expenditure Forecast (in $000s) and Project Status

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

Project Status 12/18	91.2%	Status as % is approximation based on project budget and expenditures. The design contract to rehabilitate the tunnel was awarded in February 2009 and ended in June 2011.

Changes to Project Scope, Budget, and Schedule

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

Explanation of Changes

- N/A.

CEB Impacts

- None identified at this time.

S. 137 Wastewater Central Monitoring

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

Scope

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

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$27,482	$19,782	$7,700	$371	$349	$2,061	$5,639	$0

Project Status 12/18	72.0%	Status as % is approximation based on project budget and expenditures. Construction 1 contract was substantially complete in December 2007. Construction 2 contract was substantially complete in July 2009. Wastewater SCADA/PLC Upgrades Design and Programming Services began in April 2018.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$27,482	$27,482	$0	Oct-31	Oct-31	None	$2,200	$2,061	($139)

Explanation of Changes

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

CEB Impacts

- None identified at this time.

S. 139 South System Relief Project

Project Purpose and Benefits

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

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

Project History and Background

Archdale Road Diversion Structure

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

High Level Sewer Repair

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

Outfall 023 Cleaning and Structural Improvements

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

Milton Financial Assistance

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

Pump Station Feasibility

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

Scope

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

Expenditure Forecast (in $000s) and Project Status

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

Project Status 12/18	69.6%	Status as % is approximation based on project budget and expenditures. All sub-phases are complete except for Outfall 023 Structural Improvements which is scheduled to commence in FY24.

Changes to Project Scope, Budget, and Schedule

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

Explanation of Changes

- N/A.

CEB Impacts

- None identified at this time.

S. 141 Wastewater Process Optimization

Project Purpose and Benefits

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

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

Project History and Background

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

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

Scope

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

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$10,306	$1,502	$8,836	$0	$0	$0	$5,117	$3,719

Project Status 12/18	14.4%	Status as % is approximation based on project budget and expenditures. The Notice-to-Proceed for the North System Hydraulic Study was completed in June 2015.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$10,306	$10,337	$31	Jun-31	Jun-31	None	$0	$0	$0

Explanation of Changes

- Project cost changed due to inflation adjustment for the Somerville Sewer Construction contract.

CEB Impacts

- None identified at this time.

S. 142 Wastewater Metering System – Equipment Replacement Project

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

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

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

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

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

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

Scope

Sub-phase	Scope	Status
Planning/Design/REI	Development of a long-term plan to upgrade or replace the existing wastewater metering system (technology, hardware, software, telemetry). Conduct Wastewater flow measurements in unmetered areas, evaluate and update Community Flow Formulas (CFF). Oversee purchase of metering system and perform REI services during meter installation.	Active
Equipment Purchase/Installation	Purchase and installation of equipment.	Completed
Wastewater Metering Asset Protection/Equipment Purchase	Rehabilitation, replacement and upgrades (planning, design and construction) for the Wastewater Metering System to be required every 10 years over the 40 year planning period. Includes meter purchases and installation.	Future
Meter Modems-Antenna Replacement	Purchase and replace 500 meter modems and associated antennas.	Future
Meter Power Design/CA, 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 have been 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 this Design and Construction phase.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$28,333	$5,724	$22,609	$1,813	$4,318	$13,667	$0	$8,942

Project Status 12/18	22.3%	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 by the end of 2019

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$28,733	$28,333	($400)	Dec-30	Dec-30	None	$13,679	$13,667	($12)

Explanation of Changes

- Project cost changed due to Meter Modems/Antenna Replacements deleted since work will be done in the Current Expense Budget.

- Project spending changed primarily due to updated cashflow for Planning/Study/Design contract.

CEB Impacts

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

S. 145 Interception and Pumping Facility Asset Protection

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

Scope

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

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

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

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

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

Sub-phase	Scope	Status
Interceptor Renewal No. 5 New Neponset Valley Sewer Sections 607/608/609/610 Design/CA/REI and Construction	Rehabilitation of 15,000 linear feet of New Neponset Valley Sewer in Milton.	Future
Interceptor Renewal No. 1 Reading Extension & Metropolitan Sewer Design CA/RI (7163) & Construction (7164)	Reading Extension Sewer (Sections 75, 74, and 73), rehabilitation of 12,400 linear feet of 15, 18, 20-inch Vitrified Clay (V.C.) pipe, primarily in Stoneham, with short reaches in Wakefield and Woburn. Approximately 1,400 linear feet of Reading Extension Sewer Section 74 were CIPP lined in the mid 1990's. Also, included is rehabilitation of 2,280 linear feet of 15-inch V.C. pipe of the Metropolitan Sewer Section 46 in Stoneham. Construction contract 7164 was issued a NTP in August 2017.	Active
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.	Active
Headworks and DI Shafts Study, Design CA/REI and Construction	At each of the four remote Headworks, Chelsea Creek, Ward Street, Columbus Park and Nut Island, the wastewater is discharged into a vertical shaft connected to a tunnel that conveys the sewage to the Deer Island Treatment Plant. A past inspection of the shaft at Chelsea Creek indicated that the walls of the shaft are severely deteriorated. Failure of a shaft could incapacitate the Headworks facility. There is concern this may cause additional problems at Deer Island. To-date, there have been no reported issues but it is suggested that deterioration of the interior surfaces could be detrimental to pumps or other wastewater equipment. This study will provide a detailed inspection of the four headworks shafts as well as the three shafts receiving flow at the DITP. The study will also include evaluation of shafts. This study's recommendations will be carried forward into the design & construction phase as part of the Remote Headworks Upgrade projects for Ward St. and Columbus Park. Study recommendation for the remaining five (5) shafts will be carried forward under this CIP subphase.	Active

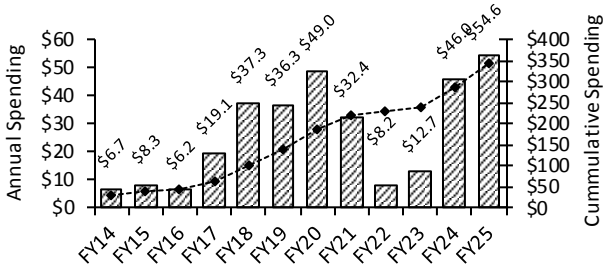
Sub-phase	Scope	Status
Remote Headworks Upgrades Design CA/ESDC/REI and Construction	The Remote Headworks Preliminary Design proposed recommendations to upgrade the Chelsea Creek, Columbus Park, and Ward Street Headworks, which will be included in final design and construction documents. The recommendations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

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$541,599	$95,051	$446,548	$36,294	$48,987	$138,563	$266,379	$41,606

I&P Asset Protection



Project Status 12/18	20.2%	Status as % is approximation based on project budget and expenditures. Interceptor Renewal #1 Reading Extension Design CA/RI and construction commenced in August 2015 and August 2017, respectively. Alewife Brook Pump Station Rehabilitation commenced in January 2016. Chelsea Creek Headworks Upgrades Construction commenced in November 2016. DeLauri Pump Station Screens and Security Upgrades commenced in February 2018. Quincy/Hingham PS Fuel Storage Upgrades was substantially complete in March 2018. Reading Extension Sewer was substantially complete in December 2018.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$472,970	$541,599	$68,629	Sep-29	Sep-29	None	$123,582	$138,563	$14,981

Explanation of Changes

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

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

CEB Impacts

- None identified at this time.

S. 146 Inspection of Deer Island Cross Harbor Tunnels

Project Purpose and Benefits

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

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

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

Project History and Background

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

Scope

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

Expenditure Forecast (in $000s) and Project Status

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

Project Status 12/18	0.0%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

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

Explanation of Changes

- N/A.

CEB Impacts

- None identified at this time.

S. 147 Randolph Trunk Sewer Relief

Project Purpose and Benefits

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

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

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

Project History and Background

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

Scope

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

Expenditure Forecast (in $000s) and Project Status

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

Project Status 12/18	0.0%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

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

Explanation of Changes

- N/A.

CEB Impacts

- None identified at this time.

S. 206 Deer Island Treatment Plant Asset Protection

Project Purpose and Benefits

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

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

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

Project History and Background

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

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

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

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

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

Scope

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

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

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

Sub-phase *Utilities:*	**Scope**	**Status**
Outfall Modifications	Inspection of the old outfall tunnels (decommissioned after startup of the new outfall tunnel). Inspection completed in July 2002.	Completed
Electrical Equipment Upgrades (EEU) including future cycles from the Master Plan	Replace substation components and bus ducts. Bus duct 2 &22 replacement completed October 2001, and EEU - 2 completed by March 2007. EEU–3 completed by August 2011. EEU-4 completed by June 2016; EEU -5 design is scheduled to start in FY23, and EEU-6 is scheduled to start in FY28.	Future
VFD Replacements, including Secondary Reactor VFDs	Replace obsolete variable frequency drives (VFDs) in the North Main Pump Station (in FY12-16); South System Pump Station in FY07-08, with the next cycle to start in FY20 (South System Pump Station Lube System Replacement was added to the scope in the FY19; Winthrop Terminal Facility (FY16-20); and miscellaneous smaller VFDs throughout the plant (on-going). In FY14 VFDs were added in the secondary oxygen reactor batteries A, B and C, to improve efficiency and reduce energy consumption. Completed by August 2016. Future replacements every 12-15 years.	Future
Power System Improvement Design & Constr. (Contracts 7061, 7061A, 7061B, 7061C, 7061D)	For modifications to DITP's electrical system as recommended in the consultant report after an FY04 power outage. Design completed in FY09-11. Completing the construction in a series of projects in FY09-14; added 7061C, dump condenser replacement and 7061D for NMPS fuel tank removal in FY11. Two awarded in FY09, two in FY11. The last, 7061A, Thermal Power Plant Fuel System Upgrade was substantially completed by May 2017.	Completed
TPP Boiler Control Replacement	Replaced boiler controls in the Thermal Power Plant that were obsolete. Completed by November 2016.	Completed
Switchgear Replacements Design/ESDC/REI and Construction including future cycles added per the Master Plan	On-going program to replace obsolete electrical switchgear. Several buildings scheduled for FY19-21, others in FY26-27. Future cycles beyond that time are not currently funded.	Future
Transformer Replacements	Approximately 42 electrical substations and 87 transformers have been in service since DITP start-up. Sub-phase eliminated in FY14; replacements are now done in Electrical Equipment Upgrades.	Completed
PICS Replacement including future cycles from the Master Plan	Replace or upgrade the Process Information Control System (PICS) including keypads, consoles, and software when obsolete. Completed in FY16; may need to be repeated every 10-12 years.	Completed
PICS Fiber Loop Replacement	Replace the PICS system "backbone", the fiber optic loop. Scheduled for FY23-25.	Future
Chemical Tank & Pipe REI and Construction (to include Gravity Thickener Overflow Pipe Replacement)	Strip and reline three of the four Sodium Hypochlorite Tanks and the two Sodium Bisulfite Tanks, which are in fair condition on the outside (shows staining, rusting, and corrosion). If one bisulfite tank fails, there is no longer any back-up. Start in FY19 (tanks have been in service for 24 years; Hypo tanks 1 & 3 were relined in 2007, tanks 2 & 4 in 2008). Added Gravity Thickener overflow pipe replacement to scope in FY19.	Future

Sub-phase *Utilities:*	**Scope**	**Status**
Chemical Pipe Replacement Design and Construction	Planned periodic replacement of the various chemical pipelines in the odor control and disinfection facilities due to deterioration from corrosion. Scheduled for FY23-25.	Future
Heat Loop Pipe Replacement Construction	Rerouted heat loop piping into galleries to reduce underground corrosion and improve accessibility. Phase 1 complete Dec. 2005, Phase 2 complete February 2008. Phase 3 complete June 2011. Includes periodic valve replacements. Another project phase needs to be added to provide redundancy to the heat loop.	Completed
Fuel Pipe Abandonment	Cleaned and cemented the existing fuel pipeline in place instead of removing it. Completed December 2012.	Completed
North Main Pump Station Motor Control Center (MCC) Construction	Replaced MCC equipment that had become obsolete and unreliable. Designed by As-Needed Design task order, construction completed in two phases in FY12-13. See Phase 2 below.	Completed
Motor Control Center (MCC) and Switchgear Replacement Design ESDC/REI and Construction	Sub-phase pulled from the project above, second phase being done FY17-22. In FY17, the design scope was revised to include replacement of switchgear in the Admin/Lab building. Construction is scheduled for FY20-FY222.	Active
Combustion Turbine Generator (CTG) Rebuilds	Rebuilds of the combustion turbines in the Thermal Power Plant. Scheduled for FY24-26 with repeat cycles every 15 years. With the addition of the "Combined Heat & Power" facility, this work may eventually be eliminated.	Future
STG System Modifications Design & Construction	Added equipment to the steam turbine generator to increase electricity output by using the current steam production more efficiently. Helps the MWRA meet energy goals set out by executive order. Completed in February 2011. Added Pressure Reducing Valve to maximize electrical generation by July 2014.	Completed
DI Digester Flare No. 4 Design and Construction	Install a fourth gas flare to reduce the potential for air permit violations when an existing flare is out of service and/or the boilers have to be taken off-line. Construction scheduled for FY25-26.	Future
Hydroturbine Replacements Design and Construction	There are two 1.1 megawatt hydroturbine generators (HTGs) at Deer Island. Electricity is generated using the force of plant effluent as it drops from the disinfection basins into the intake channel beneath each HTG. This facility came on line in July 2001. The HTGs have reached the end of their useful life, and repairs are costly. Begin design in FY21, construction in late FY22.	Future

Sub-phase Support:	Scope	Status
DISC Application	Hardware, software, and contract services to implement a plant-wide computerized database of all plant utility systems. Existing programs deemed sufficient, project removed in FY14.	Completed
Document Format Conversion	Convert DITP construction documents into electronic format and develop a document-reference database. Work is in process, and has several phases. Expect completion by the end of FY19.	Active
As-Needed Design Phases 5, 6, 7, 8 and 9	On-going technical design services and/or construction support to supplement existing engineering resources for specialized or complex engineering issues. Initially, two contracts were issued and ran for two years each. For Phase 6, contract length was extended to three years each. Phases 6-1 and 6-2 ended by October 2012, phase 7-1, 7-2, and 7-3 (at $1.6M each, end April 2016). Phases 8-1, 8-2, and 8-3 were awarded in FY16 at $1.6M each, for FY17-FY19. Phase 9 Phases 9-1, 9-2, 9-3 were added in FY20 at $2.8M each.	Active
Deer Island As-Needed Technical Design	A placeholder used to continue the technical design services as described above. Each series of new contracts will be deducted from this placeholder. In FY19, cost estimates for each 3-year contract were increased, funding now runs from FY20 to FY29 (previously it was funded through FY26).	Future
As-Needed REI	**Resident Engineering/Inspection Services where needed.**	**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	Based on condition, expect to start replacing one tank per year beginning in FY23.	Future
Primary & Secondary Clarifier Rehab – Design (ESDC/REI)	ESDC/REI Services during the Primary & Secondary Clarifier Rehab Constr., below (design by As-Needed Design consultant). Included secondary clarifiers due to deterioration in the longitudinal chains and scum collection systems. Completed September 2013.	Completed
Primary & Secondary Clarifier Rehab Construction	Replace longitudinal & cross collector chains and sprockets, chain drives, wear shoes; modify tip tubes, replace hose bibs; repair wall expansion joints, add more drop boxes, etc. Added secondary clarifier work in FY09, specified a higher-grade stainless steel which increased the cost by $30M. Separated out the gravity thickener scope due to the need for separate, distinct schedules. Project awarded at $59.4M; completed February 2012.	Completed

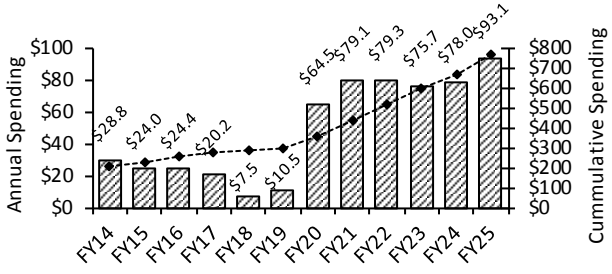
Sub-phase *Specialties:*	**Scope**	**Status**
Gravity Thickener Rehabilitation - Design	Designing gravity thickener improvements, as discussed further below. Project staff determined that a separate design phase is not needed, dropped this subphase in FY14.	Completed
Gravity Thickener Improvements - Construction	This subphase was eliminated in FY08, and the scope was included with the Primary Clarifier Rehab work above. Made a stand-alone project again in FY09. The first phase (6966) involved replacing failed fiberglass covers in FY10-12. 6966A, B, and C were added for emergency repairs to center columns in three tanks in FY11. Project completed in June 2012.	Completed
Gravity Thickener Rehabilitation	Sub-phase pulled from the project above. This phase involves installing catwalks around the perimeter of several tanks, removing concrete blocks in the effluent channels, and modifying the sludge thickener roofing to improve staff access and the operating efficiency. Awarded in FY18.	Active
Gravity Thickener Center Column Replacement	Complete replacement of the center columns in all 4 tanks with a higher grade steel, due to the failures experienced in FY11. Contract awarded in FY13, completed by January 2014.	Completed
Odor Control Rehabilitation Design/ESDC, Construction and REI	Dropped the Preliminary Design phase and added ESDC/REI to the scope in FY11. The project involves modifications to the plant-wide odor control systems, including the digester gas systems and wet scrubber improvements. Design begins in FY21, construction currently scheduled for FY25-28.	Future
Clarifier W3H Flushing System	Replaced deteriorated water flushing lines in the clarifier batteries, completed July 2013.	Completed
Clarifier Rehabilitation Phase 2 Design/ESDC, REI and Construction	Project to correct deficiencies noted during the first Primary & Secondary Clarifier project. Influent gates not sealing off tanks adequately; effluent launders and aeration systems need repair; and concrete corrosion in primary clarifiers above the water line needs repair and coating to prevent future corrosion. The sludge removal system in primary tanks and aeration/recirculation systems in secondary tanks need to be rehabilitated as well. Design/ESDC contract began in FY15, and construction is currently scheduled for FY20-24.	Active
Scum Skimmer (Clarifier Tip Tube) Replacement	Scum tip tubes not working properly results in scum build-up in clarifiers that has to be manually collected and transported to the gravity thickeners. Secondary tip tubes replacement was added to the scope, greatly increasing the cost. Done Oct-13 to Oct-16.	Completed
Digester and Storage Tank Design/ESDC/REI and Rehabilitation Phase 2	The DITP residuals facility includes twelve digesters and two gas handling/sludge storage tanks. During Digester Mods Pipe Replacement (7055), it was noted that additional digester work was needed. Issues with plugged digester recirculation pipes, mixer failures, and overflow box deterioration resulted in increasing the scope needed to correct all deficiencies. Some steel plates in the digesters may also need repair or replacement, and the interior of the digesters needs to be coated. Begin design in FY20, construction and REI scheduled for FY23 to FY26.	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 is slated to begin in FY19, followed by design in FY21 and construction in FY24.	Future
Co-Digestion Design/ESDC/REI and Construction	Co-digestion construction is for the addition of piping and a receiving tank for the liquid food waste to be delivered to Deer Island. Food waste would be barged to the plant, pumped into the receiving tank, and from there pumped into the digesters. Since this option is not currently economically feasible, the schedule has been pushed out to FY24-25.	Future
Co-Digestion Temporary Facility	Moved from the Residuals CIP to DITP in FY16. The budget was reduced to actual costs incurred since this project is not likely to be continued.	Completed

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$975,833	$252,359	$723,473	$10,549	$64,510	$309,135	$367,329	$47,009

DI Asset Protection



Project Status 12/18	26.2%	Status as % is approximation based on project budget and expenditures. Several previously completed phases for this project are included in the Completed Project list. Additional contracts recently completed include: Thermal Plant Fuel System Modifications; Digester Sludge Pump Phase 2; Butterfly and Plug Valve Replacements in NMPS and Winthrop Terminal; and Personnel Dock Rehab. Contracts in process include the following: As-Needed Design Phase 8-1, 8-2, and 8-3; NMPS and WTF Valve & Piping Replacement REI/ESDC, Clarifier Phase 2 Design, HVAC Equipment Replacement Design, Fire Alarm System Replacement Design, DITP MCC & Switchgear Replacement Design, Bidirectional Radio Repeater Upgrade, Gravity Thickener Rehabilitation and Winthrop Terminal Facility VFD Replacement. Contracts scheduled to begin in FY19 are: Clarifier Rehabilitation Phase 2 Construction & REI; HVAC Equipment Replacement Construction; Eastern Seawall Design, CHP Alternatives Analysis, Gas Protection System Replacement Phase 1, SSPS VFD Replacement Design, Chemical Storage Tanks Relining and Digester Piping.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$956,523	$975,833	$19,310	Jun-48	Jun-48	None	$305,312	$309,135	$3,823

Explanation of Changes

- Project cost change primarily due to updated cost estimates for Clarifier Rehab Phase 2 Construction, Chemical Tank and Digester Pipe, Fire Alarm Equipment Construction, As-Needed Design contracts, Eastern Seawall Design and Construction. Also, new project As-Needed REI as well as inflation adjustments on unawarded contracts.

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

CEB Impacts

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

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

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

S. 210 Clinton Wastewater Treatment Plant

Project Purpose and Benefits

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

Project History and Background

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

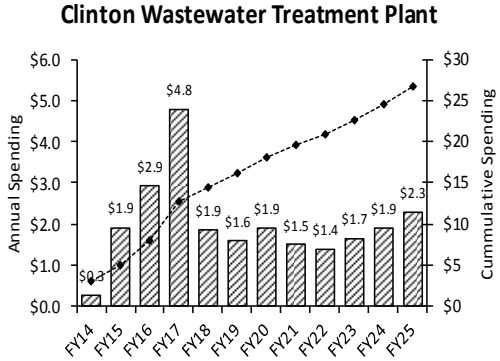
Scope

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

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$26,862	$14,265	$12,597	$1,581	$1,909	$8,024	$4,573	$0



Project Status 12/18	56.6%	Status as % is approximation based on project budget and expenditures. Phosphorus Reduction Construction completed by March 2018; design warranty period runs until March 2019 per Amendment 4. The Clinton Roofing Rehab work and Screw Pumps Replacement Phase 1 will commence in FY19.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$26,364	$26,862	$498	Mar-25	Mar-25	None	$6,764	$8,024	$1,260

Explanation of Changes

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

- Spending changed due to updated cost estimate, new project and contract award listed above as well as repackaging Clinton Rehabilitation Construction by breaking out Digester Cover Replacements as a separate phase.

CEB Impacts

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

S. 271 Residuals Asset Protection

Project Purpose and Benefits

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

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

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

Project History and Background

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

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

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

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

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

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

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

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

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

Scope

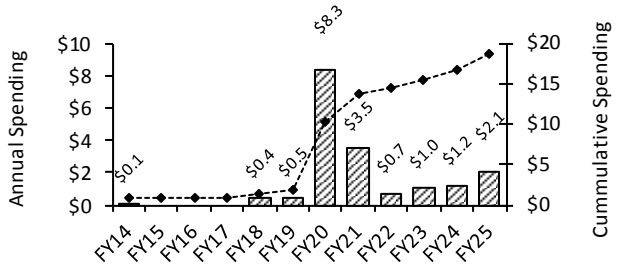
Sub-phase	Scope	Status
Condition Assessment/ Reliability Study	Evaluate the condition of the entire facility at the mid-point of the current contract and then assess other residuals processing options and regulatory changes which may provide cost-saving opportunities. First phase work (present condition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

Sub-phase	Scope	Status
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 $9.3M is allocated in the Proposed FY20 CIP for the first 3 projects identified to date (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 $2.3M were used from the Residuals Phase 2 Construction Phase. The remaining $0.3M for other construction projects is allocated to FY20- 21. The $2M Design phase is rescheduled to FY21, to begin after the current contract extension ends. This will be coupled with Phase 2 Design and Construction.	Active and Future
Residuals Phase 2 Design and Construction	For selection of a consultant to design a series of equipment replacements funded at $15M for design/ESDC and $72.7M for various unspecified construction phases. Following approval of the five year extension with NEFCo, phase 2 design work was moved out to begin in FY24; first construction project in FY26. Late in FY18, NEFCo staff informed DITP management that 2 of the 8 dryer drums were no longer functional, and a third drum was nearing the point of failure. NEFCo needs 6 dryer drums to process delivered sludge over a 5-day work week. Failure of a third drum would require adding weekend operations, increasing processing costs. Therefore, after internal discussions, it was determined that the most prudent action to take is to bring $2.3M forward into FY19-20 from Construction Phase 2, in order to replace three dryer drums. They will be replaced under the Mechanical/Electrical Replacement contract. The remaining Phase 2 funds are still budgeted beyond the FY19-23 cap period.	Future
Residuals Pellet Conveyance Piping Relocation	Build a separate support system to relocate the pipes (that convey pellets to the "high silo system") that are currently attached to the wall of a building that the MWRA does not own. This project is now scheduled to start in FY20.	Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY23
$103,832	$1,236	$102,596	$488	$8,316	$14,009	$31,677	$56,910

Residuals Asset Protection



Project Status 12/18	1.6%	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 is scheduled to begin by the end of FY19.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$103,832	$103,832	$0	Jun-48	Jun-48	None	$11,487	$14,009	$2,522

Explanation of Changes

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

CEB Impacts

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

Introduction to Combined Sewer Overflow (CSO) Program

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

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

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

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

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

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

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

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

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

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

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

In exchange for MWRA agreeing to implement its revised long-term control plan, DEP agreed to issue a series of five (5), up to three-year extensions to the water quality variances for the Lower Charles River Basin and the Alewife Brook/Upper Mystic River through 2020. As they relate to MWRA, the terms and conditions of the variance extensions would be limited to the requirements of the Court Order (i.e. MWRA's responsibility is to implement the long-term control plan contained in the revised Schedule Seven). The most recent variance extensions were issued by DEP on August 31, 2016 for Alewife Brook/Upper Mystic River and for Lower Charles River Basin. These extensions are in effect until September 1, 2019 when it is expected that DEP will issue additional extensions.

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 the numerical CSO discharge goals for each receiving water segment are presented in Table 1 on the following page.

The CSO project schedules in Schedule Seven are aggressive and reflect project-specific design, permitting and construction requirements. Cost risks include unforeseen subsurface conditions, utility conflicts and the need to manage traffic and community impacts in densely populated neighborhoods. MWRA entered into memoranda of understanding (MOU) and financial assistance agreements (FAA) with BWSC, City of Cambridge and Town of Brookline, by which each community implemented one or more of the 35 CSO projects and MWRA funded eligible engineering, construction and force account costs. The BWSC MOU/FAA (9 projects) ended on June 30, 2017. MWRA and BWSC entered into a new four-year financial assistance agreement for Dorchester Interceptor Inflow Removal (formerly part of the South Dorchester Bay sewer separation project) effective July 1, 2017. The Town of Brookline MOU/FAA (1 project) ended on July 31,2014, and the City of Cambridge MOU/FAA (5 projects) ended on June 30, 2018.

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

Receiving Water	CSO Discharge Goals (Typical Year Rainfall) Activations	Volume (million gallons)	Projects*	Capital Cost* ($ millions)
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	52.8
TOTAL **Treated**		**410** **381**		**910.1**

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

MWRA commenced implementation of the long-term CSO control plan in 1996. Project schedules, which reflect compliance with Federal Court milestones, are presented in Table 2 on the following page. By December 2015, MWRA and the CSO communities had completed all of the 35 projects in the plan. The completed CSO projects, together with earlier improvements to MWRA's wastewater conveyance and treatment systems, including the upgraded Deer Island Treatment Plant and associated pump stations, are predicted and intended to reduce the total annual volume of CSO discharge in MWRA's federal and state regulatory-approved Typical Rainfall Year from

3.3 billion gallons in 1988 to 0.4 billion gallons, an 88% reduction, with 93% of the remaining overflow receiving treatment at MWRA's four long-term CSO facilities.

Table 2: CSO Control Plan Project Schedules

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

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

MWRA's NPDES permit and the variances for the Charles River and Alewife Brook/Upper Mystic River require MWRA to estimate CSO discharges at each permitted outfall for all storm events on an annual basis. This is accomplished by MWRA staff using the InfoWorks collection system model and data from permanent and temporary meters located in the interceptor system, at CSO treatment facilities and at other CSO outfalls. In addition, the Federal Court schedule requires MWRA to conduct a system-wide performance assessment after completing the CSO projects. The court schedule requires MWRA to commence the performance assessment by January 2018 and submit a report on the assessment findings to EPA and DEP by December 2020. MWRA issued the Notice to Proceed with Contract 7572, CSO Post-Construction Monitoring and Performance Assessment on November 8, 2017, ahead of and in compliance with the January 2018 milestone.

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

Program

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

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

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

Project	Purpose
Morrissey Boulevard Drain	Reroute stormwater away from the Outfall BOS087 tributary area and the North Dorchester Bay storage tunnel to Savin Hill Cove in large storms, to increase the level of stormwater control along the South Boston beaches provided by the tunnel.
Reserved Channel Sewer Separation	Minimize CSO discharges to Reserved Channel by separating combined sewer systems in a portion of South Boston. Implementation of the recommended sewer separation plan will reduce the number of overflows to Reserved Channel from as many as 37 to 3 in the Typical Year.
Brookline Sewer Separation	Separate several areas of Brookline, totaling 72 acres, where there are remaining combined sewers tributary to MWRA's Charles River Valley Sewer. The project is intended to reduce treated CSO discharges to the Lower Charles River Basin at the Cottage Farm Facility.
Bulfinch Triangle Sewer Separation	Separate the combined sewers in a 61-acre area of Boston bounded by North Station, Haymarket Station, North Washington St., and Cambridge St. The project is intended to reduce CSO discharges to the Lower Charles River Basin and Upper Inner Harbor, reduce overflows to the Prison Point CSO Facility, and close outfall BOS049.
CSO Support	
CSO Planning and Support	The goals of the CSO Program are to minimize CSO discharges, greatly reduce beach closings following wet weather events, and maximize the beneficial use of CSO receiving waters, in compliance with state water quality standards. This project includes CSO conceptual planning, system master planning, and facilities planning/environmental review that support these goals. It also includes directly related watershed planning activities, development of short-term CSO control measures (known as System Optimization Plans, or SOPs), various as-needed technical support and system performance assessments, including the court-mandated CSO performance assessment in the period 2018-2020, and acquisition of land, easements and construction permits required for CSO project implementation.

Expenditure Forecast (in $000s) and Program Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$910,121	$902,396	$7,725	$1,418	$3,983	$7,725	$0	$0

Program Status 12/18	99.2%	Status as % is approximation based on project budget and expenditures. MWRA and the CSO communities completed the remaining CSO projects in December 2015 in compliance with Schedule Seven. (See individual project status and background information).

Changes to Program Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$910,118	$910,121	$3	Dec-15	Dec-15	None	$7,711	$7,724	$13

Explanation of Changes

- Project cost and spending changed primarily due to updated costs for South Dorchester Bay Commercial Point and Dorchester Interceptor Inflow Removal contracts.

CEB Impacts

- $400,000 for periodic cleaning of the North Dorchester Bay Tunnel and inspect BWSC outfalls every five years per the 2004 Supplemental Environmental Impact Report) and an additional $750,000 again 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 inflow removal are expected to continue through June 2021.

Scope

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

Expenditure Forecast (in $000s) and Project Status

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

Project Status 12/18	94.1%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

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

Explanation of Changes

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

CEB Impacts

- No impacts identified at this time.

S. 346 Cambridge Sewer Separation

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

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

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

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

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

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

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

Scope

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

Expenditure Forecast (in $000s) and Project Status

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

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

Changes to Project Scope, Budget, and Schedule

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

Explanation of Changes

- N/A

CEB Impacts

- No impacts identified at this time.

S. 324 CSO Planning and Support

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

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

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

The performance of the sewerage system is constantly improving as CSO and non-CSO projects are completed and as maintenance efforts continue to increase the system's capacity. Updated assessments of the system's hydraulic performance and estimates of CSO discharges based on actual field data are essential to verify the predicted benefits of various CSO-related improvements, to recalibrate the system hydraulic model to reflect updated conditions, and to provide up-to-date information to support CSO planning and design efforts. This project provides for temporary flow metering and other efforts to gather and evaluate new data and track system performance. It also includes technical support and system assessments to support the 3-year CSO performance assessment required by Schedule Seven, with work commencing by January 2018 and a report due to the Court by December 2020.

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.

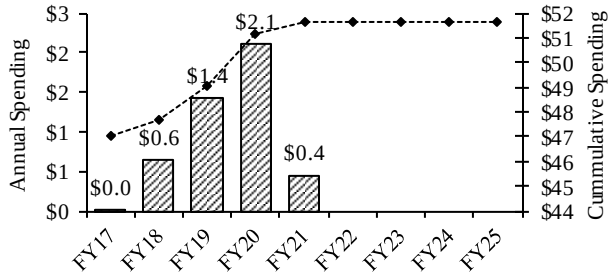
Scope

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 see if CSO control goals were 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. 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.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$52,810	$48,845	$3,962	$1,418	$2,101	$3,962	$0	$0

CSO Support



Project Status 12/18	93.7%	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 2018-2020. MWRA issued the Notice to Proceed for Contract 7572, CSO Post-Construction Monitoring and Performance Assessment, on November 8, 2017, ahead of and in compliance with the January 2018 milestone.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$52,810	$52,807	($3)	Jun-21	Jun-21	None	$3,954	$3,962	$8

Explanation of Changes

- Project spending changed due to updated CSO Performance Assessment cash flow.

CEB Impacts

- No impacts identified at this time.

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

Project Purpose and Benefits

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

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

Project History and Background

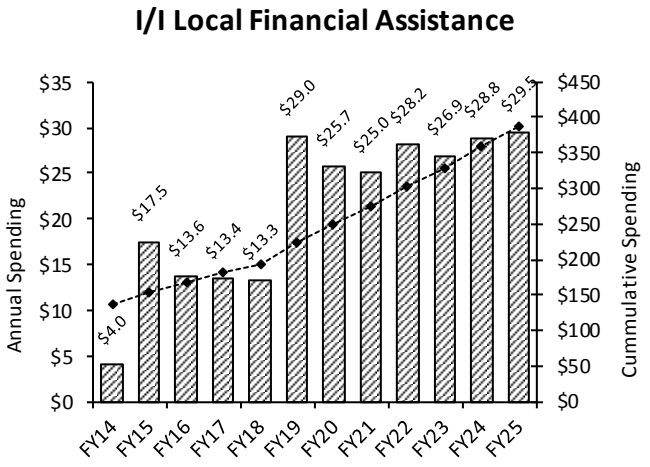
MWRA's Deer Island Wastewater Treatment Plant receives flow from 43 communities. The collection system encompasses 230 miles of MWRA interceptors and over 5,300 miles of community sewers. These sewers are of varying size, shape, age, material, depth, and conditions. All contribute some quantity of infiltration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

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$392,585	$190,036	$202,549	$29,048	$25,700	$134,829	$120,458	($52,737)

Project Distribution Status 12/18	48.7%	Through December 2018, MWRA has distributed $177.0 million in grants and $193.4 million in interest-free loans to fund 556 separate projects in 43 communities under the I/I Local Financial Assistance Program.



Project Repayment Status 12/18	45.6%	Through December 2018, a total of $167.8 million has been repaid by member communities receiving interest-free loans.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$392,585	$392,585	$0	Jun-40	Jun-40	None	$123,223	$134,829	$11,606

Explanation of Changes

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

CEB Impacts

- No impacts identified at this time.

Waterworks System Improvements

Wachusett Reservoir

Integrated Water Supply Improvement Program

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

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

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

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

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

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

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

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

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

S. 542 Carroll Water Treatment Plant

Project Purpose and Benefits

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

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

Project History and Background

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

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

Mass DEP agreed with the MWRA approach in December 1998 and determined that filtration was not required for the MWRA system. Through the Department of Justice, USEPA sued under its SDWA “overfiling” rights, seeking to require MWRA to build a filtration plant and contending that the SDWA allowed no other option. After an extended trial, on May 5, 2000 Judge Stearns issued his decision that MWRA currently complies with all 11 federal criteria for avoiding filtration under the Surface Water Treatment Rule of the Safe Drinking Water Act. He evaluated the current quality of MWRA water and found MWRA’s integrated drinking water improvement program including ozonation treatment technology the better approach to “preserving its safety.” He found EPA failed to show that filtration of MWRA water was required either as a matter of cost-benefit or scientific necessity. The judge denied EPA’s request for injunctive relief but ordered MWRA to give the Court notice of any future violations of the avoidance criteria to allow the consideration of whether the type of relief requested by USEPA might be necessary. No other order was issued. On July 16, 2001, the U.S. Court of Appeals for the First Circuit affirmed Judge Stearns ruling.

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

Scope

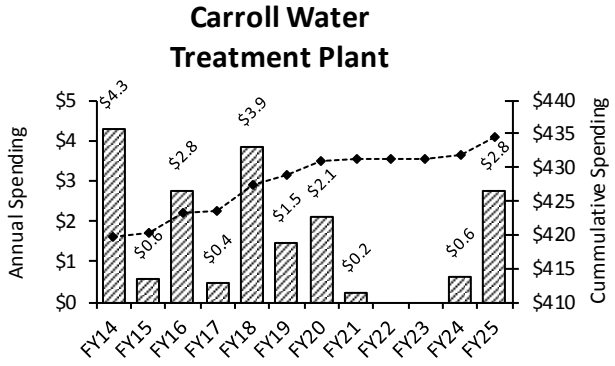
Sub-phase	Scope	Status
Study 1	Investigation of the potential impacts of SDWA amendments on the MWRA system and evaluation of the need, feasibility, and benefits of improved treatment processes.	Completed
Study 2	Evaluation of alternative filtration, disinfection, and corrosion control processes to determine the most appropriate for MWRA source waters. Construction and operation of a pilot plant at the Wachusett Reservoir to allow testing of various treatment technique combinations. Identification of potential locations for treatment facilities.	Completed
AWWARF Red Water Control Strategy Study	Evaluation of treatment options for eliminating discolored water caused by unlined cast-iron pipe. Also investigation of the fundamental aspects of iron chemistry and corrosion using unlined cast-iron pipe from the MWRA community distribution system.	Completed
Emergency Distribution Reservoir Water Management Study	Investigation of potential impacts on the emergency distribution reservoirs resulting from their replacement by new covered distribution reservoirs, and study of ways to maintain their water quality for emergency supply. Norumbega, Weston, Spot Pond, Fells, and Blue Hills Reservoirs have been studied. A pilot study was conducted to evaluate in-reservoir algae treatment for Wachusett Reservoir.	Completed
Cryptosporidium Inactivation Study	Determination of the site-specific efficacy of inactivating *Cryptosporidium* in Wachusett Reservoir source water using disinfectant alternatives (chlorine/chloramine and ozone/chloramine), and then development of design criteria for the full-scale disinfection contacting system.	Completed
Construction: Cosgrove Disinfection Facility Phases I and II	Construction of the Cosgrove Disinfection Facility. Free chlorine is applied at the Cosgrove Aqueduct to utilize travel time to achieve primary disinfection prior to corrosion control treatment and secondary disinfection.	Completed
Immediate Disinfection-MECo	Massachusetts Electric Co. power line installation to support the disinfection process at the Cosgrove Disinfection Facility.	Completed
Distribution Water Consultant	To provide technical assistance related to distribution system management.	Completed
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.	Active
Carroll Ultra Violet Disinfection Design, and Construction	Design and construction programs to add Ultra Violet (UV) to the CWTP. UV system placed into service in February 2014.	Completed
As-Needed Technical Assistance No. 1 and No. 2	As-needed design services to support the start-up of the CWTP including electrical engineering, HVAC engineering, mechanical engineering, civil engineering and a variety of geotechnical, environmental, and architectural technical assistance.	Completed
Ancillary Modifications Construction 1	Follow-up construction from the As-Needed Technical Assistance contracts.	Completed
Ancillary Modifications Construction 2	Address improvements in reliability, optimization of plant performance and/or reduce plant operating costs.	Active
Ancillary Mods Design 3 and 4	Additional As-Needed design services as a follow-up for additional improvements at the Carroll Water Treatment Plant.	Completed
Technical Assistance No. 5 and #6	Continuation of as-needed engineering technical assistance for ancillary modifications design and plant optimization.	Completed
Carroll Water Treatment Plant Storage Tank Roof Drainage System Repair	Design and construct a solution that addresses trench drainage system's poor performance. Poor roof drainage could possibly result in water quality problems.	Future
Technical Assistance No. 7 and No. 8	The next two phases of as-needed engineering technical assistance for ancillary modifications design and plant optimization.	Completed
Technical Assistance No. 9 and No. 10	The next two phases of as-needed engineering technical assistance for ancillary modifications design and plant optimization.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY23
$435,157	$423,116	$13,041	$1,473	$2,082	$3,791	$9,250	$0



Project Status 12/18	97.1%	Status as % is approximate based on project budget and expenditures. Closed Loop Cooling System, a contract of Ancillary Modifications Construction 2 subphase, was substantially complete in April 2010. Second Gaseous Oxygen Line was substantially complete in May 2012. Wachusett Emergency Connection Valves reached substantial completion in August 2013. Carroll Ultraviolet Disinfection Facility Construction reached substantial completion in February 2014. Existing Facilities Modifications CP-7 Southborough Water Quality Laboratory Upgrades was substantially complete in November 2016 and Marlborough Maintenance Facility was substantially complete in July 2018. Technical Assistance 7 was completed in November 2015. Technical Assistance 8 was completed in June 2018 and 9 and 10 commenced in July 2018.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$435,675	$436,157	$482	Dec-26	Dec-26	None	$3,374	$3,791	$417

Explanation of Changes

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

CEB Impact

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

S. 550 Spot Pond Covered Storage Facility

Project Purpose and Benefits

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

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

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

Project History and Background

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

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

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

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

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

Scope

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$60,127	$60,126	$1	$1	$0	$1	$0	$0

Project Status 12/18	100%	Status as % is approximation based on project budget and expenditures. Design/ Build contract was awarded in October 2011 and the NTP was issued in November 2011. Early Construction Water Connection was substantially complete in February 2012. The facility was placed into service in December 2015.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$60,262	$60,127	($145)	Dec-15	Dec-15	None	$0	$1	$1

Explanation of Changes

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

CEB Impact

- None identified at this time.

S. 555 Carroll Water Treatment Plant Asset Protection

Project Purpose and Benefits

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

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

Project History and Background

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

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

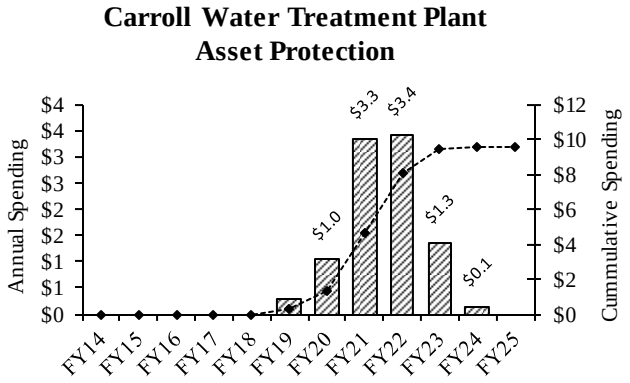
Scope

Sub-phase	Scope	Status
Carroll Water Treatment Plant 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
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

Sub-phase	Scope	Status
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
Post Treatment Building Soda Ash Equipment Replacement	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
CWTP Emergency Generator No. 1 Replacement	**Replace the generator/alternator on emergency generator No. 1 due to failure.**	**Active**

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$41,541	$0	$41,541	$281	$1,030	$9,395	$3,875	$28,271



Project Status 12/18	0%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$40,791	$41,541	$750	Oct-34	Oct-34	None	$4,741	$9,395	$4,654

Explanation of Changes

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

CEB Impacts

- None identified at this time.

S. 597 Winsor Station/Pipeline Improvements

Project Purpose and Benefits

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

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

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

Project History and Background

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

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

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

Scope

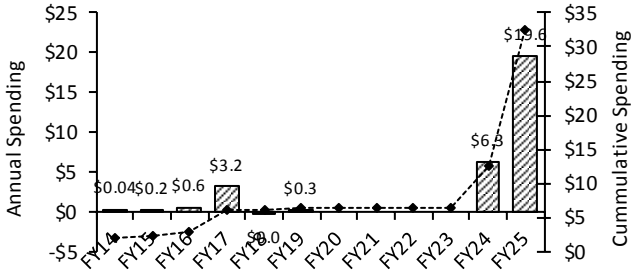
Sub-phase	Scope	Status
Quabbin Aqueduct & Winsor Power Station Preliminary Design (7114)	Preliminary design of improvements at Shafts 1, 2, 9 and 12 of the Quabbin Aqueduct and the Winsor Power Station.	Completed
Shaft 12 Isolation Gate Design CA/RI (7509) and Construction (7197)	Installation of a gate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

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$49,675	$5,734	$43,941	$319	$0	$319	$42,969	$653

Winsor Station/Pipeline Improvements



Project Status 12/18	11.7%	Status as % is approximation based on project budget and expenditures. Winsor Station Chapman Valve Repair was completed in November 2009. Shaft 12 isolation gate Design CA/RI notice to proceed was issued in March 2017. Preliminary design was completed and final design was subsequently cancelled. Hatchery Pipeline Design/ESDC/RI commenced in August 2013 and construction was substantially complete in September 2017.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$48,640	$49,675	$1,035	Jan-26	Jan-26	None	$149	$319	$170

Explanation of Changes

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

- Spending changed due to updated cashflows for Shaft 12 Isolation Gate and Hatchery Pipeline construction contracts. Shaft 12 Design was cancelled due to high cost.

CEB Impacts

- None identified at this time.

S. 604 MetroWest Water Supply Tunnel

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

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

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

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

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

Program Elements

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

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

Scope

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

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

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

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$700,184	$697,1821	$3,002	$0	$0	$0	$3,002	$0

Project Status 12/18	99.6%	Status as % is approximation based on project budget and expenditures. CP6A Lower Hultman Rehab was substantially complete in May 2013. Upper Hultman CP6B contract was substantially complete in June 2013. Shaft 5A/5 Surface Pipe Cathodic Protection was substantially complete in June 2017.

Changes to Project Scope, Budget, and Schedule

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

Explanation of Changes

- N/A.

CEB Impact

- None identified at this time.

S. 616 Quabbin Transmission Rehabilitation

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

Scope

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

Sub-phase	Scope	Status
Oakdale Phase 1A Design & Construction	Upgrade the 60-year old Oakdale facility and electrical control systems and the switchyard which are antiquated and unsafe to personnel. Will lower the station service voltage from 2,200 to 480.	Completed
Ware River Intake Valve Replacement Design and Construction	Replace oil-actuated valves currently underwater and inaccessible for maintenance with electric actuated valves. Also, replace siphons with hard piped intakes and automate equipment with remote control capabilities.	Future
CVA Intake Motorized Screen Replacement Construction	Replace current motorized screens on the CVA Intake. One screen has failed. Both have reached the end of their useful life. The screens keep debris from entering CVA.	Completed
Rehabilitation of Oakdale Turbine Design and Construction	Rehabilitate turbine. Turbine was last rehabilitated in 1986 and we will be approaching thirty years which is the expected life of an overhaul.	Future
Rehabilitate Wachusett Gatehouse/Bastion & Lower Gatehouse Design (7333) and Construction (7380)	Rehabilitate the piping in the Lower Gatehouse. Investigate the possibility of simplifying the layout and improving the reliability of the valves. Existing piping and valves are of poor quality. Other piping and valves of the same age in this facility have already been replaced. 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. Make structural improvements to the Bastion including a new roof, repairs of the concrete walls, and drainage and ventilation systems.	Future
Oakdale High Line Replacement	Replacement of 70 year old 69kv overhead transmission line and ground operated switch that supplies power and delivers power from the Oakdale Power Station.	Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$17,120	$8,667	$8,453	$3	$0	$5,607	$2,820	$25

Project Status 12/18	50.6%	Status as % is approximation based on project budget and expenditures. Valves were received in February 2006 and Phase I Design was substantially complete in June 2007. Phase 1A Construction was substantially complete in July 2013. CVA Motorized Screens Replacement Construction was substantially complete in August 2017.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY19**	**Chge.**
$16,419	$17,120	$0	Jan-27	Jan-27	None	$1,865	$5,607	$3,742

Explanation of Changes

- Project Spending changed due to updated schedules for the Rehabilitation of Wachusett Gatehouse and Bastion Lower Gatehouse contracts.

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 (rehabilitate) a means to isolate the Weston Reservoir from a break west of Ash Street that could detrimentally affect the elevation in the Weston Reservoir. The construction contract will replace antiquated stop-plank gates, stop logs and blow-off valves along the Weston Aqueduct. Existing gates in siphon are in need of repair.	Future
Sudbury Short-Term Repairs Phase 1 and 2 Construction	Repairs needed in order to better prepare the Sudbury Aqueduct for short-term use (flow test and emergency activation).	Future
Rosemary Brook Siphon Building Repairs	Repairs to stabilize structures for functional use as emergency water supply facility. Repairs include re-pointing and rebuilding of brick structures and roof replacement. Rosemary Brook Siphon in conjunction with the Sudbury Aqueduct supplies raw water to the Chestnut Hill Reservoir in the event of an emergency.	Completed
Evaluation of Farm Pond Buildings-Waban Arches (7473)	Assessment of historic structures to determine measures to repair and stabilize facilities. Will include Massachusetts Historical Commission review of proposed alternative.	Completed

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$10,174	$2,232	$7,942	$385	$575	$1,455	$5,820	$667

Project Status 12/18	25.8%	Status as % is approximation based on project budget and expenditures. Inspection of Sudbury Aqueduct was completed in October 2006. Rosemary Brook Building Repair and Evaluation of Farm Pond Buildings-Waban Arches reached substantial completion in FY18.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$10,228	$10,174	($114)	Oct-28	Oct-28	None	$1,085	$1,455	$370

Explanation of Changes

- Project cost changed due to updated final cost for Evaluation of Farm Pond Buildings and Waban Arches contract.
- Spending changed due to updated cash flow for Rosemary Brook Building Repair contract.

CEB Impacts

- None identified at this time.

S. 621 Watershed Land

Project Purpose and Benefit

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

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

Project History and Background

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

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

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

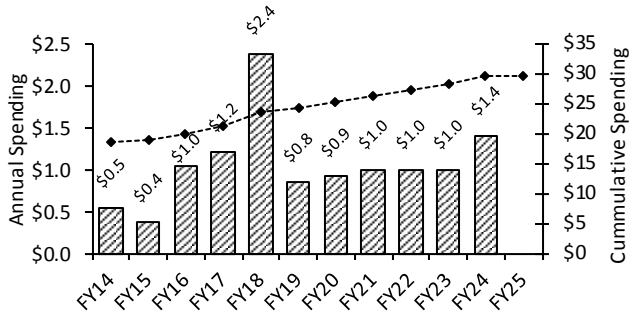
Scope

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$29,000	$22,846	$6,154	$845	$905	$4,750	$1,404	$0

Watershed Land



Project Status 12/18	82.1%	Status as % is approximation based on project budget and expenditures. MWRA began purchasing land in FY07.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$29,000	$29,000	$0	Jun-23	Jun-23	None	$5,000	$4,750	($250)

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.

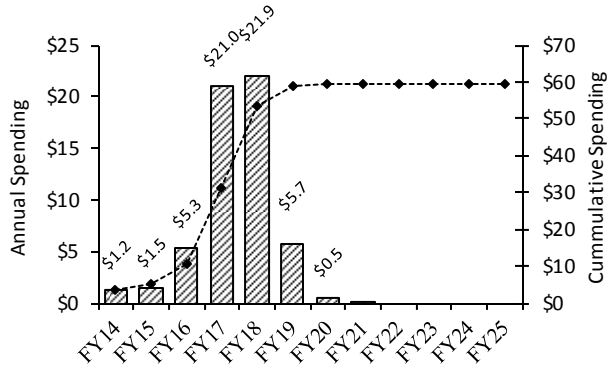
Scope

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, will provide fully treated water transmission redundancy from the Wachusett Reservoir to the beginning of the metropolitan distribution system in Weston.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$58,273	$52,018	$6,255	$5,650	$517	$6,255	$0	$0

Cosgrove Tunnel Redundancy



Project Status 12/18	97.3%	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 commenced in March 2016.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$57,495	$58,273	$778	Feb-19	Feb-19	None	$5,574	$6,255	$681

Explanation of Changes

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

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 may include spillway modifications and/or a parapet wave wall to safely pass the SDF. Dam Safety Regulations may also require dam embankment armoring to protect against overtopping.

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

Scope

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

Sub-phase	Scope	Status
Sudbury/Foss Dam Improvements/Wachusett North Dike Overtopping Protection Design CA/RI and Construction	Regulatory requirement for dam safety compliance for the Sudbury/Foss Dams to ensure spillway will properly function and regulatory requirement for dam safety compliance for the Wachusett North Dike to ensure earthen dam structure will withstand overtopping. Dike requires reconnection of earthen berm around Leominster Pump Station to protect against wave run-up/overtopping at the spillway design flood. Area of dike was removed in mid 1960s to build the P.S.	Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY23
$5,916	$3,116	$2,801	$0	$98	$2,758	$43	$0

Project Status 12/18	52.7%	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.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$5,726	$5,916	$190	Dec-23	Dec-22	(12) mos.	2,392	$2,758	$366

Explanation of Changes

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

- Schedule updated for Quinapoxet Dam Removal Construction contract.

CEB Impacts

- None identified at this time.

S. 625 Metropolitan Tunnel Redundancy

Project Purpose and Benefits

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

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

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

Project History and Background

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

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

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

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

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

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

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

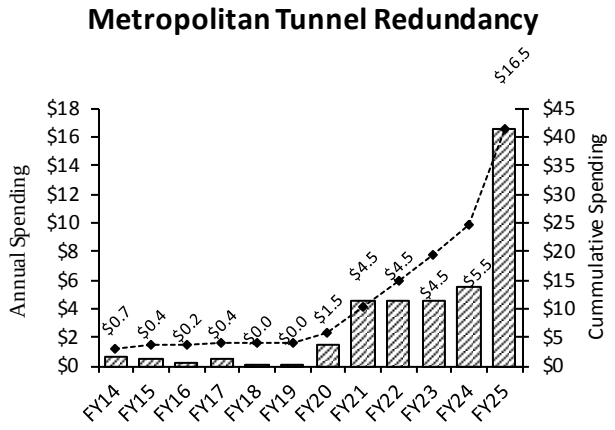
Scope

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

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$1,421,751	$3,456	$1,418,295	$14	$1,508	$15,058	$187,389	$1,215,848



Project Status 12/18	0.2%	Status as % is approximation based on project budget and expenditures. Sudbury Aqueduct MEPA Review was substantially complete in June 2017. Program Support Services is expected to commence in April 2019.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$1,387,910	$1,421,751	$33,841	Apr-42	Apr-42	None	$14,483	$15,058	$575

Explanation of Changes.

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

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

CEB Impacts

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

S. 628 Metropolitan Redundancy Interim Improvements

Project Purpose and Benefits

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

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

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

Project History and Background

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

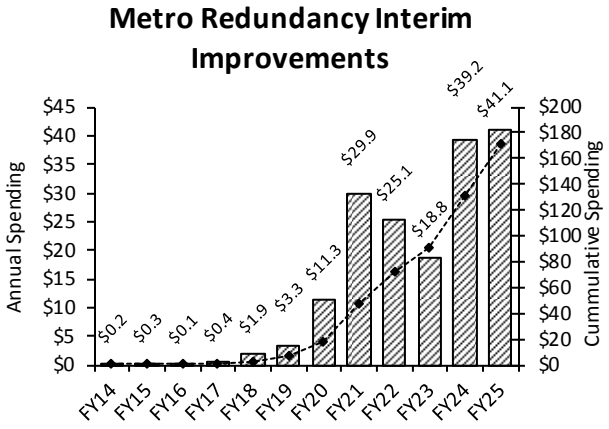
Scope

Sub-phase	Scope	Status
Tops of Shafts Interim Improvements Design/CA/RI (7560) and CP1 Shafts 6,8,9A (7561), CP2 Shafts 7,7B,7C,7D (7670), CP3 Shafts 5,9 (7671)	This project will provide strengthening of pipe directly connected to the tunnel system, if it is found to be deteriorated, cathodic protection for pipe connections to prevent further corrosion, replacement of faulty air valves directly on the shafts and piping, replacement of nuts on valve connections if found to be at risk, improvements to dewatering systems inside shafts, and installation of additional valves to allow isolation of the tunnel without operating old valves that are directly connected to the tunnel.	Future

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$192,895	$2,837	$190,058	$3,310	$11,278	$88,436	$101,523	$98



Project Status 12/18	1.7%	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 is expected to be awarded in January 2019.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$192,698	$192,895	$197	Dec-27	Jan-26	(11) mos.	$94,081	$88,436	($5,645)

Explanation of Changes

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

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

- Project spending changed due to deleted contracts listed above, updated schedules for WASM 3 Rehab CP-1,2, 3 and Chestnut Hill emergency Pump Station Design CA, and award versus budget listed above. This was partially offset by the updated costs listed above and inflation adjustments on unawarded contracts.

CEB Impacts

- None identified at this time.

S. 630 Watershed Division Capital Improvements

Project Purpose and Benefit

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

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

Project History and Background

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

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

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

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

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

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

Scope

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$19,900	$0	$19,900	$0	$357	$7,010	$12,890	$0

Project Status 12/18	0%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$18,000	$19,900	$1,900	Mar-25	Mar-25	None	$4,810	$7,010	$2,200

Explanation of Changes

- Project cost and spending changed primarily due to updated cost estimates and schedules for Maintenance Garage/Wash Bay/Storage Building Design/CA/RI and Construction contracts.

CEB Impacts

- None identified at this time.

S. 618 Peabody Pipeline Project

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

Scope

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$3,509	$1,059	$2,450	$370	$0	$2,450	$0	$0

Project Status 12/18	40.2%	Status as % is approximation based on project budget and expenditures. Design/ESDC/REI was awarded in May 2017.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$18,668	$3,509	($15,159)	Aug-20	Aug-20	None	17,504	$2,450	($15,054)

Explanation of Changes

- Project cost and spending changed due to Peabody Pipeline Construction contract being deleted.

CEB Impacts

- None identified at this time.

S. 677 Valve Replacement

Project Purpose and Benefits

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

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

Project History and Background

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

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

Scope

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

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

Expenditure Forecast (in $000s) and Project Status

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

Project Status 12/18	55.5%	Status as % is approximation based on project budget and expenditures. Phases 1-7 are complete.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$21,402	$21,655	$253	Jun-28	Jun-29	None	$0	$0	$0

Explanation of Changes

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

CEB Impacts

- None identified at this time.

S. 692 Northern High Service – Section 27 Improvements

Project Purpose and Benefits

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

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

Project History and Background

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

Scope

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

Expenditure Forecast (in $000s) and Project Status

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

Project Status 12/18	9.3%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

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

Explanation of Changes

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

- Project schedule and spending changes due to updated schedule for Section 27 Construction due to other project priorities.

CEB Impacts

- None identified at this time.

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

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

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

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

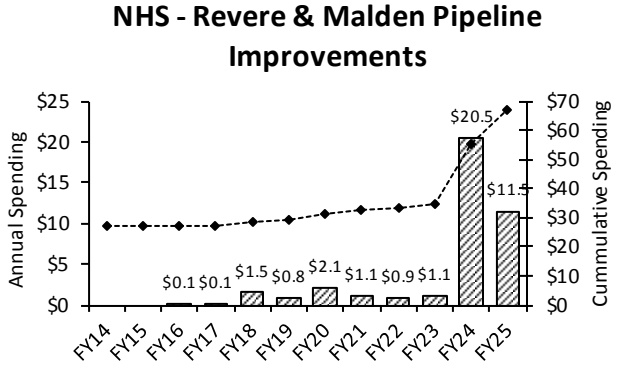
Scope

Sub-phase	Scope	Status
Design/CS/RI – Revere/Malden	Design, construction services, and resident inspection for Section 53 in Malden and Sections 97 and 97A in Revere.	Completed
Construction Revere Beach (5186)	Installation of 5,491 linear feet of 36-inch pipeline and 10,111 linear feet of 30-inch pipeline on Section 97, as well as 3,872 linear feet of 24-inch pipeline, and 1,350 linear feet of 20-inch pipeline on Section 97A in the vicinity of Revere Beach Parkway.	Completed
Construction Malden Section 53 (5176)	Installation of 11,907 feet of 48-inch diameter pipeline in Malden on Section 53.	Completed
Construction Linden Square (5238)	Construction and construction administration of a 1,000 linear feet segment of Section 53 in the Linden Square area of Malden. The Massachusetts Highway Dept constructed this section as part of its roadway reconstruction project around Linden Square.	Completed
Construction Revere Section 53 (5177)	Rehabilitation of 4,900 linear feet of 30-inch pipe in Revere on Section 53 and replacement of 1,500 linear feet under Route 1 in Revere.	Completed
Construction Road Restoration	Design, construction administration, and construction of the full road restoration to ensure a stable road surface without cracking on Eastern Avenue in Malden in compliance with the requirements of the Massachusetts Architectural Access Board. The City of Malden will do this work.	Completed
Construction Control Valves (5191)	Installation of control valves needed to regulate water pressure and fill the Winthrop standpipe.	Completed
Construction DI Pipeline Cleaning & Lining (5179)	Design and cleaning and lining of the 2,000 linear feet, 8-inch diameter water supply main to Deer Island.	Completed
Construction – Winthrop C&L (5178)	Rehabilitation of 7,900 linear feet of 16-inch diameter pipe on Section 32 and 20-inch diameter pipe on Section 55 in Revere and Winthrop.	Completed
Section 53 and 99 Connections Design CA (7485), REI (7682) and Construction (6958/6335)	Water Supply Plan, Design, Construction Administration, Resident Inspection and construction for Sections 53 and 99 Connections.	Future
Construction Section 53 Connections (6335)	Construction of 1,000 linear feet of new 48-inch pipe in Revere and 4,500 linear feet of new 48-inch pipe in Malden plus rehabilitation of 4,000 lf of Section 14. These proposed pipelines will eliminate hydraulic restrictions and better integrate Section 53 into the Northern High distribution system.	Future
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/Future
Section 56 Demolition Construction (7536)	Section 56 Construction Pipe Demolition at General Edwards Bridge.	Active
Section 14 Pipe Relocation (Malden) (6957)	Abandon 540 lf of existing Section 14 water main in Malden Center and replace with 400 feet of new 36-inch ductile iron water pipe in a new alignment. A 36-inch gate valve will also be installed as well as a blow-off setup.	completed
Sections 13 & 48 Rehabilitation Design CA/RI and Construction (7602/7603)	Design and construction of the rehabilitation of Section 13 (7,300 lf of 36-inch cast-iron 1896 vintage pipe) and Section 48 (7,300 lf of 38-inch diameter and 1,400 lf of 30-inch diameter riveted steel 1929 vintage pipe) in Stoneham, Malden and Melrose from the Gate House at Fells Reservoir partially along Highland Avenue to Pleasant Street and Charles Street will improve hydraulics and water quality.	Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$79,527	$28,561	$50,966	$815	$2,063	$6,039	$43,029	$1,898



Project Status 12/18	36.2%	Status as % is approximation based on project budget and expenditures. Revere Beach, Malden Section 53, Revere Section 53 Construction and Linden Square construction are complete. Section 56 Feasibility Study was substantially complete in June 2017. Section 14 Pipe Relocation – Malden was awarded in June 2017. Section 56 Pipe Demolition on General Edwards Bridge was awarded in September 2018.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$79,095	$79,527	$432	Jul-28	Jul-28	None	$7,618	$6,039	($1,579)

Explanation of Changes

- Project cost changed primarily due to award for Section 56 Pipe Demolition Construction was greater than budgeted.

- Spending changed due to updated schedules and cost estimates for Sections 56 Replacement/Saugus Design Construction Administration and Sections 53 and 99 Connections Design/Construction Administration contracts, partially offset by award listed above.

CEB Impacts

- None identified at this time.

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

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

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

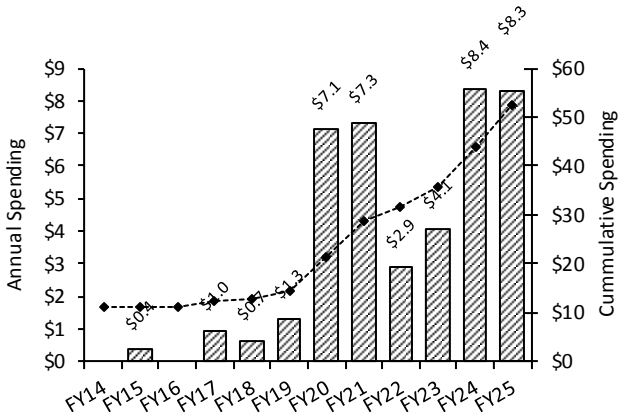
Scope

Sub-phase	Scope	Status
Watertown MOU	Payment to the City of Watertown to fund a portion of its Galen Street project to replace an existing 10-inch diameter pipeline with a new 12-inch diameter water main.	Completed
Routing Study (5163)	Identification of alternatives to determine the optimum approach for providing additional strong connections to WASM 3.	Completed
Design/CA/RI-DP1 (6383)	Design, construction administration and resident inspection services for a new 48-inch pipeline to interconnect WASM 3 with WASM 4 (CP-1). This design work was terminated based on the recommendation of the Long Term Redundancy Study.	Completed
Design DP2/4 Meter 120 (6384)	Design services for Section 47 from Meter 120 to WASM4. Construction Administration and Resident Inspection services to be performed by in-house staff.	Completed
CP2 C&L Sections 59 & 60 Construction (6548)	Cleaning and lining of 16,400 linear feet of 20-inch diameter pipe on Sections 59 and 60 (Intermediate High) from Section 25 in Watertown to Meter 121 in Arlington.	Future
Design/CA/RI and Construction Section 23, 24, 47 (6385/6392)	Cleaning and cement mortar lining of 4,500 feet of 36-inch diameter Section 23 and 11,500 feet of 20-inch Section 24 and Section 47; Replacing 4,200 feet of Section 23 water main, and 6,200 feet of Section 24 water main; Replacement of the check valve assembly at existing Revenue Meter 120 to Boston; and Replacement of 2,400 feet of Newton's 20-inch diameter water main in Ward Street, parallel to Sections 23 and 24.	Active/Future
NE Segment CP5 (6394)	Rehabilitation of 15,000 linear feet of 20 and 48-inch diameter pipe for Sections 18, 50, and 51 for the Northeast Segment plus Meter 32 replacement.	Completed
Design/CA for Sections 25, 75, 59 & 60 (6955) and REI (7680)	Design/Construction Administration/Resident Inspection services for replacement of Sections 25, extension of Section 75, and rehabilitation of Sections 59 & 60 pipelines.	Future
Section 25 Replacement Construction CP-3 (6956)	Replacement of existing Section 25 (approximately 4,800 linear feet of existing 16" pipe) with a new 20-inch diameter pipeline.	Future
Section 75 Extension Construction CP-1 (7484)	Addition of approximately 6,000 feet of new 30-inch diameter pipe to extend Section 75 easterly to Section 23 in Newton, to provide a redundant feed to the Intermediate High Service area supplying Arlington, Belmont and Watertown which also requires replacement of Section 25 under construction Contract 6956, above.	Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$54,124	$12,925	$41,200	$1,322	$7,122	$22,716	$18,483	$0

New Connecting Mains



Project Status 12/18	24.3%	Status as % is approximation based on project budget and expenditures. Northeast Segment CP-5 construction contract was completed in November 2011. Design of CP3 (Sections 23, 24 & 47) commenced in August 2016. Replacement Section 25, 75, 59 & 60 Design/CA was awarded in December 2018.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$48,567	$54,124	$5,557	Dec-25	Dec-25	None	$20,707	$22,716	$2,009

Explanation of Changes

- Project cost changed primarily due to updated cost for award of Section 25, 75,59 & 60 Design/ Construction Administration contract, as well as inflation on unawarded contracts.
- Spending changed due to a schedule shift for Replace Section 25, 75,59 & 60 Design/ Construction Administration.

CEB Impacts

- None identified at this time.

S. 704 Rehabilitation of Other Pump Stations

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

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

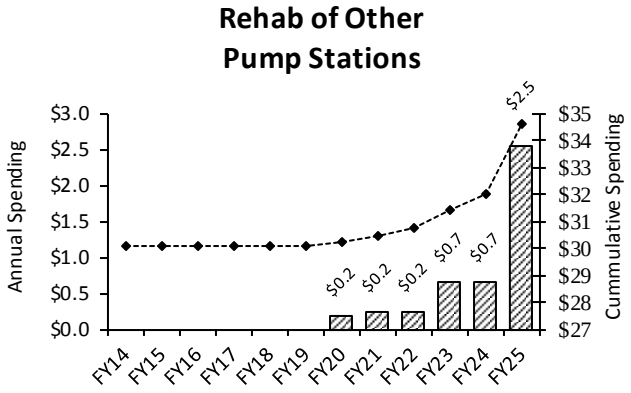
Scope

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

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$50,258	$30,058	$20,200	$0	$180	$1,321	$18,879	$0



Project Status 12/18	59.8%	Status as % is approximation based on project budget and expenditures. Construction rehabilitation of 5 pump stations (Brattle Court, Reservoir Road, Hyde Park, Belmont, and Spring Street) was substantially complete in June 2010.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$50,258	$50,258	$0	Jan-27	Jan-27	None	$1,321	1,321	$0

Explanation of Changes

- N/A

CEB Impacts

- None identified at this time.

S.708 Northern Extra High Service - New Pipelines

Project Purpose and Benefits

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

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

Project History and Background

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

Scope

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

Expenditure Forecast (in $000s) and Project Status

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

Project Status 12/18	33.4%	Status as % is approximation based on project budget and expenditures. Construction of a portion of Section 45 was completed in September 2001. Design of Sections 34, 45 and 61 is scheduled to start in FY22.

Changes to Project Scope, Budget, and Schedule

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

Explanation of Changes

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

CEB Impacts

- None identified at this time.

S. 712 Cathodic Protection of Distribution Mains

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

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

Scope

Sub-phase	Scope	Status
Planning	Evaluation of the condition of the steel pipelines, identification of areas of rapid corrosion due to stray currents, and design and installation of corrosion test stations.	Completed
Cathodic Protection Testing and Evaluation Program (6438)	Test and evaluate 1,019 cathodic protection test stations and 16 rectifiers including: level of protection; functionality of insulation joints; perform repairs; and indentify, recommend and test replacement electrodes.	Completed
Cathodic Protection Shafts E & L CA (6439) and Construction (6440),	CA/RI and construction of Cathodic Protection Shafts E & L.	Future
Cathodic Protection (Western System) Design/CA and Construction (7609/7610), and REI (7678)	Design CA/RI and Construction to replace the existing cathodic protection systems in order to maintain pipe and steel storage tanks integrity for the Western System.	Future

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY20
$66,704	$270	$66,434	$500	$580	$10,967	$55,468	$0

Project Status 12/18	0.4%	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.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$62,716	$66,704	$3,988	Dec-26	Dec-26	None	$11,531	$10,967	($564)

Explanation of Changes

- Project cost changed primarily due to updated cost estimates for Cathodic Protection West and Metropolitan Resident Engineering/Inspection contracts.

- Spending changed due to updated cash flow for the Cathodic Protection Metropolitan System Construction, partially offset by the updated cost estimates listed above.

CEB Impacts

- None identified at this time.

S. 713 Spot Pond Supply Mains - Rehabilitation

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

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

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

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

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

Scope

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$66,333	$65,489	$843	$43	$0	$843	$0	$0

Project Status 12/18	98.7%	Status as % is approximation based on project budget and expenditures. Construction of CP1 (North), CP2 (Middle), CP3 (South), the Early Valve Replacement Contract and Section 4 Webster Ave Bridge Pipe Replacement are complete.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$66,333	$66,333	$0	May-23	May-23	None	$800	$843	$43

Explanation of Changes

- Project spending changed due to updated cash flow for the Section 4 Webster Ave Bridge Pipe Rehabilitation Design contract.

CEB Impacts

- None identified at this time.

S. 719 Chestnut Hill Connecting Mains

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

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

Scope

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

Expenditure Forecast (in $000s) and Project Status

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

Project Status 12/18	54.1%	Status as % is approximation based on project budget and expenditures. Chestnut Hill Gatehouse Repairs was substantially complete in April 2018.

Changes to Project Scope, Budget, and Schedule

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

Explanation of Changes

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

- Schedule shifted due to project priorities.

CEB Impacts

- None identified at this time.

S. 721 Southern Spine Distribution Mains

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

Scope

Sub-phase	Scope	Status
Sections 21,43, 22 Design/CA/RI	Design, construction administration, and resident inspection for five construction contracts in Phase 1, including rehab of 32,000 linear feet of 24- to 48-inch diameter pipes, and installation of 17,000 linear feet of 36- to 48-inch pipes. Rehabilitation to consist of cleaning and cement mortar lining, and replacement of the main line valves, blow-off valves, and appurtenances.	Completed
Section 22 South Construction	Rehabilitation of approximately 10,000 linear feet of 48-inch diameter Section 22 South, and installation of 1,700 linear feet of new pipe.	Completed
Adams Street Bridge	Relocation of a pipeline made necessary by the reconstruction of this bridge by the MBTA.	Completed
Southern High Ext Study (6602)	Study to determine the feasibility of expanding water services to additional communities in the Southern High Service Area. Cost of the study and public participation was fully funded by the Commonwealth of Massachusetts. Completed in May-1999.	Completed
Section 22 North Facility Plan/EIR (7155)	Facility Plan/EIR for Section 22 North.	Future
Section 22 North Design/ESDC (7120)	Design/ESDC for Section 22 North.	Future

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$78,708	$36,683	$42,025	$52	$624	$2,170	$39,746	$109

Project Status 12/18	46.6%	Status as % is approximation based on project budget and expenditures. Section 22 North Facility Plan/EIR is expected to commence in March 2019.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$77,401	$78,708	$1,307	May-27	May-27	None	$1,890	$2,170	$280

Explanation of Changes

- Project cost increased due to inflation adjustments for Section 22 North Construction and Sections 20 & 58, Design and Construction as well as updated cost estimate for Section 22 North Facility Plan/Environmental Impact Report.

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

CEB Impacts

- None identified at this time.

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

Project Purpose and Benefits

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

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

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

Project History and Background

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

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

Scope

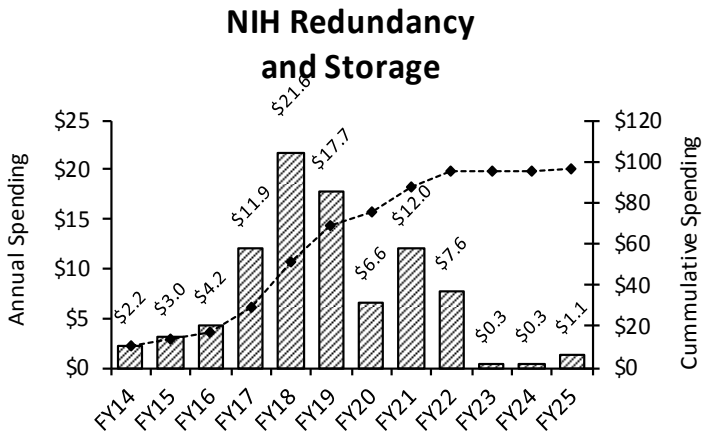
Sub-phase	Scope	Status
Concept Plan, ENF, and Mobile Pump Unit	Developed a concept level plan to evaluate options to reduce the risk and the impacts of potential failures in Sections 29 and 89. Measures evaluated included valve improvements, improved community interconnections, pipeline redundancy, targeted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

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$120,366	$48,895	$71,470	$17,727	$6,623	$44,244	$27,215	$11

Project Status 12/18	50.7%	Status as % is approximation based on project budget and expenditures. Section 89/29 Redundancy Design/CA/RI contract was awarded in March 2011. Reading/Stoneham Interconnections was substantially complete in October 2012. Gillis Pump Station Improvements was substantially complete in December 2014. West St Pipeline Reading Construction Phase 1A was substantially complete in May 2015. Phase 1B and Phase 1C were substantially complete in May 2018 and September 2018, respectively. Phase 2 Construction commenced in September 2017.



Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$118,494	$120,366	$1,872	Jan-28	Jan-28	None	$42,080	$44,244	$2,164

Explanation of Changes

- Project cost increased primarily due to change orders for Section 89/29 Redundancy Construction Phase 2, Phase 1C and B and inflation adjustments for NIH Storage contracts.
- Project spending changed primarily due to updated schedule for Section 89 Replacement Resident Engineering/Resident Inspection Services, amendment for Section 89/29 Redundancy Design CA/RI, updated cash flow for Section 89/29 Redundancy Phase 1C, partially offset by updated cash flows 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/RI and Construction – Section 8 and 57 (7092/6322)	Cleaning and cement mortar lining of the pipeline interior, replacement of all defective and inoperable valves, and the addition of new valves for 7,500 linear feet of 48-inch pipe on Section 8 in Malden and Everett. Replacement work consists of replacing 9,722 feet of 42-inch pipeline with new 36-inch ductile iron main and replacement of blow-off connections from Second Street in Everett to the Mystic River Bridge in Chelsea.	Future
Rehab Sections 37 and 46 Chelsea, East Boston Design, CA/RI and Construction (7405/6962)	Rehabilitation of approximately 3,550 linear feet of 36-inch cast iron main (Section 37) and approximately 2,500 linear feet of 36-inch cast iron main (Section 46). Both sections are located in Chelsea and are critical to the supply of water to East Boston. Section 38, the 36-inch ductile iron pipeline under the Chelsea River, is assumed to not need rehabilitation.	Future
Section 97A Construction (7021)	Installation of approximately 3,000 linear feet of 20-inch, 16-inch and 12-inch water main and a new pressure-reducing valve. This completed work is part of the Northern High System and adds redundancy to East Boston, including Logan Airport.	Completed

Sub-phase	Scope	Status
Sections 50/57 Water and 19/20/21 Sewer Rehabilitation Design CA/RI (7540) and Construction (7541)	Design, CA/RI and construction of rehabilitation of: 12,000 feet of 20-inch cast iron Northern High System water pipe; 8,000 feet of 48-inch steel Northern Low System water pipe and 11,000 feet of 51-inch by 56-inch and 56-inch by 61-inch brick sewer of the North Metropolitan System and associated manholes, valves and structures located in Medford and Malden, MA.	Active/Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$56,684	$2,955	$53,730	$1,975	$1,639	$11,952	$40,981	$796

Project Status 12/18	7.0%	Status as % is approximation based on project budget and expenditures. Section 50 & 57 Water & Sections 21/20/19 Sewer Design/ESDC/REI contract 7540 was awarded in June 2017.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$62,366	$56,684	($5,682)	Jul-28	Jul-28	None	$18,269	$11,952	($6,317)

Explanation of Changes

- Project cost changed primarily due to updated cost estimates for Section 50 & 57 Water & 21/20/19 Construction. This was partially 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.

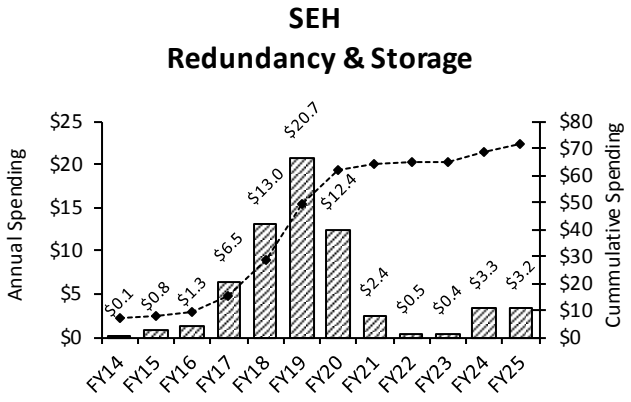
Scope

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

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY23
$131,416	$28,445	$102,971	$20,700	$12,419	$36,391	$13,877	$52,704



Project Status 12/18	26.4%	Status as % is approximation based on project budget and expenditures. Conceptual Design began in February 2007. University Ave Water Main was substantially complete in November 2008. Redundancy/Storage Phase 1 Final Design/CA/RI commenced in February 2014. Redundancy Pipeline Section 111 Construction 1 commenced in July 2016. Redundancy Pipeline Section 111 Construction 2 began in October 2017. Redundancy Pipeline Section 111 Construction 3 was awarded in May 2018.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$129,604	$131,416	$1,812	Dec-35	Dec-35	None	$36,806	$36,391	($415)

Explanation of Changes

- Project cost Increased primarily due to inflation adjustments on unawarded contracts.
- Project spending changed primarily due to updated cash flows for Redundancy Pipeline Section 111 Construction 1 and 2 contracts.

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).	Active
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.	Complete
Design CA/RI Section 28 (7083)	Design, construction administration, and resident inspection services for the rehabilitation of Section 28, suction main to the Brattle Court Pumping Station, from the WASM 3 connection to the pumping station (construction phase CP1, contract 6546).	Completed

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$80,464	$80,403	$61	$61	$0	$61	$0	$0

Project Status 12/18	99.9%	Status as % is approximation based on project budget and expenditures. Rehabilitation of WASMs 1, 2 & 4 are complete. Section 28 Arlington CP-1 was substantially complete in April 2011. Design CA/RI Section 36/Watertown Section/Waltham Connection commenced in January 2011. Watertown Section Rehabilitation was substantially complete in December 2013. Section 36/W11/S- 9-A11-A Valve was substantially completed in December 2016.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$80,464	$80,464	$0	Dec-16	Dec-16	None	$0	$61	$61

Explanation of Changes

- Project spending changed due to updated cash flow for Watertown Section Rehabilitation.

CEB Impacts

- None identified at this time.

S. 735 Section 80 Rehabilitation

Project Purpose and Benefits

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

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

Rehabilitation of approximately 16,197 feet of pipe along Route128/95. Section 80 supplies water to Wellesley and Needham. Rehabilitation will improve water quality to these two MWRA communities.

Project History and Background

Section 80 is a steel main that runs from Shaft 5 of the City Tunnel in Weston extending through Newton to supply Wellesley and Needham. The main runs along portions of 128/95 and has been exposed to highly corrosive conditions and the cathodic protection system has not been maintained. Complaints from residents in Needham and Wellesley of a tar-like smell in the water indicate deterioration of the pipe liner. Testing indicated phenols levels 10 times above allowable limits. Failure of Section 80 would create huge traffic challenges on this major metro-Boston highway.

Scope

Sub-phase	Scope	Status
Section 80 Rehabilitation Design CA (6892), Construction (6891), and REI (7675)	Design and rehabilitation of approximately 16,197 feet of Section 80 along route 128/95.	Future
Section 80 Replacement Construction (7532)	Replacement of 200 linear feet of Section 80 that was leaking.	Completed

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$13,552	$1,925	$11,627	$0	$3	$400	$10,921	$0

Project Status 12/18	14.2%	Status as % is approximation based on project budget and expenditures. Section 80 Replacement Construction was substantially complete in June 2018.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$12,419	$13,552	$1,133	Jul-26	Jul-26	None	$688	$706	$18

Explanation of Changes

- Project cost changed primarily due to updated cost estimate for Section 80 Rehabilitation Resident Engineering/Inspection and inflation adjustments on Section 80 Rehabilitation Design/Construction Administration and Construction.

- Spending changed due to inflation adjustment on Section 80 Rehabilitation Design/Construction Administration contract.

CEB Impacts

- None identified at this time.

S. 753 Central Monitoring System

Project Purpose and Benefits

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

To provide a modern centralized system for monitoring, coordinating, and controlling critical waterworks functions. Many existing MWRA facilities are monitored and operated using obsolete methods and equipment, which can hinder emergency response capabilities and prevent coordinated system operation. Two operations control centers are already operational, and various field facilities have been equipped with telemetry and communications equipment as part of this project.

Project History and Background

MWRA has been converting to system-wide remote monitoring and control of essentially all hydraulic and hydroelectric operations. The original instrumentation used to measure operating parameters was incomplete, old, and in poor condition. In many cases necessary instrumentation did not exist. The system also lacked telemetry to provide centralized and immediate information on system performance, and the ability to remotely intervene when malfunctions occurred. Without telemetry, operating decisions had to be delayed until field personnel were dispatched to collect measurements. This was a cumbersome and undesirable mode of operation, particularly in emergency situations.

The lack of flow measurement within the water delivery system also impeded identification of sources of unmetered water. When fully implemented, the central monitoring system will generate instantaneous data on water flow and pressure in 18 subsystems beginning with the supply sources and ending at the delivery points to user communities. The data will assist operations staff in detecting and pinpointing leaks in the system. The response time for leak repair work can then be lessened, resulting in significant savings of water and reduction in potential MWRA liability for public safety and property damage.

The central monitoring project has grown from the initial automation of the Reservoir Road Pump Station to include eight other pump stations. Monitoring and control of water treatment facilities has expanded to include the Interim Corrosion Control Facility in Marlborough, the Cosgrove Disinfection Facility, the Norumbega Temporary Disinfection Facility and the Ware Disinfection Facility. In addition, water quality is monitored at seven locations from two Operations Control Centers. Real time Supervisory Control and Data Acquisition (SCADA) monitoring of Telog data is being established with 150 sites currently active. Operation control centers (OCCs) at the MWRA Chelsea and Clinton facilities provide remote monitoring and control of all the SCADA facilities. Also, as part of its Integrated Water Supply Improvement Program, MWRA built several new and upgraded facilities. These included the Nash Hill Covered Storage facility and the Loring Road Covered Storage facility, Carroll Water Treatment Plant, MetroWest Water Supply Tunnel, and the Norumbega Covered Storage facility. The existing system-wide backbone microwave communications network has been improved to connect these facilities to the waterworks communications system.

Scope

Sub-phase	Scope	Status
Study	Study to determine the implementation phases.	Completed
Design	Design of the replacement and rehabilitation of 34 existing master meter sites, 22 new master meter sites, 15 western revenue meter sites, 28 reservoir level instrumentation sites, ten pumping stations, eight pressure regulator control sites, four major throttle valve sites, six chemical feed sites, four hydroelectric sites, five weather stations, five sluice gate control sites, one stream gauging station, and other facilities.	Completed
Communications Structures	Installation of two radio towers, five antennas, one satellite dish, and an equipment shelter.	Completed
CS/Start-Up Services	Construction and startup services for the metropolitan Operations Control Center, as well as metering and monitoring construction.	Completed
Equipment Pre-Purchase	Purchase of instrumentation equipment, mechanical equipment, and new master meters.	Completed
Construction 1 – Reservoir Road and Cosgrove Pilots	Purchase and installation of equipment to automate the Reservoir Road Pump Station and an aqueduct monitoring system for use by the Cosgrove Intake and Shaft 4 operators. MWRA staff installed the equipment.	Completed
SCADA Implementation	Purchase of Supervisory Control and Data Acquisition System (SCADA) equipment for monitoring, control and metering sites.	Active
Microwave Equipment	Purchase of services and equipment necessary to allow MWRA to convert from analog to digital communications to continue to utilize the Commonwealth's Interagency Microwave System.	Completed
Construction – Operations Center	Construction of a 5,000 square feet center including an environmentally controlled computer room, a printer room, a control room, office space, and sanitary facilities in Chestnut Hill.	Completed
System Wide Backbone C.P. Construction– Monitoring & Control Communications Network	Improvement of the existing Waterworks system wide backbone including upgrades of microwave antennas at MDC Hill and Bellevue water tank and provision of new microwave antennas at five facilities.	Completed
Study and Design – Waterworks Monitoring & Control Communications Network	Provision of microwave antennas and radio equipment at twelve facilities.	Completed

Sub-phase	Scope	Status
Microwave Communication for Waterworks Facilities	Furnish and install seventeen microwave antennas (dishes), three 3-legged, 90- to 100-foot towers, one unpowered 80-foot steel monopole, and two prefabricated concrete shelters to house radio equipment with associated racks, cabinets and wiring.	Completed
Quabbin Power, Communication & Security Design CA/RI and Construction	Design and construction of 2.4 miles of power, and communication to Quabbin Aqueduct Shaft 12 and 1,500 feet to the DCR Boat Cove. Also, upgrading 9,000 feet of existing overhead power line from Winsor Power Station to Quabbin Lookout Tower to insure uninterrupted service of the communication network. Increased security will be provided at Shaft 12, Winsor Power Station, CVA Intake, Nash Hill gate house, William A. Brutsch Water Treatment Facility, DCR Boat Cove and Quabbin Administration building. The Verizon communications service needed for the security devices to communicate to the Chelsea Head-end Facility will be 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 hire outside support to replace an 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 the fall of 2017. 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.	Active/Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$39,017	$20,705	$18,313	$416	$975	$9,666	$5,576	$3,070

Project Status 12/18	53.0%	Status as % is approximation based on project budget and expenditures. Quabbin Power Communications & Security Construction was substantially complete in April 2017. CWTP SCADA Design Programming RE was awarded in December 2018.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$39,017	$39,017	$0	Oct-31	Oct-31	None	$9,600	$9,666	$66

Explanation of Changes

- Spending changed primarily due to updated cash flow for SCADA Implementation.

CEB Impacts

- None identified at this time.

S. 763 Distribution Systems Facilities Mapping

Project Purpose and Benefits

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

To produce a complete, up-to-date set of appropriate scale maps of all underground waterworks facilities, along with a comprehensive database inventory. Existing maps were outdated and unreliable, complicating emergency response, field repairs, and planning.

Project History and Background

In 1995 MWRA did not have an adequate, updated set of maps of all of its underground waterworks facilities. Existing maps did not consistently show current conditions and were often incompatible or contradictory with MWRA databases. Engineering, operations, and emergency response were all affected by this inadequacy. Outdated maps hampered engineering because maps needed to be re-created. Field operations crews could not predict with certainty the results of valve shut-offs during repair efforts. The planning process was impaired because management did not have authoritative, consolidated data to evaluate pipe condition, age, C-Values, materials, and soil conditions. Additionally, the lack of a comprehensive understanding of the relationships between MWRA and local community pipe systems could result in service delays. The former mapping system created the possibility of incorrect actions, and in critical instances could have resulted in exacerbated property damage.

Reliable engineering records do not exist for certain sections of the distribution system. The Records Development sub-phase will create, update and automate record drawings and detail records for high priority areas.

Scope

Sub-phase	Scope	Status
Planning/Design	Creation of a complete set of 200 to 400 scale maps of the distribution system with an associated verified inventory of size, material, age, and condition of pipes.	Completed
Data Purchase	Purchase of project related data from Boston Edison.	Completed
Records Development (6525)	Automation of MWRA record drawings.	Future
Update of Record Drawings (7489)	Update record drawings and detail record information for selected water pipeline sections using information from detail records, plans, field books, surveys, and valve inventories. Establish procedures for continued updating and maintenance of detail record information.	Future
Water System Hydraulic Model (7613)	Upgrade and calibrate the water system hydraulic model.	Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$2,799	$1,036	$1,763	$0	$269	$1,549	$214	$0

Project Status 12/18	37.0%	Status as % is approximation based on project budget and expenditures. Update of Record Drawings is expected to begin in FY20.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$2,799	$2,799	$0	Jan-22	Oct-23	21 mos.	$1,663	$1,549	($114)

Explanation of Changes

- Schedule and spending shifted due to sequencing of Update of Record Drawings and Records Development projects.

CEB Impacts

- No additional impacts identified at this time.

S. 765 Local Water System Assistance Program

Project Purpose and Benefit

☑ *Contributes to improved public health*
☑ *Provides environmental benefits.*

To provide loans to facilitate water system improvements in MWRA communities.

Project History and Background

The Local Water System Assistance Program is a critical piece of MWRA's Integrated Water Supply Improvement Program. In November 1999, the Board of Directors approved the Phase 1 Local Pipeline Assistance Program, supported through a Tax Exempt Commercial Paper (TECP) program, to make $25 million available annually in loans to MWRA communities for pipeline relining and replacement in proportion to each community's share of total unlined pipe miles. Communities are required to pay back principal for each loan during a ten-year time period beginning one year after the project funding is approved. MWRA increased the initial total program budget to $256,796,500 to provide funds for additional water system communities: Stoughton ($4,480,000), Reading ($1,916,000), Lynnfield ($320,000), Dedham/Westwood ($7,500), and Wilmington ($73,000). The Phase 1 Local Pipeline Assistance Program concluded at the end of FY13 with a total of $222.3 million in interest-free loans distributed to member water communities.

An additional $210 million was added to the FY11 budget for the Phase 2 Local Water System Assistance Program. Community distributions from this program will be made from FY11 through FY23 with repayments scheduled for FY12 through FY33. The $210 million is split with $200 million allocated among 42 Metro-Boston/Metro-West communities and $10 million allocated among three Chicopee Valley Aqueduct (CVA) communities.

The Local Water System Assistance Program was expanded beginning in FY17 to include $100 million in interest-free loans to communities solely for efforts to fully replace lead service lines. The *Lead Service Line Replacement Loan Program* is budgeted over twenty years, but the pace of spending for the program will depend on the level of participation by communities, the communities' ability to work with individual homeowners, and future regulatory requirements.

In FY18 Local Water System Assistance Program Phase 3 was added in the amount of $292 million. Community distributions from this program will be made from FY18 through FY30 with repayments scheduled for FY19 through FY40.

Scope

Sub-phase	Scope	Status
Community Loans	Loans for MWRA water communities to replace and rehabilitate local water pipelines based on each community's share of total unlined pipe miles. These loans will be complete by the end of FY13.	Completed
Community Repayments	Principal repayment over a ten-year period beginning one year after origination of the loans.	Active
Local Water System Assistance Program Loans	This is a continuation of the program of providing interest-free loans to water system communities for pipeline replacement, cleaning and lining, water metering and other local water system improvements.	Active
Local Water System Assistance Program Repayments	Principal repayment over a ten-year period beginning one year after origination of the loans.	Active

CVA Loans	This is an extension of the Local Water System Assistance program to the CVA communities to provide interest-free loans to water system communities for pipeline replacement, cleaning and lining, water metering and other local water system improvements.	Active
CVA Repayments	Principal repayment over a ten-year period beginning one year after origination of the loans.	Active
Lead Service Line Replacement Loans	Replacement of lead service lines budgeted over a twenty year period beginning in FY17.	Active
Lead Service Line Replacement Repayments	Principal repayment over a ten-year period beginning one year after origination of the loans.	Active
Local Water System Assistance Phase 3 Loans	This is a continuation of the program (Phase 3) of providing interest-free loans to water system communities for pipeline replacement, cleaning and lining, water metering and other local water system improvements.	Active
Local Water System Assistance Phase 3 Repayments	Principal repayment over a ten-year period beginning one year after origination of the loans.	Active
Local Water System Assistance Phase 3 CVA Loans	This is an extension of the Local Water System Assistance program to the CVA communities to provide interest-free loans to water system communities for pipeline replacement, cleaning and lining, water metering and other local water system improvements.	Active
Local Water System Assistance Phase 3 CVA Repayments	Principal repayment over a ten-year period beginning one year after origination of the loans.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget*	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$0	$140,273	($140,273)	$22,400	$9,698	$37,498	$20,033	($197,804)

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

Project Distribution Status 12/18	49.8%	Through December 2018, MWRA has distributed $410.4 million in loans to fund 421 projects in 42 communities under the Local Water System Financial Assistance Program.

Project Repayment Status 12/18	31.2%	Through December 2018, a total of $257.5 million has been repaid by member communities receiving interest-free loans under the Local Water System Assistance Program.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$0	$0	$0	May-46	May-46	None	$32,408	$37,498	$5,090

Explanation of Changes

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

CEB Impact

- The annual interest paid for the Commercial Paper program supporting the Local Water System Assistance Program initiative is over $635,000 average per year based on the last 5 years of actual spending.

S. 766 Waterworks Facility Asset Protection

Project Purpose and Benefits

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

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

Project History and Background

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

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

While the current schedule indicates a completion date of 2023 for construction, the Waterworks Facility Asset Protection project will be ongoing throughout the useful life of the facilities.

Scope

Sub-phase	Scope	Status
Meter Vault Manhole Retrofits Design and Construction (6689/7479)	Retrofit approximately 195 meter manholes.	Future
Painting for Deer Island Water Storage Tank (7601)	Exterior and interior abrasive blast cleaning and painting for Deer Island Tank. Structural and concrete repairs. Removing, storing, installing and reinstalling components of the microwave communication system. Erection and maintenance for scaffolding and staging including enclosures with protection and ventilation.	Active
Painting for Bellevue 2 and Turkey Hill Steel Water Storage Tanks (7634)	Exterior and interior abrasive blast cleaning and painting for Bellevue 2 and Turkey Hill Tanks. Structural and concrete repairs and design and erect scaffolding to support the temporary antenna relocation at Turkey Hill. Installation of the interior components of the cathodic protection system.	Active
Design/CA for Steel Tank Improvements (6832), Construction (7493) and REI (7676)	Design and construction to repaint, replace cathodic protection systems and make necessary improvements to 3 steel water storage tanks (Bellevue 1, Park Circle, and Walnut Hill). Design and construction for improvements to the recently painted Bellevue 2, Turkey Hill and Deer Island storage tanks.	Future
Waltham Pipe Bridge Replacement (6910)	Replacement of approximately 100 feet of 30-inch steel pipe over commuter rail tracks in Waltham including a bridge crossing.	Completed

Sub-phase	Scope	Status
Design and Construction Cosgrove Valve Replacement (7064/7065)	Replacement of isolation sluice gates at Cosgrove Intake to improve reliability for emergency shut down of Cosgrove facility and to isolate new sliding sleeve valves to facilitate preventive maintenance and any future corrective maintenance.	Future
Transformer at Cosgrove Intake Building (7228)	Replacement of a 45 year old main service transformer and load break switch. This transformer supplies power to the Cosgrove Intake Building. If it were to fail, the building would be running on generator power for a significant period of time.	Completed
Covered Storage Tank Rehabilitation Design and Construction (7385/7482)	Rehabilitation of Fells and Loring Road Covered storage facilities commencing in FY19. The valves, sluice gates, and piping should be considered for rehabilitation by this time, as each facility will be more than 20 years old.	Future
Electrical Distribution Upgrades at Southborough (7425)	Upgrade of existing 13.8kV distribution system that supplies the various buildings at Southborough Complex due to on-going service disruptions. Install electrical metering equipment to better manage electrical use in facility.	Future
Water Meter Upgrade Replacement Design CA/RI (7542) and Construction (7453)	Replace six older Venturi meters in Boston and upgrade to above ground cabinets. 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. Task Order services are being used to support ESDC services.	Future
New Roofs at Water Pumping Stations Design/CA/RI (7628) and 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.	Active
Generator Docking Station (7025) and REI (7024)	To install an electrical switchboard eleven facilities, 5 - Water and 6 - Wastewater as a means for a quick connection to a towable generator. Generator will be deployed for use as a back-up in the event of prolonged utility failure or failure of the in-house emergency power generator.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$39,875	$2,383	$37,492	$6,519	$4,877	$125,980	$11,512	$0

Project Status 12/18	9.0%	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. Bellevue Hill II and Turkey Hill Tanks Repainting are expected to commenced in August 2018. Cosgrove Roof Replacement began in September 2018 and Gillis PS/Cottage Farm CSO Roof Replacement and Generator Docking Station are expected to commence in 2019.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$40,882	$39,875	($1,007)	Jul-26	Jul-26	None	$29,191	$25,980	($3,211)

Explanation of Changes

- Project cost changed due to award was less than budgeted for the Painting Bellevue 2 and Turkey Hill Tanks, partially offset by updated cost estimates for Generator Docking Station for resident/inspection services, Painting Deer Island Water Tank, and award greater than budgeted for Cosgrove Intake Roof Replacement.

- Project spending changed primarily due to several schedule changes including Steel Tank Improvements Design/Construction Administration, Construction, and Resident Engineering/Inspection. Also, award was less than budgeted for the Painting Bellevue 2 and Turkey Hill Tank, partially offset by updated cost estimates listed above.

CEB Impacts

- None identified at this time.

Business and Operations Support

S. 881 Equipment Purchase

Project Purpose

To provide critical equipment for improved maintenance and operations at MWRA facilities.

Project History and Background

This project includes the purchase of large vehicles, purchase and installation of security equipment at various MWRA facilities, and purchase of an Inductively Coupled Plasma-Mass Spectrometer (ICP-MS) for MWRA's Central Laboratory. The security equipment and installation component of the project includes the design and installation of security systems at MWRA facilities. MWRA is ranking facilities and locations with respect to the critical nature of service delivery, with an emphasis on the waterworks system. This ranking will frame the extent and scheduling of the security improvements for each specific site.

Scope

Sub-phase	Scope	Status
Security Equipment & Installation	Design and installation of security systems at various MWRA facilities and sites.	Active
ICP-MS Lab Testing Equipment	Purchase of Inductively Coupled Plasma – Mass Spectrometer to replace a 14-year-old instrument and expand the laboratory's high sensitivity metals testing capacity. Equipment was purchased in 2008.	Completed
FY14-18 Major Laboratory Instrumentation	Purchase major laboratory instrumentation, such as high resolution GC-MS or LC-MS to provide for lab testing of newly regulated contaminants.	Active
Vehicles:		
High Lift Fork Loader (Lull)	Purchase High Lift Fork Loader (Lull) to move equipment and materials at Deer Island.	Completed
Prior Vehicle Purchases	Vehicle purchases including TV Inspection Truck, Two Back Hoes, Vactor Truck, Water Service Truck, Bucket Machine, Excavator, Grove Crane, Land Fill Loader, Power Sweeper/Catch Basin Cleaner, Front-End Loader, Two Dump Trucks, Crane, and International Tractor/Trailer.	Completed
Ramp Truck	Purchase of Ramp Truck to support Fleet Services.	Completed
Street Sweeper	Purchase of Street Sweeper to support MWRA facilities and community assistance.	Completed
Contaminant Monitoring Equipment	Contaminant monitoring equipment including radiological monitoring, contaminant monitoring system panel replacement or expansion, and buoys.	Future
FY11-13 Vehicle Purchases	Vehicle purchases planned for FY11-13.	Completed
FY14-18 Vehicle Purchases	Vehicle purchases planned for FY14-18.	Completed
FY19-23 Vehicle Purchases	Vehicle purchases planned for FY19-23.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$38,706	$21,857	$16,849	$2,039	$1,743	$10,069	$6,780	$0

Project Status 12/18	58.7%	Status as % is approximation based on project budget and expenditures. Purchase and installation of security equipment is in process and will continue into FY23.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$33,825	$38,706	$4,881	Jun-23	Jun-28	None	$9,391	$10,069	$678

Explanation of Changes

- Project cost and spending increased primarily due to updated cost estimates for Vehicle Purchases, and Security Equipment and Installation.
- Schedule changed due to updated cost and schedule for vehicle purchases beyond FY23.

CEB Impacts

- No impacts identified at this time.

S.925 Technical Assistance

Project Purpose

To ensure ready access on an as needed basis, to professional and technical services not available or not cost-effectively provided by in-house staff.

Project History and Background

Efficient implementation of MWRA's Capital Improvement Program and other projects often requires specialized skills and technical assistance that are not available from in-house staff. This project ensures ready access to a variety of services through a series of task order contracts with pre-set limits. Task orders are used when immediate expertise on projects is required. When a task order is complete, the expense is transferred to the appropriate capital project or Current Expense Budget cost center.

Scope

Sub-phase	Scope
Technical Assistance	MWRA technical assistance contracts include the following: surveying, hazardous materials assessment, and land appraisals.

Status: MWRA uses technical assistance contracts in support of various CIP and CEB projects.

Expenditure Forecast (in $000s)

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$ 1,100	$0	$1,100	$0	$366	$1,100	$0	$0

Changes in Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY19	Chge.
$1,100	$1,100	$0	Jun-21	Jun-22	12 mos.	$1,074	$1,100	$26

Explanation of Changes

- Schedule and spending 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. Sub-phases consist of As-Needed Design phases 1-19.	Completed/Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$28,162	$14,201	$13,961	$3,240	$3,437	$13,961	$0	$0

Project Status 12/18	52.4%	Status as % is approximation based on project budget and expenditures. All tasks in *Inventory & Evaluation Phases 1 & 2* are complete. As-Needed Design 7 was substantially completed in July 2012. As-Needed Design 8 was completed in February 2012. As-Needed Contracts 9 and 10 were completed in January and February 2014, respectively. Contract 11 was completed in August 2015. Contracts 12 and 13 were completed in July 2016 and August 2016, respectively. As-Needed Contracts 14 and 15 commenced in June 2016 and were completed in December 2018. Contracts 16 and 17 commenced in June 2018.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
23,157	$28,162	$5,005	Sep-21	Sep-21	None	$8,519	$13,961	$5,442

Explanation of Changes

- Project cost changed primarily due to new contracts added for As-Needed Design 18 and 19.
- Spending changed due to new contracts added for As-Needed Design 18 and 19 as well as updated cash flows for As-Needed Design contracts 14 and 15.

CEB Impacts

- None identified at this time.

S. 934 MWRA Facilities Management and Planning

Project Purpose

To improve MWRA operations by consolidating projects and providing a central point of review and decision making for space planning decisions.

Project History and Background

This project consolidated existing MWRA projects (DI Maintenance Facilities and DI CSB Demolition) to provide a central point of review and decision making for space planning decisions across the organization.

The project will cover work to rehabilitate or demolish the old Administration Building on Deer Island as the building has deteriorated and certain structures need to be upgraded to current standards if it is to remain occupied. The project also included funds for demolition of the CSB (Construction Support Building) which was built as a temporary structure and has also deteriorated. The CSB Demolition contract was completed in September 2009.

Scope

Sub-phase	Scope	Status
Design & Engineering Services	Design and engineering services to support space plan.	Future
Facilities Construction	Construction of modifications to MWRA facilities in accordance with space plan.	Completed/Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$2,871	$371	$2,500	$0	$300	$2,500	$0	$0

Project Status 12/18	12.9%	Status as % is approximation based on project budget and expenditures. CSB Demolition contract was substantially complete in September 2009. Records Center Shelving and Moving to the interim warehouse/records center was completed in the spring of 2009. Remaining work is to demolish old Administration Building on Deer Island. Some rehabilitation work will need to be done as well.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$2,151	$2,871	$720	Mar-21	Sep-21	6 mos.	$1,780	$2,500	$720

Explanation of Changes

- Project cost and spending changed due to updated cost estimates for DI Administration Building Design and Construction.

- Project schedule shifted due to project priorities.

CEB Impacts

- None identified at this time.

S. 935 Alternative Energy Initiatives

Project Purpose

A comprehensive "green energy" initiative that is expected to bring solar, wind and hydroelectric power either alone or in combination to a number of MWRA facilities

Project History and Background

This project was originally included under Deer Island in previous budget cycles. Building upon its track record in sustainable resource use – most notably dramatic system-wide reductions in water demand, 100% beneficial reuse of biosolids, self-generation of approximately 25% of Deer's Island power needs, and maximizing revenue through hydropower – MWRA continues to work aggressively to use its resources efficiently, respond appropriately to climate change, and reduce the environmental impacts of its daily operations. Key initiatives completed to-date include: A comprehensive "green energy" initiative that brought solar, wind and hydroelectric power to a number of MWRA facilities.

Scope

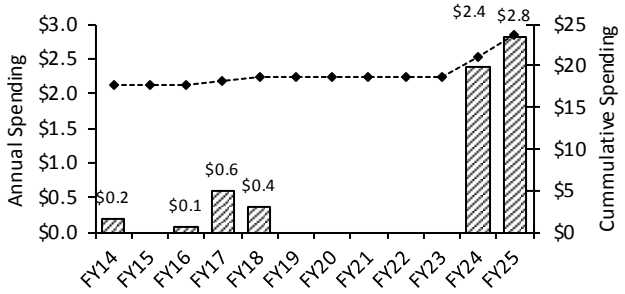
Sub-phase	Scope	Status
DI Solar Residuals Odor Control (ROC)	Design and construction of 100 kw photovoltaic array. Projected annual output estimated at 105,000 kwh.	Completed
DI Wind	Design and construction of 2 600kw solar wind turbine systems. Projected annual output estimated at 2,300,000 kwh. Project added to include repair/rehabilitation contract.	Completed
DI Solar Maintenance/Warehouse	Design and construction of 180kw photovoltaic array. Projected annual output estimated at over 200,000 kwh. Project funding includes $735K million from the American Recovery and Reinvestment Act ("ARRA").	Completed
Future Renewable Energy (7270)	Design and construction for future renewable energy projects throughout the Authority.	Future
DI Solar Power Purchase Agreement (PPA)	Design and construction of 456 kw photovoltaic array through a third party 20 yr Power Purchase Agreement. Projected annual output estimated at 520,000 kwh. Project partially subsidized by $1.1M from ARRA program. No capital costs to MWRA; pay for electricity generated.	Completed
Loring Road Hydro	Construction of a 200 kW hydropower turbine/generator at Loring Road. Projected annual output estimated at 1,200,000 kwh. Project funding includes $1.5 million from the ARRA program.	Completed
Energy Adv Con Services	Consultant for comprehensive energy advisory services on throughout the Authority.	Completed
Technical Assistance	Various technical assistance contracts to aid solar, wind, and hydro initiatives.	Completed
Carroll WTP Solar Construction	Installation of photovoltaic cells with generating capacity of 496 kw at Carroll WTP plant. Projected annual output estimated at over 616,000 kwh. Project funding includes $2.2 million from the ARRA program.	Completed

Charlestown Wind	Design and construction of 1.5 MW wind turbine system. Projected annual output estimated at 3,000,000 kwh. Project funding includes $4.8 million from the ARRA program.	Completed

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$23,598	$18,418	$5,181	$0	$0	$0	$5,181	$0

Alternative Energy Initiatives



Project Status 12/18	78.0%	Status as % is approximation based on project budget and expenditures. Carroll Water Treatment Solar and Loring Road Hydro Construction were completed in May 2011. Carroll Water Treatment Plant Solar Construction and Charlestown Wind Project were completed in 2011. DITP Solar PPA was completed in 2011. Hatchery Pipeline & Hydro was substantially complete in September 2017.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$23,476	$23,598	$122	Dec-24	Dec-24	None	$0	$0	$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 1,150 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 1,394 desktops, 214 laptops, 115 servers, 20 Wide Area Network Circuits and associated ancillary equipment, as well as the 18 Terabytes of data managed by MIS.

S. 940 Applications Improvements Program

Project Purpose

To develop, improve, and procure management information systems (MIS) applications to improve efficiencies of business processes associated with managing the operations, and support divisions.

Project History and Background

This program will continue the good work started in previous years to update and enhance a wide range of applications to improve efficiencies of business process and effectiveness of the staff performing the processes while ensuring the availability, integrity and confidentiality of the MWRA's data resources. The program will continue to enhance the integration and availability of data to provide a more holistic view of the overall operational status with seamless access to the detailed data.

Scope – The table describes the CIP phases and associated projects.

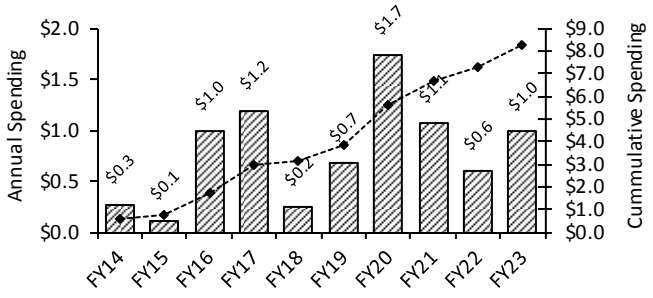
Sub-phase	Scope	Status
GIS Applications & Integration	Expand role of GIS technology for scientific, environmental and engineering applications. This project will assess the current state of the GIS Program and make recommendations for improvements.	Future
Lawson Upgrade	Upgrade current Infor application to version 11 and ultimately to version 12, Infor's latest version.	Future
Maximo Upgrade	Completed high priority pending items post Maximo upgrade to v7.6, such as IBM Control Desk (ICD) workflow automation for identified processes, added Clinton site, integrations with Lawson, and message re-processing. An end to end Maximo application performance study was conducted by a third party vendor and appropriate corrective measures were applied.	Completed
Pre-Treatment Information Management System (PIMS) Replace or Build	PIMS system is used by the MWRA to monitor the pretreatment program pursuant to MWRA's NPDES permit and EPA regulations. PIMS CROMERR implementation, deployment of release 12, move of PIMS database to Oracle Database Appliance (ODA) and upgrade server operating system to supported version are planned.	Future
SAP BO Migration	Upgrade SAP Business Objects Suite, including Crystal Reports, to the most recent version. Currently, the Business Objects platform is used to provide custom reports and data visualization to end-users of various data systems. This upgrade will include the migration of nearly 1000 existing reports.	Active

Sub-phase	Scope	Status
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	Technical consultant services to implement upgrades to the Water Quality reporting System.	Active
Laboratory Information Management System (LIMS) Upgrade	E-Lab is a project that will improve productivity of staff and reduce the amount of paper being generated. This initiative added a new module into LIMS called Electric Laboratory Notebook (ELN). ELN replaced paper based laboratory notebooks with tablets that are connected to LIMS and integrated into the core product. This project included the purchase of tablets, ELN licenses and services required to implement the new module. Phase I of the project is complete for the Water Labs. An Improvement project is currently underway and once completed, Phase II will begin for the Wastewater Labs.	Future
Lawson Global HR	Upgrade to Infor's Global Human Resources to provide the latest enhancements to the Employee Safety, Position Budgeting, Benefits, Employee Relations, Absence and Occupational Health modules as well as introduce a new configurable Organizational / person structure to our HR platform.	Future
Time Entry System/WFM	Provide a new time entry and tracking system that includes all of the modern Work Force Management (WFM) features.	Future
AP Invoice Automation	Automate the paper-based process for processing invoices and getting payment authorization from the divisions.	Future
Hyperion	The Hyperion Pillar application, currently used for budgeting, is out dated and no longer supported by Oracle and needs to be replaced with a commercially viable product, most likely the Infor Budget module.	Future
8M Permit	Develop a system that will manage the issuance of 8M Permits required for certain construction projects. The permits allow other entities to build, construct, excavate, or cross within an easement or other property interest held by the Authority.	Future
Instrument Data Management	There is a need for ancillary in-house (LIMS) data management improvements for laboratory instruments at MWRA. Massachusetts certification and records retention laws require that raw data from instruments be retained and accessible for up to 15 years. While the final results and a limited amount of raw data are transferred from the instruments' data systems to LIMS, the bulk of the raw data are retained and archived outside of LIMS. The current approach is labor-intensive, thus a more user-friendly, automated approach is needed.	Future
PI (OSI)	Consolidation of the separate DI and FOD PI systems into one.	Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY23
$11,413	$2,892	$8,521	$679	$1,733	$5,060	$3,461	$0

Application Improvements Program



Project Status 12/18	25.3%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$12,198	$11,413	($785)	Sep-25	Sep-25	None	$5,337	$5,060	($277)

Explanation of Changes

- Project cost and spending changed due to updated, re-structured, and re-scheduled Application Improvements MIS initiatives for the next five years.

CEB Impacts

- None identified at this time.

S. 942 Information Security Program

Project Purpose

To ensuring the availability, integrity and confidentiality of the MWRA's data resources through the selection and implementation of Information technology solutions associated with cyber security.

Project History and Background

This program focuses on the resiliency and sustainability of the MWRA's data security practices. The projects associated with this program established policies, procedures and an information security awareness program for all of the MWRA. This program included the design of both an information security program and electronic security plans in order to provide a more formal, comprehensive IT security framework that is compliant with Federal Standards.

Scope – The table describes the CIP phases and associated projects.

Sub-phase	Scope	Status
MSSP	The current Managed Security Service Provider (MSSP) contract ends on 6/30/21.	Active
ITSM Access Management	Implementation of additional technologies to manage and monitor user access to IT assets and services.	Future
MSSP/SIEM	New contract for Managed Security Service Provider (MSSP) and Security information and event management (SIEM) starting 7/1/21.	Future
Active Directory	The authentication services application for MWRA systems is Microsoft's Active Directory. The version currently installed is end-of-life and will need to be upgraded over the next year.	Future
XEN Mobile/XEN App/Work Space	Upgrade the existing mobile device, remote access and Sharefile services.	Future
Information Security Plan Implementation	Coordinate a system-by-system development of Information Security Plan to apply security controls and standards to each system within MWRA's application portfolio.	Future
IT Security Program (ISP) Development	Formal and informal activities to inform staff (including contractors and business partners) of the information security risks associated with their activities and their responsibilities in complying with MWRA policies and procedures designed to reduce these risks. This project started in FY13 and was completed in FY14.	Completed

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$5,506	$1,708	$3,798	$47	$1,087	$3,798	$0	$0

Project Status 12/18	31.0%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**	**FY19**	**FY20**	**Chge.**
$3,727	$5,506	$1,779	Jun-23	Jun-21	(24) mos.	$2,045	$3,798	$1,753

Explanation of Changes

- Project cost, schedule, and spending changed due to updated, re-structured, and re-scheduled Information Security Program MIS initiatives for the next five years.

CEB Impacts

- None identified at this time.

S. 944 Information Technology Management Program

Project Purpose

To improve the overall efficiencies in how MIS delivers IT services and to more effectively adapt to the changing business needs associated with managing the operational and administrative systems of the Authority.

Project History and Background

This program improves the organization of MIS and the oversight processes for selecting and implementing IT solutions throughout the MWRA. This program updates the IT Steering Committee to ensure that the business and technology priorities of the MWRA are aligned and are being met.

Scope – The table describes the CIP phases and associated projects.

Sub-phase	Scope	Status
IT Project Management Methodology	Implement a set of procedures, standards, tools and techniques that will improve the predictability of deliverables and cost associated with information technology projects.	Active

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$200	$0	$200	$200	$0	$200	$0	$0

Project Status 12/18	0%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$636	$200	($436)	Dec-20	Jun-19	(18) mos.	$636	$200	($436)

Explanation of Changes

- Project cost, schedule and spending changed primarily due to moving Software Development Life Cycle contract to Application Improvements Program project and deleting contract for Service Delivery & Best Practices.

CEB Impacts

- None identified at this time.

S. 946 IT Infrastructure Program

Project Purpose

To assess and implement consolidated and optimized versions of equipment and data bases and improve and optimize data management practices.

Project History and Background

The MWRA currently owns and operates 1,394 desktops, 214 laptops, 115 servers, 20 Wide Area Network Circuits and associated ancillary equipment, as well as 18 Terabytes of data. This program assesses and implements consolidated and optimized versions of core IT infrastructure elements to improve and optimize data management practices, including: storage, backup, archive and purge processes, and technologies.

Scope – The table describes the CIP phases and associated projects.

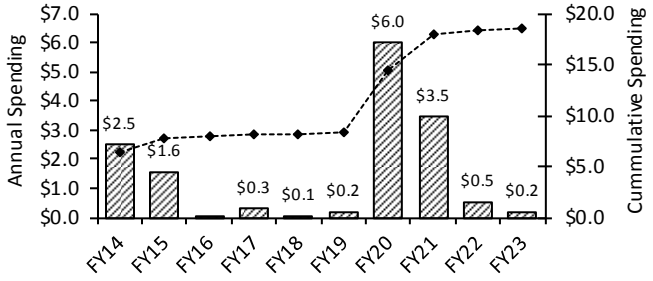
Sub-phase	Scope	Status
IT Infrastructure Upgrades	Server upgrades will be performed in FY18. These upgrades will use specifications developed for server hardware and software including ability to implement greater virtualization as well as take advantage of opportunities to standardize operating systems, and hardware, for greater ease of support.	Completed
Cabling	Replacement of older Ethernet cabling to support PBX replacement.	Future
Sans Storage	Implement recommended IT infrastructure changes that include enhancements to capacity and performance of networking and communications, storage, backups, server consolidation, disaster recovery, and integration approach and tools.	Future
Oracle Database Appliance	Upgrade Oracle Database appliances that will be end-of-life.	Future
Servers Upgrades	Develop specifications for server hardware and software including ability to implement greater virtualization. Seek opportunities to standardize operating systems, and hardware for greater ease of support.	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.	Future
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.	Future
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	Future

Sub-Phase	Scope	Status
Core Switches	Upgrade of existing end-of-life hardware.	Future
Edge Switches	Upgrade of existing end-of-life hardware.	Future
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.	Future

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY18	Remaining Balance	FY19	FY20	FY19-23	FY24-28	Beyond FY28
$16,602	$5,731	$10,471	$172	$6,004	$10,319	$152	$0

IT Infrastucture Program



Project Status 12/18	35.4%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY19-23 Spending		
FY19	FY20	Chge.	FY19	FY20	Chge.	FY19	FY20	Chge.
$15,754	$16,202	$448	Dec-22	Dec-23	12 mos.	$9,789	$10,319	$530

Explanation of Changes

- Project cost, schedule, and spending changed due to updated, re-structured, and re-scheduled Information Technology Infrastructure initiatives for the next five years.

CEB Impacts

- Annual incremental cost for Storage Upgrades are estimated at $100,000 in FY22; and $101,000 for the IT

Infrastructure Program in FY22.

APPENDIX 2

Expenditure Forecast Report with Planned NTP and SC dates

Understanding the Expenditure Forecast

Capital expenditure forecasts, also referred to as projected cashflows, are presented in this section of the FY20 Proposed CIP document. Expenditure forecasts are accrual based, i.e., they are estimated based on when services are expected to be rendered. Projects appear in this report in the same order they appear on-line, i.e. organized by capital program area.

The following presents a description of each column in the expenditure forecast tables:

Project and Subphase Names

The first column of the expenditure forecast identifies the organizational hierarchy of the CIP: division area (i.e., Wastewater), followed by the program category (i.e., Interception and Pumping), then individual sub-phases (i.e. Design/CS/RI,) followed by the project name and dollar totals comprising all the sub-phases within that project (i.e. Braintree-Weymouth Relief Facilities). Sub-phases represent both awarded and unawarded contracts.

Contract Number

Following each project name is a string of nine numbers. These numbers are assigned by the Rates and Budget Department and are the number reference for the sub-phase in MWRA's capital budgeting database.

The first string is a five-digit number representing the MWRA Lawson Activity Management System sub-phase number. Project budgets and expenditures are tracked by this account number.

Following the five-digit sub-phase number is a four-digit number representing the contract reference number in MWRA's contract management system. This reference number is used to access contract information such as the award amount, change order activity, and processed invoices.

Notice to Proceed (NTP) and Substantial Completion (SC)

Project schedules are tracked by two key milestones; Notice to Proceed and Substantial Completion. These milestones indicate the expected start and end dates for contract activity.

Contract Value

The Contract Value represents the budgeted amount for the capital program, divisions, program categories, projects, and sub-phases. For unawarded contracts, the contract amount is based on a cost estimate. For awarded contracts, this amount includes the award amount plus any change orders, amendments, and purchase orders accounted for prior to completing the budget.

Payments through FY18

Payments through FY18 include actual and accrued expenditures since the inception of the contract through the end of FY18.

Remaining Balance

Remaining Balance is calculated by subtracting Payments through FY18 from the Contract Amount. This amount is then spread in the columns to the right, for FY19, FY19-23, and Beyond FY23.

APPENDIX 2
FY20 PROPOSED FIVE-YEAR CIP BY MAJOR PROGRAM CATEGORY
FY20 by Quarters

CAPITAL IMPROVEMENT PROGRAM													
EXPENDITURE FORECAST FY2019-2023													
($000)													
	Total Contract Amount	Project Payments Thr. FY18	Balance as of 6/30/18	FY19	QI FY20	QII FY20	QIII FY20	QIV FY20	FY20	FY21	FY22	FY23	5-Year Total FY19-23
Wastewater System Improvements	3,700,571	2,061,317	1,639,254	82,761	37,388	41,860	42,206	48,242	169,697	161,383	138,482	124,732	677,055
Waterworks System Improvements	4,287,691	2,111,415	2,176,276	85,195	17,909	16,752	15,853	14,920	65,434	83,467	73,204	52,562	359,861
Business & Operations Support	163,611	101,030	62,581	6,377	3,537	3,119	4,926	3,088	14,671	13,850	7,071	5,039	47,008
Total MWRA	8,151,873	4,273,762	3,878,111	174,333	58,835	61,732	62,985	66,250	249,802	258,700	218,756	182,333	1,083,924
Contingency	181,067		181,067						13,636	14,809	12,451	10,745	51,641
Total MWRA w/ Contingency	8,332,940	4,273,762	4,059,178	174,333	58,835	61,732	62,985	66,250	263,438	273,509	231,207	193,077	1,135,565

Massachusetts Water Resources Authority
Capital Improvement Program
FY20 Proposed Expenditure Forecast

Program / Project / Contract	Contract No.	Notice to Proceed	Substantial Completion	Total Contract Amount	Payments through FY18	Remaining Balance	FY19	FY20	FY21	FY22	FY23	FY19-FY23 Expenditures	FY24-FY28 Expenditures	Beyond FY28
Total MWRA				**8,151,873,364**	**4,273,762,304**	**3,878,111,061**	**174,333,281**	**249,801,950**	**258,700,059**	**218,756,210**	**182,332,747**	**1,083,924,249**	**1,578,394,290**	**1,215,792,452**
Wastewater				**3,700,571,273**	**2,061,317,110**	**1,639,254,164**	**82,761,348**	**169,696,888**	**161,382,659**	**138,482,031**	**124,732,035**	**677,054,961**	**855,910,165**	**106,289,015**
Interception & Pumping				**1,192,713,929**	**602,400,132**	**590,313,797**	**39,678,011**	**65,280,018**	**50,015,767**	**28,838,263**	**19,521,447**	**203,333,506**	**331,873,087**	**55,107,202**
102 Quincy Pump Facilities Total	**completed project**			**25,907,202**	**25,907,202**	**-**								
104 Braintree-Weymouth Relief Facilities														
Geotechnical - Marine	10001_5333	Nov-91	Apr-92	442,860	442,860	-								
Geotechnical - Land	10044_5332	Nov-91	Mar-92	7,980	7,980	-								
Facilities Planning - Phase 1	10045_5311	Oct-81	Dec-90	331,140	331,140	-								
EIR - Phase 1	10046_5312	Nov-84	Oct-90	513,530	513,530	-								
Design 1/CS/RI	10047_5313	Nov-94	Jun-06	18,882,312	18,882,312	-								
Land Acquisition	10048_5314	Mar-97	Jun-10	12,841,909	12,841,908	-								
Tunnel Construction/Rescue	10049_5315	Jun-99	Jul-03	83,190,599	83,190,599	-								
Intermediate Pump Station - Construction	10050_5316	Dec-00	Apr-05	47,444,929	47,444,929	-								
North Weymouth Relief Interceptor	10051_5303	Mar-01	Jun-02	4,704,618	4,704,618	-								
HDD Siphon - Construction	10052_5373	Jul-03	May-07	16,357,407	16,357,407	-								
B-W Replacement Pump Station	10054_5375	Jan-05	Apr-08	17,728,028	17,728,028	-								
Design - Rehab	10055_5308	Sep-88	Dec-89	23,710	23,710	-								
Construction - Rehab	10056_5309	Jan-92	Dec-96	255,490	255,490	-								
Final EIR/Facility Plan	10057_5324	Apr-91	Aug-93	1,111,007	1,111,007	-								
Design 2/CS/RI	10058_5331	Apr-95	Dec-11	14,999,141	14,999,141	-								
Rehabilitation of Section 624 - Construction	10060_5310	Jul-10	Dec-10	2,505,767	2,505,767	-								
Technical Assistance	10061_5951	Nov-84	Apr-07	144,264	144,264	-								
Sedimentation Testing	10251_6016	Sep-94	Apr-96	95,880	95,880	-								
Legal	10263_6072	Jul-95	Apr-08	849,220	849,220	-								
Hazardous Waste	10265_6074	Jul-95	Apr-07	7,937	7,937	-								
Marine Pipeline - Design	10278_6119	Feb-97	Aug-97	1,100,000	1,100,000	-								
Mill Cove Siphon - Construction	10302_6368	Aug-97	Jun-98	2,748,908	2,748,908	-								
Community Technical Assistance	10354_6631	Jul-99	Apr-07	1,111,451	1,111,451	-								
Geotechnical Consultant	10375_6766	Sep-00	Mar-03	56,045	56,045	-								
IPS/RPS Communication System	10378_6792	Dec-02	Apr-08	224,884	224,884	-								
Wetlands Replication	10470_7290			25,607	25,606	1								
Mill Cove Siphon Sluice Gates - Design	10479_7326	Apr-24	Apr-27	834,870	-	834,870							834,870	
Mill Cove Sluice Gates - Construction	10480_7327	Aug-25	Apr-26	2,000,000	-	2,000,000							2,000,000	
B/W Improvements - Construction	10493_7366	Sep-23	Sep-25	7,000,000	-	7,000,000							7,000,000	
B/W Improve - Design/CS	19567_7435	Nov-18	Nov-23	2,085,170	-	2,085,170	173,764	417,034	417,034	417,034	417,034	1,841,900	243,270	
B/W Improvements - REI	19568_7683	Sep-23	Sep-25	480,000	-	480,000							480,000	
104 Braintree-Weymouth Relief Facilities Total				**240,104,663**	**227,704,621**	**12,400,041**	**173,764**	**417,034**	**417,034**	**417,034**	**417,034**	**1,841,900**	**10,558,140**	
105 New Neponset Valley Relief Sewer Total	**completed project**			**30,300,304**	**30,300,304**	**-**								
106 Wellesley Extension Replacement Sewer Total	**completed project**			**64,358,543**	**64,358,543**	**-**								
107 Framingham Extension Relief Sewer Total	**completed project**			**47,855,986**	**47,855,986**	**-**								
127 Cummingsville Replacement Sewer Total	**completed project**			**8,998,768**	**8,998,768**	**-**								
130 Siphon Structure Rehabilitation														
Planning	10253_6017	Jan-96	Nov-98	937,670	937,670	-								
Land Acquisition	10280_6165	Oct-20	Oct-22	50,000	2,100	47,900			18,700	25,000	4,200	47,900		
Design/CS/RI	10293_6224	Apr-19	Oct-23	1,584,200	-	1,584,200	60,000	460,000	460,000	460,000	120,000	1,560,000	24,200	
Construction	10294_6225	Apr-21	Oct-22	3,960,360	-	3,960,360			500,000	2,700,000	760,360	3,960,360		
Phase 2 Land Acquisition	10600_7684	Dec-24	Dec-26	50,000	-	50,000							50,000	
Phase 2 Design CS/RI	10601_7685	Jul-23	Dec-27	1,584,200	-	1,584,200							1,584,200	
Phase 2 Construction	10602_7686	Jul-25	Dec-26	3,960,360	-	3,960,360							3,960,360	
130 Siphon Structure Rehabilitation Total				**12,126,790**	**939,770**	**11,187,020**	**60,000**	**460,000**	**978,700**	**3,185,000**	**884,560**	**5,568,260**	**5,618,760**	

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131 Upper Neponset Valley Sewer System Total	**completed project**			**54,174,077**	**54,174,077**	**-**								
132 Corrosion & Odor Control														
Planning/Study	10279_6137	Jan-97	Dec-98	587,422	587,422	-								
Land Acquisition	10323_6549	Aug-02	Jun-05	22,945	11,831	11,114	11,114					11,114		
Legal	10325_6551	Dec-00	Jul-08	1,925	1,925	-								
Design/CS/RI	10327_6553	Aug-02	Jun-05	1,787,912	1,787,912	-								
Interim Corrosion Control	10373_6743	Jul-00	Dec-01	620,805	620,805	-								
FES/FERS Biofilters - Design	10406_6919	Jul-23	May-26	1,193,533	-	1,193,533							1,193,533	
FES/FERS Biofilters - Construction	10456_7215	Dec-23	Dec-24	1,953,054	-	1,953,054							1,953,054	
System-wide Odor Control - Study	10491_7364	Jan-24	Jan-26	1,000,000	-	1,000,000							1,000,000	
NI Mechanical & Electrical Upgrades - Design/CA	10492_7365	Jul-23	Nov-28	4,800,000	-	4,800,000							3,960,000	840,000
NI System-wide Odor Control - Evaluation	10495_7494	Sep-15	Feb-17	487,280	487,280	-								
NI Mechanical & Electrical Upgrades - Construction	10496_7495	Nov-25	Nov-27	20,000,000	-	20,000,000							20,000,000	
NI Odor Control & HVAC - Design/CA/REI	10497_7517	Mar-17	Sep-23	6,236,901	2,682,765	3,554,136	955,573	781,096	781,096	781,096	240,275	3,539,136	15,000	
NI Odor Control HVAC Improvements - Constr. Phase 2	10498_7548	May-19	Sep-22	39,884,996	-	39,884,996		9,968,375	11,465,499	11,465,499	4,485,623	37,384,996	2,500,000	
NI Mechanical & Electrical Upgrades - REI	10580_7635	Nov-25	Nov-27	440,000	-	440,000							440,000	
132 Corrosion & Odor Control Total				**79,016,773**	**6,179,940**	**72,836,833**	**966,687**	**10,749,471**	**12,246,595**	**12,246,595**	**4,725,898**	**40,935,246**	**31,061,587**	**840,000**
136 West Roxbury Tunnel														
Inspection	10299_6230	Jul-98	Sep-99	344,202	344,202	-								
Tunnel Easements & Permits	10329_6566	Mar-10	Dec-15	53,789	53,789	-								
Legal	10330_6567	Apr-00	Mar-10	2,133	2,133	-								
Land Acquisition	10331_6568	Apr-00	Mar-10	440,154	440,154	-								
Construction	10332_6569	Jun-01	Jun-02	6,673,671	6,673,671	-								
Design/CS/RI	10333_6570	Apr-00	Jun-03	1,416,580	1,416,580	-								
Technical Assistance	10366_6709	Nov-99	Mar-10	7,752	7,752	-								
Tunnel - Design	10400_6897	Feb-09	Jun-11	1,375,292	1,375,292	-								
Tunnel Inspection	10401_6898	Sep-23	Jun-24	1,000,000	-	1,000,000							1,000,000	
136 West Roxbury Tunnel Total				**11,313,573**	**10,313,573**	**1,000,000**							**1,000,000**	
137 Wastewater Central Monitoring														
Planning	10301_6232	Jan-98	Jul-99	563,425	563,425	-								
Design and Integration Services	10319_6532	Jun-02	Jul-10	6,344,266	6,344,266	-								
Construction 1 (CP1)	10320_6533	Mar-06	Jan-08	7,662,173	7,662,173	-								
Construction 2 (CP2)	10321_6534	Feb-08	Jul-09	5,139,444	5,139,444	-								
Technical Assistance	10322_6535	Sep-02	Jul-10	7,425	7,425	-								
Equipment Prepurchase	10398_6861	Apr-05	Dec-09	65,303	65,303	-								
Wastewater Redundant Communications	10490_7363	Jul-20	Mar-24	700,000	-	700,000			187,000	187,000	187,000	561,000	139,000	
Design & Programming Services	10551_7578	Apr-18	Oct-27	3,470,000	-	3,470,000	171,295	268,705	160,000	160,000	160,000	920,000	2,550,000	
Construction	10552_7579	Dec-23	Oct-31	1,420,000	-	1,420,000							1,420,000	
Equipment/Hardware	10553_7580	Jun-18	Oct-27	2,110,000	-	2,110,000	200,000	80,000	100,000	100,000	100,000	580,000	1,530,000	
137 Wastewater Central Monitoring Total				**27,482,036**	**19,782,036**	**7,700,000**	**371,295**	**348,705**	**447,000**	**447,000**	**447,000**	**2,061,000**	**5,639,000**	
139 South System Relief Project														
Archdale - CS/RI	10309_6419	Nov-98	Aug-99	5,379	5,379	-								
Archdale - Construction	10310_6420	May-99	Aug-99	210,748	210,748	-								
Sections 70 & 71 HLS - Evaluation	10318_6519	Sep-98	Oct-99	215,140	215,140	-								
Outfall 023 - Design	10345_6595	Jun-99	Sep-99	509	509	-								
Outfall 023 - Cleaning	10346_6596	Apr-00	Nov-00	1,097,526	1,097,526	-								
Land Acquisition/Easements	10347_6605	Apr-99	Apr-05	5,053	5,053	-								
Sections 70 & 71 HLS - Construction	10349_6611	Jun-99	Oct-99	417,021	417,021	-								
Milton Financial Assistance	10350_6616	Oct-99	Jun-00	1,487,868	1,487,868	-								
Outfall 023 - Structural Improvements	10386_6801	Jan-24	Dec-25	1,500,000	-	1,500,000							1,500,000	
139 South System Relief Project Total				**4,939,244**	**3,439,244**	**1,500,000**							**1,500,000**	

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141 Wastewater Process Optimization														
Planning	10367_6733	Aug-01	Aug-04	930,308	930,308	-								
North System Hydraulic Study	10412_6930	Nov-11	Jun-15	571,459	571,459	-								
Somerville Sewer - Design	10413_6931	Oct-23	Mar-26	200,000	-	200,000							200,000	
Somerville Sewer - Construction	10414_6932	Mar-24	Mar-25	1,193,533	-	1,193,533							1,193,533	
North System Hydraulic Flood Engineering - Design & Const.	19401_7412	Jan-24	Jun-31	7,442,023	-	7,442,023							3,723,000	3,719,023
141 Wastewater Process Optimization Total				**10,337,323**	**1,501,767**	**8,835,556**							**5,116,533**	**3,719,023**
142 Wastewater Meter System - Equipment Replacement														
Planning / Study / Design	10371_6739	Jun-17	Aug-19	3,858,154	586,455	3,271,699	1,812,610	1,060,020	367,091	31,978		3,271,699		
Equipment Purchase & Installation	10379_6793	Nov-03	Jun-08	5,137,912	5,137,912	-								
Meter Power Design/CA	10410_6928	Jul-19	Dec-22	1,205,000	-	1,205,000		258,213	344,286	344,286	258,215	1,205,000		
Constr Meter Install	10411_6929	Dec-20	Dec-21	5,000,000	-	5,000,000		-	1,538,000	3,462,000		5,000,000		
WW Metering Asset Protect/Equip Purch	10451_7191	Aug-19	Dec-30	12,941,846	-	12,941,846		3,000,000	1,000,000			4,000,000		8,941,846
Meter Power REI	10800_7687	Dec-20	Dec-21	190,000	-	190,000			58,000	132,000		190,000		
142 Wastewater Meter System - Equipment Replacement Total				**28,332,912**	**5,724,367**	**22,608,545**	**1,812,610**	**4,318,233**	**3,307,377**	**3,970,264**	**258,215**	**13,666,699**		**8,941,846**
143 Regional I/I Management Planning Total	**completed project**			**168,987**	**168,987**	**-**								
145 Facility Asset Protection														
Prison Point HVAC Upgrades - Construction	10380_6795	Dec-10	Dec-13	2,764,181	2,764,181	-								
Remote Headworks Heating System Upgrade	10381_6796	May-05	May-06	1,175,181	1,175,181	-								
Alewife Brook Pump Station Rehab - Construction	10382_6797	Jan-16	Nov-18	13,451,447	9,773,277	3,678,171	3,678,171					3,678,171		
Rehab of Section 93A Lexington	10383_6798	Jul-03	Apr-04	1,565,742	1,565,742	-								
Chelsea Creek Upgrades - REI	10387_6802	Nov-16	Feb-21	3,446,834	864,594	2,582,239	913,316	987,027	681,897			2,582,240		
Technical Assistance	10392_6829	Jul-02	Mar-22	96,202	97,677	(1,475)	(1,475)					(1,475)		
Sections 80 & 83	10394_6842	Apr-07	Sep-07	364,590	364,590	-								
Section 160	10395_6843	Jun-07	Dec-08	1,581,369	1,581,369	-								
Survey	10396_6857	Nov-04	May-05	10,708	10,708	-								
Permits	10397_6858	May-03	May-25	14,979	14,979	-								
Remote Headworks Concept Plan	10399_6886	May-08	Sep-09	670,436	670,436	-								
Construction CB1 Sections 26 & 27	10418_6936	Sep-25	Sep-27	30,000,000	-	30,000,000							30,000,000	
Alewife Brook Pump Station Rehab - Design/CA	10419_6937	Apr-10	Oct-11	223,194	223,194	-								
Prison Point HVAC Upgrades - Design	10420_6938	Jan-08	Mar-13	441,387	441,387	-								
93 A Force Main Replacement	10423_6987	May-06	Jan-07	461,962	461,962	-								
Mill Brook Valley Sewer Sections 79 & 92	10424_7004	Jun-04	Mar-05	542,292	542,292	-								
Hingham Pump Station Isolation Gate - Construction	10427_7033	Sep-11	May-12	124,500	124,500	-								
Alewife Brook Pump Station - Final Design/CA/REI	10428_7034	Mar-12	Nov-19	2,169,652	1,634,900	534,752	524,952	9,800				534,752		
Caruso Pump Station Improvements - Design/CA/REI	10431_7037	Aug-12	Jun-17	865,096	861,097	3,999		3,999				3,999		
Land/Easements	10440_7073	Jul-03	Jun-10	103,386	103,386	-								
Nut Island Headworks Fire Alarm/Wire Conduit	10444_7144	Jun-09	Dec-09	285,391	285,391	-								
Chelsea Creek Upgrades - Construction	10445_7161	Nov-16	Nov-20	81,783,873	31,530,134	50,253,739	24,586,094	19,273,913	6,393,733			50,253,740		
Hayes Pump Station Rehab - Design	10446_7162	Nov-19	May-24	1,508,310	-	1,508,310		250,000	500,000	365,000	365,000	1,480,000	28,310	
Interceptor Renewal 1, Reading Extension - Design/CA/REI	10447_7163	Aug-15	Aug-19	1,156,116	691,793	464,323	332,195	132,128				464,323		
Interceptor Renewal 1, Reading Extension - Construction	10448_7164	Aug-17	Nov-18	1,948,945	973,509	975,436	975,435					975,435		
Chelsea Creek Upgrades - Design/CA	10455_7206	Jul-10	Oct-21	10,315,831	7,360,894	2,954,937	925,600	1,432,470	596,867			2,954,937		
Interceptor Renewal 7, Malden & Melrose - Study/Design/CA/REI	10457_7216	Jan-20	Dec-23	900,000	-	900,000			150,000	300,000	300,000	750,000	150,000	
Interceptor Renewal 7, Malden & Melrose - Construction	10458_7217	Jan-24	Jun-25	1,440,000	-	1,440,000							1,440,000	
Remote Headworks & Deer Island Shaft - Study	10463_7237	Sep-18	Jul-19	1,371,789	-	1,371,789	780,000	591,789				1,371,789		
Interceptor Renewal 3, Dorchester Interceptor Sewer - Construction	10467_7279	Apr-19	Oct-20	5,580,000	-	5,580,000	960,000	4,380,000	240,000			5,580,000		
Cambridge Branch 2, Sections 23 & 24 - Construction	10468_7280	Sep-27	Sep-29	30,000,000	-	30,000,000							8,400,000	21,600,000
Cottage Farm Fuel System Upgrade	10469_7281	Jun-12	Apr-13	497,558	497,558	-								
NI Electrical & Grit/Sreenings Conveyance System- Design	10477_7312	Mar-11	May-16	1,229,761	1,229,761	-								
NI Electrical & Grit/Sreenings Conveyance System - Construction	10478_7313	Jul-13	May-15	5,192,243	5,192,243	-								
Interceptor Renewal 5, NNVS 607 - Construction	10481_7328	Jul-25	Jul-27	13,200,000	-	13,200,000							13,200,000	
Interceptor Renewal 6, Chelsea Sections 12, 14, 15, 62	10482_7329	Aug-26	Aug-28	11,000,000	-	11,000,000							9,708,000	1,292,000
Prison Point/Cottage Farm Pump & Gearbox Rebuilds - ESDC	10483_7330	Feb-14	Dec-16	314,767	314,767	-								
Somerville/Marginal Influent Gates & Stop-Log Replacement	10484_7344	Jul-11	Nov-11	366,848	366,848	-								
Prison Point Rehab - Design/CA/RI	10486_7359	Aug-16	Jul-22	3,140,559	1,398,976	1,741,583	588,000	523,600	592,659	29,859	7,465	1,741,583		
System Relief & Contingency Planning	10487_7360	Jul-20	Jun-23	500,000	-	500,000			125,001	166,667	166,666	458,334	41,666	
DeLauri Pump Station Screens & Security Upgrades	10488_7361	Feb-18	Feb-19	1,346,472	193,206	1,153,266	1,153,267					1,153,267		
Caruso Pump Station Impovements - Construction	10489_7362	Mar-16	Jun-17	4,416,578	4,416,578	-								

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Hayes Pump Station Rehab - Construction	10500_7375	May-21	May-23	10,000,000	-	10,000,000				3,400,000	3,300,000	6,700,000	3,300,000	
Secion 156 Rehab - Design/Build	10503_7393	Jul-11	Jul-12	2,562,778	2,562,773	5								
Cambridge Branch 1, Sections 26, 27 - Design/ ESDC	10504_7410	Sep-23	Sep-28	6,000,000	-	6,000,000							5,688,000	312,000
Sections 4, 5, 6, 186 - Design CA/RI	10505_7421	Jul-19	Jul-25	2,004,000	-	2,004,000		250,500	334,000	334,000	334,000	1,252,500	751,500	
Sections 4, 5, 6, 186 - Construction	10506_7422	Jul-22	Jul-24	7,400,000	-	7,400,000					2,775,000	2,775,000	4,625,000	
Sections 4, 5, 6, 186 - Study	10507_7423	Feb-17	May-18	1,213,974	905,649	308,325	308,325					308,325		
Ward St. & Columbus Park Headworks - Design/CA	10510_7429	Feb-20	Nov-28	11,421,823	-	11,421,823		247,214	1,483,281	1,483,281	1,483,281	4,697,057	6,691,433	33,333
Ward St. Headworks - Construction	10511_7430	Feb-23	Aug-27	57,558,319	-	57,558,319					2,093,030	2,093,030	55,465,289	
Chelsea Screenhouse Upgrades	10512_7431	Aug-15	Sep-16	4,953,041	4,953,041	-								
Prison Point/Cottage Farm Pump & Gearbox Rebuilds	10515_7452	Oct-13	Nov-15	6,439,438	6,439,438	-								
Prison Point Pipeline Rehab - Design/CA/RI	10518_7459	Oct-16	Sep-17	461,919	199,552	262,367	262,367					262,367		
Prison Point Pipeline Rehab - Construction	10519_7462	Jul-19	Jul-21	36,272,169	-	36,272,169		18,600,000	17,672,169			36,272,169		
Cottage Farm Rehab - Construction	10520_7463	Jul-23	Jul-25	11,995,827	-	11,995,827							11,995,826	
Chelsea Screenhouse Upgrades - ESDC/REI	10521_7490	Sep-15	Sep-17	848,887	848,887	-								
Cottage Farm Rehab - Design/CA/REI	10522_7508	Jul-21	Jul-26	2,399,166	-	2,399,166				400,000	600,000	1,000,000	1,399,166	
Chelsea Headworks - Caruso Pump Station - Utilities	10523_7510	Jul-16	Jun-19	32,000	10,856	21,144	21,144					21,144		
Cambridge Branch 23, 24, 26, 27 - Study	10524_7511	Oct-16	Jan-18	511,602	511,602	-								
Interceptor Renewal 3, Dorchester Interceptor Sewer - Design CA/RI	10525_7512	Apr-17	Oct-21	1,496,354	363,506	1,132,848	286,262	338,635	338,635	169,317		1,132,849		
Cambridge Branch 2, Sections 23 & 24 - Design/ESDC	10526_7513	Sep-25	Sep-30	6,000,000	-	6,000,000							3,206,000	2,794,000
Interceptor Renewal 6, Chelsea - Design CA/REI	10527_7514	Aug-24	Aug-29	2,200,000	-	2,200,000							1,925,000	275,000
Interceptor Renewal 5, NNVS 607-610 - Design/CA	10528_7515	Sep-23	Sep-28	3,000,000	-	3,000,000							3,000,000	
Quincy/Hingham Pump Station Fuel Storage Upgrades - Construction	10529_7534	Jul-17	Mar-18	528,532	528,532	-								
Chelsea Headworks & Deer Island Shaft Rehab - Design/CA/RI	10530_7549	Dec-23	May-27	1,200,000	-	1,200,000					146,342	146,342	1,053,659	
Chelsea Headworks & Deer Island Shaft Rehab - Construction	10531_7550	May-24	May-25	8,500,000	-	8,500,000							8,499,999	
Wiggins Terminal Pump Station - Design	10532_7551	Jul-19	Mar-22	529,740	-	529,740		154,590	187,575	187,575		529,740		
Wiggins Terminal Pump Station - Construction	10533_7552	Mar-20	Mar-21	2,118,960	-	2,118,960		176,580	1,942,380			2,118,960		
Fuel Oil Tank Replacement - Construction Phase 1	10535_7554	Jun-19	Jun-20	1,361,197	-	1,361,197		1,134,330	226,867			1,361,197		
Fuel Oil Tank Replacement - Construction Phase 2	10536_7555	Jun-20	Jun-22	2,302,024	-	2,302,024			892,434	1,070,921	338,669	2,302,024		
Columbus Park Headworks - Construction	10537_7587	May-23	Nov-27	57,558,319	-	57,558,319							57,558,319	
Ward St. & Columbus Park Headworks - REI	10538_7636	Feb-23	Nov-27	7,161,000	-	7,161,000					125,600	125,600	7,035,400	
Fuel Oil Tank Replacement - Construction Phase 3	10539_7637	Jun-21	Oct-22	2,000,000	-	2,000,000							2,000,000	
Hayes Pump Station Rehab - REI	10540_7668	May-21	May-23	500,000	-	500,000				167,000	166,500	333,500	166,500	
Pump Station & CSO Facilities Rehab - Construction	10545_7688	Nov-23	Nov-30	37,500,000	-	37,500,000							25,300,000	12,200,000
Pump Station & CSO Facilities Rehab - Design/CA/REI	10546_7689	Nov-21	Nov-31	7,500,000	-	7,500,000				150,000	500,000	650,000	3,750,000	3,100,000
Sections 191 & 192 Rehab	54012_7643	May-19	Oct-19	500,000	-	500,000		500,000				500,000		
145 Facility Asset Protection Total				**541,599,248**	**95,050,946**	**446,548,302**	**36,293,653**	**48,986,575**	**32,357,498**	**8,223,620**	**12,701,553**	**138,562,899**	**266,379,067**	**41,606,333**
146 D.I. Cross Harbor Tunnel														
DI Cross Harbor Tunnels Inspection	10454_7199	Jul-24	Jun-29	5,000,000	-	5,000,000							5,000,000	
146 D.I. Cross Harbor Tunnel Total				**5,000,000**	**-**	**5,000,000**							**5,000,000**	
147 Randolph Trunk Sewer Relief														
Study	10461_7220	Jul-20	Jun-22	697,500	-	697,500			261,563	348,750	87,187	697,500		
147 Randolph Trunk Sewer Relief Total				**697,500**	**-**	**697,500**			**261,563**	**348,750**	**87,187**	**697,500**		

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Treatment				**1,037,227,592**	**301,156,788**	**736,070,805**	**12,129,232**	**66,418,532**	**80,566,870**	**80,726,953**	**77,317,529**	**317,159,115**	**371,902,273**	**47,009,415**
182 DI Primary and Secondary Treatment Total	**completed project**			**(957,878)**	**(957,878)**	**-**								
200 DI Plant Optimization Total	**completed project**			**33,278,598**	**33,278,598**	**-**								
206 DI Treatment Plant Asset Protection														
DITP Roof Replacements	18045_6196	Jun-10	Jun-11	2,299,881	2,299,881	-								
Digester Storage Tank Rehab - Construction	19161_6240	Jul-22	Jan-26	28,500,000	-	28,500,000					4,071,429	4,071,429	24,428,571	
DISC Application	19162_6241			125,077	125,077	-								
Pump Packing Replacement	19176_6422	Sep-03	Jun-08	732,447	732,447	-								
Demineralizer Construction	19177_6423	Jul-00	Dec-00	50,527	50,527	-								
Odor Control Rehab - Construction	19188_6538	Sep-24	Mar-28	32,522,270	-	32,522,270							30,973,590	1,548,680
Odor Control Rehab - REI	19191_6592	Sep-24	Jun-28	4,016,005	-	4,016,005							3,569,782	446,223
Equipment Condition Monitoring	19193_6594	May-04	Jan-05	1,776,946	1,776,946	-								
NMPS & WTF Valve & Piping Replacement - ESDC/REI	19194_6598	Dec-14	Oct-18	1,546,981	1,493,121	53,860	53,860					53,860		
Expansion Joint Repair - Design	19204_6668	Apr-99	Oct-04	149,421	149,421	-								
Expansion Joint Repairs - Construction 1	19205_6669	Aug-02	Nov-03	304,726	304,726	-								
Expansion Joint Repairs - Construction 2	19217_6704	Aug-12	Feb-14	1,893,500	1,893,500	-								
Expansion Joint Repairs - Construction 3	19218_6705	Sep-19	Sep-21	1,950,945	-	1,950,945		433,543	975,472	541,930		1,950,945		
As-needed Design Phase 6-1	19220_6721	May-09	Oct-12	1,910,867	1,910,867	-								
As-needed Design Phase 6-2	19221_6722	May-09	Aug-12	1,743,843	1,743,843	-								
Eastern Seawall Design/ESDC/REI	19222_6723	Apr-19	Nov-23	1,220,249	-	1,220,249		549,112	145,111	326,499	181,388	1,202,110	18,139	
Eastern Seawall Construction - 1	19223_6724	Oct-20	Nov-22	4,500,020	-	4,500,020			1,000,004	2,250,010	1,250,006	4,500,020		
Barge Berth Rehab - Design/ESDC/REI	19224_6725	Apr-23	Aug-28	1,362,990	-	1,362,990							1,351,900	11,090
Barge Berth Rehab - Construction	19225_6726	Feb-25	Aug-27	6,814,948	-	6,814,948							6,814,947	
Rip-rap Material DITP	19226_6727	Mar-17	Jun-17	227,055	227,055	-								
Digester Gas Flare No. 4 - Design	19227_6728	Oct-23	Jul-27	597,756	-	597,756							597,756	
Digester Gas Flare No. 4 - Construction	19228_6729	Apr-25	Jul-26	1,235,362	-	1,235,362							1,235,362	
Combined Heat & Power - Design/ESDC/REI	19229_6730	Apr-21	Jan-29	5,580,000	-	5,580,000				1,278,750	1,395,000	2,673,750	2,716,638	189,612
Roof Replacement - Phase I	19230_S464	Mar-09	Mar-10	2,749,941	2,749,941	-								
Drive Chain Replacement	19231_6742	Oct-01	Jul-03	264,000	264,000	-								
Busduct Replacement (2+22)	19236_6763	Jan-01	Oct-01	195,500	195,500	-								
Reline Hypochlorite Tanks 1 & 3	19237_6764	May-07	Nov-07	1,691,095	1,691,095	-								
CTG Modifications	19238_6765	Mar-01	May-02	482,339	482,339	-								
Electrical Equipment Upgrades - Construction 2	19239_6767	Apr-05	Feb-07	1,913,183	1,913,183	-								
Document Format Conversion	19241_6791	May-07	Jun-19	68,110	68,110	-								
Outfall Modification - Inspection	19243_6811	Dec-01	Jul-02	173,500	173,500	-								
Secondary Clarifier Access	19244_6812	Sep-01	Jul-02	274,874	274,874	-								
Transformer Replacement	19245_6813			1,703,072	1,703,072	-								
Digested Sludge Pump Replacement - Phase 2	19246_6821	Jan-16	Jul-17	2,673,377	2,673,377	-								
Co-Digestion Design/Build	19247_6822	Aug-23	Feb-25	5,000,000	-	5,000,000							5,000,000	
Reline Hypochlorite Tanks 2 & 4	19250_6849	Apr-08	Oct-08	2,241,692	2,241,692	-								
Chemical Pipe Replacement - Design	19252_6851	Jun-21	Dec-25	637,606	-	637,606				239,102	91,294	330,396	307,210	
Chemical Pipe Replacement - Construction	19253_6852	Dec-22	Dec-24	2,146,775	-	2,146,775					89,449	89,449	2,057,326	
Electrical Equipment Upgrades - Construction 3	19256_6855	Feb-08	Aug-11	15,173,750	15,173,750	-								
WTF VFD Replacement - Construction	19258_6875	Jun-16	Mar-20	11,951,088	3,614,772	8,336,316	3,010,461	3,865,910	1,459,945			8,336,316		
Heat Loop Pipe Replacement - Construction 1	19259_6876	Mar-05	Dec-05	615,000	615,000	-								
Secondary Reactor VFDs	19260_6877	May-05	Aug-16	3,233,191	3,233,191	-								
Grit Air Handler Replacements	19264_6881	Jul-08	Jun-10	2,029,247	2,029,247	-								
CEMS Equipment Replacement	19265_6882	Nov-05	Mar-06	100,392	100,392	-								
Heat Loop Pipe Replacement - Construction 2	19266_6883	Dec-06	Feb-08	1,488,356	1,488,356	-								
PICS Replacement - Construction	19267_6884	Jul-11	Sep-15	1,229,952	1,229,952	-								
Primary & Secondary Clarifier Rehab - Construction	19268_6899	Feb-09	Feb-12	58,613,089	58,613,089	-								
Electrical Equipment Upgrades - Construction 4	19270_6901	May-13	May-16	7,871,148	7,871,148	-								
NMPS VFD Replacement - Design/ESDC	19271_6902	Dec-07	Apr-12	1,277,604	1,277,604	-								
NMPS VFD Replacement - Construction	19272_6903	Dec-11	Mar-16	24,432,063	24,432,063	-								
Fire Alarm System Replacemen - Design	19273_6904	Dec-15	Feb-24	2,078,771	718,689	1,360,082	28,446	151,161	362,785	362,786	394,440	1,299,618	60,464	
Combined Heat & Power Alternatives Study	19274_6963	Jan-19	Apr-20	1,100,000	-	1,100,000	220,000	880,000				1,100,000		
Combined Heat & Power - Construction	19275_6964	Jan-24	Jan-28	83,000,000	-	83,000,000							83,000,000	
Primary & Secondary Clarifier Rehab - Design	19276_6965	Mar-09	Sep-13	1,677,666	1,677,666	-								

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Gravity Thickener Improvements - Construction	19277_6966	Apr-10	Jun-12	933,118	933,118	-								
Steam Turbine Generator System Modifications - Design	19278_6967	Jun-09	Apr-11	(44,268)	(44,268)	-								
Electrical Equipment Upgrades 3 - REI	19279_6968	Feb-08	Nov-11	1,111,984	1,111,984	-								
NMPS Motor Control Center - Construction	19283_6972	Jan-12	Apr-13	913,900	913,900	-								
Steam Turbine Generator System Modifications - Construction	19284_6973	May-10	Apr-11	2,119,673	2,119,673	-								
Digester Chiller Replacement	19287_7005	Sep-05	May-06	635,244	635,244	-								
Dystor Tank Membrane Replacement	19288_7006	Sep-04	Oct-05	640,195	640,195	-								
Fire Alarm System Replacement - Construction	19289_7051	Aug-19	Feb-23	22,000,000	-	22,000,000		2,619,047	4,285,714	4,285,714	4,285,715	15,476,190	6,523,810	
Digester & Storage Tank Rehab - Design/ESDC	19290_7052	Jan-20	Jan-27	4,055,000	-	4,055,000		168,958	1,013,750	844,792	286,235	2,313,735	1,741,265	
Digester & Storage Tank Rehab - REI	19291_7053	Jul-22	Apr-26	4,092,000	-	4,092,000					545,600	545,600	3,546,400	
Thickened Primary Sludge Pump Replacement - Construction	19292_7054	Oct-13	Jun-14	27,297	27,297	-								
Digester Modules 1 & 2 Pipe Replacement	19293_7055	Aug-11	Aug-14	7,096,335	7,096,335	-								
Cathodic Protection - Construction	19294_7056	Jul-21	Jan-24	6,402,659	-	6,402,659					1,280,532	1,280,532	5,122,127	
Centrifuge Backdrive Replacement	19295_7057	Feb-13	Mar-15	3,965,204	3,965,204	-								
Switchgear Relay Replacement - Construction	19297_7059	Apr-21	Apr-24	7,440,000	-	7,440,000				1,860,000	2,480,000	4,340,000	3,100,000	
Power Consultant Recommnedations - Design	19298_7060	Jan-06	Jul-09	2,097,404	2,097,404	-								
Power System Improvements - Construction	19299_7061	Jan-09	May-17	10,117,307	10,117,307	-								
NMPS VFD Replacements - REI	19300_7062	Dec-12	Jun-16	740,442	740,442	-								
Heat Loop Pipe Replacement - Construction 3	19301_7063	Jun-09	Jun-11	11,546,392	11,546,391	-								
Odor Control Rehab - Design/ESDC	19303_7088	Mar-21	Mar-28	4,266,208	-	4,266,208				933,333	933,333	1,866,666	2,313,294	86,248
Sodium Hypochlorite Tank Liner Removal	19304_7089	May-06	Sep-06	196,400	196,400	-								
As-needed Design Phase 5-1	19305_7090	Aug-07	Aug-09	955,174	955,174	-								
As-needed Design Phase 5-2	19306_7091	Jul-07	Jul-09	1,055,822	1,055,822	-								
HVAC Equipment Replacement - REI	19307_7094	Mar-19	Dec-22	2,000,000	-	2,000,000		372,093	502,326	613,953	511,628	2,000,000		
HVAC Equipment Replacement - Design/ESDC	19309_7111	Mar-14	Oct-20	2,011,441	1,389,151	622,290	1,969	151,298	181,557	181,557	90,779	607,160	15,130	
HVAC Equipment Replacement - Construction	19310_7110	Mar-19	Sep-22	40,204,700	-	40,204,700		8,040,940	10,855,269	13,267,551	8,040,940	40,204,700		
DI As-needed Technical Design	19311_7121	Jul-22	Jun-29	20,250,000	-	20,250,000					2,250,000	2,250,000	15,000,000	3,000,000
Radio Repeater System Upgrades - Phase 1	19312_7122	Oct-18	Apr-19	182,896	-	182,896	182,896					182,896		
Digester Sludge Pump Replacement - Construction	19313_7123	Oct-09	Dec-14	1,843,074	1,793,146	49,928	49,928					49,928		
Electrical Equipment Upgrades 5 - Construction	19314_7124	Dec-24	Dec-27	23,161,875	-	23,161,875							23,161,875	
Miscellaneous VFD Replacements FY19-FY23	19315_7125	Oct-20	Jun-25	4,495,620	-	4,495,620			500,000	500,000	1,119,000	2,119,000	2,376,620	
SSPS VFD Replacements - Design/ESDC/REI	19316_7126	May-19	May-25	4,464,000	-	4,464,000		1,174,736	939,789	569,526	678,076	3,362,127	1,101,873	
SSPS VFD Replacements - Construction	19317_7127	May-21	May-24	20,553,000	-	20,553,000				2,567,333	4,851,000	7,418,333	13,134,667	
NMPS VFD Replacements - Design/ESDC/REI	19318_7128	Jun-24	Dec-31	4,420,000	-	4,420,000							2,767,864	1,652,136
NMPS VFD Replacements - Construction	19319_7129	Dec-26	Dec-30	25,000,000	-	25,000,000							6,770,833	18,229,167
Electrical Equipment Upgrades 5 - Design/ESDC/REI	19320_7130	Dec-22	Dec-28	4,308,132	-	4,308,132					287,209	287,209	3,857,324	163,599
Miscellaneous VFD Replacements FY18	19321_7131	Oct-17	Jun-18	498,000	450,000	48,000	48,000					48,000		
DI Switchgear Replacement - Design/ESDC/REI	19322_7132	Jul-23	Jul-28	4,500,000	-	4,500,000							4,459,091	40,909
DI Switchgear Replacement - Construction	19323_7133	Jul-25	Jul-27	16,000,000	-	16,000,000							16,000,000	
Radio Repeater System Upgrade 2	19324_7134	Apr-19	Dec-19	2,500,000	-	2,500,000	312,500	2,187,500				2,500,000		
DI Dystor Membrane Replacements	19325_7135	Jul-19	Nov-19	4,000,000	-	4,000,000		2,000,000				2,000,000		2,000,000
DI Combustion Turbine Generator Rebuilds	19326_7136	Jul-23	Jul-26	8,000,000	-	8,000,000							8,000,000	
Centrifuge Replacement - Design/ESCD/REI	19327_7137	Dec-23	Jun-28	4,160,000	-	4,160,000							4,122,182	37,818
DI Centrifuge Replacements - Construct.	19328_7138	Jun-25	Jun-27	16,640,000	-	16,640,000							16,640,000	
Cryogenics Plant Equipment Replacement - Design	19329_7139	Dec-21	Jun-28	3,255,000	-	3,255,000				195,300	781,200	976,500	2,257,899	20,601
Cryogenics Plant Equipment Replacement - Construction	19330_7140	Jun-24	Jun-27	15,000,000	-	15,000,000							15,000,000	
Replace Sodium Hypochlorite & Bisulfite Tanks	19332_7142	Jul-22	Jul-26	20,000,000	-	20,000,000					2,500,000	2,500,000	17,500,000	
Gas Protection System Replacement - Phase 1	19333_7167	Apr-19	Jul-20	1,000,000	-	1,000,000		600,000	400,000			1,000,000		
Personnel Dock Rehab	19334_7168	Feb-17	Oct-17	1,367,835	1,452,579	(84,744)	(84,744)					(84,744)		
Gas Protection System Replacement - Phase 2	19335_7169	Mar-20	Jun-21	1,000,000	-	1,000,000			666,667	333,333		1,000,000		
East/West Odor Control Air Handler Replacement	19336_7170	Jun-25	Jun-30	2,000,000	-	2,000,000							2,000,000	
PICS Fiber Loop Replacement	19338_7172	Jul-22	Jun-25	12,462,000	-	12,462,000					2,423,167	2,423,167	10,038,833	
NMPS & WTF Butterfly Valve Replacement	19339_7275	Jun-14	Sep-17	17,513,566	17,513,566	-								
Clarifier W3H Flushing System	19346_7374	Jul-12	Jul-13	1,262,406	1,262,406	-								
Clarifier Rehab Phase 2 - Design	19347_7394	Jan-15	Oct-21	2,375,346	1,178,533	1,196,813	250,049	194,555	212,242	212,241	317,322	1,186,409	10,404	
Clarifier Rehab Phase 2 - Construction	19348_7395	Feb-19	Nov-22	135,000,000	-	135,000,000		23,050,000	33,475,000	38,475,000	30,000,000	125,000,000	10,000,000	
Scum Skimmer Replacement	19349_7396	Oct-13	Oct-16	20,393,784	20,393,784	-								
Clarifier Rehab Phase 2 - REI	19351_7397	Feb-19	Feb-23	3,000,000	-	3,000,000	106,250	637,500	675,000	831,250	750,000	3,000,000		
Cryogenics Chillers Replacement	19352_7398	Oct-14	Oct-16	3,219,270	3,219,270	-								
As-Needed Design 7-1	19353_7399	Oct-12	Oct-15	1,547,446	1,547,445	-								
As-Needed Design 7-2	19354_7400	Oct-12	Apr-16	1,060,919	1,060,919	-								
Thermal Power Plant Boiler Controls Replacement	19355_7401	Nov-14	Nov-16	1,619,520	1,619,520	-								

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Electrical Equipment Upgrades 6 - Construction	19557_7414	Dec-27	Dec-31	20,000,000	-	20,000,000							416,667	19,583,333
Fuel Pipe Abandonment	19558_7415	Aug-12	Jan-13	230,000	230,000	-								
Electrical Equipment Upgrades 4 - REI	19559_7416	May-14	Oct-16	858,375	858,375	-								
Motor Control Center & Switchgear Replacement - Design/ESDC/REI	19560_7419	Jan-17	Jul-22	2,479,672	607,222	1,872,450	437,290	471,247	514,087	428,406	21,420	1,872,450		
Motor Control Center & Switchgear Replacement - Construction	19561_7420	Feb-19	Aug-21	10,585,725	-	10,585,725		3,881,433	4,234,290	2,470,003		10,585,725		
Roof Replacement Phase 3	19562_7424	Sep-13	Jul-14	610,500	610,500	-								
Fire System Replacement - REI	19563_7426	Aug-19	May-23	2,139,000	-	2,139,000		237,666	570,400	570,400	570,400	1,948,866	190,134	
Gravity Thickener Center Column Replacement	19564_7427	Jan-13	Jan-14	825,457	825,457	-								
Gravity Thickener Rehab	19565_7428	May-18	Feb-21	19,638,822	407,500	19,231,322	4,877,466	6,296,574	8,057,283			19,231,323		
As-Needed Design 7-3	19566_7434	Oct-12	Apr-16	950,148	950,148	-								
As-Needed Design 8-1	19600_7501	Jul-16	Jul-19	925,136	444,523	480,613	330,613	150,000				480,613		
As-Needed Design 8-2	19601_7502	Jul-16	Jul-19	996,592	382,890	613,702	463,702	150,000				613,702		
As-Needed Design 8-3	19602_7503	Jul-16	Jul-19	817,986	408,036	409,950	259,950	150,000				409,950		
Hydroturbine Replacement - Design/ESDC/REI	19603_7570	Jun-20	Sep-26	1,860,000	-	1,860,000			390,600	260,400	265,714	916,714	943,286	
Hydroturbine Replacement - Construction	19604_7571	Mar-22	Sep-25	9,300,000	-	9,300,000					2,214,286	2,214,286	7,085,714	
As-Needed Des 9-1	19605_7644	Jul-19	Jul-22	2,800,000	-	2,800,000		455,000	793,333	1,318,333	233,334	2,800,000		
As-Needed Des 9-2	19606_7645	Jul-19	Jul-22	2,800,000	-	2,800,000		455,000	793,333	1,318,333	233,334	2,800,000		
As-Needed Des 9-3	19607_7646	Jul-19	Jul-22	2,800,000	-	2,800,000		455,000	793,333	1,318,333	233,334	2,800,000		
As-Needed REI-1	19608_7647	Jul-19	Jul-21	3,000,000	-	3,000,000		731,250	1,275,000	993,750		3,000,000		
Co-Digestion Temporary Facilities	26073_7148	Sep-13	Jun-15	433,832	433,832	-								
Chemical Tank Relining & Pipe Replacement	40256_7449	Feb-19	Feb-21	8,000,000	-	8,000,000		4,000,000	4,000,000			8,000,000		
206 DI Treatment Plant Asset Protection Total				**975,832,762**	**252,359,437**	**723,473,323**	**10,548,636**	**64,509,523**	**79,072,290**	**79,347,918**	**75,656,564**	**309,134,930**	**367,328,977**	**47,009,416**
210 Clinton Wastewater Treatment Plant														
Clinton Soda Ash Replacement	19302_7075	Nov-07	Aug-08	267,221	267,221	-								
Clinton Permanent Standby Generator	19308_7095	Feb-07	Nov-07	230,440	230,440	-								
Clinton Concrete Repair - Design	19340_7276	Feb-13	Dec-13	62,615	62,615	-								
Clinton Digester Cleaning & Rehab	19341_7277	May-10	Apr-17	3,442,672	3,442,672	-								
Clinton Aeration Effciency Improvement	19342_7278	Apr-12	Feb-13	1,864,562	1,864,561	-								
Clinton WWTP Rehab - Design/ESDC/RE	19343_7371	Sep-21	Mar-26	1,000,000	-	1,000,000				291,667	208,333	500,000	500,000	
Valves & Screw Pumps Replacement	19344_7372	Jan-19	Mar-21	2,500,000	-	2,500,000		1,500,000	1,000,000			2,500,000		
Phosphorus Reduction - Design/ESDC	19350_7377	Nov-13	Mar-19	1,639,017	1,415,952	223,065	223,064					223,064		
Phosphorus Reduction - Construction	19400_7411	Mar-16	Mar-18	7,523,266	6,585,732	937,533	937,533					937,533		
Clinton Roofing Rehab	19405_7450	Sep-18	Sep-19	672,000	-	672,000	420,000	252,000				672,000		
Clinton WWTP Rehab - Construction	19406_7451	Mar-23	Mar-25	4,073,295	-	4,073,295							4,073,295	
NGRID Gas Line	19407_7528	Apr-16	Jun-17	395,762	395,762	-								
Screw Pump Replacement Phase 2 - Construction	19408_7591	Jun-21	Jun-23	2,300,000	-	2,300,000				847,368	1,452,632	2,300,000		
Digester Cover Replacement	19409_7648	Jul-20	Dec-21	600,000	-	600,000			360,000	240,000		600,000		
Equipment Storage Building	19410_7693	Sep-19	Dec-20	291,589	-	291,589		157,009	134,580			291,589		
210 Clinton Wastewater Treatment Plant Total				**26,862,439**	**14,264,955**	**12,597,482**	**1,580,597**	**1,909,009**	**1,494,580**	**1,379,035**	**1,660,965**	**8,024,186**	**4,573,295**	
211 Laboratory Services Total	**completed project**			**2,211,674**	**2,211,674**	**-**								
Residuals				**167,642,622**	**65,047,023**	**102,595,600**	**488,000**	**8,316,398**	**3,491,369**	**717,556**	**995,333**	**14,008,656**	**31,677,204**	**56,909,740**
261 Residuals Total	**completed project**			**63,810,848**	**63,810,848**	**-**								
271 Residuals Asset Protection														
Residuals Facility Plan / EIR	26069_7143	Jan-22	Jan-25	1,000,000	-	1,000,000				55,556	333,333	388,889	611,111	
Residuals Facility Upgrades - Design	26070_7145	Feb-21	Aug-23	1,655,000	-	1,655,000			55,167	662,000	662,000	1,379,167	275,833	
Residuals Facility Upgrades - Construction	26071_7146	Nov-19	Dec-20	336,550	-	336,550		168,275	168,275			336,550		
Condition Assessment/Technology & Regulatory Review	26072_7147	May-09	Jan-14	831,775	831,775	-								
Residuals Phase 2 - Design	26074_7149	Nov-23	Apr-32	15,000,000	-	15,000,000							9,586,093	5,413,907
Residuals Phase 2 - Construction	26075_7150	Apr-26	Apr-32	72,700,000	-	72,700,000							21,204,167	51,495,833
Sludge Tank & Silo Coating	26076_7151	Sep-17	Sep-18	745,200	257,200	488,000	488,000					488,000		
Residual Electrical/Mechanical/Drum Replacement	26078_7153	Jun-19	Dec-20	8,563,250	147,200	8,416,050		6,448,123	1,967,927			8,416,050		
Pellet Piping Relocation	26079_7173	Apr-19	Jul-20	3,000,000	-	3,000,000		1,700,000	1,300,000			3,000,000		
271 Residuals Asset Protection Total				**103,831,775**	**1,236,175**	**102,595,600**	**488,000**	**8,316,398**	**3,491,369**	**717,556**	**995,333**	**14,008,656**	**31,677,204**	**56,909,740**

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CSO				**910,121,268**	**902,396,415**	**7,724,853**	**1,417,746**	**3,982,027**	**2,325,064**			**7,724,837**		
CSO MWRA Managed				**433,534,309**	**433,534,309**	**-**								
339 North Dorchester Bay Total		**completed project**		**221,509,794**	**221,509,793**	**-**								
347 East Boston Branch Sewer Relief Total		**completed project**		**85,637,164**	**85,637,164**	**-**								
349 Chelsea Trunk Sewer Total		**completed project**		**29,779,319**	**29,779,320**	**-**								
350 Union Park Detention Treatment Facility Total		**completed project**		**49,583,407**	**49,583,407**	**-**								
353 Upgrade Existing CSO Facilities Total		**completed project**		**22,385,200**	**22,385,200**	**-**								
354 Hydraulic Relief Projects Total		**completed project**		**2,294,549**	**2,294,549**	**-**								
355 MWR003 Gate & Siphon Total		**completed project**		**4,424,220**	**4,424,219**	**-**								
357 Charles River CSO Controls Total		**completed project**		**3,633,077**	**3,633,077**	**-**								
CSO Community Managed				**423,780,126**	**420,017,055**	**3,763,068**		**1,881,527**	**1,881,527**			**3,763,054**		
340 Dorchester Bay Sewer Separation (Fox Point) Total		**completed project**		**55,028,985**	**55,028,985**	**-**								
341 Dorchester Bay Sewer Separation (Commercial Point)														
Design	32650_6154	Jun-96	Dec-16	16,410,225	16,410,225	-								
Construction	32665_6248	Apr-99	Dec-16	43,451,415	43,451,415	-								
DOR Int Inflow Remo Constr	32750_7576	Jul-19	Jun-21	3,763,054	-	3,763,054		1,881,527	1,881,527			3,763,054		
341 Dorchester Bay Sewer Separation (Commercial Point) Total				**63,624,694**	**59,861,640**	**3,763,054**		**1,881,527**	**1,881,527**			**3,763,054**		
342 Neponset River Sewer Separation Total		**completed project**		**2,491,747**	**2,491,747**	**-**								
343 Constitution Beach Sewer Separation Total		**completed project**		**3,731,315**	**3,731,315**	**-**								
344 Stony Brook Sewer Separation Total		**completed project**		**44,319,314**	**44,319,314**	**-**								
346 Cambridge Sewer Separation Total		**completed project**		**104,552,056**	**104,552,054**	**-**								
351 BWSC Floatables Controls Total		**completed project**		**945,936**	**945,936**	**-**								
352 Cambridge Floatables Control Total		**completed project**		**1,126,708**	**1,126,708**	**-**								
356 Fort Point Channel Sewer Separation Total		**completed project**		**11,507,257**	**11,507,256**	**-**								
358 Morrissey Boulevard Drain Total		**completed project**		**32,181,036**	**32,181,034**	**-**								
359 Reserved Channel Sewer Separation Total		**completed project**		**70,524,212**	**70,524,205**	**-**								
360 Brookline Sewer Separation Total		**completed project**		**24,715,291**	**24,715,291**	**-**								
361 Bulfinch Triangle Sewer Separation Total		**completed project**		**9,031,576**	**9,031,575**	**-**								
CSO Planning & Support				**52,806,833**	**48,845,051**	**3,961,783**	**1,417,746**	**2,100,500**	**443,537**			**3,961,783**		
Technical Assistance	32400_5790	Feb-94	Dec-95	228,320	228,320	-								
Planning/EIR	32401_5791	Mar-88	Sep-90	10,768,610	10,768,610	-								
Master Planning	32403_5716	Mar-92	Sep-04	21,762,805	21,762,805	-								
Technical Assistance - Geotech	32407_5970	Jun-90	Jun-92	61,110	61,110	-								
Modeling	32409_5795	May-92	Mar-95	299,840	299,840	-								
SOP Program	32411_5767	Jan-94	May-01	772,828	772,829	-								

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Watershed Planning	32645_6036	Dec-94	Apr-01	877,134	877,134	-								
Technical Review	32648_6150	Jul-96	Jun-21	584,583	528,932	55,651	10,000	20,000	25,651			55,651		
Land Acquisition/Easement	32658_6169	Jul-96	Jun-21	12,875,388	12,844,914	30,474	9,000	10,500	10,974			30,474		
System Assessment	32691_6372	May-97	Jun-21	255,000	68,637	186,363	32,000	64,000	90,363			186,363		
Somerville Marginal In-System Storage	32748_7539	Aug-18	Sep-20	1,400,000	-	1,400,000		1,400,000				1,400,000		
CSO Performance Assessment	32749_7572	Nov-17	Mar-21	2,921,215	631,920	2,289,295	1,366,746	606,000	316,549			2,289,295		
324 CSO Support Total				**52,806,833**	**48,845,051**	**3,961,783**	**1,417,746**	**2,100,500**	**443,537**			**3,961,783**		
Other Wastewater				**392,865,861**	**190,316,754**	**202,549,107**	**29,048,359**	**25,699,913**	**24,983,589**	**28,199,260**	**26,897,727**	**134,828,847**	**120,457,601**	**(52,737,342)**
128 I/I Local Financial Assistance														
Phase II - Grants	10273_6084	May-93	May-06	15,928,524	15,928,524	-	-							
Phase II - Loans	10274_6085	May-93	May-06	47,664,000	47,664,000	-	-							
Phase II - Repayments	10282_6170	May-94	May-11	(47,664,000)	(47,664,000)	-	-							
Public Participation	10348_6609	Feb-99	Jun-02	6,461	6,461	-								
Phase IV - Grants	10368_6736	Nov-99	May-10	34,650,000	34,650,000	-								
Phase IV - Loans	10369_6737	Nov-99	May-10	42,350,000	42,350,000	-								
Phase IV - Repayments	10370_6738	Nov-00	May-15	(42,350,000)	(42,350,000)	-								
Phase V - Grants	10407_6925	Aug-04	May-12	18,000,000	18,000,010	(10)	(10)					(10)		
Phase V - Loans	10408_6926	Aug-04	May-12	22,000,000	22,000,007	(7)	(7)					(7)		
Phase V - Repayments	10409_6927	Aug-05	May-17	(22,000,000)	(21,999,989)	(11)	(11)					(11)		
Phase VI - Grants	10441_7107	Nov-06	Jun-21	18,000,000	17,528,397	471,603	471,603					471,603		
Phase VI - Loans	10442_7108	Nov-06	Jun-21	22,000,000	21,423,596	576,404	576,404					576,404		
Phase VI - Repayments	10443_7109	Nov-07	Jun-26	(22,000,000)	(19,671,442)	(2,328,558)	(708,024)	(677,269)	(450,092)	(196,994)	(180,896)	(2,213,274)	(115,284)	
Phase VII - Grants	10471_7293	Aug-09	Jun-21	18,000,000	17,263,782	736,219	100,000	225,000	411,218			736,218		
Phase VII - Loans	10472_7294	Aug-09	Jun-21	22,000,000	21,100,179	899,822	206,250	275,000	418,571			899,821		
Phase VII - Repayments	10473_7295	Aug-10	Jun-26	(22,000,000)	(17,341,481)	(4,658,519)	(1,330,088)	(1,098,867)	(800,000)	(600,000)	(400,000)	(4,228,955)	(429,564)	
Phase VIII - Grants	10474_7296	Aug-12	Jun-21	18,000,000	15,610,685	2,389,315	700,000	540,000	500,000	649,315		2,389,315		
Phase VIII - Loans	10475_7297	Aug-12	Jun-21	22,000,000	19,079,727	2,920,273	900,000	660,000	700,000	660,273		2,920,273		
Phase VIII - Repayments	10476_7298	Aug-13	Jun-26	(22,000,000)	(12,345,291)	(9,654,709)	(2,750,971)	(2,000,000)	(1,277,984)	(1,200,000)	(1,012,703)	(8,241,658)	(1,413,051)	
Phase IX Grants	10560_7464	Jul-14	Jun-21	60,000,000	30,706,992	29,293,008	7,500,000	7,500,000	3,750,000	3,750,000	3,750,000	26,250,000	3,043,009	
Phase IX Loans	10561_7465	Jul-14	Jun-21	20,000,000	10,235,664	9,764,336	2,500,000	2,500,000	1,250,000	1,250,000	1,250,000	8,750,000	1,014,336	
Phase IX Repayment	10562_7466	Jul-15	Jun-31	(20,000,000)	(2,232,249)	(17,767,751)	(1,308,722)	(1,368,831)	(1,857,830)	(1,853,040)	(1,598,380)	(7,986,802)	(6,918,967)	(2,861,982)
Phase X Grants	10563_7467	Jul-16	Jun-25	60,000,000	15,466,350	44,533,650	7,500,000	7,500,000	7,500,000	7,500,000	6,000,000	36,000,000	8,533,650	
Phase X Loans	10564_7468	Jul-16	Jun-25	20,000,000	5,155,450	14,844,550	2,500,000	2,500,000	2,500,000	2,500,000	2,000,000	12,000,000	2,844,550	
Phase X Repayment	10565_7469	Jul-16	Jun-35	(20,000,000)	(529,513)	(19,470,488)	(508,045)	(555,120)	(1,060,295)	(1,310,295)	(1,560,295)	(4,994,050)	(9,251,078)	(5,225,360)
Phase XI Grants	10566_7620	Aug-18	Aug-24	75,000,000	-	75,000,000	9,500,000	4,500,000	6,000,000	7,500,000	7,500,000	35,000,000	40,000,000	
Phase XI Loans	10567_7621	Aug-18	Aug-24	25,000,000	-	25,000,000	3,200,000	1,500,000	2,000,000	2,500,000	2,500,000	11,700,000	13,300,000	
Phase XI Repayment	10568_7622	Aug-19	Aug-34	(25,000,000)	-	(25,000,000)		(300,000)	(500,000)	(700,000)	(900,000)	(2,400,000)	(8,800,000)	(13,800,000)
Phase XII Grants	10569_7623	Aug-19	Aug-25	75,000,000	-	75,000,000		3,000,000	4,500,000	6,000,000	7,500,000	21,000,000	45,000,000	9,000,000
Phase XII Loans	10570_7624	Aug-19	Aug-25	25,000,000	-	25,000,000		1,000,000	1,500,000	2,000,000	2,500,000	7,000,000	15,000,000	3,000,000
Phase XII Repayment	10571_7625	Aug-20	Aug-35	(25,000,000)	-	(25,000,000)			(100,000)	(250,000)	(450,000)	(800,000)	(6,350,000)	(17,850,000)
I/I Loans Only	10572_7640	Jul-23	Jun-30	100,000,000	-	100,000,000							30,000,000	70,000,000
I/I Loans Only Repayment	10573_7641	Jul-24	Jun-40	(100,000,000)	-	(100,000,000)							(5,000,000)	(95,000,000)
128 I/I Local Financial Assistance Total				**392,584,985**	**190,035,878**	**202,549,108**	**29,048,360**	**25,699,913**	**24,983,588**	**28,199,259**	**26,897,726**	**134,828,848**	**120,457,601**	**(52,737,342)**
138 Sewerage System Mapping Upgrades Total	**completed project**			**280,876**	**280,876**	**-**								

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Waterworks				**4,287,690,928**	**2,111,415,257**	**2,176,275,671**	**85,194,527**	**65,434,170**	**83,467,029**	**73,203,679**	**52,561,768**	**359,861,173**	**706,911,016**	**1,109,503,437**
Drinking Water Quality Improvements				**704,555,418**	**649,972,373**	**54,583,044**	**1,755,219**	**3,112,000**	**3,574,810**	**3,399,000**	**1,346,000**	**13,187,029**	**13,125,000**	**28,271,000**
542 Carroll Water Treatment Plant														
Study 1	53293_5023	Jan-88	Feb-89	444,190	444,190	-								
Study 2	53294_5024	Jul-90	Mar-94	2,368,323	2,368,323	-								
EIR / Conceptual Design	53296_5042	Nov-93	Jul-95	5,807,703	5,807,703	-								
Technical Assistance	53300_5997	Jan-88	Jun-00	74,558	74,558	-								
Wachusett WTP - Design/CS/RI	53301_5017	Oct-96	Sep-06	46,605,542	46,605,542	-								
Permit Fees	53304_5157	Jul-93	Nov-19	87,037	86,674	363	363					363		
Cryptosporidium Inactivation Study	53367_6118	Feb-97	May-00	150,000	150,000	-								
Management Support - Design	53371_6134	Apr-97	Apr-00	1,729,937	1,729,937	-								
AWWARF Study	53375_6182	Dec-96	Sep-03	650,342	650,342	-								
Emergency Distribution Reservoir Water Management Study	53376_6206	Nov-98	Sep-02	1,453,825	1,453,825	-								
Wachusett and Cosgrove Intakes - CP1	53377_6207	Jun-00	Jun-03	15,489,314	15,489,314	-								
Construction Management/RI	53378_6208	Aug-98	Sep-06	31,437,824	31,437,824	-								
Cosgrove Disinfection - Phase II	53390_6365	Apr-98	May-99	2,169,292	2,169,292	-								
Cosgrove Disinfection - Phase I	53391_6397	Jul-97	Oct-97	150,380	150,380	-								
Distribution Water Consultant	53392_6401	Jul-97	Jun-98	3,200	3,200	-								
Immediate Disinfection - MECO	53393_6406	Jul-97	Jul-97	10,300	10,300	-								
Cosgrove Disinfection Facility - Underwater Improvements	53406_6479	Jan-98	Jun-98	217,400	217,400	-								
Community Chlorine Analyzers	53410_6485	Apr-98	Jun-98	48,863	48,863	-								
Wachusett Aqueduct Interim Rehab - CP2	53412_5522	Dec-00	Oct-02	23,400,005	23,400,005	-								
Sitework & Storage Tanks - CP3	53413_6488	Mar-99	Nov-02	67,367,673	67,367,673	-								
Treatment Facilities - CP4	53414_6489	Dec-00	Jul-05	145,761,497	145,761,497	-								
Late Sitework - CP6	53416_6491	Jul-04	Jan-06	4,087,831	4,087,831	-								
OCIP	53418_6494	Mar-99	Dec-07	5,107,089	5,107,089	-								
Professional Services	53419_6495	Sep-98	Oct-05	2,752,328	2,752,328	-								
Marlboro MOA	53420_6497	Sep-98	Jun-05	5,859,141	5,859,141	-								
CWTP- MECO	53421_6520	Sep-98	Mar-05	128,328	128,328	-								
Site Security Services	53425_6613	May-99	Mar-05	1,263,635	1,263,635	-								
Existing Facilities Modifications - CP7	53426_6650	Aug-15	Apr-20	8,074,680	6,930,369	1,144,310	362,310	782,000				1,144,310		
CSX Crossing	53427_6670	Aug-01	Dec-01	64,700	64,700	-								
Wachusett Algae - Design CS/RI	53428_6671	Jul-24	Dec-27	450,000	-	450,000							450,000	
Public Health Research	53432_6691	Jul-00	Jun-07	1,702,560	1,702,560	-								
Security Equipment	53435_6756	Jun-00	Jun-00	570,721	570,721	-								
Cosgrove Screens, CP8 - Construction	53437_6773	Aug-03	Aug-04	3,238,306	3,238,306	-								
AWWARF - Evaluation Ozone & Ultraviolet	53443_6815	Jul-01	Jan-04	301,750	301,750	-								
Fitout / Construction	53445_6827	Oct-03	Oct-19	645,159	547,117	98,042	98,042					98,042		
Wachusett Algae - Construction	53448_6889	Feb-25	Dec-26	1,800,000	-	1,800,000							1,800,000	
CWTP Ultraviolet Disinfection - Design/ESDC/REI	53450_6923	Jul-08	Apr-15	4,350,956	4,350,956	-								
CWTP Ultraviolet Disinfection - Construction	53451_6924	Apr-11	Feb-14	31,057,187	31,057,187	-								
As-needed Technical Assistance No. 1	53452_6939	Jan-06	Jun-08	491,274	491,274	-								
Existing Facilities Modifications, CP7 - Design	53453_6951	Jul-05	Apr-15	964,746	964,746	-								
As-needed Technical Assistance	53455_6989	Jan-06	Jun-08	702,024	702,024	-								
Ancillary Modifications - Construction 1	53456_7084	Jul-06	Jun-08	160,475	160,475	-								
Ancillary Modifications - Construction	53457_7085	Jan-09	Nov-20	5,884,153	4,897,943	986,210	363,201	500,000	123,010			986,211		
Ancillary Modifications - Design 3	53458_7192	Mar-08	Sep-10	299,101	299,101	-								
Ancillary Modifications - Design 4	53459_7208	Mar-08	Sep-10	527,412	527,412	-								
Technical Assistance 5	53464_7315	Sep-10	Mar-13	254,922	254,922	-								
Technical Assistance 6	53465_7316	Sep-10	Mar-13	407,989	407,989	-								
CWTP Storage Tank Roof Drainage System	53470_7376	Jan-24	Nov-26	7,000,000	-	7,000,000							7,000,000	
Technical Assistance 7	75530_7406	Jun-13	Nov-15	593,529	593,529	-								
Technical Assistance 8	75531_7407	Jan-16	Jun-18	490,251	428,149	62,102	62,102					62,102		
Technical Assistance 9	75601_7543	Jul-18	Jun-20	750,000	-	750,000	275,000	400,000	75,000			750,000		
Technical Assistance 10	75602_7544	Jul-18	Jun-20	750,000	-	750,000	312,200	400,000	37,800			750,000		
542 Carroll Water Treatment Plant Total				**436,157,452**	**423,116,424**	**13,041,027**	**1,473,218**	**2,082,000**	**235,810**			**3,791,028**	**9,250,000**	
543 Quabbin Water Treatment Plant Total		**completed project**		**19,972,883**	**19,972,879**	**-**								

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544 Norumbega Covered Storage Total	**completed project**			**106,674,147**	**106,674,146**	**-**								
545 Blue Hills Covered Storage Total	**completed project**			**40,082,837**	**40,082,837**	**-**								
550 Spot Pond Covered Storage Facility														
Environmental Review	53400_6455	Apr-02	Feb-03	232,830	232,830	-								
Design / Build	53402_6457	Nov-11	Dec-15	50,545,431	50,545,426	5								
Easement/Land Acquisition/Permits	53447_6868	Oct-08	Dec-14	6,115,143	6,114,143	1,000	1,000					1,000		
Owners' Representative	53462_7233	Mar-10	Feb-18	3,011,681	3,011,672	9								
Early Construction Water Connection	53463_7314	Jul-11	Feb-12	222,016	222,016	-								
550 Spot Pond Covered Storage Facility Total				**60,127,101**	**60,126,087**	**1,014**	**1,000**					**1,000**		
555 Carroll Water Treatment Plant (CWTP) Asset Protection														
CWTP Control Room Fire Suppression System	54000_7592	Oct-19	Sep-20	325,000	-	325,000		163,000	162,000			325,000		
CWTP Asset Protection Study	54001_7593	Oct-22	Oct-23	465,000	-	465,000					365,000	365,000	100,000	
LOX Yard Redundancy	54002_7594	Jul-20	Jun-21	670,000	-	670,000			670,000			670,000	-	
CWTP Water Pump VFD Replacement	54003_7595	Oct-22	Oct-23	186,000	-	186,000					140,000	140,000	46,000	
Ozone Generator Re-Build	54004_7596	Jul-21	Oct-22	930,000	-	930,000				880,000	50,000	930,000		
CWTP Chemical Pipe System Pipe, Pumps & Tank Replacement	54005_7597	Jul-20	Jun-22	4,000,000	-	4,000,000			1,440,000	1,920,000	640,000	4,000,000		
Post-treatment Building Soda Ash Equipment Replacement	54006_7598	Jul-20	Aug-21	465,000	-	465,000			415,000	50,000		465,000		
HVAC Equipment Replacement	54007_7605	Jul-19	May-22	1,750,000	-	1,750,000		398,000	652,000	549,000	151,000	1,750,000		
Water Pump Replacement	54008_7606	Jul-27	Jul-30	2,000,000	-	2,000,000							486,000	1,514,000
Ozone Generator Replacement	54009_7607	Oct-27	Oct-30	20,000,000	-	20,000,000							3,243,000	16,757,000
Ultaviolet Reactor Replacement	54010_7608	Oct-32	Oct-34	10,000,000	-	10,000,000								10,000,000
CWTP Emergency Generator No. 1 Replacement	54011_7642	Jan-19	Aug-19	750,000	-	750,000	281,000	469,000				750,000		
555 CWTP Asset Protection Total				**41,541,000**	**-**	**41,541,000**	**281,000**	**1,030,000**	**3,339,000**	**3,399,000**	**1,346,000**	**9,395,000**	**3,875,000**	**28,271,000**
Transmission				**2,531,999,434**	**825,200,270**	**1,706,799,165**	**10,527,310**	**15,237,688**	**40,014,486**	**36,840,500**	**29,028,246**	**131,648,230**	**357,860,447**	**1,217,290,467**
597 Winsor Station Pipeline Improvements														
Preliminary Permit, Study & Licensing	60032_6276	Nov-97	Jun-99	38,901	38,897	4								
Quabbin Aqueduct TV Inspection	60033_6277	Jul-23	Oct-24	3,255,090	-	3,255,090							3,255,090	
Hatchery Pipeline - Design/ESDC/RI	60077_7017	Aug-13	Sep-18	814,276	777,973	36,303	36,303					36,303		
Quabbin Aqueduct & Winsor Power Station (WPS) Upgrades - Design/CA	60087_7114	Feb-10	Aug-15	838,039	838,031	8								
Quabbin Aqueduct & WPS - Construction	60088_7115	Jan-24	Jan-26	19,400,336	-	19,400,336							19,400,336	
Shaft 12 Isolation Gates - Construction	60095_7197	Jan-24	Jan-26	16,616,160	-	16,616,160							16,616,160	
Winsor Station Chapman Valve Repair	60101_7212	Feb-09	Nov-09	416,425	416,425	-								
Purchase of Sleeve Valves	60105_7234	Jul-08	May-09	368,270	368,270	-								
Hatchery Pipeline - Construction	60106_7235	Mar-16	Sep-17	2,577,346	2,509,767	67,579	67,579					67,579		
Quabbin Aqueduct & WPS - Final Design/CA/RI	60140_7460	Jan-24	Jan-29	4,350,000	-	4,350,000							3,697,500	652,500
Shaft 12 Isolation Gates - Design CA/RI	60141_7509	Mar-17	Dec-18	1,000,000	784,522	215,478	215,478					215,478		
597 Winsor Station Pipeline Improvements Total				**49,674,843**	**5,733,885**	**43,940,958**	**319,360**					**319,360**	**42,969,086**	**652,500**
601 Sluice Gate Rehabilitation Total				**9,158,411**	**9,158,411**	**-**								

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604 MetroWest Tunnel														
Study	59794_5043	Jun-84	Oct-89	414,770	414,770	-								
Design/EIR - Tunnel/ESDC	59795_5044	Apr-92	Mar-07	37,939,302	37,939,302	-								
Sudbury Pipe Bridge - Construction	59796_5048	Nov-91	Jun-92	295,910	295,910	-								
West Tunnel Segment - CP1	59798_6054	Apr-97	Apr-03	147,774,009	147,774,009	-								
Construction Managementt/Resident Inspection	59799_5284	May-95	Apr-04	39,427,799	39,427,799	-								
Technical Assistance	59804_5976	Jun-84	Jun-98	131,400	131,400	-								
Land Acquisition	59805_5139	Oct-95	Jul-13	6,258,741	6,258,741	-								
Hultman Study	59806_5141	Apr-95	Mar-05	1,863,998	1,863,998	-								
DEP Permit Fees	60012_6037	Oct-94	Sep-14	58,000	56,178	1,822							1,822	
Middle Tunnel Segment - CP2	60013_6055	Jun-96	Apr-03	245,809,358	245,809,358	-								
MHD Salt Sheds - CP5	60014_6056	Sep-96	Jun-97	1,313,900	1,313,900	-								
Shaft 5A - CP3	60015_6059	Aug-97	Aug-98	5,815,614	5,815,614	-								
Local Supply Contingency - Design/CA/RI	60017_6063	May-96	Oct-99	858,703	858,703	-								
Community Technical Assistance	60018_6067	Jun-95	Apr-99	297,408	297,408	-								
Professional Services	60020_6117	Nov-95	Dec-03	730,860	730,860	-								
OCIP	60021_6122	Jun-96	May-06	26,021,794	26,021,794	-								
Hultman Leak Repair	60022_6128	Aug-96	May-97	307,280	307,280	-								
Framingham MOU	60023_6129	May-96	Dec-03	2,444,171	2,444,171	-								
Local Supply Contingency - Construction	60024_6130	Jun-97	Dec-03	4,298,444	4,298,444	-								
Local Supply Contingency - Legal/Easement	60025_6131	Apr-97	Jun-02	9,110	9,110	-								
Hultman Repair Bands	60026_6140	Aug-96	Dec-96	28,400	28,400	-								
Loring Road Storage Tanks - CP-8	60029_6203	Sep-97	Nov-00	41,367,921	41,367,921	-								
Testing & Disinfection - CP7	60030_6204	Jan-03	Oct-03	3,612,435	3,612,435	-								
Upper Hultman Rehab - CP6B	60031_6205	Apr-12	Jun-13	5,849,390	5,849,390	-								
Southboro MOA	60038_6366	May-97	Jun-03	254,883	254,883	-								
Weston MOA	60039_6367	Apr-96	Oct-04	1,005,524	1,005,524	-								
East Tunnel Segment - CP3A	60040_6374	Nov-98	Sep-02	56,262,907	56,262,907	1								
Hultman Investigation and Repair	60042_6430	Jun-99	Nov-00	1,604,381	1,604,381	-								
Hultman Repair Bands 98-99	60043_6492	Apr-99	Jun-99	116,457	116,457	-								
Wayland MOA	60053_6762	Jun-00	Dec-02	35,040	35,040	-								
Equipment Prepurchase	60054_6777	Jun-05	Mar-06	198,000	198,000	-								
Hultman Rehab - CP9	60058_6856	Nov-05	Dec-06	3,256,702	3,256,702	-								
Interim Disinfection	60059_6872	Jan-03	Oct-05	1,244,540	1,244,540	-								
Hultman Interconnection - Final Design/CA/R	60066_6911	Sep-05	Sep-14	5,732,364	5,732,364	-								
Lower Hultman Rehab -CP6A	60073_6975	Sep-09	May-13	52,288,838	52,288,838	-								
Hultman Interconnection - RI Services	60083_7082	Jan-10	Jan-15	1,870,346	1,870,346	-								
CP6 Easements	60085_7105	Jan-08	Apr-14	33,094	33,091	3								
CP6A Demolition	60086_7106	Sep-08	Jan-09	57,222	57,222	-								
Valve Chamber & Storage Tank Access Improvements - Design	60109_7283	Jul-23	Mar-28	600,000	-	600,000							600,000	
Valve Chamber & Storage Tank Access Improvements - Construction	60160_7476	Mar-25	Mar-27	2,400,000	-	2,400,000							2,400,000	
Shaft 5A/5 Surface Piping Cathodic Protection - Construction	60161_7477	Nov-16	Jun-17	142,028	142,028	-								
Hultman Leak Shaft 5A	60162_7507	Mar-16	May-16	153,138	153,138	-								
604 MetroWest Tunnel Total				**700,184,181**	**697,182,356**	**3,001,826**							**3,001,822**	
615 Chicopee Valley Aqueduct Redundancy Total	**completed project**			**8,666,292**	**8,666,291**	**-**								
616 Quabbin Transmission System														
Facilities Inspection	60055_6828	Oct-05	Oct-07	1,005,413	1,005,413	-								
Oakdale High Line Replacement - Construction	60068_6940	Mar-20	Jul-20	465,000	-	465,000			465,000			465,000		
Equipment Pre-purchase	60075_7007	Feb-05	Jun-08	534,366	534,366	-								
Oakdale Phase 1A Electrical - Design	60103_7229	Oct-09	Jul-14	775,534	775,534	-								
Oakdale Phase 1A Electrical - Construction	60104_7230	Apr-12	Jul-13	2,260,002	2,260,001	1								
Ware River Intake Valve Replacement - Design	60108_7282	Sep-20	Sep-25	300,000	-	300,000			50,000	50,000	50,000	150,000	150,000	
Rehab Wachusett Gatehouse/Bastion & Lower Gatehouse - Design	60113_7333	Jul-20	Jun-24	1,587,850	-	1,587,850	3,357		365,000	487,000	487,000	1,342,357	245,493	
Rehabilitate Oakdale Turbine	60135_7378	May-26	Jan-27	1,000,000	-	1,000,000							1,000,000	
Rehab Wachusett Gatehouse/Bastion & Lower Gatehouse - Construction	60137_7380	Jul-21	Jun-23	4,000,000	-	4,000,000				1,500,000	2,000,000	3,500,000	500,000	
Ware Rver Intake Vlve Rep Const	60138_7487	Sep-22	Sep-24	900,000	-	900,000					150,000	150,000	750,000	
CVA Motorized Screens Replacement - Construction	60139_7488	Jan-17	Aug-17	1,209,930	1,209,930	-								
Oakdale Turbine Rehab - Design	60201_7545	May-25	Jun-29	200,000	-	200,000							175,000	25,000
Oakdale Valves - Phase 1 Construction	75491_6690	Oct-05	Jun-06	1,811,309	1,811,309	-								
Oakdale Valves - Phase 1 Study & Design	75496_6831	Apr-04	Jun-07	1,070,290	1,070,290	-								

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616 Quabbin Transmission System Total				**17,119,694**	**8,666,843**	**8,452,851**	**3,357**		**880,000**	**2,037,000**	**2,687,000**	**5,607,357**	**2,820,493**	**25,000**
617 Sudbury/Weston Aqueduct Repairs														
Sudbury Aqueduct Inspection	60056_6838	Aug-05	Oct-06	369,520	369,520	-								
Technical Assistance	60057_6839	Sep-09	Dec-11	25,000	25,000	-								
Sudbury Short-Term Repairs - Phase 1	60076_7016	Jul-23	Jun-24	489,380	-	489,380							489,380	
Sudbury Short-Term Repairs - Phase 2	60110_7317	Jul-23	Jul-24	2,098,000	-	2,098,000							2,098,000	
Weston Aqueduct Sluice Gates - Construction	60130_7369	Sep-19	Sep-20	1,069,500	-	1,069,500		575,000	494,500			1,069,500		
Rosemary Brook Building Repair	60150_7472	Mar-16	May-18	1,748,794	1,362,837	385,956	385,956					385,956		
Evaluation of Farm Pond Buildings - Waban Arches	60151_7473	Jul-16	Jul-18	208,442	208,942	(500)	(500)					(500)		
Waban Arches Rehabilitation - Design/CA/RI	60153_7616	Oct-23	Oct-28	300,000	-	300,000							288,000	12,000
Waban Arches Rehabilitation - Construction	60154_7617	Oct-25	Oct-27	1,200,000	-	1,200,000							1,200,000	
Farm Pond Inlet Chamber & Gatehouse - Design	60155_7618	Oct-24	Oct-29	400,000	-	400,000							305,000	95,000
Farm Pond Inlet Chamber & Gatehouse - Construction	60156_7619	Oct-26	Oct-28	2,000,000	-	2,000,000							1,440,000	560,000
Hazardous Material Sudbury Aqueduct	75486_6617	Apr-99	May-05	265,428	265,428	-								
617 Sudbury/Weston Aqueduct Repairs Total				**10,174,064**	**2,231,727**	**7,942,336**	**385,456**	**575,000**	**494,500**			**1,454,956**	**5,820,380**	**667,000**
620 Wachusett Reservoir Spillway Improvements Total		**completed project**		**9,287,460**	**9,287,460**	**-**								
621 Watershed Land														
Land Acquisition	60081_7069	Apr-06	Jun-23	29,000,000	22,846,400	6,153,600	845,000	905,000	1,000,000	1,000,000	1,000,000	4,750,000	1,403,600	
621 Watershed Land Total				**29,000,000**	**22,846,400**	**6,153,600**	**845,000**	**905,000**	**1,000,000**	**1,000,000**	**1,000,000**	**4,750,000**	**1,403,600**	
622 Cosgrove Tunnel Redundancy														
Wachusett Aqueduct Pump Station - Design/ESDC/RI	60090_7156	Feb-12	May-20	7,603,600	6,481,679	1,121,922	526,239	510,586	85,098			1,121,923		
Wachusett Aqueduct Pump Station - Construction	60091_7157	Mar-16	Feb-19	50,653,918	45,530,231	5,123,687	5,123,687					5,123,687		
Permits/Easements	60124_7354	Aug-15	Jun-21	15,000	5,985	9,015		6,591	2,424			9,015		
622 Cosgrove Tunnel Redundancy Total				**58,272,518**	**52,017,895**	**6,254,624**	**5,649,926**	**517,177**	**87,522**			**6,254,625**		
623 Dam Projects														
Dam Safety Modifications & Repairs - Construction	60094_7194	Aug-11	Sep-12	2,054,559	2,054,554	5								
Dam Safety Modifications & Repairs - Design/ESDC	60100_7211	Sep-09	Jun-14	1,060,757	1,060,757	-								
Dam Permits	60118_7346	Jul-18	Dec-21	1,000	434	566		566				566		
Quinapoxet Dam Removal - Design/ESDC/RI	60119_7347	Jul-20	Dec-23	200,000	-	200,000			43,000	57,000	57,000	157,000	43,000	
Quinapoxet Dam Removal - Construction	60120_7348	Jul-21	Dec-22	600,000	-	600,000				300,000	300,000	600,000		
Sudbury/Foss Dam Improvemnts -Design/CA/RI	60190_7614	Apr-19	Jun-23	300,000	-	300,000		97,000	97,000	97,000	9,000	300,000		
Sudbury/Foss Dam Improvemnts -Construction	60191_7615	Jul-20	Jun-22	1,600,000	-	1,600,000			600,000	800,000	200,000	1,600,000		
Quinapoxet Dam Removal - REI	60192_7690	Jul-21	Feb-23	100,000	-	100,000				45,000	55,000	100,000		
623 Dam Projects Total				**5,916,316**	**3,115,745**	**2,800,571**		**97,566**	**740,000**	**1,299,000**	**621,000**	**2,757,566**	**43,000**	
625 Metropolitan Tunnel Redundancy														
Water Transmission Redundancy Plan	60035_6273	Oct-08	Sep-11	1,396,572	1,396,572	-								
Preliminary Design & MEPA Review	60092_7159	Apr-20	Apr-23	9,265,497	-	9,265,497			3,004,000	3,004,000	3,004,000	9,012,000	253,497	
Tunnel Construction	60107_7291	Jan-27	Jan-40	983,003,279	-	983,003,279							93,916,000	889,087,279
Sudbury Aqueduct - MEPA Review	60122_7352	Oct-12	Jun-17	2,073,401	2,059,395	14,005	14,005					14,005		
Construction Management	60126_7356	Jul-25	Jan-40	117,037,860	-	117,037,860							22,069,000	94,968,860
Top of Shafts Surface Construction	60127_7357	Jan-34	Jan-40	41,542,702	-	41,542,702								41,542,702
Administration, Legal & Public Outreach	60170_7516	Jan-24	Jan-40	151,004,958	-	151,004,958							39,898,000	111,106,958
Top of Shafts Rehab - Design/CA/RI	60172_7521	Apr-38	Apr-43	1,262,173	-	1,262,173								1,262,173
Top of Shafts Rehab - Construction	60173_7522	Apr-40	Apr-42	5,278,178	-	5,278,178								5,278,178
Final Design/ESDC	60174_7556	Jan-24	Jan-40	89,729,026	-	89,729,026							23,710,000	66,019,026
Shaft 7 Buildings - Design/CA/RI	60176_7558	Apr-38	Apr-43	1,316,472	-	1,316,472								1,316,472
Shaft 7 Buildings - Construction	60177_7559	Apr-40	Apr-42	5,265,888	-	5,265,888								5,265,888
Program Support Services	60178_7655	Apr-19	Mar-28	13,574,790	-	13,574,790		1,508,000	1,508,000	1,508,000	1,508,000	6,032,000	7,542,790	
625 Metropolitan Tunnel Redundancy Total				**1,421,750,796**	**3,455,967**	**1,418,294,828**	**14,005**	**1,508,000**	**4,512,000**	**4,512,000**	**4,512,000**	**15,058,005**	**187,389,287**	**1,215,847,536**

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628 Metropoliyan Redundancy Interim Improvements														
CP1 Shafts 6, 8, 9A	60202_7561	Oct-19	Oct-20	1,630,000	-	1,630,000		752,000	878,000			1,630,000		
CHEPS Improvements - Construction	60203_7562	Jan-23	Jan-25	19,093,680	-	19,093,680					2,291,000	2,291,000	16,802,680	
WASM/Spot Pond Supply Mains West PRV - Construction	60204_7563	Jul-20	Jul-22	12,304,816	-	12,304,816			4,429,000	5,905,000	1,970,816	12,304,816		
Easements/Permits	60206_7573	Apr-19	Jun-27	300,000	100	299,900	1,055	48,945	50,000	50,000	50,000	200,000	99,900	
CHEPS Improvements - Design/CA/RI	60207_7574	Jan-19	Jan-26	6,700,000	-	6,700,000	268,000	1,072,000	1,072,000	1,072,000	1,072,000	4,556,000	2,144,000	
WASM/Spot Pond Supply Mains West PRV - Design/CA/RI	60208_7575	Jul-18	Jul-23	2,849,332	-	2,849,332	572,902	682,000	682,000	682,000	230,430	2,849,332		
Shafts 5 & 9 Building Improvements - Design/CA/RI	60209_7599	Oct-19	Oct-22	750,000	-	750,000		121,000	243,000	243,000	143,000	750,000		
Shafts 5 & 9 Building Improvements II - Construction	60210_7600	Jul-20	Jul-21	3,000,000	-	3,000,000			3,000,000			3,000,000		
CHEPS Improvements - REI	60212_7669	Jan-23	Jan-25	572,000	-	572,000					69,000	69,000	503,000	
CP2 Shafts 7, 7B, 7C, 7D	60213_7670	Apr-20	Apr-21	2,500,000	-	2,500,000			2,307,000	193,000		2,500,000		
CP3 Shafts 5 & 9	60214_7671	Oct-20	Oct-21	2,500,000	-	2,500,000			1,153,000	1,347,000		2,500,000		
Section 101/Waltham Section - REI	60215_7672	Jul-21	Jul-23	1,040,000	-	1,040,000				187,000	499,000	686,000	354,000	
Shafts 5 & 9 Building Improvements - REI	60216_7673	Jul-20	Jul-21	286,000	-	286,000			198,000	88,000		286,000		
WASM/Spot Pond Supply Mains - REI	60217_7674	Jul-20	Jul-22	995,000	-	995,000			358,000	477,000	160,000	995,000		
WASM 3 - MEPA/Design/CA/RI	68166_6539	Jul-13	Jun-27	15,512,835	2,014,405	13,498,430	1,000,000	1,300,000	1,400,000	1,400,000	1,400,000	6,500,000	6,900,000	98,431
WASM 3 Rehab CP-2	68170_6543	Jan-23	Dec-24	27,613,800	-	27,613,800					3,451,000	3,451,000	24,162,800	
WASM 3 CP-1	68171_6544	Jan-20	Dec-21	20,366,500	-	20,366,500		2,545,000	10,183,000	7,638,500		20,366,500		
WASM 3 Rehab CP-3	68172_6545	Jan-24	Jan-26	42,598,254	-	42,598,254							42,598,254	
Section 101/Waltham Section - Construction	68333_7457	Jul-21	Jul-23	19,483,145	-	19,483,145				5,013,000	6,752,000	11,765,000	7,718,145	
Section 101/Waltham Section - Design/CA/RI	68334_7547	Jul-19	Jul-24	3,000,000	-	3,000,000		540,000	720,000	780,000	720,000	2,760,000	240,000	
Commnonwealth Ave. Pump Station Improvements - Design/CA/RI	75580_7523	Jan-17	Jul-21	2,765,907	822,784	1,943,124	624,249	700,000	568,874	50,000		1,943,123		
Commonwealth Ave. Pump Station Improvements - Construction	75581_7524	Jan-19	Jan-21	7,033,590	-	7,033,590	844,000	3,517,000	2,672,590			7,033,590		
628 Metropolitan Redundancy Interim Improvements Total				**192,894,859**	**2,837,289**	**190,057,571**	**3,310,206**	**11,277,945**	**29,914,464**	**25,125,500**	**18,808,246**	**88,436,361**	**101,522,779**	**98,431**
630 Watershed Division Capital Improvements														
Quabbin Administration Building Rehab - Design/CA/RI	60300_7564	Mar-21	Mar-25	2,800,000	-	2,800,000			57,000	688,000	685,000	1,430,000	1,370,000	
Quabbin Administration Building Rehab - Construction	60301_7565	Mar-23	Mar-25	12,000,000	-	12,000,000					480,000	480,000	11,520,000	
Quabbin Administration Building Rehab - Conceptual Design Report	60302_7569	Oct-19	Oct-20	200,000	-	200,000		50,000	150,000			200,000		
Maintenance Garage/Wash Bay/Storage Building - Construction	60303_7577	Apr-20	Apr-22	3,900,000	-	3,900,000			1,872,000	1,872,000	156,000	3,900,000		
Maintenance Garage/Wash Bay/Storage Building - Design/CA/RI	60304_7677	Apr-19	Apr-23	1,000,000	-	1,000,000		307,000	307,000	307,000	79,000	1,000,000		
630 Watershed Division Capital Improvements Total				**19,900,000**	**-**	**19,900,000**		**357,000**	**2,386,000**	**2,867,000**	**1,400,000**	**7,010,000**	**12,890,000**	
Distribution And Pumping				**961,957,344**	**464,357,486**	**497,599,858**	**43,576,757**	**31,265,836**	**28,198,789**	**20,951,252**	**16,340,183**	**140,332,818**	**298,591,191**	**58,675,843**
618 Peabody Pipeline Project														
Peabody Pipeline - Design/ESDC/REI	60063_6895	Jun-17	Aug-21	3,498,857	1,054,831	2,444,026	364,116		1,631,545	448,365		2,444,026		
Easements	60064_6896	Jun-17	Feb-20	10,000	4,250	5,750	5,750					5,750		
618 Peabody Pipeline Project Total				**3,508,857**	**1,059,081**	**2,449,776**	**369,866**		**1,631,545**	**448,365**		**2,449,776**		
677 Valve Replacement														
Construction 1	67559_5126	Nov-95	Nov-96	717,800	717,800	-								
Technical Assistance	67560_5124	Oct-95	May-10	124,607	124,607	-								
Equipment Purchase	68005_6088	Oct-95	Jun-18	1,111,804	1,111,804	-								
Construction 2	68012_6105	Nov-97	Jul-99	1,356,516	1,356,516	-								
Construction 3	68039_6278	Feb-00	Aug-01	1,337,571	1,337,571	-								
Construction 4	68079_6345	May-02	Oct-03	1,539,911	1,539,911	-								
Construction 5	68080_6346	Mar-04	Jul-05	1,389,006	1,389,006	-								
Construction 6	68126_6435	May-07	Dec-08	1,571,992	1,571,992	-								
Construction 7	68127_6436	Apr-11	Apr-13	2,858,864	2,858,859	5								
Permits	68239_6859	Jan-02	Jun-29	2,542	2,542	-								
Easements	68240_6860	Jan-02	Jun-29	5,770	5,770	-								
Construction 8	68300_7195	Jan-26	Jun-28	4,016,011	-	4,016,011							3,613,000	403,011
Construction 9	68307_7236	Jun-27	Jun-29	4,016,011	-	4,016,011							1,606,000	2,410,011
Phase 8 - Design/CA/RI	68330_7417	Jan-24	Jun-30	803,202	-	803,202							733,202	70,000
Phase 9 - Design/CA/RI	68331_7418	Jun-25	Jun-30	803,202	-	803,202							535,000	268,202
677 Valve Replacement Total				**21,654,809**	**12,016,378**	**9,638,431**							**6,487,202**	**3,151,224**
678 Boston Low Service-Pipe & Valve Rehab Total	**completed project**			**23,690,863**	**23,690,863**	**-**								
683 Heath Hill Road Pipe Replacement Total	**completed project**			**19,358,036**	**19,358,036**	**-**								

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689 James L. Gillis Pump Station Total	**completed project**			**33,419,007**	**33,419,008**	**-**								
692 Northern High Service (NHS) - Section 27 Improvements														
Section 27 - Construction	67769_6333	Mar-24	Nov-25	1,201,067	26,581	1,174,486							1,174,486	
Easements	68192_6589	Apr-16	Jun-22	22,800	-	22,800				11,400	11,400	22,800		
Technical Assistance	68211_6712	Oct-99	Jun-22	64,500	59,794	4,706	713	1,238	750	750	750	4,201	506	
Surveying	68229_6809	Jun-01	Mar-17	37,271	37,271	-								
692 Northern High Servie (NHS)- Section 27 Improvements Total				**1,325,638**	**123,646**	**1,201,992**	**713**	**1,238**	**750**	**12,150**	**12,150**	**27,001**	**1,174,992**	
693 NHS - Revere & Malden Pipeline Improvements														
Revere & Malden - Design/CS/RI	67780_5185	May-88	Sep-94	1,785,747	1,785,747	-								
Revere Beach - Construction	67781_5186	Aug-92	Oct-94	6,314,186	6,314,186	-								
Malden Section 53 - Construction	67782_5176	Apr-92	Sep-94	10,026,430	10,026,430	-								
Revere Section 53 - Construction	67784_5177	Sep-08	Aug-09	2,938,022	2,938,022	-								
Control Valves - Construction	67785_5191	Jun-88	Aug-89	948,780	948,780	-								
DI Pipeline Cleaning & Lining - Construction	67786_5179	Jun-90	Sep-90	157,930	157,930	-								
Winthrop Cleaning & Lining - Construction	67787_5178	Jun-90	Aug-90	575,040	575,040	-								
Section 53 Connections - Construction	67790_6335	Nov-23	Nov-25	11,546,958	-	11,546,958							11,546,958	
Technical Assistance	67791_5986	Jul-06	Mar-18	246,445	246,445	-								
Linden Square - Construction	67792_5238	Apr-91	Nov-91	1,849,430	1,849,430	-								
Linden Square - Construction Administration	67793_5239	Apr-91	Nov-91	125,380	125,380	-								
Road Restoration - Design/CA/RI	67996_6033	Nov-94	Dec-95	77,250	77,250	-								
Road Restoration - Construction	67997_6034	Jul-95	Jun-96	1,713,790	1,713,790	-								
Malden Section 53 - Landscaping	68020_6113	Apr-96	Jun-96	20,000	20,000	-								
Sidewalk Restoration	68033_6183	Sep-96	Oct-96	54,100	54,100	-								
Revere Section 53 - Easements	68078_6334	Sep-02	Jul-09	210	210	-								
Section 14 Water Pipe Relocation (Malden)	68257_6957	Jul-17	May-18	1,555,800	1,501,660	54,140	54,139					54,139		
Section 99 Connections - Constuction	68258_6958	May-23	May-25	7,883,271	-	7,883,271							7,883,271	
Easements	68265_6978	Jul-06	Dec-20	30,000	-	30,000	21,500		8,500			30,000		
Permits	68280_7049	Apr-05	Mar-22	5,000	2,130	2,870	1,753		1,117			2,870		
Section 53 Connections - Design CA/RI	75526_7402			-	-	-								
Shaft 9A-D - Design/CA/RI	75527_7403	Mar-20	Nov-24	-	-	-								
Section 56 Replacement/Saugus River - Design//RICA	75545_7454	Apr-19	Apr-25	1,536,995	-	1,536,995		302,000	302,000	302,000	302,000	1,208,000	328,995	
Sections 53 and 99 Connections - Design/CA/RI	75548_7485	Mar-19	Mar-25	3,404,435	-	3,404,435		600,000	800,000	600,000	407,557	2,407,557	996,878	
Section 56 Replacement/Saugus River - Construction	75549_7486	Apr-23	Apr-24	9,750,000	-	9,750,000					437,500	437,500	9,312,500	
Section 56 Replacement/Saugus River - Feasibility Study	75565_7500	Dec-15	Jun-17	224,777	224,777	-								
Section 53 Connections - Feasibility Study	75568_7520			-	-	-								
Section 56 Pipe Demolition - Design/CA/RI	75569_7535			-	-	-								
Section 56 Pipe Demolition - Construction	75570_7536	Oct-18	Mar-19	1,898,500	-	1,898,500	737,703	1,160,797				1,898,500		
Section 13 & 48 Rehab - Design /CA/RI	75571_7602	Jul-24	Jul-29	2,150,000	-	2,150,000							1,972,000	178,000
Section 13 & 48 Rehab - Construction	75572_7603	Jul-26	Jul-28	10,750,000	-	10,750,000							9,030,000	1,720,000
Section 56 Replacement - REI	75573_7681	Apr-23	Apr-24	520,000	-	520,000							520,000	
Sections 53 & 99 Connections - REI	75574_7682	Nov-23	May-25	1,438,593	-	1,438,593							1,438,593	
693 NHS - Revere & Malden Pipe Total				**79,527,069**	**28,561,307**	**50,965,762**	**815,095**	**2,062,797**	**1,111,617**	**902,000**	**1,147,057**	**6,038,566**	**43,029,195**	**1,898,000**
702 New Connecting Mains - Shaft 7 to WASM 3														
Routing Study	67846_5163	Aug-94	Nov-96	397,087	397,087	-								
Watertown MOU	68035_6199	Jun-94	Sep-97	167,000	167,000	-								
CP1- Design/CA/RI	68110_6383	Sep-98	Jul-11	3,532,814	3,532,814	-								
DP2/4 Meter 120 - Design/CA/RI	68111_6384	Aug-02	Oct-08	1,277,722	1,277,722	-								
CP3 (Sections 23, 24 & 47) - Final Design/CA/RI	68112_6385	Jul-16	Jun-22	3,506,868	1,608,806	1,898,062	930,500	482,052	349,115	136,395		1,898,062		
CP1 A & B - Easements	68114_6387			16,919	16,919	-								
CP3 - Easements	68115_6388	Jan-18	Dec-18	40,000	-	40,000	32,500	7,500				40,000		
CP5 - Easements	68117_6390	Dec-06	Jan-11	21,659	21,659	-								
CP3 (Sections 23, 24 & 47) - Rehab	68119_6392	Apr-19	Mar-22	14,322,000	-	14,322,000	250,000	6,022,000	6,272,000	1,778,000		14,322,000		
CP5 - Northeast Segment	68121_6394	Aug-09	Nov-11	5,902,607	5,902,606	1								
CP2 - Clean & Line Sections 59 & 60 - Construction	68174_6548	Dec-23	Dec-25	8,899,480	-	8,899,480							8,899,480	
CP2 -Easements	68175_6547	May-17	May-25	33,000	-	33,000	9,437	10,000	5,000	5,000	2,000	31,437	1,563	
Replacement of Sections 25, 75, 59 & 60 - Design/CA/RI	68255_6955	Jan-19	Jun-26	4,200,000	-	4,200,000	100,000	600,000	700,000	700,000	600,000	2,700,000	1,500,000	
CP-3 (Replacement of Section 25) - Construction	68256_6956	Oct-23	Apr-25	3,904,288	-	3,904,288							3,904,288	
CP-1 (Section 75 Extension) - Construction	68350_7484	Apr-22	Apr-24	4,185,000	-	4,185,000				200,000	2,125,000	2,325,000	1,860,000	
Replacement of Sections 25, 75, 89 & 60 - REI	68351_7680	Apr-22	Dec-25	3,718,000	-	3,718,000				50,000	1,350,000	1,400,000	2,318,000	

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702 New Connecting Mains - Shaft 7 to WASM 3Total				**54,124,444**	**12,924,613**	**41,199,831**	**1,322,437**	**7,121,552**	**7,326,115**	**2,869,395**	**4,077,000**	**22,716,499**	**18,483,331**	
704 Rehab of Other Pump Stations														
Preliminary Design	67885_5153	Aug-94	Mar-96	351,000	351,000	-								
Design/CS/RI	68017_6110	May-97	Nov-04	2,545,826	2,545,826	-								
Construction II & C	68072_6304	Jan-00	Feb-01	639,272	639,272	-								
Rehab of 5 Pump Stations	68102_6375	Oct-06	Jun-10	21,847,856	21,847,856	-								
Legal	68179_6557	Jul-99	Jan-10	6,097	6,097	-								
Proprietary Equipment Purchases	68204_6676	Jun-99	Jan-10	157,638	157,638	-								
Design 2 CS/RI	68266_6980	Dec-04	Jun-11	4,510,163	4,510,163	-								
Pump Station Rehab - Evaluation	75582_7525	Jul-19	Jul-21	500,000	-	500,000		180,000	240,000	80,000		500,000		
Pump Station Rehab - Design/CA/RI	75583_7526	Jan-22	Jan-28	3,940,000	-	3,940,000				164,167	656,667	820,834	3,119,166	
Pump Station Rehab - Construction	75584_7527	Jan-25	Jan-27	15,760,000	-	15,760,000							15,760,000	
704 Rehab of Other Pump Stations Total				**50,257,852**	**30,057,852**	**20,200,000**		**180,000**	**240,000**	**244,167**	**656,667**	**1,320,834**	**18,879,166**	
706 NHS - Connecting Mains from Section 91 Total	**completed project**			**2,360,194**	**2,360,194**	**-**								
708 Northern Extra High Service - New Pipelines														
Design/CA/RI	67970_5242	Sep-94	Jun-01	587,802	587,802	-								
Appraisal & Easements	67971_6339	Sep-94	Jun-01	389	389	-								
Construction	67972_6340	Aug-99	Sep-01	3,031,572	3,031,572	-								
Regulatory Compliance	68010_6099	Nov-95	Oct-00	250	250	-								
Sections 34, 45 & 61 - Construction	68162_6522	Jan-24	Jul-26	5,983,656	-	5,983,656							5,983,656	
Public Participation	68176_6554	Jul-15	Dec-20	5,000	-	5,000	1,998	2,202	700	100		5,000		
Legal	68177_6555	Jul-15	Dec-20	5,000	-	5,000	1,250	2,500	1,250			5,000		
Technical Assistance	68210_6707	Nov-10	Jan-17	17,631	7,886	9,745	5,000	4,745				9,745		
PLC Equipment Purchases	68215_6749	Dec-99	Dec-00	4,220	4,220	1								
Permits	68281_7050	Nov-10	Jan-17	5,000	-	5,000	1,748	3,252				5,000		
Sections 34, 45 & 61 - Design/CA/RI	75528_7404	Jan-22	Jul-27	1,233,560	-	1,233,560				107,388	315,000	422,388	811,172	
708 Northern Extra High Service - New Pipelines Total				**10,874,080**	**3,632,119**	**7,241,962**	**9,996**	**12,699**	**1,950**	**107,488**	**315,000**	**447,133**	**6,794,828**	
712 Cathodic Protection of Distribution Mains														
Planning Phase I	68002_6058	Apr-95	Dec-97	107,680	107,680	-								
Cathodic Protection Testing Eval. Progra	68129_6438	Aug-15	Aug-17	128,716	128,716	-								
Cathodic Prot Shafts E&L	68131_6440	Oct-18	Jun-19	893,500	-	893,500	500,000	393,500				893,500		
Technical Assistance	68216_6751	Jan-00	May-09	33,233	33,233	-								
Cath Prot West Des/CA	68380_7609	Jul-19	Jun-23	930,000	-	930,000		186,000	248,000	248,000	227,000	909,000	21,000	
Cath Prot West Construction	68381_7610	Jul-21	Jun-25	4,300,000	-	4,300,000				941,000	941,000	1,882,000	2,418,000	
Cath Prot Metro System Des/CA	68382_7611	Jul-26	Jun-26	9,207,000	-	9,207,000			1,233,860	1,523,000	1,523,000	4,279,860	4,927,140	
Cath Prot Metro System Construction	68383_7612	Jan-23	Dec-26	47,100,000	-	47,100,000					1,751,000	1,751,000	45,349,000	
Cath Prot West REI	68384_7678	Jun-21	Jun-25	2,288,000	-	2,288,000				572,000	572,000	1,144,000	1,144,000	
Cath Prot Metro REI	68385_7679	Jan-23	Dec-26	1,716,000	-	1,716,000					107,250	107,250	1,608,750	
712 Cathodic Protection of Distribution Mains Total				**66,704,129**	**269,629**	**66,434,500**	**500,000**	**579,500**	**1,481,860**	**3,284,000**	**5,121,250**	**10,966,610**	**55,467,890**	
713 Spot Pond Supply Mains Rehabilitation														
Section 4 Webster Ave Bridge Pipe Rehab - Design	60114_7334	Oct-13	Mar-17	685,536	642,341	43,195	43,195					43,195		
Section 4 Webster Ave Bridge Pipe Rehab - Construction	60115_7335	May-15	Dec-16	3,792,313	3,792,313	-								
Walnut St Bridge Truss - Construction	60145_7483	Oct-21	May-23	800,000	-	800,000				600,000	200,000	800,000		
Preliminary Design & Design/CA/RI	68038_6223	Sep-98	Oct-08	10,868,582	10,868,582	-								
Easements & Paving - CP1	68059_6316	May-00	Mar-02	143,347	143,347	-								
North (Medford/Melrose)	68060_6317	May-00	Jan-02	6,597,330	6,597,330	-								
Easements - CP2	68106_6379	May-02	Jun-06	49,601	49,601	-								
Easements - CP3	68107_6380	Apr-04	Nov-07	79,782	79,782	-								
Middle (Medford/Somerville)	68108_6381	Jun-02	Jul-06	22,176,813	22,176,813	-								
South (Cambridge/Boston)	68109_6382	Oct-04	Apr-08	17,590,133	17,590,133	-								
Early Valve Replacement Contract	68150_6475	Sep-98	Jan-00	2,387,073	2,387,073	-								
Easements - CP4	68151_6476	Sep-06	May-09	1,451	1,451	-								
Early Valve Equipment Purchase	68153_6483	May-98	Nov-01	161,390	161,390	-								
Easements - CP5	68225_6784	Jul-14	Jun-20	74,797	74,497	300	300					300		
CP3 - CA/RI	68274_7003	Sep-04	Apr-09	924,656	924,656	-								
713 Spot Pond Supply Mains Rehabilitation Total				**66,332,804**	**65,489,309**	**843,495**	**43,495**			**600,000**	**200,000**	**843,495**		

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714 Southern Extra High - Sections 41 & 42 Total	**completed project**			**3,657,244**	**3,657,244**	**-**								
719 Chestnut Hill Connecting Mains														
Pump Station Potable Connection -Design/CA/RI	68026_6141	Mar-00	Dec-04	1,359,533	1,359,533	-								
Preliminary Engineering	68051_6301	Jan-05	Apr-06	457,200	457,200	-								
Easements	68053_6303	Apr-03	Dec-07	80,575	80,575	-								
Emergency Pump Relocation - Construction	68155_6501	Feb-99	Mar-01	6,502,187	6,502,187	-								
Emergency Pump Relocation - Design/CA/RI	68157_6503	May-98	May-01	1,120,816	1,120,816	-								
Boston Paving	68180_6558	Jul-99	Dec-07	132,896	132,896	-								
Legal	68182_6560	Jul-99	Jun-08	1,137	1,137	-								
BECo Emergency Pump Construction	68199_6623	Sep-99	Jun-00	430,641	430,641	-								
Pump Station Potable Connection - Construction	68203_6651	Apr-02	Dec-03	7,132,109	7,132,109	-								
Shaft 7 & Meter 120 - Design/CA/RI	68218_6770			-	-	-								
Equipment Pre-purchase	68230_6814	Apr-01	Oct-01	154,337	154,337	-								
Demolition of Garages	68231_6820	Feb-02	May-02	71,600	71,600	-								
Utilities	68244_6869	Jun-02	Aug-02	43,644	43,644	-								
Chestnut Hill Final Connections - Construction	68267_6982	Jul-25	Dec-27	12,953,655	-	12,953,655							12,953,655	
Chestnut Hill Final Connections - Design/ESDC/ REI	68268_6995	Jul-23	Dec-28	2,586,752	-	2,586,752							2,580,752	6,000
Chestnut Hill Gatehouse No. 1 Repairs - Construction	75521_7382	Nov-17	Apr-18	799,843	799,843	-								
719 Chestnut Hill Connecting Mains Total				**33,826,925**	**18,286,518**	**15,540,407**							**15,534,407**	**6,000**
720 Warren Cottage Line Rehab Total	**completed project**			**1,204,821**	**1,204,821**	**-**								
721 Southern Spine Distribution Mains														
Sections 21, 43 & 22 - Design	68083_6290	Sep-00	May-13	7,114,815	7,114,815	-								
Sections 21, 43 & 22 - Easements	68084_6291	Mar-02	May-12	106,986	106,986	-								
Section 22 South - Construction	68085_6292	Jul-03	Jun-05	4,993,131	4,993,131	-								
Sections 20 & 58 - Design	68089_6296	Jun-23	May-28	3,350,435	-	3,350,435							3,241,683	108,752
Sections 20 & 58 - Easements	68090_6297	Sep-21	Sep-25	35,070	-	35,070				5,115	8,768	13,883	21,187	
Sections 20 & 58 - Construction	68091_6298	Sep-25	May-27	15,767,304	-	15,767,304							15,767,304	
Adams Street Bridge	68122_6396	Jul-98	Dec-99	153,783	153,783	-								
Southern High Public Participation	68193_6601	Oct-98	May-99	15,000	15,000	-								
Southern High Extension Study	68194_6602	Sep-98	May-99	242,372	242,372	-								
Boston Paving	68228_6787			3,194	3,194	-								
Section 22 North - Construction	68235_6844	Feb-24	Feb-26	19,243,016	-	19,243,016							19,243,016	
Section 107 Phase 1 - Construction	68236_6845	Jul-07	Jan-09	6,184,362	6,184,362	-								
Legal	68237_6846	May-04	May-27	5,000	1,192	3,808	191	381	381	481	481	1,915	1,894	
Technical Assistance	68238_6847	Feb-04	Oct-05	28,102	28,102	-								
Contract 1A - Construction	68247_6885	Nov-03	Jun-05	2,858,603	2,858,603	-								
Section 107 Phase 2 - Construction	68290_7099	Jan-10	Jan-12	14,846,562	14,846,562	-								
Milton Pressure Regulator Valve	68291_7104	Jun-06	Nov-06	135,000	135,000	-								
Section 22 North - Design/ESDC	68298_7120	Aug-21	Feb-27	2,325,000	-	2,325,000				355,000	499,200	854,200	1,470,800	
Section 22 North - Facility Plan/EIR	68299_7155	Mar-19	Mar-21	1,300,000	-	1,300,000	52,000	624,000	624,000			1,300,000		
721 Southern Spine Distribution Mains Total				**78,707,735**	**36,683,102**	**42,024,633**	**52,191**	**624,381**	**624,381**	**360,596**	**508,449**	**2,169,998**	**39,745,884**	**108,752**
722 Northern Intermediate High (NIH) Redundancy & Storage														
Concept Plan	53454_6954	Feb-06	Aug-10	796,748	796,748	-								
Easements	68093_6306	Jul-17	Jun-20	429,450	429,450	-								
Section 89 & 29 Redundancy - Design	68252_6906	Mar-11	Aug-20	6,912,435	5,171,365	1,741,069	816,938	833,864	90,268			1,741,070		
Purchase Mobile Pump Unit	68276_7026	Jul-09	Jan-10	290,848	290,848	-								
Short Term Improvements - Design/CA/RI	68277_7045	Sep-09	May-15	820,733	820,733	-								
Permits	68278_7047	Jan-10	Dec-18	5,000	150	4,850	2,850	2,000				4,850		
Technical Assistance	68279_7048	Jan-10	Dec-18	18,000	-	18,000	5,125	12,875				18,000		
West St. Pipe Reading - Construction Phase1A	68282_7066	Jun-14	May-15	1,909,952	1,909,952	-								
Section 89 & 29 Redundancy - Construction Phase 2	68283_7067	Sep-17	Jun-20	23,748,800	5,456,202	18,292,598	13,518,714	4,773,884				18,292,598		
NIH Storage - Construction	68284_7068	Jan-26	Jan-28	22,634,264	-	22,634,264							22,634,264	
Section 89 & 29 Replacement - Design/ESDC	68294_7116	Apr-18	Jan-23	3,948,625	144,753	3,803,872	1,000,000	1,000,000	930,247	823,625	50,000	3,803,872		
Section 89 & 29 Replacement - Construction	68295_7117	May-20	Jan-22	16,000,000	-	16,000,000			10,000,000	6,000,000		16,000,000		
Gillis Pump Station Improvements	68309_7260	Jul-13	Dec-14	2,178,325	2,178,325	-								
Reading/Stoneham Interconnections	68310_7261	Aug-11	Oct-12	3,466,546	3,466,546	-								
NIH Storage - Design	68316_7311	Jan-24	Jan-29	4,592,459	-	4,592,459							4,581,000	11,459
Section 89&29 Redundancy - Phase 1B Construction	68317_7471	Jan-16	May-18	12,374,275	12,247,811	126,464	126,464					126,464		

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Section 89&29 Redundancy - Phase 1C Construction	68318_7478	Jan-17	Sep-18	18,301,547	16,044,743	2,256,805	2,256,805					2,256,805		
Reading Reimbursement	68319_7590	Jun-17	Sep-17	(62,470)	(62,470)	-								
Section 89 & 29 Replacement - RE/RI Services	68320_7633	May-20	Jan-22	2,000,000	-	2,000,000			1,000,000	800,000	200,000	2,000,000		
722 Northern Intermediate High (NIH) Redundancy & Storage Total				**120,365,537**	**48,895,156**	**71,470,381**	**17,726,896**	**6,622,623**	**12,020,515**	**7,623,625**	**250,000**	**44,243,659**	**27,215,264**	**11,459**
723 Northern Low Service Rehabilitation - Section 8														
Easements	68094_6321	Jul-15	Jul-27	80,000	-	80,000	14,375		10,000	10,000	10,000	44,375	35,625	
Section 8 & 57 Construction	68095_6322	Jul-26	Jul-28	25,280,004	-	25,280,004							24,616,262	663,742
Rehab Sections 37 & 46, Chelsea/East Boston - Construction	68262_6962	Jul-25	Jun-27	3,200,000	-	3,200,000							3,200,000	
Permits	68263_6977	Jul-05	Jul-27	299,000	284,912	14,088	1,550		1,600	1,600	1,600	6,350	7,738	
Technical Assistance	68264_6979	Jul-05	Jul-17	44,245	44,245	-								
Section 97A - Construction	68275_7021	Oct-08	Oct-09	1,991,829	1,991,829	-								
Section 8 & 57 - Design/CA/RI	68287_7092	Jul-23	Jul-29	5,056,001	-	5,056,001							4,923,252	132,749
Rehab Sections 37 & 46, Chelsea/East Boston - Design/CA/RI	75529_7405	Jul-23	Jun-28	852,935	-	852,935							852,935	
Sections 50 & 57 Water & 21/20/19 Sewer Rehab - Design/CA/RI	75610_7540	Jul-17	May-22	5,980,403	633,628	5,346,775	1,959,001	1,639,107	1,300,000	448,666		5,346,774		
Sections 50 & 57 Water & 21/20/19 Sewer Rehab - Construction	75611_7541	Oct-21	Dec-23	13,900,000	-	13,900,000				3,277,000	3,278,000	6,555,000	7,345,000	
723 Northern Low Service Rehabilitation - Section 8 Total				**56,684,417**	**2,954,614**	**53,729,803**	**1,974,926**	**1,639,107**	**1,311,600**	**3,737,266**	**3,289,600**	**11,952,499**	**40,980,812**	**796,491**
725 Hydraulic Model Update Total	**completed project**			**598,358**	**598,358**	**-**								
727 Southern Extra High (SEH) Redundancy & Storage														
Conceptual Plan/Preliminary Design/Environmental Review	53397_6452	Feb-07	Feb-14	632,519	632,520	-								
Redundancy Pipeline - Phase 1 Design/CA/RI	53398_6453	Feb-14	Aug-21	7,677,305	4,603,590	3,073,715	1,000,000	1,000,000	966,973	106,742		3,073,715		
Redundancy Pipeline Section III Phase 1 - Construction	53399_6454	Jul-16	Sep-18	12,540,931	12,407,969	132,963	132,963					132,963		
Redundancy/Storage Phase 2 - Final Design/CA/RI	68135_6444	Jan-26	Dec-31	7,370,186	-	7,370,186							4,021,000	3,349,186
University Avenue Water Main	68136_6445	Mar-08	Nov-08	6,137,445	6,137,445	-								
Sections 77 & 88 Rehab - Design	68292_7112	Mar-21	Mar-26	1,410,462	-	1,410,462			25,060	343,000	343,000	711,060	699,402	
Sections 77 & 88 Rehab - Construction	68293_7113	Apr-23	Apr-25	6,066,500	-	6,066,500							6,066,500	
Easements/Agreements	68305_7226	Jul-14	Jul-27	300,000	12,048	287,952	105,000	95,519	36,100	11,333	20,000	267,952	20,000	
Permits/Utilities	68306_7227	Aug-08	Jul-27	300,000	5,801	294,199	100,000	100,001	94,198			294,199		
Redundancy/Storage Phase 2 - Construction	68308_7245	Jan-28	Dec-30	36,850,930	-	36,850,930							3,070,000	33,780,930
Phase 3, 2nd Tank - Construction	68311_7262	Jan-33	Dec-35	12,978,168	-	12,978,168								12,978,168
Phase 3, 2nd Tank - Design	68312_7263	Jan-31	Dec-36	2,595,633	-	2,595,633								2,595,633
Redundancy Pipeline Section 111 Phase 2 - Construction	68555_7504	Oct-17	Nov-19	17,471,074	4,645,440	12,825,633	8,552,463	4,273,170				12,825,633		
Redundancy Pipeline Section 111 Phase 3 - Construction	68556_7505	Jun-18	Sep-20	19,085,000	-	19,085,000	10,810,000	6,950,000	1,325,000			19,085,000		
727 Southern Extra High (SEH) Redundancy & Storage Total				**131,416,153**	**28,444,813**	**102,971,341**	**20,700,426**	**12,418,690**	**2,447,331**	**461,075**	**363,000**	**36,390,522**	**13,876,902**	**52,703,917**
730 Weston Aqueduct Supply Mains (WASM)														
Newton Water Mains - Construction	59774_5034	Apr-95	Oct-96	668,790	668,790	-								
Technical Assistance	59776_5975	Mar-95	Oct-18	186,424	186,424	-								
WASM 4 - Design/CA/RI	67865_5147	Mar-95	Sep-07	5,978,368	5,978,368	-								
WASMs 1 & 2 - Design/CA/RI	68027_6142	Jun-97	Jul-06	5,059,988	5,059,988	-								
Appraisal / Easement	68030_6174	Mar-95	Oct-18	448,682	448,682	-								
WASM 1, 2 & 4 - Auburndale	68031_6175	Jun-97	Nov-98	4,001,461	4,001,461	-								
Meter 103 - Construction	68032_6176	Oct-96	Jul-98	61,027	61,027	-								
WASMs 1 & 2 - Newton	68041_6280	Mar-00	Jun-02	9,218,520	9,218,520	-								
WASMs 1 & 2 - Boston	68042_6281	Feb-03	Jun-05	7,038,896	7,038,896	-								
WASMs 2 & 4 - Newton	68069_6312	Apr-98	Mar-01	8,281,877	8,281,877	-								
WASM 4 - Allston & Western Ave. Sewer	68070_6313	Feb-02	Dec-04	17,330,800	17,330,800	-								
Section 36/Watertown Square/Waltham Connection - Design/CA/RI	68167_6540	Jan-11	May-17	2,017,800	2,011,329	6,471	6,471					6,471		
Section 28, Arlington - CP1	68173_6546	Aug-09	Feb-11	2,303,626	2,303,626	-								
Survey	68245_6870	Dec-01	Oct-25	88,681	88,681	-								
Arlington Pipe Work	68269_6996	Dec-09	May-10	401,035	401,035	-								
WASM3 Section 12 Replacement - Construction	68272_7000	Oct-04	Sep-05	2,113,693	2,113,693	-								
WASM3 Section 12 Replacement - Design	68273_7001	May-04	Aug-06	264,663	264,663	-								
Section 28 - Design/CA/RI	68285_7083	Oct-06	Apr-11	866,688	866,688	-								
Watertown Section Rehab	68301_7222	May-13	Dec-13	2,818,298	2,764,050	54,247	54,247					54,247		
Section 36/W11/S 9-A11 Valve	68332_7448	Nov-14	Dec-16	11,314,379	11,314,379	-								
730 Weston Aqueduct Supply Mains (WASM) Total				**80,463,696**	**80,402,977**	**60,718**	**60,718**						**60,718**	
731 Lynnfield Pipeline Total	**completed project**			**5,625,829**	**5,625,828**	**-**								

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732 Walnut St. & Fisher Hill Pipeline Rehabilitation Total	**completed project**			**2,717,141**	**2,717,141**	**-**								
735 Section 80 Rehabilitation														
Section 80 Rehab - Construction	68249_6891	Jul-23	Jul-26	8,735,762	-	8,735,762							8,735,762	
Section 80 Rehab - Design/CS/RI	68250_6892	Jul-21	Jul-27	2,031,066	-	2,031,066				300,000	398,760	698,760	1,332,306	
Section 80 Replacement - Construction	68410_7532	Dec-16	Jun-18	1,908,279	1,908,279	-								
Permits	68411_7533	Oct-16	Jun-24	26,605	16,605	10,000		3,250	1,125	1,125	1,250	6,750	3,250	
Section 80 Rehab - REI	68412_7675	Jul-23	Jul-26	850,000	-	850,000							850,000	
735 Section 80 Rehabilitation Total				**13,551,712**	**1,924,884**	**11,626,828**		**3,250**	**1,125**	**301,125**	**400,010**	**705,510**	**10,921,318**	
Other Waterworks				**89,178,732**	**171,885,128**	**(82,706,396)**	**29,335,241**	**15,818,646**	**11,678,944**	**12,012,927**	**5,847,339**	**74,693,097**	**37,334,379**	**(194,733,873)**
753 Central Monitoring System														
Study	75300_5025	Mar-84	Sep-86	189,590	189,590	-								
Design	75301_5026	Oct-87	Jan-92	2,651,250	2,651,250	-								
Equipment Prepurchase	75302_5027	Oct-87	Dec-93	2,161,920	2,161,920	-								
SCADA Implementation	75303_5028	Aug-96	Mar-17	2,101,110	2,034,833	66,277	66,277					66,277		
Communications Structures	75304_5160	Nov-92	May-93	161,290	161,290	-								
Construction & Start-up Services	75305_5173	Jul-92	Aug-98	352,040	352,040	-								
Construction 1	75306_5171	Nov-97	Nov-98	208,950	208,950	-								
Operations Center - Construction	75308_5849	Sep-92	Jun-94	1,498,980	1,498,980	-								
Technical Assistance	75309_5987	Jul-92	Dec-97	385,601	385,601	-								
Waterworks SCADA/PLC Upgrades	75310_5218	Oct-16	Oct-31	3,258,903	188,547	3,070,356								3,070,356
Microwave Equipment	75474_6125	Mar-96	Dec-01	781,987	781,987	-								
Microwave Communicaton System-Wide Backbone	75488_6653	Sep-01	Jun-02	1,694,018	1,694,018	-								
Monitoring & Control - Study & Design	75489_6654	Dec-99	Sep-04	1,807,784	1,807,784	-								
Microwave Communication for Waterworks Facilities	75494_6816	Sep-02	Jul-04	1,957,399	1,957,399	-								
Ludlow Communications	75495_6825	Sep-01	Oct-01	40,504	40,504	-								
Quabbin Power, Communication & Security - Construction	75512_7338	Feb-16	Apr-17	3,512,205	3,512,205	-								
Quabbin Power, Communication & Security - Design	75540_7461	Sep-14	Sep-18	813,905	813,905	-								
Utility Fees and Permits	75541_7475	Jul-14	Dec-17	263,775	263,773	2								
CWTP SCADA Upgrades - Design/Programming RE	75630_7581	Jan-19	Jul-23	4,100,000	-	4,100,000	350,000	975,000	1,500,000	750,000	525,000	4,100,000		
CWTP SCADA Upgrades - Construction	75631_7582	Jul-20	Jul-22	4,900,000	-	4,900,000			2,450,000	1,950,000	500,000	4,900,000		
Other Design and Programming Serivces	75632_7583	Jul-22	Oct-28	2,880,000	-	2,880,000					240,000	240,000	2,640,000	
Other Construction	75633_7584	Dec-22	Oct-28	1,776,000	-	1,776,000					200,000	200,000	1,576,000	
Other Equipment/Hardware	75634_7585	Dec-22	Oct-28	1,520,000	-	1,520,000					160,000	160,000	1,360,000	
753 Central Monitoring System Total				**39,017,211**	**20,704,576**	**18,312,635**	**416,277**	**975,000**	**3,950,000**	**2,700,000**	**1,625,000**	**9,666,277**	**5,576,000**	**3,070,356**
763 Distribution Systems Facilities Mapping														
Planning and Design	75458_5162	Feb-95	Dec-98	936,368	936,368	-								
Data Purchase	75476_6152	Nov-95	Aug-96	100,000	100,000	-								
Records Development	75484_6525	Oct-21	Oct-23	762,551	-	762,551				183,000	366,000	549,000	213,551	
Update of Record Drawings	75600_7489	Sep-19	Sep-20	500,000	-	500,000		269,000	231,000			500,000		
Water System Hydraulic Model	75650_7613	Jul-20	Jun-21	500,000	-	500,000		-	346,000	154,000		500,000		
763 Distribution Systems Facilities Mapping Total				**2,798,919**	**1,036,368**	**1,762,551**		**269,000**	**577,000**	**337,000**	**366,000**	**1,549,000**	**213,551**	
764 Local Water Infrastructure Rehabilitation Total	**completed project**			**7,487,762**	**7,487,762**	**-**								

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765 Local Water System Assistance Program (LWSAP)														
Community Loans	75485_6608	Aug-00	Jun-13	222,317,575	222,317,575	1								
Community Repayment	75493_6759	Aug-01	Jun-23	(222,317,575)	(200,091,718)	(22,225,857)	(8,235,519)	(5,902,057)	(3,706,396)	(2,550,610)	(1,821,015)	(22,215,597)	(10,260)	
Local Water System Assistance Loans	75513_7339	Aug-10	Jun-20	200,000,000	140,130,800	59,869,200	24,689,363	16,000,000	11,200,000	7,979,837		59,869,200		
Local Water System Assistance Repayment	75514_7340	Aug-11	Jun-30	(200,000,000)	(42,416,710)	(157,583,290)	(14,092,923)	(15,025,860)	(18,100,000)	(18,600,000)	(17,900,000)	(83,718,783)	(60,247,050)	(13,617,458)
CVA Loans	75515_7350	Nov-10	Jun-20	10,000,000	5,573,000	4,427,000	1,000,000	1,000,000	1,000,000	1,000,000	427,000	4,427,000		
CVA Repayments	75516_7351	Nov-11	Jun-30	(10,000,000)	(1,331,000)	(8,669,000)	(557,300)	(557,300)	(757,300)	(857,300)	(863,800)	(3,593,000)	(3,762,500)	(1,313,500)
Lead Service Line Replacement Loans	75517_7529	Aug-16	May-36	100,000,000	8,979,000	91,021,000	4,000,000	5,000,000	5,000,000	5,000,000	5,000,000	24,000,000	25,000,000	42,021,000
Lead Service Line Replacement Repayment	75518_7530	Aug-17	May-46	(100,000,000)	(600,000)	(99,400,000)	(917,400)	(917,400)	(1,800,000)	(2,300,000)	(2,800,000)	(8,734,800)	(20,900,000)	(69,765,200)
LWSAP Phase 3 Distributions	75620_7567	Aug-17	May-26	278,000,000	7,212,265	270,787,735	17,284,757	12,000,000	16,000,000	20,000,000	20,000,000	85,284,757	150,002,978	35,500,000
LWSAP Phase 3 Repayments	75621_7568	Aug-18	May-36	(278,000,000)	-	(278,000,000)	(721,227)	(1,849,702)	(3,600,000)	(5,200,000)	(7,200,000)	(18,570,929)	(76,000,000)	(183,429,071)
LWSAP Phase 3 CVA Loans	75622_7588	Aug-17	May-26	14,000,000	500,000	13,500,000					1,000,000	1,000,000	8,000,000	4,500,000
LWSAP Phase 3 CVA Repayments	75623_7589	Aug-18	Aug-36	(14,000,000)	-	(14,000,000)	(50,000)	(50,000)	(50,000)	(50,000)	(50,000)	(250,000)	(2,050,000)	(11,700,000)
765 Local Water System Assistance Program (LWSAP) Total				**-**	**140,273,212**	**(140,273,211)**	**22,399,751**	**9,697,681**	**5,186,304**	**4,421,927**	**(4,207,815)**	**37,497,848**	**20,033,168**	**(197,804,229)**
766 Waterworks Facility Asset Protection														
Meter Vault Manhole Retrofits - Design	75490_6689	Oct-19	Jul-23	450,989	-	450,989		61,000	122,000	122,000	122,989	427,989	23,000	
Steel Tank Improvements - Design/CA/RI	75497_6832	May-19	Sep-24	2,100,000	-	2,100,000		385,000	420,000	420,000	420,000	1,645,000	455,000	
Gillis Pump Station/Cottage Farm CSO Facility Roof Replacements	75500_6888	Jan-19	Jan-20	350,000	-	350,000	80,000	270,000				350,000		
Waltham Bridge Pipe Replacement	75501_6910	Mar-04	Sep-04	237,550	237,550	-								
Permits and Legal Fees	75502_6920	Mar-04	Jun-18	16,340	11,186	5,154	750	2,765	1,639			5,154		
Cosgrove Intake Roof Replacement	75505_7022	Jan-19	Jul-19	876,000	-	876,000	375,000	501,000				876,000		
Generator Docking Station - REI	75507_7024	Jan-19	Jan-20	200,000	-	200,000	46,000	154,000				200,000		
Generator Docking Station	75508_7025	Jan-19	Jan-20	902,200	-	902,200	208,000	694,200				902,200		
Cosgrove Valve Replacement - Construction	75509_7064	Jul-24	Dec-24	1,992,520	-	1,992,520							1,992,520	
Cosgrove Valve Replacement - Design	75510_7065	Jul-23	Dec-25	229,140	-	229,140							229,140	
Transformer at Cosgrove Intake Building	75511_7228	Jun-11	Jul-12	299,313	299,313	-								
Covered Storage Tank Rehab - Design/CA/RI	75524_7385	Jul-22	Jul-27	1,000,000	-	1,000,000					184,000	184,000	816,000	
Electrical Distribution Upgrades at Southborough	75535_7425	Jan-20	Jan-21	1,200,000	-	1,200,000		500,000	700,000			1,200,000		
Water Meter Upgrade Replacement - Construction	75536_7453	Sep-20	Jun-23	1,000,000	-	1,000,000			226,000	387,000	387,000	1,000,000		
Beacon Street Line Repair - Construction	75537_7458	Jun-16	Apr-17	1,441,390	1,441,390	-								
Beacon Street Line Repair - Design/CA/RI	75538_7474	Nov-14	Dec-17	393,771	393,771	-								
Meter Vault Manhole Retrofits - Construction	75550_7479	Sep-20	Jun-22	1,443,165	-	1,443,165			460,000	789,000	194,165	1,443,165		
Covered Storage Tank Rehab - Construction	75553_7482	Jul-24	Jul-26	4,000,000	-	4,000,000							4,000,000	
Water Meter Upgrade Replacement - Design CA/RI	75554_7542	Oct-18	Jul-24	200,000	-	200,000	20,000	36,000	36,000	36,000	36,000	164,000	36,000	
Painting DI Water Tank	75555_7601	Dec-18	Aug-19	4,090,000	-	4,090,000	1,817,000	2,273,000				4,090,000		
New Roofs at Water Pumping Stations - Construction	75556_7626	Jul-25	Jun-26	500,000	-	500,000							500,000	
New Roofs at Water Pumping Stations - Design/CA/RI	75558_7628	Jul-24	Jun-27	100,000	-	100,000							100,000	
Paint Bellevue II & Turkey Hill Water Tanks	75559_7634	Aug-18	Feb-19	3,972,463	-	3,972,463	3,972,463					3,972,463		
Steel Tanks Improvements - REI	75560_7676	Nov-21	Sep-23	1,200,000	-	1,200,000				261,000	626,000	887,000	313,000	
Steel Tanks Improvements - Construction	77552_7493	Nov-21	Sep-23	11,680,000	-	11,680,000				2,539,000	6,094,000	8,633,000	3,047,000	
766 Waterworks Facility Asset Protection Total				**39,874,841**	**2,383,210**	**37,491,631**	**6,519,213**	**4,876,965**	**1,965,639**	**4,554,000**	**8,064,154**	**25,979,971**	**11,511,660**	

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Capital Improvement Program
FY20 Proposed Expenditure Forecast

Program / Project / Contract	Contract No.	Notice to Proceed	Substantial Completion	Total Contract Amount	Payments through FY18	Remaining Balance	FY19	FY20	FY21	FY22	FY23	FY19-FY23 Expenditures	FY24-FY28 Expenditures	Beyond FY28
Business & Operations Support				**163,611,163**	**101,029,937**	**62,581,226**	**6,377,407**	**14,670,892**	**13,850,372**	**7,070,500**	**5,038,944**	**47,008,114**	**15,573,109**	
881 Equipment Purchase														
Contaminant Monitoring Equipment	88108_7631	Sep-21	Jun-25	2,690,000	-	2,690,000				630,000	530,000	1,160,000	1,530,000	
Security Equipment & Installation	92374_6760	Jan-01	Jun-23	11,649,884	9,106,884	2,543,000	360,000	1,080,000	400,000	400,000	303,000	2,543,000		
ICP-MS Lab Testing Equipment	92379_6808	Oct-08	Dec-08	117,432	117,432	-								
High Lift Fork Loader (Lull)	92411_7239	Oct-10	Dec-10	121,449	121,449	-								
Ford Ramp Truck	92416_7246	Apr-10	Jun-10	121,572	121,572	-								
Street Sweeper	92417_7247	Jul-09	Sep-09	181,673	181,673	-								
Prior Vehicle Purchases	98454_7306	Jul-00	Jun-10	2,415,190	2,415,190	-								
FY11-13 Vehicle Purchases	98455_7307	Jul-09	Jun-13	2,361,415	2,361,415	-								
FY14-18 Vehicle Purchases	98456_7308	Jul-13	Jun-18	6,670,782	6,670,780	2								
FY19-23 Vehicle Purchases	98457_7309	Jul-18	Jun-23	10,616,309	-	10,616,309	1,491,309	475,000	845,000	555,000	2,000,000	5,366,309	5,250,000	
FY14-18 Major Lab Instrumentation	98458_7310	Jun-16	Jun-18	639,294	639,294	-								
Front-End Loader	98467_7325	Oct-10	Dec-10	121,221	121,221	-								
FY19-23 Major Lab Instrumentation	98495_7632	Jul-18	Jun-23	1,000,000	-	1,000,000	187,500	188,000	187,500	187,500	249,500	1,000,000		
881 Equipment Purchase Total				**38,706,221**	**21,856,910**	**16,849,311**	**2,038,809**	**1,743,000**	**1,432,500**	**1,772,500**	**3,082,500**	**10,069,309**	**6,780,000**	
925 Technical Assistance														
Land Appraisal	77000_LAND			100,000	-	100,000		33,000	33,000	34,000		100,000		
Surveying	80000_SURV			100,000	-	100,000		33,000	33,000	34,000		100,000		
Hazardous Material	90000_HAZM			900,000	-	900,000		300,000	300,000	300,000		900,000		
925 Technical Assistance Total				**1,100,000**	**-**	**1,100,000**		**366,000**	**366,000**	**368,000**		**1,100,000**		
930 MWRA Facility - Chelsea Total	**completed project**			**9,812,071**	**9,812,071**	**-**								
931 Business Systems Plan Total	**completed project**			**24,562,604**	**24,562,604**	**-**								
932 Environmental Remediation Total	**completed project**			**1,478,602**	**1,478,602**	**-**								
933 Capital Maintenance Planning/Development														
Inventory & Evaluation - 1 & 2	19175_6421	Apr-00	Jul-05	2,579,434	2,579,434	-								
As-Needed Design Contract 1	92387_6976	Mar-05	Sep-07	313,302	313,302	-								
As Needed Design Contract 2	92393_6988	Mar-05	Sep-07	317,539	317,539	-								
As-Needed Design Contract 5	92399_7070	Sep-08	Mar-11	558,111	558,111	-								
As-Needed Design Contract 3	92402_7101	Aug-07	Feb-10	578,622	578,623	-								
As-Needed Design Contract 4	92403_7102	Aug-07	Aug-09	247,384	247,384	-								
As-Needed Design Contract 6	92413_7242	Aug-08	Aug-10	704,220	704,220	-								
As-Needed Design Contract 7	92414_7243	Jan-10	Jul-12	979,576	979,576	-								
As-Needed Design Contract 8	92415_7244	Feb-10	Jun-13	1,043,586	1,043,586	-								
As-Needed CS/REI Contract 1	94491_7629	Sep-18	Sep-21	1,500,000	-	1,500,000	284,000	486,000	486,000	244,000		1,500,000		
As-Needed CS/REI Contract 2	94492_7630	Sep-18	Sep-21	1,500,000	-	1,500,000	284,000	486,000	486,000	244,000		1,500,000		
As-Needed Design Contract 9	98470_7390	Jul-11	Jan-14	1,609,621	1,609,621	-								
As-Needed Design Contract 10	98471_7391	Aug-11	Feb-14	1,867,677	1,867,677	-								
As-Needed Design Contract 11	98473_7436	Feb-14	Aug-15	431,584	431,584	-								
As-Needed Design Contract 12	98474_7437	Jan-14	Jul-16	721,695	721,695	-								
As-Needed Design Contract 13	98485_7456	Feb-14	Aug-16	683,439	683,439	-								
As-Needed Design Contract 14	98487_7496	Jun-16	Sep-18	1,301,086	678,945	622,141	622,141					622,141		
As-Needed Design Contract 15	98488_7497	Jun-16	Dec-18	1,291,926	885,926	405,999	406,000					406,000		
As-Needed Design Contract 16	98489_7498	Jun-18	Jun-20	2,451,225	-	2,451,225	817,000	1,225,000	409,225			2,451,225		
As-Needed Design Contract 17	98490_7604	Jun-18	Jun-20	2,481,790	-	2,481,790	827,001	1,240,000	414,789			2,481,790		
As-Needed Design Contract 18	98493_7691	Jul-20	Jul-21	2,500,000	-	2,500,000			900,000	1,200,000	400,000	2,500,000		
As-Needed Design Contract 19	98494_7692	Jul-20	Jul-21	2,500,000	-	2,500,000			900,000	1,200,000	400,000	2,500,000		
933 Capital Maintenance Planning/Development Total				**28,161,817**	**14,200,662**	**13,961,155**	**3,240,142**	**3,437,000**	**3,596,014**	**2,888,000**	**800,000**	**13,961,156**		
934 MWRA Facilities Management & Planning														
Design/Engineering Services	92389_6983	Jul-19	Sep-20	500,000	(2)	500,002		300,000	200,000			500,000		
Facilities Construction	92390_6984	Sep-20	Sep-21	2,370,535	370,535	2,000,000			1,076,000	924,000		2,000,000		
934 MWRA Facilities Management & Planning Total				**2,870,535**	**370,533**	**2,500,002**		**300,000**	**1,276,000**	**924,000**		**2,500,000**		

Massachusetts Water Resources Authority
Capital Improvement Program
FY20 Proposed Expenditure Forecast

Program / Project / Contract	Contract No.	Notice to Proceed	Substantial Completion	Total Contract Amount	Payments through FY18	Remaining Balance	FY19	FY20	FY21	FY22	FY23	FY19-FY23 Expenditures	FY24-FY28 Expenditures	Beyond FY28
935 Alternative Energy Initiatives														
Deer Island Solar	19285_6974	Sep-07	May-08	903,714	903,714	-								
DI Wind	92428_6974C	Nov-08	Apr-10	4,063,294	4,063,294	-								
Future Renewable Energy Projects	92430_7270	Oct-23	Dec-24	5,180,552	-	5,180,552							5,180,552	
Loring Road Hydro - Design	92432_6974E	Mar-08	Sep-09	2,344	2,344	-								
Technical Assistance - Solar	92439_7274	May-09	Nov-12	123,540	123,540	-								
Energy Advisory Consultant Services	92440_6974B	Jun-08	Jun-10	45,632	45,632	-								
Wind Power Feasibility Study	92441_OP67	Mar-07	Jun-10	346,426	346,426	-								
DI Photovoltaic System Phase 1 - Construction	92442_7292	Sep-09	Mar-10	1,119,000	1,119,000	-								
Technical Assistance - Energy Efficiency	92443_7274A	May-09	Nov-13	463,085	463,085	-								
Technical Assistance - Solar II	92444_7274B	May-09	Nov-12	347,937	347,937	-								
Technical Assistance - Emerging Technology	92445_7274C	May-09	Dec-13	101,264	101,263	-								
Technical Assistance - Wind	92446_7274D	May-09	May-13	460,242	460,242	-								
Charlestown Wind - Construction	98450_7302	Feb-10	Oct-11	5,124,506	5,124,502	4								
John J. Carroll WTP Solar - Construction	98452_7304	Jan-10	Aug-11	2,367,287	2,367,287	-								
Loring Road Hydro - Construction	98459_6974F	Jan-10	May-11	1,882,218	1,882,218	-								
DI Wind Phase II Construction	98463_7321			37,080	37,080	-								
Fish Hatchery Pipeline Hydro	98465_7323	Mar-16	Sep-17	1,030,000	1,030,000	-								
935 Alternative Energy Initiatives Total				**23,598,121**	**18,417,564**	**5,180,556**							**5,180,552**	
940 Application Improvement Program														
GIS Applications & Integration	92420_7251	Jan-14	Jun-20	350,000	22,272	327,728		327,728				327,728		
Lawson Upgrade	92435_7286	Jul-21	Dec-22	625,000	-	625,000	4			450,000	175,000	625,004		
Maximo Upgrade	92436_7287	Jul-15	Jun-19	2,625,904	2,434,468	191,436	191,436					191,436		
PIMS Replace or Build	92437_7288	Jul-23	Sep-25	3,400,000	-	3,400,000							3,400,000	
SAP BO Migration	92469_7386	Jun-16	Dec-20	480,900	80,900	400,000		200,000	200,000			400,000		
Enterprise Content Management	98475_7438	Apr-19	Mar-21	1,013,437	-	1,013,437	422,812	337,500	253,125			1,013,437		
WQRS Aquarius	98478_7441	Jan-19	Dec-20	325,000	-	325,000	65,000	130,000	130,000			325,000		
LIMS Upgrade	98484_7447	Mar-15	Jun-22	654,490	354,490	300,000			150,000	150,000		300,000		
Lawson Golbal HR	98500_7649	Jul-20	Jun-21	285,000	-	285,000			285,000			285,000		
Time Entry System / WFM	98501_7650	Jul-19	Dec-19	275,000	-	275,000		275,000				275,000		
AP Invoice Automation	98502_7651	Apr-23	Jun-23	325,000	-	325,000					325,000	325,000		
Hyperion	98503_7652	Jul-19	Dec-19	100,000	-	100,000		100,000				100,000		
8M Permit	98504_7653	Jul-19	Jun-20	150,000	-	150,000		150,000				150,000		
Instrument Data Management	98506_7656	Jul-22	Dec-23	545,001	-	545,001					484,444	484,444	60,557	
PI (OSI)	98606_7666	Jan-20	Dec-20	258,000	-	258,000		213,000	45,000			258,000		
940 Application Improvement Program Total				**11,412,732**	**2,892,130**	**8,520,602**	**679,252**	**1,733,228**	**1,063,125**	**600,000**	**984,444**	**5,060,049**	**3,460,557**	
942 Information Security Program (ISP)														
IT Security Infrastructure - Equipment	92434_7285	Sep-11	Jun-14	501,414	501,414	-								
MSSP	92500_7499	Jun-16	Dec-20	1,050,330	861,511	188,819	47,205	94,409	47,205			188,819		
ITSM Access Management	92501_7657	Jul-19	Jun-20	325,000	-	325,000		325,000				325,000		
MSSP/SIEM	92502_7658	Apr-21	Jun-21	2,600,000	-	2,600,000			2,600,000			2,600,000		
Active Directory	92503_7659	Jan-20	Sep-20	194,600	-	194,600		177,934	16,666			194,600		
XenMobile/XenApp WorxSpace	98476_7439	Apr-14	Mar-20	156,568	26,569	129,999		129,999				129,999		
Information Security Plan Implementation	98477_7440	Oct-19	Jun-20	360,000	-	360,000		360,000				360,000		
IT Security Program (ISP) Development	98483_7446	May-13	Jun-14	318,411	318,411	-								
942 Information Security Program (ISP) Total				**5,506,323**	**1,707,905**	**3,798,418**	**47,205**	**1,087,342**	**2,663,871**			**3,798,418**		
944 Information Technology Management Program														
IT Project Management Methodology	98472_7408	Apr-19	Jun-19	200,000	-	200,000	200,000					200,000		
944 Information Technology Management Program Total				**200,000**	**-**	**200,000**	**200,000**					**200,000**		

Massachusetts Water Resources Authority
Capital Improvement Program
FY20 Proposed Expenditure Forecast

Program / Project / Contract	Contract No.	Notice to Proceed	Substantial Completion	Total Contract Amount	Payments through FY18	Remaining Balance	FY19	FY20	FY21	FY22	FY23	FY19-FY23 Expenditures	FY24-FY28 Expenditures	Beyond FY28
946 IT Infrastructure Program														
IT System Architecture	92404_7200	Sep-12	Oct-15	1,009,341	1,009,341	-								
Cabling	92405_7201	Mar-11	Jun-21	5,066,302	1,065,716	4,000,586		2,000,000	2,000,586			4,000,586		
Sans Storage	92406_7203	Jul-13	Sep-20	2,058,502	1,040,503	1,017,999		1,012,000	6,000			1,018,000		
Oracle Database Appliance	92407_7204	Jul-13	Dec-20	760,658	580,658	180,000		165,000	15,000			180,000		
Servers	92408_7205	Oct-13	Mar-23	1,164,992	304,992	860,000	172,000	172,000	172,000	172,000	172,000	860,000		
Near Field Communications	98480_7443	Jul-23	Dec-23	790,379	638,379	152,000							152,000	
Exchange Upgrades	98481_7444	Jun-16	Jun-20	190,478	8,006	182,472		182,472				182,472		
Enterprise Data Management	98482_7445	Jan-14	Dec-21	2,121,361	1,083,362	1,037,999			692,000	346,000		1,038,000		
NetScalers	98505_7654	Jul-19	Dec-19	100,000	-	100,000		100,000				100,000		
Telephone System Upgrade	98600_7660	Oct-19	Sep-20	447,125	-	447,125		408,182	38,943			447,125		
Core Switches	98601_7661	Jul-20	Sep-20	500,000	-	500,000			500,000			500,000		
Edge Switches	98602_7662	Jul-19	Dec-19	700,000	-	700,000		700,000				700,000		
Disaster Recovery	98603_7663	Jan-20	Sep-20	983,000	-	983,000		954,667	28,333			983,000		
Instrumentation & Controls IT	98604_7664	Jul-19	Mar-20	310,000	-	310,000		310,000				310,000		
946 IT Infrastructure Program Total				**16,202,138**	**5,730,957**	**10,471,181**	**172,000**	**6,004,321**	**3,452,862**	**518,000**	**172,000**	**10,319,183**	**152,000**	

APPENDIX 3

New Capital Projects Added During the FY20 CIP

APPENDIX 3
New Capital Projects Added to the FY20 Proposed CIP

Program	Project	Subphase	Contract Number	Total Contract Amount	NTP	SC	FY19	FY20	FY21	FY22	FY23	FY19-23	Beyond FY23	Total Expenditures
Interception & Pumping	Facility Asset Protection	Section 191 & 192 Charles River Valley Sewer	7643	$ 500,000	May-19	Oct-19		$ 500,000				**$ 500,000**	$ -	**$ 500,000**
Interception & Pumping	Facility Asset Protection	Pump Stations & CSO Facility Rehab Design/CA/REI	7689	$ 7,500,000	Nov-21	Nov-31				$ 150,000	$ 500,000	**$ 650,000**	$ 6,850,000	**$ 7,500,000**
Interception & Pumping		Pump Stations & CSO Facility Rehab Construction	7688	$ 37,500,000	Nov-23	Nov-30						**$ -**	$ 37,500,000	**$ 37,500,000**
Treatment	DITP Asset Protection	As-Needed REI	7647	$ 3,000,000	Jul-19	Jul-21		$ 731,250	$ 1,275,000	$ 993,750		**$ 3,000,000**		**$ 3,000,000**
Treatment	Clinton Wastewater Treatment Plant	Equipment & Supplies Storage Building	7693	$ 292,589	Sep-19	Dec-20		$ 157,009	$ 135,580			**$ 292,589**		**$ 292,589**
Drinking Water Quality Improvements	Carroll Water Treatment Asset Protection	CWTP Emergency Generator #1 Replacement (Electric Portion)	7642	$ 750,000	Jan-19	Aug-19	281,000	$469,000				**$ 750,000**		**$ 750,000**
Business & Operations Support	Capital Maintenance Planning & Support	As-Needed Design Contract 18	7691	$ 2,500,000	Jul-20	Jul-22			900,000	1,200,000	400,000	**$ 2,500,000**		**$ 2,500,000**
Business & Operations Support	Capital Maintenance Planning & Support	As-Needed Design Contract 19	7692	$ 2,500,000	Jul-20	Jul-22			900,000	1,200,000	400,000	**$ 2,500,000**		**$ 2,500,000**

SUMMARY:

Total Wastewater Projects		**$ 48,792,589**			**$ -**	**$ 1,388,259**	**$ 1,410,580**	**$ 1,143,750**	**$ 500,000**	**$ 4,442,589**	**$ 44,350,000**	**$ 48,792,589**
Total Waterworks Projects		**$ 750,000**			**$ 281,000**	**$ 469,000**	**$ -**	**$ -**	**$ -**	**$ 750,000**	**$ -**	**$ 750,000**
Business & Operations Support		**$ 5,000,000**			**$ -**	**$ -**	**$ 1,800,000**	**$ 2,400,000**	**$ 800,000**	**$ 5,000,000**	**$ -**	**$ 5,000,000**
Total Projects		**$ 54,542,589**			**$ 281,000**	**$ 1,857,259**	**$ 3,210,580**	**$ 3,543,750**	**$ 1,300,000**	**$ 10,192,589**	**$ 44,350,000**	**$ 54,542,589**

APPENDIX 4

Overview of the FY20 Proposed CIP and Changes from the FY19 Final CIP

APPENDIX 4
Comparison of the FY19 Final CIP and the FY20 Proposed CIP

Program and Project	FY19 Final				FY20 Proposed				Change from Final FY19			
	Total Budget Amount	FY14-18	FY19-23	Beyond 23	Total Budget Amount	FY14-18	FY19-23	Beyond 23	Total Budget Amount	FY14-18	FY19-23	Beyond 23
Total MWRA	**8,009,088**	**595,622**	**1,051,829**	**2,673,508**	**8,151,875**	**585,638**	**1,083,923**	**2,794,187**	**142,037**	**(9,984)**	**27,440**	**124,583**
Wastewater	**3,603,553**	**334,086**	**643,200**	**890,263**	**3,700,573**	**325,315**	**677,055**	**962,199**	**97,020**	**(8,771)**	**33,855**	**71,936**
Interception & Pumping	**1,115,506**	**83,504**	**188,703**	**322,759**	**1,192,715**	**81,861**	**203,334**	**386,981**	**77,209**	**(1,643)**	**14,631**	**64,222**
102 Quincy Pump Facilities	25,907	-	-	-	25,907	-	-	-	-	-	-	-
104 Braintree-Weymouth Relief Facilities	239,378	1	1,814	9,859	240,105	1	1,842	10,558	727	-	28	699
105 New Neponset Valley Relief Sewer	30,300	-	-	-	30,300	-	-	-	-	-	-	-
106 Wellesley Extention Replacement Sewer	64,359	-	-	-	64,359	-	-	-	-	-	-	-
107 Framingham Extension Relief Sewer	47,856	-	-	-	47,856	-	-	-	-	-	-	-
127 Cummingsville Replacement Sewer	8,999	-	-	-	8,999	-	-	-	-	-	-	-
130 Siphon Structure Rehabilitation	6,168	-	5,228	-	12,127	-	5,568	5,619	5,959	-	340	5,619
131 Upper Neponset Valley Sewer	54,174	-	-	-	54,174	-	-	-	-	-	-	-
132 Corrosion & Odor Control	76,754	2,947	41,502	29,304	79,017	3,179	40,935	31,902	2,263	232	(567)	2,598
136 West Roxbury Tunnel	11,314	-	-	1,000	11,314	-	-	1,000	-	-	-	-
137 Wastewater Central Monitoring	27,482	-	2,200	5,500	27,482	-	2,061	5,639	-	-	(139)	139
139 South System Relief Project	4,939	-	-	1,500	4,939	-	-	1,500	-	-	-	-
141 Wastewater Process Optimization	10,306	297	-	8,804	10,337	297	-	8,836	31	-	-	32
142 Wastewater Meter System-Equipment	28,733	974	13,679	8,942	28,333	586	13,667	8,942	(400)	(388)	(12)	-
143 Regional I/I Management Planning	169	-	-	-	169	-	-	-	-	-	-	-
145 Facility Asset Protection	472,970	79,285	123,582	252,850	541,599	77,798	138,563	307,985	68,629	(1,487)	14,981	55,135
146 D.I. Cross Harbor Tunnel Inspection	5,000	-	-	5,000	5,000	-	-	5,000	-	-	-	-
147 Randolph Trunk Sewer Relief	698	-	698	-	698	-	698	-	-	-	-	-
Treatment	**1,017,420**	**117,772**	**312,076**	**402,848**	**1,037,228**	**116,434**	**317,159**	**418,910**	**19,808**	**(1,338)**	**5,083**	**16,062**
182 DI Primary and Secondary	**(958)**	-	-	-	(958)	-	-	-	-	-	-	-
200 DI Plant Optimization	33,279	(148)	-	-	33,279	(148)	-	-	-	-	-	-
206 DI Treatment Plant Asset Protection	956,523	105,912	305,312	397,798	975,833	104,859	309,135	414,338	19,310	(1,053)	3,823	16,540
210 Clinton Wastewater Treat Plant	26,364	12,024	6,764	5,051	26,862	11,739	8,024	4,573	498	(285)	1,260	(478)
211 Laboratory Services	2,212	(16)	-	-	2,212	(16)	-	-	-	-	-	-
Residuals	**167,643**	**675**	**11,487**	**90,945**	**167,643**	**511**	**14,009**	**88,587**	**-**	**(164)**	**2,522**	**(2,358)**
261 Residuals	63,811	-	-	-	63,811	-	-	-	-	-	-	-
271 Residuals Asset Protection	103,832	675	11,487	90,945	103,832	511	14,009	88,587	-	(164)	2,522	(2,358)

APPENDIX 4
Comparison of the FY19 Final CIP and the FY20 Proposed CIP

Program and Project	FY19 Final				FY20 Proposed				Change from Final FY19			
	Total Budget Amount	FY14-18	FY19-23	Beyond 23	Total Budget Amount	FY14-18	FY19-23	Beyond 23	Total Budget Amount	FY14-18	FY19-23	Beyond 23
CSO	**910,118**	**64,699**	**7,711**	**-**	**910,121**	**64,688**	**7,724**	**-**	**3**	**(11)**	**13**	**-**
340 Dorchester Bay Sewer Separation (Fox Point)	55,029	877	-	-	55,029	877	-	-	-	-	-	-
341 Dorchester Bay Sewer Separation (Commercial Point)	63,619	(1,286)	3,758	-	63,625	(1,286)	3,763	-	6	-	5	-
342 Neponset River Sewer Separation	2,492	47	-	-	2,492	47	-	-	-	-	-	-
343 Constitution Beach Sewer Separation	3,731	(38)	-	-	3,731	(38)	-	-	-	-	-	-
344 Stony Brook Sewer Separation	44,319	121	-	-	44,319	121	-	-	-	-	-	-
346 Cambridge Sewer Separation	104,552	54,068	-	-	104,552	54,068	-	-	-	-	-	-
351 BWSC Floatables Controls	946	13	-	-	946	13	-	-	-	-	-	-
352 Cambridge Floatables Control	1,127	40	-	-	1,127	40	-	-	-	-	-	-
356 Fort Point Channel Sewer Separation	11,507	(499)	-	-	11,507	(499)	-	-	-	-	-	-
358 Morrissey Boulevard Drain	32,181	(166)	-	-	32,181	(166)	-	-	-	-	-	-
359 Reserved Channel Sewer Separation	70,524	10,484	-	-	70,524	10,484	-	-	-	-	-	-
360 Brookline Sewer Separation	24,715	(1,282)	-	-	24,715	(1,282)	-	-	-	-	-	-
361 Bulfinch Triangle Sewer Separation	9,032	(826)	-	-	9,032	(826)	-	-	-	-	-	-
339 North Dorchester Bay	221,510	(111)	-	-	221,510	(111)	-	-	-	-	-	-
347 East Boston Branch Sewer Relief	85,637	(9)	-	-	85,637	(9)	-	-	-	-	-	-
348 BOS019 Storage Conduit	14,288	-	-	-	14,288	-	-	-	-	-	-	-
349 Chelsea Trunk Sewer	29,779	-	-	-	29,779	-	-	-	-	-	-	-
350 Union Park Detention Treatment Facility	49,583	-	-	-	49,583	-	-	-	-	-	-	-
353 Upgrade Existing CSO Facilities	22,385	-	-	-	22,385	-	-	-	-	-	-	-
354 Hydraulic Relief Projects	2,295	-	-	-	2,295	-	-	-	-	-	-	-
355 MWR003 Gate & Siphon	4,424	3,775	-	-	4,424	3,775	-	-	-	-	-	-
357 Charles River CSO Controls	3,633	-	-	-	3,633	-	-	-	-	-	-	-
324 CSO Support	52,810	(508)	3,954	-	52,807	(519)	3,962	-	(3)	(11)	8	-
Other Wastewater	**392,866**	**67,436**	**123,223**	**73,711**	**392,866**	**61,821**	**134,829**	**67,721**	**-**	**(5,615)**	**11,606**	**(5,990)**
128 I/I Local Financial Assistance	392,585	67,436	123,223	73,711	392,585	61,821	134,829	67,721	-	(5,615)	11,606	(5,990)
138 Sewerage System Mapping Upgrade	281	-	-	-	281	-	-	-	-	-	-	-
Total Waterworks	**4,253,659**	**237,374**	**370,062**	**1,771,547**	**4,287,692**	**236,734**	**359,865**	**1,816,417**	**33,283**	**(640)**	**(14,851)**	**48,774**
Drinking Water Quality	**703,468**	**54,845**	**8,115**	**45,300**	**704,555**	**54,765**	**13,187**	**41,396**	**337**	**(80)**	**418**	**-**
542 Carroll Water Treatment Plant	435,675	11,842	3,374	9,250	436,157	11,908	3,791	9,250	482	66	417	-
543 Quabbin Water Treatment Plant	19,973	7,205	-	-	19,973	7,205	-	-	-	-	-	-
544 Norumbega Covered Storage	106,674	-	-	-	106,674	-	-	-	-	-	-	-
545 Blue Hills Covered Storage	40,083	120	-	-	40,083	120	-	-	-	-	-	-
550 Spot Pond Storage Facility	60,272	35,678	-	-	60,127	35,532	1	-	(145)	(146)	1	-
555 CWTP Asset Protection	40791	0	4741	36050	41,541	-	9,395	32,146	750	-	4,654	(3,904)

APPENDIX 4
Comparison of the FY19 Final CIP and the FY20 Proposed CIP

Program and Project	FY19 Final				FY20 Proposed				Change from Final FY19			
	Total Budget Amount	FY14-18	FY19-23	Beyond 23	Total Budget Amount	FY14-18	FY19-23	Beyond 23	Total Budget Amount	FY14-18	FY19-23	Beyond 23
Transmission	**2,494,174**	**70,511**	**129,441**	**1,539,191**	**2,532,001**	**70,164**	**131,650**	**1,575,153**	**37,827**	**(347)**	**2,209**	**35,962**
597 Winsor Station Pipeline	48,640	4,505	149	42,591	49,675	4,338	319	43,622	1,035	(167)	170	1,031
601 Sluice Gate Rehabilitation	9,158	-	-	-	9,158	-	-	-	-	-	-	-
604 MetroWest Tunnel	700,184	1,784	-	3,002	700,184	1,784	-	3,002	-	-	-	-
615 Chicopee Valley Aqueduct Redundancy	8,666	-	-	-	8,666	-	-	-	-	-	-	-
616 Quabbin Transmission System	17,120	1,464	1,865	6,588	17,120	1,464	5,607	2,845	-	-	3,742	(3,743)
617 Sudbury/Weston Aqueduct Repairs	10,288	2,069	1,085	6,475	10,174	1,572	1,455	6,487	(114)	(497)	370	12
620 Wachusett Reservior Spillway Improvement	9,287	-	-	-	9,287	-	-	-	-	-	-	-
621 Watershed Land	29,000	5,254	5,000	1,404	29,000	5,504	4,750	1,404	-	250	(250)	-
622 Cosgrove/Wachusett Redundancy	57,495	50,746	5,574	-	58,273	50,842	6,255	-	778	96	681	-
623 Dam Projects	5,726	31	2,392	218	5,916	31	2,758	43	190	-	366	(175)
625 Metro Tunnel Redundancy	1,387,910	1,790	14,483	1,369,970	1,421,751	1,790	15,058	1,403,237	33,841	-	575	33,267
628 Metro Redundancy Interim Improvement	192,698	2,566	94,081	96,051	192,895	2,837	88,436	101,621	197	271	(5,645)	5,570
630 Watershed Division Capital Improvement	18,000	300	4,810	12,890	19,900	-	7,010	12,890	1,900	(300)	2,200	-
Distribution & Pumping	**965,831**	**90,418**	**159,644**	**343,064**	**961,957**	**91,654**	**140,335**	**357,265**	**(3,874)**	**1,236**	**(19,309)**	**14,201**
618 Peabody Pipeline	18,668	1,163	17,504	-	3,509	1,059	2,450	-	(15,159)	(104)	(15,054)	-
677 Valve Replacement	21,402	-	-	9,385	21,655	-	-	9,638	253	-	-	253
678 Boston Low Service-Pipe & Valve Rehabilitation	23,691	-	-	-	23,691	-	-	-	-	-	-	-
683 Heath Hill Road Pipe Replacement	19,358	-	-	-	19,358	-	-	-	-	-	-	-
689 James L. Gillis Pump Station Rehabilitation	33,419	-	-	-	33,419	-	-	-	-	-	-	-
692 NHS - Section 27 Improvements	1,294	-	27	1,143	1,326	-	27	1,175	32	-	-	32
693 NHS - Revere & Malden Pipeline Improvement	79,095	1,572	7,618	43,072	79,527	1,729	6,039	44,927	432	157	(1,579)	1,855
702 New Connect Mains-Shaft 7 to WASM 3	48,567	1,929	20,707	14,970	54,124	1,964	22,716	18,483	5,557	35	2,009	3,513
704 Rehabilitation of Other Pump Stations	50,258	-	1,321	18,879	50,258	-	1,321	18,879	-	-	-	-
706 NHS-Connecting Mains from Section 91	2,360	-	-	-	2,360	-	-	-	-	-	-	-
708 Northern Extra High Service New Pipelines	10,685	13	402	6,638	10,874	-	447	6,795	189	(13)	45	157
712 Cathodic Protection Of Distrubution Mains	62,716	129	11,531	50,915	66,704	129	10,967	55,468	3,988	-	(564)	4,553
713 Spot Pond Supply Mains Rehabilitation	66,333	4,551	800	-	66,333	4,507	843	-	-	(44)	43	-
714 Southern Extra High Sections 41 & 42	3,657	-	-	-	3,657	-	-	-	-	-	-	-
719 Chestnut Hill Connecting Mains	33,435	816	-	15,132	33,827	800	-	15,540	392	(16)	-	408
720 Warren Cottage Line Rehabilitation	1,205	-	-	-	1,205	-	-	-	-	-	-	-
721 South Spine Distribution Mains	77,401	(9)	1,890	38,828	78,708	(9)	2,170	39,855	1,307	-	280	1,027
722 NIH Redundancy & Storage	118,494	41,927	42,080	28,512	120,366	42,921	44,244	27,226	1,872	994	2,164	(1,286)
723 Northern Low Service Rehabilitation Section 8	62,366	829	18,269	40,947	56,684	634	11,952	41,777	(5,682)	(195)	(6,317)	830
724 Northern High Service - Pipeline Rehabilitation	-	-	-	-	-	-	-	-	-	-	-	-
725 Hydraulic Model Update	598	-	-	-	598	-	-	-	-	-	-	-
727 Southern Extra High Redundancy & Storage	129,604	21,206	36,806	64,836	131,416	21,688	36,391	66,581	1,812	482	(415)	1,745
730 Weston Aqueduct Supply Mains	80,464	14,420	-	-	80,464	14,360	61	-	-	(60)	61	-
731 Lynnfield Pipeline	5,626	(52)	-	-	5,626	(52)	-	-	-	-	-	-
732 Walnut St. & Fisher Hill Pipeline Rehabilitation	2,717	-	-	-	2,717	-	-	-	-	-	-	-

APPENDIX 4
Comparison of the FY19 Final CIP and the FY20 Proposed CIP

	FY19 Final				FY20 Proposed				Change from Final FY19			
Program and Project	**Total Budget Amount**	**FY14-18**	**FY19-23**	**Beyond 23**	**Total Budget Amount**	**FY14-18**	**FY19-23**	**Beyond 23**	**Total Budget Amount**	**FY14-18**	**FY19-23**	**Beyond 23**
733 NHS Pipeline Rehabilitation 13-18 & 48	-	-	-	-	-	-	-	-	-	-	-	-
734 Southern Extra High Pipelines-Sections 30, 39,40, & 44	-	-	-	-	-	-	-	-	-	-	-	-
735 Section 80 Rehabilitation	12,419	1,925	688	9,807	13,552	1,925	706	10,921	1,133	-	18	1,114
Other	**90,186**	**21,600**	**72,862**	**(156,010)**	**89,179**	**20,151**	**74,693**	**(157,399)**	**(1,007)**	**(1,449)**	**1,831**	**(1,389)**
753 Central Monitoring System	39,017	5,061	9,600	8,552	39,017	4,901	9,666	8,646	-	(160)	66	94
763 Distribution Systems Facilities Mapping	2,799	-	1,663	100	2,799	-	1,549	214	-	-	(114)	114
764 Local Water Infrastructure Rehabilitation Assistance Program	7,488	-	-	-	7,488	-	-	-	-	-	-	-
765 Local Water Pipeline Improvement Loan Program	-	14,654	32,408	(173,921)	-	13,414	37,498	(177,771)	-	(1,240)	5,090	(3,850)
766 Waterworks Facility Asset Protection	40,882	1,886	29,191	9,259	39,875	1,837	25,980	11,512	(1,007)	(49)	(3,211)	2,253
Business & Operations Support	**151,876**	**24,160**	**38,572**	**11,701**	**163,610**	**23,587**	**47,008**	**15,574**	**11,734**	**(573)**	**8,436**	**3,873**
881 Equipment Purchase	33,825	9,796	9,391	2,530	38,706	9,750	10,069	6,780	4,881	(46)	678	4,250
925 Technical Assistance	1,100	26	1,074	-	1,100	-	1,100	-	-	(26)	26	-
930 MWRA Facility - Chelsea	9,812	(2)	-	-	9,812	(2)	-	-	-	-	-	-
931 Business Systems Plan	24,563	111	-	-	24,563	111	-	-	-	-	-	-
932 Environmental Remediation	1,479	-	-	-	1,479	-	-	-	-	-	-	-
933 Capital Maintenance Planning	23,157	4,513	8,519	-	28,162	4,076	13,961	-	5,005	(437)	5,442	-
934 MWRA Facilities Management	2,151	-	1,780	-	2,871	-	2,500	-	720	-	720	-
935 Alternative Energy Initiatives	23,476	1,221	-	5,058	23,598	1,221	-	5,181	122	-	-	123
940 Applicat Improv Program	12,198	2,828	5,337	3,961	11,413	2,819	5,060	3,461	(785)	(9)	(277)	(500)
942 Info Security Program ISP	3,727	1,146	2,045	-	5,506	1,173	3,798	-	1,779	27	1,753	-
944 Info Tech Mgmt Program	636	-	636	-	200	-	200	-	(436)	-	(436)	-
946 IT Infrastructure Program	15,754	4,522	9,789	152	16,202	4,440	10,319	152	448	(82)	530	-

APPENDIX 5

Master Plan/CIP Status

Appendix 5
Master Plan/CIP Status
(in 000s)

Listing of Master Plan Projects	Original MP Rating	CIP Year	Rating when added to CIP	NTP	SC	Total Contract Amount	FY19-23	Beyond FY23	Comment
FY20 Proposed Budget Cycle									
S.145 I&P Asset Protection									
Section 191 & 192 Charles River Valley Sewer	**3**	**FY20**	**3**	May-19	Oct-19	500,000	500,000	0	
Pump Stations & CSO Facility Rehab Design/CA/REI	**3**	**FY20**	**3**	Nov-21	Nov-31	7,500,000	650,000	6,850,000	
Pump Stations & CSO Facility Rehab Construction	**3**	**FY20**	**3**	Nov-23	Nov-30	37,500,000	0	37,500,000	
S.555 Carroll Water Treatment Plant Asset Protection									
CWTP Emergency Generator #1 Replacement (Electric Portion)	**3**	**FY20**	**2**	Jan-19	Aug-19	750,000	750,000	0	
FY20 Master Plan Totals - 3 projects						**$46,250,000**	**$1,900,000**	**$44,350,000**	
FY19 Proposed Budget Cycle									
S.206 Deer Island Asset Protection									
Hydroturbine Replacements Design/ESDC/REI	**3**	**FY19**	**3**	Sep-18	Jun-24	2,000,000	1,720,253	279,747	
Hydroturbine Replacements Construction	**3**	**FY19**	**3**	Jun-20	Jun-23	10,000,000	8,611,111	1,388,889	
Bidirectional Radio Repeater System Upgrade	**2**	**FY19**	**2**	Apr-18	Oct-19	3,000,000	3,000,000		
S.128 I/I Local Financial Assistance									
Phases 11 & 12	**3**	**FY19**	**3**	Aug-18	Aug-25	90,000,000	63,700,000	26,300,000	
S. 542 Carroll Water Treatment Plant									
HVAC Equipment Replacement	**2**	**FY19**	**2**	Jul-19	May-22	2,300,000		2,300,000	
CWTP Chemical Pipe System Pipe, Pumps and Tank Replacement	**2**	**FY19**	**2**	Jul-27	Jun-29	4,000,000		4,000,000	
CWTP Water Pump Replacement	**2**	**FY19**	**2**	Jul-27	Jul-30	2,000,000		2,000,000	
Ozone Generator Replacement	**2**	**FY19**	**2**	Oct-27	Oct-30	20,000,000		20,000,000	
Ultra Violet Reactor Replacement	**2**	**FY19**	**2**	Oct-32	Oct-34	10,000,000		10,000,000	
S. 623 Dam Projects									
Sudbury/Foss Dam Impr/Wach North Dike Overtopping Protection Design CA/RI	**2**	**FY19**	**2**	Oct-24	Oct-29	210,000	302,960		
Sudbury/Foss Dam Improvements/Wachusett North Dike Overtopping Protection Construction	**2**	**FY19**	**2**	Oct-26	Oct-28	1,600,000	1,693,325		
S.617 Sudbury/Weston Aqueduct Repairs									
Farm Pond Inlet Chamber and Gate House - Rehabilitation Design CA/RI	**3**	**FY19**	**3**	Oct-24	Oct-29	400,000		400,000	
Farm Pond Inlet Chamber and Gate House - Rehabilitation Construction	**3**	**FY19**	**3**	Oct-26	Oct-28	2,000,000		2,000,000	
Waban Arches Rehabilitation Design CA/RI	**3**	**FY19**	**3**	Oct-23	Oct-28	300,000		300,000	
Waban Arches Rehabilitation Construction	**3**	**FY19**	**3**	Oct-25	Oct-27	1,200,000		1,200,000	
S.621 Watershed Land									
Watershed Land Acquisition	**3**	**FY19**	**3**	Apr-06	Jun-23	5,000,000		5,000,000	
S.693 NHS Revere & Malden Pipeline									
Sections 13 & 48 Rehabilitation Design CA/RI	**3**	**FY19**	**3**	Jul-24	Jul-29	2,150,000		2,150,000	
Sections 13 & 48 Rehabilitation Construction	**3**	**FY19**	**3**	Jul-26	Jul-28	10,750,000		10,750,000	
S.712 Cathodic Protection Distribution Mains									
Cathodic Protection Western System Design/CA/RI	**3**	**FY19**	**2**	Jul-19	Jun-23	930,000	909,000	21,000	**Condition determined to be worse than when Master Plan Priority Ratings assigned.**
Cathodic Protection Western System Construction	**3**	**FY19**	**2**	Jul-21	Jun-23	4,300,000	3,762,000	538,000	**Condition determined to be worse than when Master Plan Priority Ratings assigned.**
Cathodic Protection Metropolitan System Design/CA/RI	**3**	**FY19**	**2**	Jul-20	Jun-26	9,900,000	4,602,000	5,298,000	**Condition determined to be worse than when Master Plan Priority Ratings assigned.**
Cathodic Protection Metropolitan System Construction	**3**	**FY19**	**2**	Jul-22	Jun-26	47,100,000	8,831,000	38,269,000	**Condition determined to be worse than when Master Plan Priority Ratings assigned.**
S.763 Distribution Systems Facilities Mapping									
Water System Hydraulic Model	**4**	**FY19**	**4**	Jul-19	Jun-20	500,000	500,000		
FY19 Master Plan Totals - 17 projects						**$229,640,000**	**$97,631,649**	**$132,194,636**	

Master Plan Priority Ratings - Wastewater

Priority One **Critical/Emergency** Risk moderate to high/Consequence very high

Projects which:

Resolve emergencies or critical threats to public health or worker health and safety

Prevent imminent failure of the system and significant loss of service

---

Priority Two **Essential Projects** Risk variable/Consequences high

Projects which are essential to:

Critical facility assessment

Fix existing reliability or capacity problems during dry weather flow conditions

Reduce sanitary sewer overflows from the MWRA system

Address facilities in poor condition where the ability to provide uninterrupted service or adequate flow is compromised.

Upgrade or maintain emergency backup facilities in poor condition

Meet minimum hydraulic performance requirements and service needs

Implement MWRA's approved CSO control plan

Maintain wastewater effluent and residuals quality

To comply with mandated legal, regulatory or statutory requirements

---

Priority Three **Necessary Projects** Risk moderate to high/Consequence moderate to low

Projects which are necessary to:

Improve public health and worker safety

Restore the system's infrastructure where it is seriously deteriorated

Improve hydraulic performance

Significantly improve the effectiveness, efficiency, or reliability of system operations and service delivery including where appropriate, the ability to monitor the system

Maintain consumer confidence

To comply with other legal, regulatory or statutory requirements

---

Priority Four **Important Projects** Risk moderate/Consequences low

Projects which are important to:

Maintain the integrity of the system's infrastructure

Produce significant cost savings or revenue gains for MWRA

Monitor system needs and plan appropriate longer-term responses

Provide acceptable working conditions at field sites and at maintenance support facilities

Implement the regional I/I plan

Priority Five **Desirable Projects** Risk/Consequence both low

Projects which are desirable because they would:

Yield worthwhile cost savings, revenue gains, or efficiency improvements for MWRA

Protect the long term value and usefulness of system assets

Solve future problems and conditions which are expected to arise in the latter half of the planning period

Be beneficial towards the improved operation of a local system

Master Plan Priority Ratings - Water

Priority One **Critical/Emergency** Risk moderate to high/Consequence very high

Projects which:

Resolve emergencies or critical threats to public health or worker health and safety

Prevent imminent failure of the system and significant loss of service

---

Priority Two **Essential Projects** Risk variable/Consequences high

Projects which are essential to:

Critical facility assessment

Fix existing reliability problems related to "single points of failure"

Upgrade or maintain emergency back-up facilities in operational condition

Address facilities in poor condition where the ability to provide uninterrupted service, sanitary protections or adequate flow is compromised.

Meet minimum hydraulic performance requirements and service needs including adequate distribution storage in areas with a critical shortfall of storage

To comply with mandated legal, regulatory or statutory requirements

---

Priority Three **Necessary Projects** Risk moderate to high/Consequences moderate to low

Projects which are necessary to:

Improve public health and worker safety

Restore the system's infrastructure where it is seriously deteriorated

Significantly improve the effectiveness, efficiency, or reliability of system operations and service delivery including where appropriate, the ability to monitor the system

Preserve water quality during distribution

Maintain consumer confidence

To comply with other legal, regulatory or statutory requirements

---

Priority Four **Important Projects** Risk moderate/Consequence low

Projects which are important to:

Maintain the integrity of the system's infrastructure

Improve hydraulic performance or add distribution storage

Produce significant cost savings or revenue gains for MWRA

Monitor system needs and plan appropriate longer-term responses

Provide acceptable working conditions at field sites and at maintenance support facilities

Maintain efforts to manage system demands

Provide broader environmental benefits

Priority Five **Desirable Projects** Risk/Consequence both low

Projects which are desirable because they would:

Yield worthwhile cost savings, revenue gains, or efficiency improvements for MWRA

Protect the long term value and usefulness of system assets

Solve future problems and conditions which are expected to arise in the latter half of the planning period

Be beneficial towards the improved operation of a local system

APPENDIX 6

Municipality and Project Reference by Municipality

APPENDIX 6
PROJECT/MUNICIPALITY(s)

Project	Number/ Project	Community(s) Served
104	Braintree-Weymouth Relief Facilities	Braintree, Hingham, Holbrook, Randolph, Weymouth, Quincy
128	Infiltration/Inflow Local Financial Assistance Program	All Wastewater Communities
130	Siphon Structure Rehabiliation	All Wastewater Communities
131	Upper Neponset Valley Sewer System	Dedham, Boston, Brookline, Newton
132	Corrosion and Odor Control Study	All Wastewater Communities
136	West Roxbury Tunnel	Ashland, Framingham, Natick, Wellesley, Dedham, Boston, Brookline, Newton, Nedham, and
137	Wastewater Central Monitoring	All Wastewater Communities
139	South System Relief Project	Boston, Milton
141	Wastewater Process Optimization	All Wastewater Communities
142	Wastewater Metering System Equipment Replacement	All Wastewater Communities
145	Interception & Pumping Facility Asset Protection	All Wastewater Communities
146	D.I. Cross Harbor Tunnel	All Wastewater Communities
147	Randolph Trunk Sewer Relief	Braintree & Randolph
206	Deer Island Treatment Plant Asset Protection	All Wastewater Communities
210	Clinton Wastewater Treatment Plant	Clinton
211	Laboratory Services	All MWRA Communities
271	Residuals Asset Protection	All Wastewater Communities
324	CSO Support	Boston, Cambridge, Chelsea, Revere, Somerville
339	North Dorchester Bay & Reserve Channel Conduits/CSO	Boston
340	South Dorchester Bay Sewer Separation (Fox Point)	Boston
341	South Dorchester Bay Sewer Separation (Commercial Pt.)	Boston
346	Cambridge CAM002-004 Sewer Separation	Cambridge
347	East Boston Branch Sewer Relief	Boston, Chelsea, Everett
355	MWR003 Gate and Siphon	Boston, Cambridge
356	Fort Point Channel Sewer Separation	Boston
357	Charles River CSO Controls	Boston, Brookline, Cambridge
358	Morrissey Boulevard Drain	Boston
359	Reserved Channel Sewer Separation	Boston
360	Brookline Sewer Separation	Brookline
361	Bulfinch Triangle Sewer Separation	Boston
542	Carroll Water Treatment Plant	All Water Customers (except Chicopee, Wilbraham, South Hadley Fire District #1, Worcester, Clinton, and Leominster)
543	Quabbin Water Treatment Plant	South Hadley, Chicopee, Wilbraham
545	Blue Hills Covered Storage	Boston, Canton, Milton, Norwood, Quincy, Brookline, Dedham, Westwood, Stoughton
550	Low Service Storage Near Spot Pond	Cambridge, Charlestown, Chelsea, East Boston, Everett, Malden, Medford, Somerville
555	Carroll Water Treatment Plant Asset Protection	All Water Customers (except Chicopee, Wilbraham, South Hadley Fire District #1, Worcester, Clinton, and Leominster)
597	Winsor Dam Hydroelectric	All Water Communities
604	MetroWest Tunnel	All Water Communities (except South Hadley Fire District #1, Chicopee, Wilbraham, Worcester, Clinton, and Leominster)
616	Quabbin Transmission System	Chicopee, South Hadley, Wilbraham
617	Sudbury/Weston Aqueduct Repairs	All Water Communities (except South Hadley Fire District #1, Chicopee, Wilbraham, Worcester, Clinton, and Leominster)
618	Peabody Pipeline Project	Peabody
621	Watershed Land	All Water Communities
622	Cosgrove Tunnel Redundancy	All Water Customers (except Chicopee, Wilbraham, South Hadley Fire District #1, Worcester, Clinton, and Leominster)
623	Dam Projects	All Water Communities
625	Metro Tunnel Redundancy	All Water Customers (except Chicopee, Wilbraham, South Hadley Fire District #1, Worcester, Clinton, and Leominster)
628	Metro Redundancy Interim Improvements	All Water Customers (except Chicopee, Wilbraham, South Hadley Fire District #1, Worcester, Clinton, and Leominster)
630	Watershed Division Capital Improvements	All Water Communities
677	Valve Replacement	All Water Communities
692	Northern High Service Section 27 Improvements	Lynn, Marblehead, Nahant, Swampscott
693	Northern High Service Pipe Improvements - Revere/Malden	Boston, Lynn, Malden, Marblehead, Nahant, Peabody, Reading, Revere, Saugus, Winthrop, Wakefield, Melrose, Lynnfield, Swampscott, Stoneham, Medford
702	New Connecting Mains - Shaft 7 to WASM 3	Arlington, Bedford, Belmont, Boston, Lexington, Medford, Newton, Somerville, Waltham, Watertown, Winchester
704	Rehabilitation of Other Pump Stations	Arlington, Bedford, Belmont, Boston, Brookline, Canton, Lexington, Milton, Norwood, Waltham, Watertown, Winchester
708	Northern Extra High Service - New Pipelines	Arlington, Bedford, Lexington, Waltham
712	Cathodic Protection of Distribution Mains	All Water Communities
713	Spot Pond Supply Mains Rehabilitation	Arlington, Boston, Cambridge, Chelsea, Everett, Malden, Medford, Somerville
719	Chestnut Hill Connecting Mains	Boston, Brookline, Newton
721	Southern Spine Distribution Mains	Boston, Brookline, Canton, Milton, Norwood, Quincy, Dedham, Westwood, Stoughton

APPENDIX 6
PROJECT/MUNICIPALITY(s)

Project	Number/ Project	Community(s) Served
722	NIH Redundancy & Covered Storage	Reading, Stoneham, Wakefield, Winchester, Woburn
723	Northern Low Service Rehab. - Sections 8	Chelsea, Boston, Everett
727	SEH Redundancy & Storage	Boston, Brookline, Canton, Milton, Norwood, Dedham, Westwood, Stoughton
730	Weston Aqueduct Supply Mains	Weston, Newton, Boston, Watertown, Cambridge, Waltham, Belmont, Arlington, Somerville
731	Lynnfield Pipeline	Lynnfield, Saugus
735	Section 80 Rehabilitation	Wellesley and Needham
753	Central Monitoring System	All Water Communities
763	Distribution Systems Facilities Mapping	All Water Communities
765	Local Water Pipeline Imp. Loan Program	All Water Communities
766	Waterworks Facility Asset Protection	All Water Communities
881	Centralized Equipment Purchase	All MWRA Customers
925	Technical Assistance	All MWRA Customers
931	Business Systems Plan	All MWRA Customers
932	Environmental Remediation	All MWRA Customers
933	Capital Maintenance Planning/Development	All MWRA Customers
934	MWRA Facilities Management	All MWRA Customers
935	Alternative Energy Initiatives	All MWRA Customers
940	Application Improvement Program	All MWRA Customers
942	Information Security Program ISP	All MWRA Customers
944	Information Technology Management Program	All MWRA Customers
946	IT Infrastructure Program	All MWRA Customers

APPENDIX 7

MWRA Completed Projects

Appendix 7

MWRA Completed Projects
(as of December 31, 2018)

Project	Total Cost ($000)	Completion Date	Summary
Wastewater	$5,274,076		
Waterworks	$1,788,704		
Business and Operations Support	$67,174		
MWRA Total	$7,129,954		

Bolded items represent projects added since the last document.

Italicized items represent a change in value to a closed project due to a determination that past retainage values no longer represent a liability to the Authority.

Wastewater System Improvements			
Boston Harbor Project	$3,512,332	Nov-01	BHP constructed to minimize the pollution of Boston Harbor. The new Deer Island Primary and Secondary Treatment Facilities are the largest components of the Project to comply with the requirements of the federal Clean Water Act and to improve the harbor for
S.101 Wastewater Metering System Upgrade	$7,516	Dec-93	Construction of system to provide accurate flow data.
S.102 Quincy Pump Facilities	$25,907	Sep-03	Constructed 3 new pump station and rehabbed force mains to ensure continuous pumping to treatment facilities.
S.103 Hingham Pump Station	$3,027	Apr-92	Elimination of untreated sewage discharges.
S.104 Braintree-Weymouth Relief Facilities	$227,705	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.)	$55,454	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	**$5,274,076**		

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	$423,110	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.
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	**$1,788,704**		

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