

# Capital Improvement Program

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**Final  
FISCAL YEAR 2016**



MASSACHUSETTS WATER RESOURCES AUTHORITY

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August 2015

Katherine Haynes Dunphy, Chairwoman  
MWRA Advisory Board  
100 First Avenue  
Boston, MA 02129

Dear Chairwoman Dunphy:

This letter transmits to the Advisory Board the MWRA's Capital Improvement Program (CIP) for Fiscal Year 2016 as approved by the MWRA's Board of Directors on June 24, 2015. The Final FY16 CIP represents an update to the FY15 CIP approved by the Board in June 2014, and includes the latest projected spending estimates and project schedules.

FY2016 spending is projected at \$140.5 million, which supports \$88.1 million for Wastewater System Improvements, \$43.4 million for Waterworks System Improvements, and \$9.0 million for Business and Operations Support. The Final FY16 CIP reaffirms the Authority's commitment of supporting the Financial Assistance Programs to the communities which include the Water Pipeline Program and the expanded Inflow and Infiltration Program. FY16 is the third year of the FY14-18 Base-Line Cap which was set at \$791.7 million. Based on the FY16 Final Budget, the Cap for FY14-18 stands at \$689.1 million which is \$102.5 million or 13.0% lower than the Base-Line Cap.

Going forward, asset protection and water redundancy initiatives will be the main focus of the MWRA's CIP as well as the completion of the court-mandated Combined Sewer Overflow (CSO) control program scheduled for December 2015. Some of the major projects with significant spending in the FY14-18 timeframe include projects already in construction such as the Spot Pond Covered Storage Tanks, the Deer Island Scum Skimmer replacement, the Cambridge Sewer Separation, as well as planned projects such as Wachusett Aqueduct Pump Station construction, Chelsea Creek Headworks rehabilitation, Northern Intermediate High and Southern Extra High redundancy initiatives and various asset protection projects at Deer Island. The single largest initiative that will shape the long-term capital program is the water redundancy programs which will be refined in future CIPs.

A copy of the CIP document is available on-line at [www.mwra.com](http://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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## **Final FY16 Capital Improvement Program**

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### **Overview**

The MWRA was created by the Massachusetts legislature in 1985 and since its inception has invested over \$7.9 billion to modernize and improve the wastewater and waterworks systems serving its 61 member communities. The system serves 2.5 million people and more than 5,500 businesses. Major initiatives completed include the Boston Harbor Program, the MetroWest Water Supply Tunnel, the Carroll Water Treatment Plant, and nearing completion of the remaining court-mandated projects, most notably the long-term Combined Sewer Overflow (CSO) Control Plan.

The five initiatives below account for nearly \$6.0 billion or 76% of spending to date:

- Boston Harbor Project - \$3.8 billion (in use)
- Combined Sewer Overflow - \$884 million (32 of 35 projects complete)
- MetroWest Tunnel - \$697 million (in use)
- Carroll Water Treatment Plant - \$416 million (in use)
- Covered Storage Facilities - \$234 million (in use)

### **An Agency in Transition**

As the MWRA reaches maturity as an agency, a greater proportion of its capital budget will be designated for Asset Protection, Water System Redundancy, Business System Support, and Pipeline Replacement and Rehabilitation. Of the \$7.9 billion in capital spending to date, approximately 80% was for court-mandated projects and these mandated initiatives are nearing completion. Capital expenditures for the MWRA have been trending down since the completion of the Boston Harbor project in 2001, but other spending spikes represent other mandated initiatives including the CSO program, Carroll Water Treatment Plant, and MetroWest Tunnel.

The infrastructure modernization and new facilities construction phase of the MWRA is nearing completion and barring new mandates, the agency is approaching steady-state operations. Steady-state spending will focus on asset protection to preserve the Authority's capital assets and long-term water redundancy to reduce risks of service interruption. Long-term water redundancy will be the largest initiative with impacts on CIP spending in the future.

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. The Authority's outstanding debt balance as of June 30, 2015 is \$5.6 billion and its related debt service requirements account for nearly 62% of the Authority's FY16 operating budget.

Barring additional mandates, leverage is projected to continue this decline as the MWRA enters a steady state phases.

The MWRA's credit ratings of Aa1 from Moody's, AA+ from S&P, and AA+ from Fitch. These ratings 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 Final FY16 CIP, the Authority identified the needs of the programs taking into account the mandated project timeframes and 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 serves as a road map for inclusion of projects in the CIP in every budget cycle.

The Final FY16 Capital Improvement Program (CIP) represents an update to the program approved by the Board in June 2014 for FY15. The spending projections put forth are the result of prioritizing the projects based on the Master Plan, establishing realistic estimates based on the latest information, striking a balance between maintenance and infrastructure improvements, and taking some risks while ensuring there is adequate support for the core operations to meet all regulatory operating permit requirements.

The Final FY16 Capital Improvement Program projects \$140.5 million spending for FY16, of which \$88.1 million supports Wastewater System Improvements, \$43.4 million supports Waterworks System Improvements, and \$9.0 million is for Business and Operations Support.

Some of the major projects with significant spending in the FY16 include projects already in construction such as Cambridge Sewer Separation, a number of asset protection projects at Deer Island such as the Scum Skimmer replacement, the Electrical Equipment Upgrade Construction 4, and the North Main Pump Station Variable Frequency Drive replacement, as well as planned projects such as the Wachusett Aqueduct Pump Station construction, Chelsea Creek Headworks Rehabilitation, and the Northern Intermediate High and Southern Extra High redundancy initiatives. Staff projects 45 project awards for FY16, the most significant ones being the Chelsea Creek Headworks Rehabilitation, HVAC Equipment Replacement at Deer Island, and Northern Intermediate High (NIH) Section 89/29 Construction.

In FY16, the Authority will also reach a significant milestone as the court mandated Combined Sewer Overflow (CSO) program is nearing completion.

### **The Five-Year Spending Cap**

MWRA established its first five-year Cap in FY03 covering the FY04-08 period. The intent of the Cap was to create a ceiling or not-to-exceed amount for spending over a five-year period. The goal of the Cap is to control spending while still ensuring an adequate level of investment to support the core operational needs of the Authority.

Each year, actual spending is compared to the Base-Line Cap. The Cap allows annual spending to vary by +/- 20% from the Base-Line Cap as long as the total five-year spending does not exceed the Base-Line Cap.

### The FY14-18 Base-Line Cap

The FY14 Final CIP established the FY14-18 Base-Line Cap at \$791.7 million with the following breakdown.

FY14-18 Base-Line Cap		FY14	FY15	FY16	FY17	FY18	Total FY14-18
		Projected Expenditures	\$142.5	\$147.6	\$149.3	\$141.8	\$136.8
	Contingency	7.6	9.5	10.1	9.8	9.3	46.1
	Inflation on Unawarded Construction	0.8	4.2	8.4	11.1	13.5	37.9
	Less: Chicopee Valley Aqueduct Projects	(5.0)	(2.2)	(1.4)	(1.3)	(0.4)	(10.3)
	<b>FY14-18 Base-Line Cap</b>	<b>\$145.8</b>	<b>\$159.1</b>	<b>\$166.4</b>	<b>\$161.3</b>	<b>\$159.1</b>	<b>\$791.7</b>

In FY15, at the recommendation of the Advisory Board, the Base-Line Cap was modified to exclude Community Assistance Programs from the Cap calculation which resulted in a net change of \$4.7 million (restated Cap would be ~\$787.0 million).

Based on the Final FY16 CIP, the five-year spending is now at \$689.1 million, which is \$102.5 million or 13.0% below the base-line cap and is attributable to exclusion of the Community Assistance Programs, cash flow changes between the years based on the latest cost estimates, and updated schedules. The exclusion of the Community Assistance Programs from the Cap calculation account for a reduction of \$65.0 million.

### Final FY16 Cap FY14-18 Comparison

Final FY16		FY14	FY15	FY16	FY17	FY18	Total FY14-18
		Projected Expenditures	\$102.2	\$104.7	\$140.5	\$180.8	\$183.4
	Contingency	0.0	4.7	7.6	11.1	11.4	34.8
	Inflation on Unawarded Construction	0.0	0.0	1.1	5.4	8.6	15.1
	Less: I/I Program	0.0	(17.2)	(17.2)	(18.9)	(17.6)	(71.0)
	Less: Water Loan Program	0.0	1.4	2.2	2.5	(0.1)	6.0
	Less: Chicopee Valley Aqueduct Projects	(5.6)	(1.4)	(0.1)	(0.1)	(0.2)	(7.3)
	<b>FY16 Draft Final FY14-18 Spending</b>	<b>\$96.6</b>	<b>\$92.2</b>	<b>\$134.1</b>	<b>\$180.8</b>	<b>\$185.5</b>	<b>\$689.1</b>

Final FY16 vs. FY14-18 Base-Line Cap		FY14	FY15	FY16	FY17	FY18	Total FY14-18
		Projected Expenditures	(\$40.3)	(\$42.9)	(\$8.8)	\$39.1	\$46.5
	Contingency	(7.6)	(4.8)	(2.4)	1.3	2.1	(11.3)
	Inflation on Unawarded Construction	(0.8)	(4.2)	(7.3)	(5.7)	(4.9)	(22.8)
	Less: I/I Program	0.0	(17.2)	(17.2)	(18.9)	(17.6)	(71.0)
	Less: Water Loan Program	0.0	1.4	2.2	2.5	(0.1)	6.0
	Less: Chicopee Valley Aqueduct Projects	(0.6)	0.7	1.4	1.2	0.2	3.0
	<b>FY14-18 Cap (\$ Change)</b>	<b>(\$49.2)</b>	<b>(\$66.9)</b>	<b>(\$32.2)</b>	<b>\$19.5</b>	<b>\$26.3</b>	<b>(\$102.5)</b>
	<b>FY14-18 Cap (% Change)</b>	<b>-33.8%</b>	<b>-42.1%</b>	<b>-19.4%</b>	<b>12.1%</b>	<b>16.6%</b>	<b>-13.0%</b>

The FY14-18 Cap based on the Final FY16 CIP complies with both the overall and annual Cap requirements.

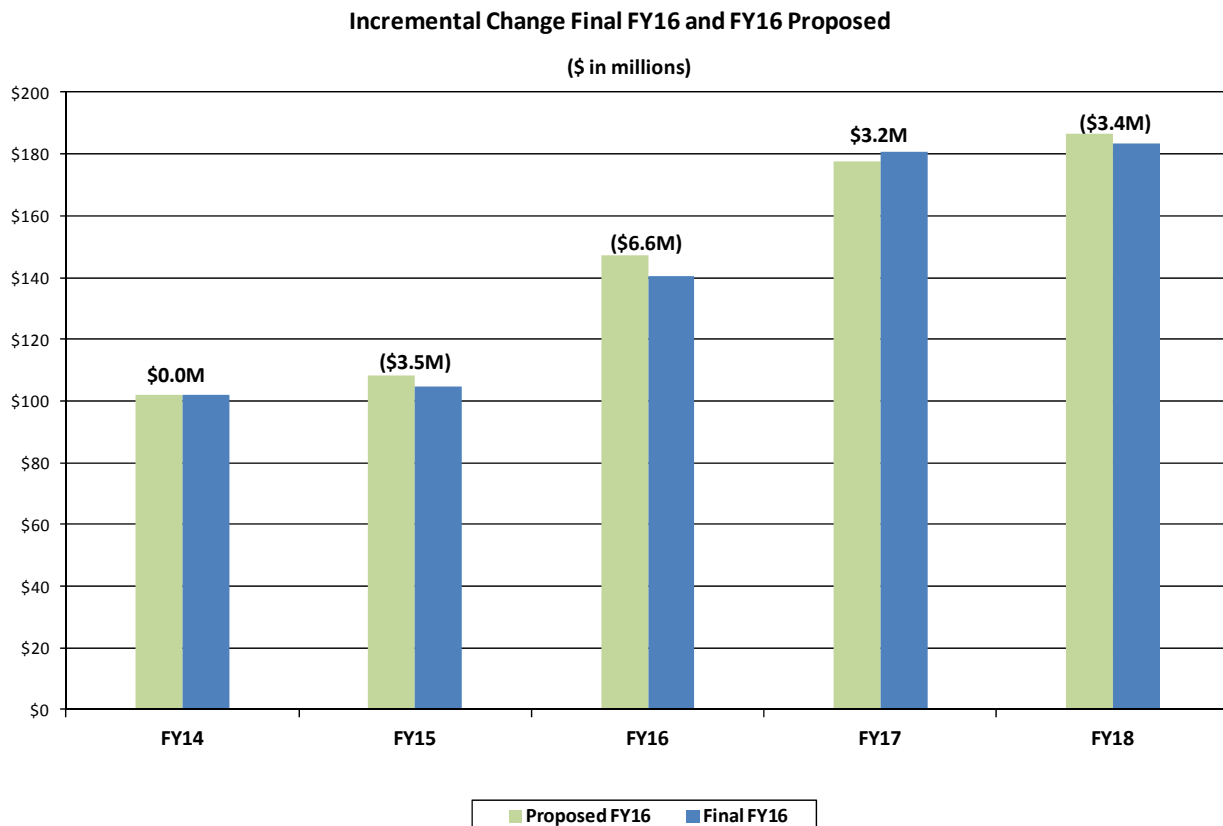
## Final FY16 CIP Compared to the FY16 Proposed CIP by Program

The Final FY16 CIP increased by \$3.2 million versus the FY16 Proposed CIP approved by the Board of Directors in June 2015, with most of the additional spending in years outside of the current Cap period.

	Proposed FY16	Final FY16	\$ Change	% Change	Proposed FY16 FY14-18	Final FY16 FY14-18	FY14-18 \$ Change	FY14-18 % Change
Wastewater Systems Improvements	\$ 2,975.5	\$ 2,974.6	\$ (0.9)	0.0%	\$ 432.0	\$ 419.3	\$ (12.7)	-2.9%
Waterworks System Improvements	2,906.7	2,909.4	2.7	0.1%	248.3	251.3	3.0	1.2%
Business and Operations Support	127.0	128.4	1.4	1.1%	41.5	40.9	(0.6)	-1.4%
<b>Total MWRA without contingency</b>	<b>\$ 6,009.2</b>	<b>\$ 6,012.4</b>	<b>\$ 3.2</b>	<b>0.1%</b>	<b>\$ 721.8</b>	<b>\$ 711.5</b>	<b>\$ (10.3)</b>	<b>-1.4%</b>

The Final FY16 CIP is primarily level funded with the Proposed FY16 CIP and reflects updated scope changes and cost estimates, particularly in the FY14-18 timeframe.

The chart below shows the incremental change between the Final FY16 CIP and the Proposed FY16 CIP by fiscal year.



Please refer to Appendix 4 for detailed changes at the project level for the FY14-18 Cap and potential spending beyond FY18.



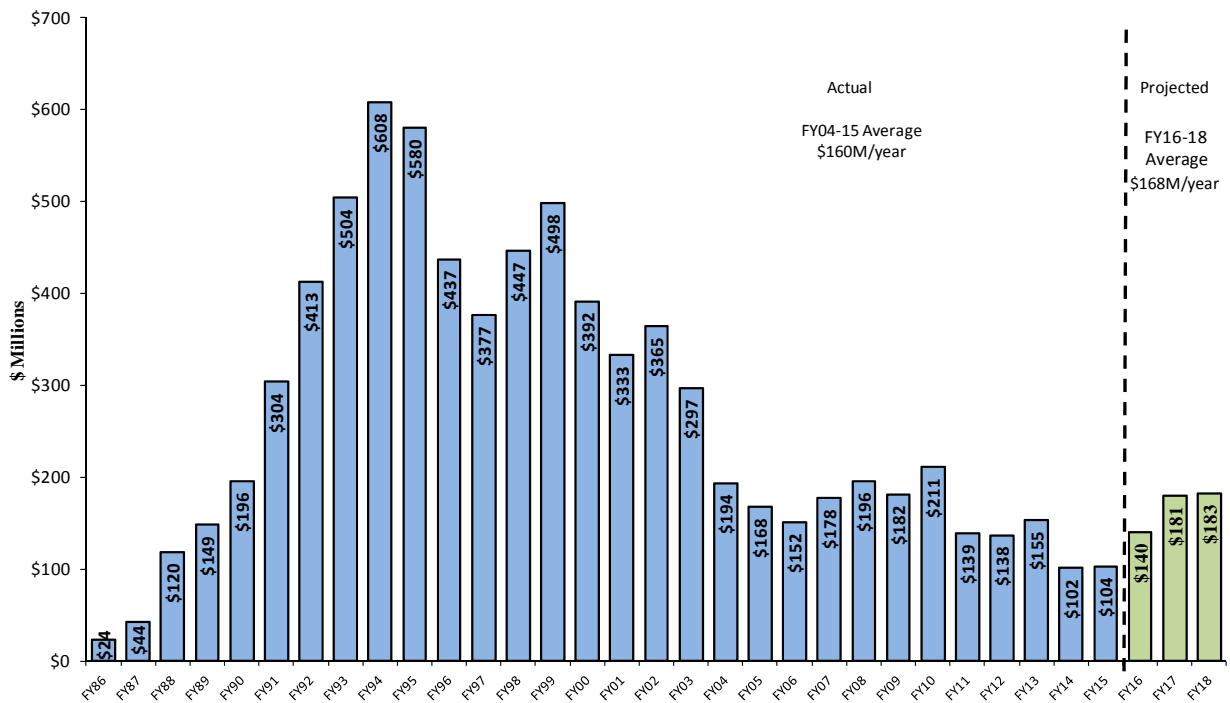
**Major Planned Contract Awards for Fiscal Year 2016:**

In FY16, 49 contracts totaling \$224.8 million are projected to be awarded. The largest ten projected contract awards total \$173.5 million, accounting for just over 77% of expected awards:

Project	Subphase	NTP	FY16 Budget
Long Term Redundancy	Wachusett Aqueduct Pump Station Construction	Sep-15	\$ 60.5
Facility Asset Protection	Chelsea Creek Upgr Construction	Dec-15	54.8
NIH Redundancy & Storage	Section 89/29 Redundancy Construction Phase 1B	Aug-15	11.0
Facility Asset Protection	Alewife Brook Pump Station Rehabilitation - Construction	Aug-15	10.4
Clinton Wastewater Treatment Plant	Phosphorus Reduction Construction	Feb-16	7.1
Carroll Water Treatment Plant	Existing Facilities Modifications - CP7	Jul-15	6.7
DI Treatment Plant Asset Protection	Sodium Bisulfite & Hypochlorite Tanks Rehabilitation	Jun-16	6.6
DI Treatment Plant Asset Protection	Combined Heat & Power Design	Jan-16	6.0
DI Treatment Plant Asset Protection	Gravity Thickener Rehabilitation	Dec-15	5.8
DI Treatment Plant Asset Protection	Digester Sludge Pump Replacement Phase 2	Oct-15	4.7
<b>Top Ten Awards for FY16</b>			<b>\$ 173.5</b>
<b>49 Contract Awards Planned for FY16</b>			<b>\$ 224.8</b>

## Historical Spending

The chart on the following page captures the historical CIP spending through FY14 and projects spending to FY18 based on the Final FY16 CIP.



## Changing Nature of the Capital Program - Shift from Mandated Projects

Since 1985, nearly 80% of the Authority's spending has been on court mandated projects. Going forward, the majority of spending will support Asset Protection, Water System Redundancy, Pipeline Replacement and Rehabilitation, and continued support for Community Assistance programs. Asset Protection and Water System Redundancy spending is projected to rise from past levels and currently accounts for 56.4% and 25.8% of FY14-18 capital expenditures respectively, a total of nearly \$585.0 million of the \$711.5 million projected to be spent over the 5-year period.

	Total Contract	FY09-13	FY14-18	FY19-23	Beyond 23
Asset Protection	\$2,254.7	\$248.0	\$401.2	\$734.8	\$235.3
Carroll WTP	438.2	38.5	15.2	11.8	0.0
Water Redundancy	1895.0	134.7	183.8	495.3	218.5
CSO	873.8	315.5	57.7	3.0	0.0
Other	550.7	88.4	53.6	-21.1	-64.8
<b>Total</b>	<b>\$6,012.4</b>	<b>\$825.1</b>	<b>\$711.5</b>	<b>\$1,223.8</b>	<b>\$389.0</b>
<b>Asset Protection</b>	<b>37.5%</b>	<b>30.1%</b>	<b>56.4%</b>	<b>60.0%</b>	<b>60.5%</b>
Carroll WTP	7.3%	4.7%	2.1%	1.0%	0.0%
<b>Water Redundancy</b>	<b>31.5%</b>	<b>16.3%</b>	<b>25.8%</b>	<b>40.5%</b>	<b>56.2%</b>
CSO	14.5%	38.2%	8.1%	0.2%	0.0%
Other	9.2%	10.7%	7.5%	-1.7%	-16.7%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

The Final FY16 projects total CIP spending of \$2.2 billion starting in FY15.

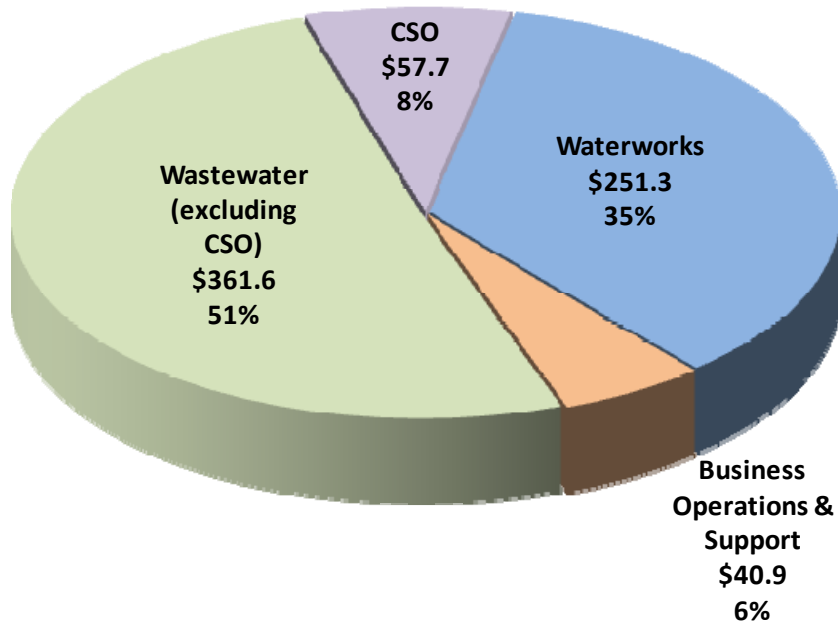
	Total Contract Amount	Payments Thru FY14	Projected Spending	Total FY14-18	Total FY19-23	Beyond 23
<b>Wastewater System Improvements</b>	<b>\$2,974.6</b>	<b>\$1,791.7</b>	<b>\$1,182.9</b>	<b>\$419.3</b>	<b>\$634.9</b>	<b>\$184.3</b>
Interception & Pumping	890.0	527.4	362.6	98.0	224.9	46.6
Treatment	775.6	213.8	561.8	184.0	352.1	54.8
Residuals	167.6	64.6	103.0	4.6	8.5	90.1
CSO	898.5	853.3	45.2	57.7	3.0	-
Other Wastewater	242.9	132.5	110.3	75.0	46.5	(7.1)
<b>Waterworks System Improvements</b>	<b>\$2,909.4</b>	<b>\$1,915.6</b>	<b>\$993.8</b>	<b>\$251.3</b>	<b>\$578.8</b>	<b>\$204.7</b>
Drinking Water Quality Improvements	666.3	625.4	40.9	58.9	12.2	0.0
Transmission	1,224.2	759.5	464.7	78.8	275.9	114.4
Distribution & Pumping	949.1	377.5	571.6	105.8	325.0	145.7
Other Waterworks	69.8	153.2	(83.4)	7.8	(34.2)	(55.5)
Business & Operations Support	128.4	83.0	45.4	40.9	10.0	-
<b>Total MWRA</b>	<b>\$6,012.4</b>	<b>\$3,790.3</b>	<b>\$2,222.1</b>	<b>\$711.5</b>	<b>\$1,223.8</b>	<b>\$389.0</b>

### Final FY16 FY14-18 CIP Expenditures

Spending during the FY14-18 timeframe is projected to be \$711.5 million. Yearly cash-flows for the proposed Cap period are shown below:

	Total Contract Amount	Payments Thru FY14	Projected Spending	FY14	FY15	FY16	FY17	FY18	Total FY14-18
<b>Wastewater System Improvements</b>	<b>\$2,974.6</b>	<b>\$1,791.7</b>	<b>\$1,182.9</b>	<b>\$55.7</b>	<b>\$71.5</b>	<b>\$88.1</b>	<b>\$108.3</b>	<b>\$95.7</b>	<b>\$419.3</b>
Interception & Pumping	890.0	527.4	362.6	6.9	9.5	20.1	32.2	29.3	98.0
Treatment	775.6	213.8	561.8	29.1	21.5	37.6	50.2	45.7	184.0
Residuals	167.6	64.6	103.0	0.1	-	-	2.9	1.6	4.6
CSO	898.5	853.3	45.2	15.6	23.3	13.2	4.1	1.5	57.7
Other Wastewater	242.9	132.5	110.3	4.0	17.2	17.2	18.9	17.6	75.0
<b>Waterworks System Improvements</b>	<b>\$2,909.4</b>	<b>\$1,915.6</b>	<b>\$993.8</b>	<b>\$41.0</b>	<b>\$26.3</b>	<b>\$43.4</b>	<b>\$62.9</b>	<b>\$77.7</b>	<b>\$251.3</b>
Drinking Water Quality Improvements	666.3	625.4	40.9	30.2	15.1	6.4	4.9	2.3	58.9
Transmission	1,224.2	759.5	464.7	4.5	3.0	19.5	24.3	27.5	78.8
Distribution & Pumping	949.1	377.5	571.6	4.8	9.1	17.4	31.9	42.6	105.8
Other Waterworks	69.8	153.2	(83.4)	1.5	(0.9)	0.1	1.8	5.2	7.8
Business & Operations Support	128.4	83.0	45.4	5.5	6.9	9.0	9.6	10.0	40.9
<b>Total MWRA</b>	<b>\$6,012.4</b>	<b>\$3,790.3</b>	<b>\$2,222.1</b>	<b>\$102.2</b>	<b>\$104.7</b>	<b>\$140.5</b>	<b>\$180.8</b>	<b>\$183.4</b>	<b>\$711.5</b>

The graph below illustrates a breakdown of the major program spending for the FY14-18 timeframe.



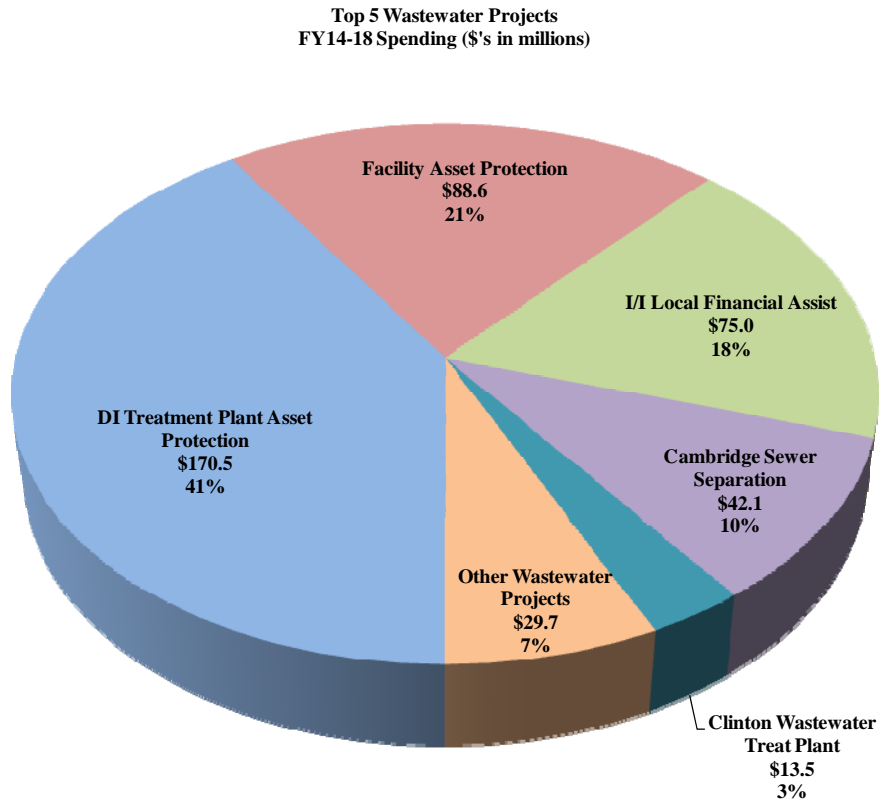
Please refer to Appendix 2 for a more detailed project listing and projected cash flows.

### Top 10 Projects – FY14-18 Cap Period

It is important to emphasize that the majority of spending within the Wastewater and Water Capital programs is concentrated in several larger projects with significant spending in the FY14-18 timeframe. These projects are either currently under construction or soon to be awarded. The top 5 projects for the Wastewater program total \$389.7 million for FY14-18 period and represent 93.0% of the \$432.0 million total program.

Project	Total Contract Amount	FY14-18 Spending	% of Program
DI Treatment Plant Asset Protection	\$ 720.4	\$ 170.5	41%
Facility Asset Protection	311.8	88.6	21%
I/I Local Financial Assist	242.6	75.0	18%
Cambridge Sewer Separation	92.6	42.1	10%
Clinton Wastewater Treat Plant	20.5	13.5	3%
<b>Total Top 5 Wastewater Projects</b>	<b>\$ 1,387.8</b>	<b>\$ 389.7</b>	<b>93%</b>
Other Wastewater Projects	1,586.8	29.7	7%
<b>Total Wastewater</b>	<b>\$ 2,974.6</b>	<b>\$ 419.3</b>	<b>100%</b>

The breakdown of the \$419.3 million program by the major projects is illustrated below:



The FY14-18 sub-phases of projects with spending greater than \$20 million along with a brief description of the scope of work are included below:

**Infiltration/Inflow (I/I) Local Financial Assistance** - \$75.0 million – This program provides funding assistance for communities to rehabilitate their collection systems with the goal of structurally reducing I/I flow.

**Cambridge Sewer Separation CSO Control Program Design and Construction**- \$42.1 million (\$92.6 million total costs, \$63.5 million already spent). This project encompasses the wastewater system improvements implemented by the City of Cambridge to control CSO discharges to the Alewife Brook. Completed work includes the CAM004 Stormwater Outfall and Wetland Basin, Interceptor Connection Relief and Floatables Controls, and Sewer Separation at Outfall CAM400 and contract 8A (Huron Ave West). Remaining work involves three construction contracts to separate combined sewers in a 211-acre area upstream of Outfall CAM004 in the Huron Avenue and Concord Avenue neighborhoods, east of Fresh Pond Parkway. Cambridge’s contracts 8B and 9 are well underway. The contracts will redirect stormwater removed from the system to the wetland basin and will culminate in the closing of Outfall CAM004.

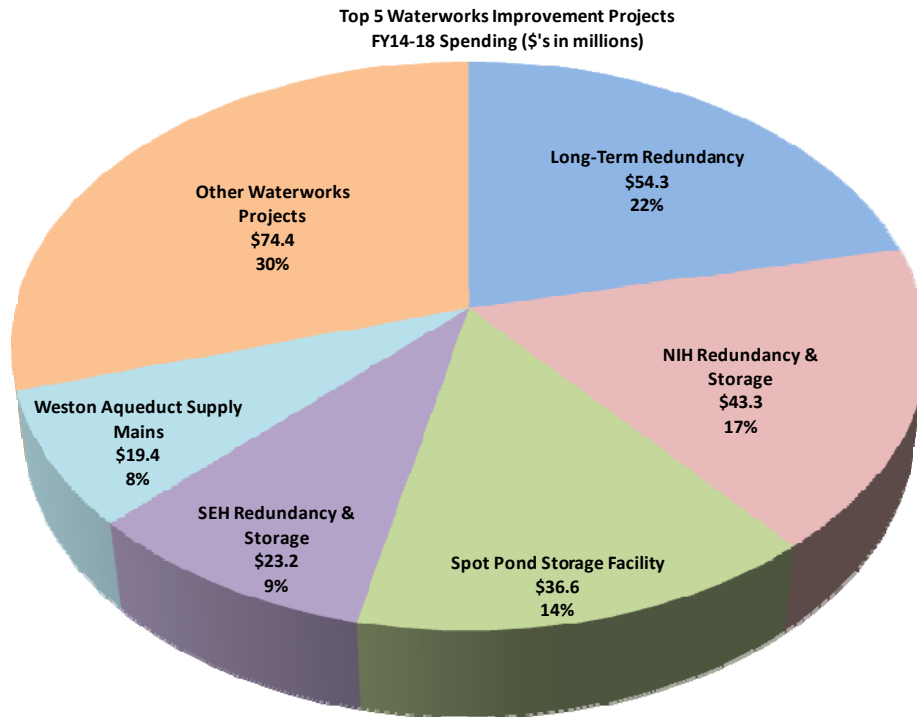
**Chelsea Headworks Construction** - \$35.7 million (\$54.8 million total construction cost). This major rehabilitation project includes replacement/upgrade to the screens, grit collection system, grit and handling systems, odor control systems, HVAC, mechanical, plumbing and instrumentation. Solids handling systems will be automated and the building’s egress and fire suppressions systems will also be upgraded.

**Deer Island Scum Skimmer Replacement** - \$20.2 million - This is an asset protection replacement project which proposes to replace degraded carbon steel tip tubes and drive mechanisms for 40 Primary Clarifier tanks and 54 Secondary Clarifier tanks with stainless steel components to improve the system reliability and overall maintenance.

Similarly, the top five projects for the Waterworks program total \$176.9 million for FY14-18 and represent 70% of the \$251.3 million total program.

Project	Total Contract Amount	FY14-18 Spending	% of Program
Long-Term Redundancy	\$ 409.4	\$ 54.3	22%
NIH Redundancy & Storage	90.2	43.3	17%
Spot Pond Storage Facility	61.2	36.6	15%
SEH Redundancy & Storage	99.5	23.2	9%
Weston Aqueduct Supply Mains	281.1	19.4	8%
<b>Total Top 5 Waterworks Projects</b>	<b>\$ 941.4</b>	<b>\$ 176.9</b>	<b>70%</b>
Other Waterworks Projects	1,968.0	74.4	30%
<b>Total Waterworks</b>	<b>\$ 2,909.4</b>	<b>\$ 251.3</b>	<b>100%</b>

The breakdown of the \$251.3 million program by the major projects is illustrated below:



The FY14-18 sub-phases of projects with spending greater than \$20 million along with a brief description of the scope of work are included below:

**Wachusett Aqueduct Pump Station Design and Construction** - \$46.0 million (\$67.1 million in total cost) - This is a redundancy project for construction of a 240 mgd emergency pump station which will provide redundancy for the Cosgrove Tunnel by pumping raw water from the Wachusett Aqueduct to the Carroll Water Treatment Plant. This project, along with the completion of the on-going 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.

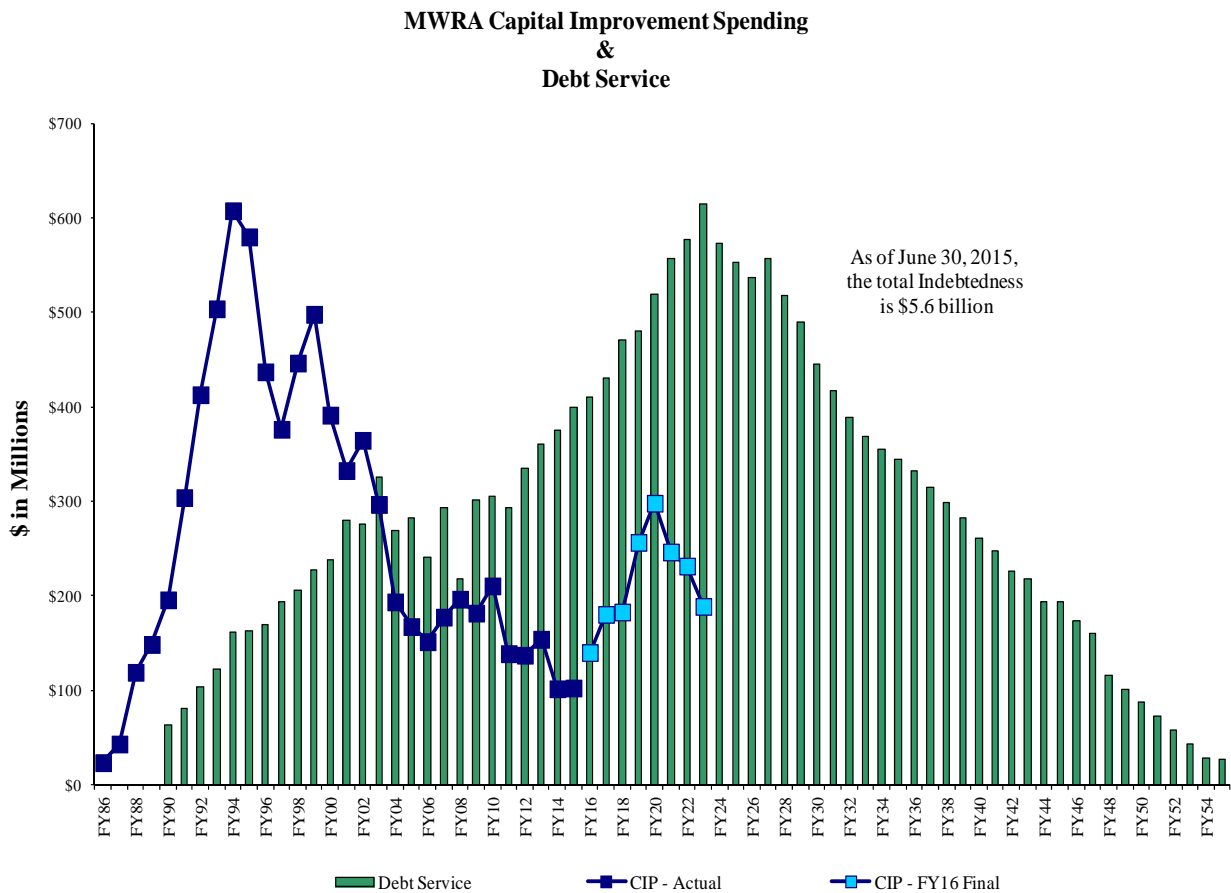
**Spot Pond Storage Facilities** - \$36.6 million (\$61.2 million in total cost) - This project is for the construction of a 20 million-gallon drinking water storage facility and redundant pump station in Stoneham. The underground, concrete tanks will provide drinking water storage for MWRA's Low Service area. Additionally, this project will provide system redundancy for 21 communities in the Northern Intermediate High and Northern High service areas currently served by the Gillis Pump Station.

**Northern Intermediate High (NIH) Section 89 & 29 Redundancy Construction Phases 1A-C & 2** - \$23.7 million and \$12.3 million respectively (total construction cost \$23.7 million and \$21.2 million) - This is a redundancy project for the MWRA's Northern Intermediate High service area. Currently, this area is primarily supplied by a single 48-inch diameter pipeline, the Gillis Pump Station, and water distribution storage from the Bear Hill Tank. This project proposes a new seven mile redundant pipeline under four construction phases and will provide uninterrupted water supply to the service area in the event of a failure of the existing single supply pipe and to allow the existing pipe to be removed from service for inspection, maintenance, and repair.

**MWRA Capital Improvement Spending versus Debt Service -**

The following graph was updated with the Final FY16 CIP spending and debt service projections to illustrate the relationship between the MWRA's CIP and debt service.

As of June 30, 2015, MWRA's total debt was \$5.6 billion. The Authority's debt service obligation as a percent of total expenses has increased from 36% in 1990 to more than 61% in the Final FY16 Current Expense Budget. It is important to note that the amount of capital expenditures scheduled for FY2016 is less than the scheduled principal payments, contributing to a decrease of outstanding debt.





## **Contingency**

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. The total contingency budget in the Final FY16 CIP is \$154.0 million, with \$34.8 million during FY14-18.

## **Future Risks**

Going forward the largest decision that MWRA will have to make is pertaining to the Long-Term Redundancy project specifically the Sudbury Aqueduct alternatives plans. That decision will have a significant impact on the capital program for the next 10-15 years.

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

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

# **Capital Improvement Program**

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**FISCAL YEAR 2016**

**APPENDICES**



**MASSACHUSETTS WATER RESOURCES AUTHORITY**

# APPENDIX 1

## Project Budget Summaries and Detail of Changes

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**Project Budget Summaries and Detail of Changes**  
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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
Design 1/CS/RI – Tunnel & IPS	Design of the tunnel and IPS. Includes completion of design modifications for sludge pumping facilities at Deer Island and residuals filtrate facilities at Fore River.
Sediment Tests	Tests required as part of the evaluation of marine pipeline option.
Design 2/CS/RI – Surface	Design of remaining construction including siphons and replacement pump station.
Tunnel Construction & Rescue	Construction of a 2.9-mile, 12-foot 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.

Sub-phase	Scope
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.
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.
Fore River Siphons Construction	Construction of 36-inch, 3,900-foot 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.
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.
Rehab Section 624	Rehabilitation of 2,000 feet of Section 624 in North Weymouth.
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.
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.
Geotechnical Consultant	Consulting services related to the tunnel shaft excavation.
Communication System	Radio systems for the intermediate and replacement pump stations.
Mill Cove Sluice Gates Design and Construction	Install gates which will allow staff to remotely flush out the site as needed, and will reduce odors.
Braintree-Weymouth Improvements Design CS/RI and Construction	Several facility modifications are needed to improve facility safety, reliability, and performance. Design and construction improvements are required to address deficiencies in odor control, solids handling, and pumping operations. This project includes a study to determine deficiencies and corrections for the grinder room odor control, grinder equipment, and wastewater pumps.

#### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$232,455	\$227,704	\$4,751	\$1	\$0	\$310	\$4,441	\$0

Project Status 5/15	98.0%	Status as % is approximation based on project budget and expenditures. Work that is substantially complete includes the deep rock tunnel, N Weymouth Interceptor, Intermediate Pump Station, Fore River Siphons contract, and the Replacement Pump Station. Rehabilitation of Section 624 was completed in December 2010.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$232,453	\$232,455	\$2	Aug-20	Aug-20	None	\$309	\$310	\$1

**Explanation of Changes**

- Schedule and spending changed due to final cost adjustment.

**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. Hydraulic flows through many of these siphon chambers and connecting structures are below design capacities. The poor flow conditions, caused by irregular maintenance due to the inaccessibility of many structures, contribute to significant surcharges and overflows. Odor problems have 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 at structures at 29 siphon locations that are most inaccessible or in greatest need of repair.

### Scope

Sub-phase	Scope
Planning	Identification of methods to improve accessibility and structures. Inspection of the siphon chambers and diversion structures along with recommendations for rehabilitation.
Design/CS/RI	Design, Construction Services and Resident Inspection for improvements at 29 siphon locations.
Construction	Construction of improvements at 29 siphon locations.

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$6,635	\$940	\$5,695	\$0	\$0	\$0	\$5,695	\$0

Project Status 5/15	14.2%	Status as % is approximation based on project budget and expenditures. Initial Planning subphase was completed in 1998. Design is expected to begin in July 2018.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$6,520	\$6,635	\$115	Jun-21	Jun-21	None	\$0	\$0	\$0

**Explanation of Changes**

- Project cost changed due inflation adjustments on unawarded contracts.

**CEB Impacts**

- None identified at this time.

## S. 132 Corrosion and Odor Control

### Project Purpose and Benefits

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

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

### Project History and Background

Hydrogen sulfide produces sewer odors and is highly corrosive to pipes and pump stations. Collapses in the Framingham Extension Sewer (FES) have alerted MWRA to problems in that area. Odor complaints have been received from residents abutting both the Framingham Extension Relief Sewer (FERS) and the Wellesley Extension Sewer (WES) systems resulting in legal claims totaling several hundred thousand dollars. Severe corrosion has occurred in the West Roxbury Tunnel. This situation has prompted MWRA to add odor control chemicals at various points in the local systems and FES to try to reduce the hydrogen sulfide levels. The results have been mixed; not all of the chemicals were effective even over the short term, and none completely eliminated hydrogen sulfide.

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 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.

Interim Corrosion Control commenced in July 2000. The design for the modifications to the FERS pump station, FES Tunnel, and air treatment systems started in August 2002 and continued until June 2005.

### Scope

Sub-phase	Scope
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.
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.
FES Tunnel Rehab Design CS/RI and Construction	Rehabilitation of the FES Tunnel.

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.
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.
Nut Island Control System Evaluation, Design CS/RI and Construction	Evaluation, design, and upgrades to the existing odor control, HVAC, and Building Energy Management Systems.
System-wide Odor Control	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.

#### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$19,782	\$3,001	\$16,780	\$0	\$88	\$543	\$16,238	\$0

Project Status 5/15	15.2%	Status as % is approximation based on project budget and expenditures.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$16,346	\$19,782	\$3,436	Jun-20	Dec-20	6 mos.	\$1,000	\$543	(\$457)

#### Explanation of Changes

- Cost increase is primarily due to updated costs including new sub-phase for NI System-Wide Odor Control Construction, updated cost for System Wide Odor Control Evaluation, and inflation adjustments.
- Spending and schedule changed as a result of updated plan for NI System Wide-Odor Control work including the Evaluation, Design/Engineering Services, and Construction phases.

#### 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, immediately upstream of the tunnel, crosses beneath the VFW Parkway. 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**

<b>Sub-phase</b>	<b>Scope</b>
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.
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.
Construction	Rehabilitation of 1,000 feet of Section 138 and the West Portal. Completed in June 2002.
Tunnel Inspection	Inspection contract to monitor the conditions of the tunnel in 10 years

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$11,314	\$10,314	\$1,000	\$0	\$0	\$0	\$1,000	\$0

Project Status 5/15	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.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$11,314	\$11,314	\$0	Jun-20	Jun-20	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 already made substantial progress towards increased 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 Treatment Plant and Nut Island Headworks, and Supervisory Control and Data Acquisition System (SCADA) implementation is ongoing within the water conveyance system. The recommended wastewater SCADA system and associated business practices will support a single philosophy for central monitoring and control of all MWRA facilities and systems.

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.

### Scope

Sub-phase	Scope
Planning	Development of a plan for a monitoring and control system for the MWRA wastewater transport system.
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.
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.).
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.

Equipment Prepurchase	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.
Technical Assistance	Technical assistance work to support all subphases.
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.
Wastewater SCADA/PLC Upgrades	<b>Replacement of existing SCADA PLCs nearing their end of life with a current PLC platform. New PLC platforms further provide increased security capabilities and improved programming functionality. Secondary goals include standardizing PLC logic and HMI graphics, and upgrading aging field instrumentation.</b>

#### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$27,482	\$19,782	\$7,700	\$0	\$0	\$760	\$2,910	\$4,030

Project Status 5/15	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 Redundant Communications is expected to begin in July 2017.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$20,482	\$27,482	\$7,000	Mar-20	Oct-31	139 mos.	\$327	\$760	\$433

#### Explanation of Changes

- Project budget, schedule, and spending changed primarily due to the inclusion of a new project for Wastewater SCADA/PLC Upgrade. Spending increase was partially offset by updated schedule for Wastewater Redundant Communications phase.

#### CEB Impacts

- None identified at this time.



## S. 139 South System Relief Project

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### 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 2019. 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
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.
Sections 70 and 71 HLS Evaluation/ Construction	Initial evaluation and construction of recommended improvements.
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.
Milton Financial Assistance	Payment to the Town of Milton for local projects to mitigate downstream impacts from high flow conditions.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$4,939	\$3,439	\$1,500	\$0	\$0	\$0	\$1,500	\$0

Project Status 5/15	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 FY19.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$4,939	\$4,939	\$0	Dec-20	Dec-20	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
Planning	Evaluate collection system and facility modification alternatives to maximize wastewater treatment and minimize operating and maintenance costs.
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.
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.
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.
Hydraulic Flood Engineering Design and Construction– North System	Future implementation of system optimization measures or more significant system modifications which will be identified during the initial study. Additional follow-up analysis or project implementation may be done under this phase.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$10,383	\$1,217	\$9,166	\$220	\$65	\$1,391	\$5,817	\$1,970

Project Status 5/15	14.0%	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.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$10,360	\$10,383	\$23	Jun-25	Jun-25	None	\$1,391	\$1,391	\$0

**Explanation of Changes**

- Project cost increased due to inflation adjustments.

**CEB Impacts**

- None identified at this time.

## S. 142 Wastewater Metering System Equipment Replacement

### Project Purpose and Benefits

- Extends current asset life
- Improves system operability and reliability.

To improve the accuracy of meter data used to determine wholesale wastewater charges. This will be accomplished by replacing the existing wastewater metering system, including hardware and software utilizing the latest available technology. This technology will reduce confined space entries, making the metering system safer and less costly to maintain. This project will be coordinated with and support SCADA implementation for the wastewater system. Meter replacement was completed in FY06.

### Project History and Background

Installation of MWRA's initial wastewater metering system began in 1989 and was completed in 1994. Individual meters in 43 customer communities receive routine maintenance on a continuous basis. This initial system was replaced in 2003-2004. Lessons learned with the initial metering system was that the life expectancy of wastewater meters is approximately 7-10 years and that timely replacement of meters can be scheduled to avoid whole scale replacement. Our current system is approaching its 10<sup>th</sup> year. Plans will be developed to evaluate new wastewater metering technology for our 3<sup>rd</sup> generation of meters. Meter replacement will be phased in rather than an entire system replacement. Certain key meters will be supplied with electric power instead of battery resulting in more civil, electrical, and construction costs.

### Scope

Sub-phase	Scope
Planning/Study/Design	Development of a long-term plan to upgrade or replace the existing wastewater metering system (technology, hardware, software, telemetry).
Equipment Purchase/Installation	Purchase and installation of equipment.
Permanent Site Improvements Construction	Supply of power and enhanced wireless communications to approximately half of the 218 permanent wastewater metering sites. The data from these key sites will be used to optimize MWRA operation and maintenance activities during normal and wet weather conditions.
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.

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$27,738	\$5,138	\$22,600	\$0	\$359	\$6,436	\$1,564	\$14,600

Project Status 5/15	18.5%	Status as % is approximation on project budget and expenditures. The purchase and installation of 2 <sup>nd</sup> generation of meters is complete. Planning for the next replacement is underway.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$26,438	\$27,738	\$1,300	Jul-29	Jul-29	None	\$7,300	\$6,436	(\$864)

**Explanation of Changes**

- Project budget and pending changes decreased due to updated meter replacement plan including updated cost estimates and schedules for Planning/Study Design, Construction, and Wastewater Meter System Equipment Replacement phases.

**CEB Impacts**

- Potential cost savings associated with this project have not yet been 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
Rehab of Section 93A Lexington	Rehabilitation of 4,000 linear feet of pipeline in Lexington (Section 93A). Completed in April 2004.
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.
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.
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.
Mill Brook Valley Sewer Sec 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.
Interceptor Renewal #1 Reading Extension & Metropolitan Sewer Design CA/RI & Construction	#1 – Rehabilitation of 10,800 linear feet of the Reading Extension Sewer Sections 75, 74, 73, 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 2,280 linear feet of Metropolitan Sewer Section 46 in Stoneham.
Interceptor Renewal #2 Cambridge Branch Design CA/RI & Construction	#2 – Rehabilitation of Cambridge Branch Sewer Sections 26 and 27.



<b>Sub-phase</b>	<b>Scope</b>
Interceptor Renewal #3 Dorchester Interceptor Sewer	#3 – Rehabilitation of Dorchester Interceptor Sewer Sections 240, 241, and 242.
Interceptor Renewal #4 Everett Sections 23 and 24	#4 – Rehabilitation of portions of Sections 23 and 24 in Everett.
Malden & Melrose Hydraulics and Structural Study/Design and Construction	#7 – Rehabilitation of Melrose, Malden Sections 41,42,49,54 and 65.
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.
Interceptor Renewal #5 Milton Sections 607/609/610	#5 - Rehabilitation of portions of Sections 607/609/610 in Milton.
Interceptor Renewal #6 Chelsea Sections 12/14/15/62	#6 - Rehabilitation of portions of Sections 12/14/15/62 in Chelsea.
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.
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.
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.
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.

Sub-phase	Scope
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 will include 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.
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 will be performed under a separate contract.
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.
Nut Island Fire Pump Building Study	Study to investigate the settlement of the fire pump building at the Nut Island Headworks. Fire protection and service water needs will be assessed as well as building stability, tank capacity, and repair and/or replacement needs and options.
Nut Island Mechanical & Electrical Replacements	Project to identify the portions of the mechanical and electrical systems that are failing or reached the end of their useful life. Electrical systems will be evaluated through service contract maintenance, which often reveal obsolescence and/or potential for future failure. Mechanical systems have exhibited operational and maintenance difficulties that require close review for design improvement and replacement.
NIH 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.
Headworks Effluent Shaft Study	At each of the three remote Headworks, Chelsea Creek, Ward Street and Columbus Park, 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 this material could be detrimental to pumps or other wastewater equipment at Deer Island. This study should also include requirements related to plant and shaft ventilation, and replacement of the grating and instrumentation.

Sub-phase	Scope
Chelsea Headworks Upgrades Design CA/ESDC/REI and Construction, Columbus Park and Ward St. Headworks Upgrades Design ESDC/REI and Construction	The Remote Headworks Preliminary Design proposed recommendations to upgrade the Chelsea Creek, Columbus Park, and Ward Street Headworks, which will be included in final design and construction documents. The recommendations include replacement/upgrades to the screens, grit and screenings collection and conveyance systems, odor control, HVAC, mechanical, plumbing, instrumentation, PCB removal, and electrical systems, as well as antenna towers. The final design of the Chelsea Creek Headworks Upgrade is ongoing, and will be followed by design and construction contracts for Ward Street and Columbus Park Headworks. Chelsea Creek Headworks REI will be performed under a separate contract.
Pump Station/CSO Condition Assessment	This project provides professional engineering services including planning, inventory, evaluation, identification and prioritization of rehabilitation/replacement projects and operational processes for the older pump stations and CSO facilities.
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.
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.
Prison Point Rehabilitation Design/CA/RI and Construction	The Prison Point CSO Facility was constructed in 1981. This contract will include upgrades to the facility including replacement of diesel pump engines, dry weather screen, updating of facility equipment including electrical distribution and chemical disinfection systems, architectural updating of facility and repair/replacement of miscellaneous equipment as identified in the 2012 Prison Point CSO Planning Report. Improvement/installation of systems as appropriate for flood control, energy efficiencies, security, and fire alarm will also be included in this contract.
Cottage Farm Rehabilitation	The Cottage Farm CSO Facility was constructed in 1971. Cottage Farm Rehabilitation to include updating of facility equipment including pumps, sluice gates, gearboxes for course screens, electrical distribution and chemical disinfection systems, architectural updating of facility including replacement of roof 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 flood control, energy efficiencies, security, and fire alarm will also be included.

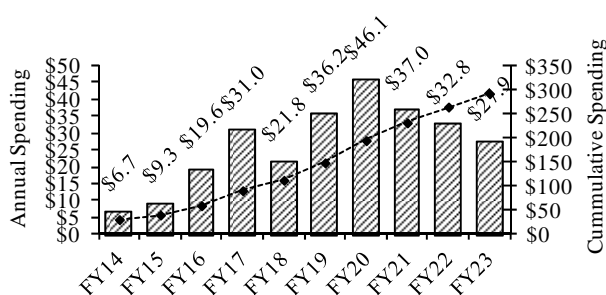
Sub-phase	Scope
Pump Station Rehab Preliminary Design/Study	Preliminary design/study for upgrades at Hayes, Hingham, Caruso, DeLauri Pump Stations, Wiggins-Castle Island Terminal, and the Somerville-Marginal CSO Facility. The project is to follow contract 7162, Pump Station and CSO Condition Assessment, which may result in other facility improvements. Upgrades to the facilities will ensure design output is met. Failure of a particular piece of equipment could lead to failure of another; such as failure of a grinder could negatively impact a pump. Upgraded facilities should result in fewer corrective maintenance calls. This is a system wide project designed to upgrade multiple facilities to ensure worker safety, equipment integrity, environmental protection, and ensure service is not interrupted. Final Design and Construction phases will be added to a future CIP cycle.
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.
Caruso Pump Station Improvements Design, CA/RI, and Construction	This project would replace the existing standby generator, HVAC system, fire detection/suppression system and security system at the Caruso Pump Station. The standby generator is 21 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 will be 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. Due to the age of the fire detection /suppression system, frequent problems, the fire protection system needs to be replaced and/or upgraded. The existing security system is outdated and does not meet MWRA requirements.
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.
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.
Sections 4,5, and 6 North Metropolitan Sewer Rehabilitation Design CS/RI and Construction	Rehabilitation of 3,300 feet (from total of 13,201 linear feet) of 108-inch sewer pipe. Rehab projects in 1991 and 1997 lined these sections with 3-inches of silica/shotcrete covered with epoxy coating. Recent video and manned inspections for the Section 186 emergency work identified the shotcrete as crumbling and the epoxy lining peeling.

Sub-phase	Scope
Rehabilitation of Sections 186 and 4 Construction	Emergency removal of delaminated plastic liner from Section 186 was performed in June 2011. This project includes rehabilitation of Section 186 in its entirety including removal of all remaining failed lining and relining of Section 186, and rehabilitation of a portion of Section 4 just upstream of Section 186; for a total of 2,000 linear feet of 108" sewer pipe. The preliminary design report was finalized in October 2012 and the project is currently under final design.
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.
Cottage Farm PCB Abatement Design CA and Construction	Design and construction to remediate PCB containing paint by removal and encapsulation where appropriate in accordance with the PCB abatement plan at Cottage Farm.

#### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$311,791	\$24,116	\$287,675	\$9,326	\$19,590	\$88,585	\$179,955	\$25,999

#### I&P Asset Protection



Project Status 5/15	10.3%	Status as % is approximation based on project budget and expenditures. Chelsea Headworks Upgrades Final Design commenced in July 2012. Melrose Sewer work was completed in February 2011. NI Electrical & Grit/Screens Conveyance Design commenced in March 2011 and the construction contract was substantially complete in May 2015. Somerville/Marginal Influent Gate Replacement was substantially complete in November 2011. Prison Point HVAC Construction was substantially complete in March 2012. Hingham Pump Station Isolation Gate was substantially complete in June 2012. Alewife Brook PS Final Design/CA/REI Notice to Proceed was issued in July 2012. Caruso PS Improvements Design/CA/REI Notice to Proceed was issued in August 2012. Cottage Farm Fuel System Upgrade was substantially complete in April 2013. Prison Point/Cottage Farm Pumps, Engine, and Gearbox Rebuilds Notice to Proceed was issued in October 2013. Milestone 1, installation of diesel oxidation catalysts was completed in April 2014.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$306,806	\$311,791	\$4,985	Dec-31	Dec-31	None	\$98,644	\$88,585	(\$10,059)

#### Explanation of Changes

- Budget increased primarily due to inflation adjustments for Ward Street & Columbus Park Headworks Design and Construction, Chelsea Creek Headworks Construction, Interceptor Renewal Construction 2 Cambridge Branch, Cottage Farm Rehabilitation Construction, and Prison Point Rehabilitation Construction contracts. Also, updated cost estimates for Caruso Pump Station Improvements Construction, Chelsea Screenhouse Engineering Services During Construction/Resident Engineer Inspection, Chelsea Screenhouse Upgrades, and Interceptor Renewal #1 Design Construction Administration/Resident Inspection sub-phases. This was partially offset by DeLauri Pump Station sub-phase being deleted and updated cost estimate due to reduction in scope for Prison Point Design Construction Administration/Resident Inspection phase.
- Schedule and spending changes primarily due to schedule changes for Chelsea Creek Upgrades Construction, Cottage Farm Rehabilitation Construction, Prison Point Rehabilitation Construction, Ward Street & Columbus Park Headworks Design/Construction Administration/Resident Inspection, Cottage Farm Construction 1 (PCB), and updated cost estimates.

#### 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
Tunnel Shaft Repairs Design & Construction	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, design, and construction of repairs.

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$5,000	\$0	\$5,000	\$0	\$0	\$0	\$5,000	\$0

Project Status 5/15	0.0%	Status as % is approximation based on project budget and expenditures.
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### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$5,000	\$5,000	\$0	Jun-20	Jun-20	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
Study	Study to identify system improvements at Sewer Section 628 and Pearl Street Siphon.

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$750	\$0	\$750	\$0	\$0	\$0	\$750	\$0

Project Status 5/15	0.0%	Status as % is approximation based on project budget and expenditures.
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### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$750	\$750	\$0	Jun-20	Jun-20	None	\$0	\$0	\$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 (DITP) 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.*

*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 at the new plant in 1995 and secondary treatment in 1997. With the completion of the Effluent Outfall Tunnel in September 2000, the plant discharges treated effluent 9.5 miles offshore into the Massachusetts Bay through a series of 55 diffusers spaced along the last 1.25 miles of the tunnel.*

### **Project History and Background**

The Deer Island Treatment Plant Asset Protection program was formerly titled "Facilities Asset Management Program" (FAMP). Since the Facilities Asset Management Program was expanded to include other Operations units throughout MWRA, this Deer Island project was renamed. An initial component of the program, Inventory and Evaluation phases 1 and 2 (previously a part of this project), were placed under the Capital Maintenance Planning and Development project in the *Business Operations and Support* capital budget in a prior budget cycle.

At an expansive and complex facility like the Deer Island Treatment Plant, unanticipated equipment and system failures have the potential to cause operational and 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. This project encompasses five 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	Scope
<i>Equipment Replacement:</i>	

<b>Sub-phase</b> <i>Equipment Replacement:</i>	<b>Scope</b>
Equipment Replacement Projection (ERP)	Long-term placeholder for funding new projects and/or increases to existing projects. Funds for new projects identified during each CIP development phase are deducted from this placeholder and then shown under new sub-phases. In FY09 the funds were depleted due to cost increases in electrical projects and the primary/ secondary clarifier rehab project. Therefore, \$25M was added for FY14 – FY18 to fund other projects added during this next cap period. In the FY12 Final CIP, this spending was all moved to the FY19-23 cap period.
Equipment Condition Monitoring	Installation of temperature & vibration-monitoring equipment in NMPS and Winthrop Terminal Facility (WTF). Completed in January 2005.
CEMS Equipment Replacement	Replaced the data collection computers, upgraded the software, and added PLCs to the Continuous Emissions Monitoring Systems on the two high-pressure Zurn boilers. Project was substantially complete in March 2006.
Pump Packing Replacement	Replace pump packing seals with mechanical seals in the North Main, South System, and Winthrop Terminal pump stations. Purchases were complete by the end of FY08 with installations completed by in-house staff in FY09.
LOCAT Scrubber Replacement Design & Construction	Replace the Thermal Power Plant’s high-maintenance digester gas wet scrubber system. This work is added to the “Combined Heat & Power Facility” scope in the FY16 Proposed cycle, so it is being removed as a separate sub-phase.
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.
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.
Dystor Membrane Replacements	Periodic future replacement of the two gas & sludge storage tank membranes in the digester complex; added in FY08 per the Master Plan. Replaced both membranes in 2005, anticipated to be required every 12-15 years. The next phase is scheduled for FY17.
Digested Sludge Pump Replacement Design & Construction (Phase 1)	The three positive displacement Abel pumps caused a great deal of pipe vibration and require extensive maintenance. Added per the Master Plan, centrifugal pumps with higher flow rates are being installed to reduce the potential for grit settlement in the pipes. The first phase ran from October 2009 to September 2011, to install one centrifugal pump and a flushing pump. These new pumps have been tested to ensure they work well before the three remaining pumps are replaced. See Phase 2 below.
Digested Sludge Pump Replacement Phase 2	New sub-phase added in FY14, to complete replacement of the Abel pumps and includes replacement of the thickened primary sludge pumps header manifold. Expected to begin in October 2015, and be completed by October 2017.
Centrifuge Back-drive Replacements	Replace the centrifuge back-drives, which have become obsolete. Commenced in February 2013 and reached substantial completion in March 2015.

<b>Sub-phase</b> <i>Equipment Replacement:</i>	<b>Scope</b>
Grit & East/West Odor Ctrl Air Handler Unit (AHU) Replacements	Replace deteriorated air handlers; added per the Master Plan. Replacements in FY09-16, then every 15 years. Grit AHU replacement was completed in June 2010. The E/W Odor Control AHU Replacements are now included as part of the HVAC Equipment Replacement project, below.
Fire Alarm System Replacement – Design & Construction and REI	Newly identified in FY08, added from the Master Plan. To replace obsolete fire alarm monitoring & control systems. Expect to begin design in June 2015, replace in FY17-20 and approximately every 20 years thereafter.
HVAC Equipment Replacement – Design/ESDC & Construction	Newly identified in FY08, added from the Master Plan. To replace two obsolete HVAC control systems with one manufacturer’s system, reducing replacement parts and improving automation. Design began in FY14; replace in FY17-20 and then every 15 years. Scope includes central lab fume hoods and East/West Odor Control Air Handler replacements.
Centrifuge Replacements – Design & Construction	Replace the sludge centrifuges when the scrolls/bowls are too worn to repair, or after catastrophic failure. Units have a 20-30 year life but were exposed to a lot of grit after start-up in 1996. Included in the Master Plan; plan to replace four centrifuges every ten years; beginning design in FY19. Centrifuges are now only used to thicken secondary waste sludge before it goes to the digesters.
Cryogenics Plant Equipment Replacement – Design & Construction	Design and construction to replace pumps, valves, motors, sensors, switches, programmable controllers and other obsolete equipment as needed. Added in FY08 per the Master Plan. Project to replace 3 chillers was given a separate sub-phases for FY13; see below. Remaining plant overhaul work to commence in FY19-22 with future rehab and upgrade work occurring every 10 to 15 years.
Cryogenics Chillers Replacement	Project to replace failing air chillers that require frequent maintenance in the oxygen generation plant. Construction began in FY15, expect completion in FY17.
South System Pump Station Pump Lube System Replacement	Change the pump lubrication system from one using grease to one using oil. Only requires routine maintenance after installation, not replacement. Included in the Master Plan. Construction is scheduled for FY19-21.
Digester Modules 1 & 2 Pipe Replacement Design & Construction	During digester pipe cleaning done in mid-2007, deterioration of the glass lining was noted. This sub-phase was not in the Master Plan; it was added in FY08. The \$8M funding was taken from the Equipment Replacement placeholder, so no net CIP increase occurred. Construction was substantially complete by August 2014. Scope also included plug valve replacements. A new project to complete additional digester storage tank rehab work was added in FY12, and given its own sub-phase in FY13; see the DI Digester Storage Tank project under “Specialties”.
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 has been replaced; the removed valve was sent out for evaluation, but the condition was too poor to rebuild. Several others have begun to leak, indicating that the gaskets and seals are failing. Scope revisions were made in FY10 to include replacing the magnetic flow meters; scope now includes the replacement of PSL piping and Eight (8) hydraulic actuators for the SSPS pump check valves. Work began in June 2014 with expected completion by June 2017.

<b>Sub-phase</b>	<b>Scope</b>
<i>Architectural:</i>	
Study/Concept Design- Concrete Repairs	For installing a protective coating on concrete in secondary clarifiers and disinfection basins. Data indicates work not needed; dropped in FY11.
Expansion Joint Repairs	The program to periodically replace failed expansion joints in the concrete clarifier decks and/or various retaining walls. The first phase was completed in November 2003; phase 2 was completed in November 2013, phase 3 is scheduled for FY17-19.
Eastern Seawall Design & Construction	Design and construction of repairs to the base of the eastern seawall due to tidal damage, exposing rebar. Removed in FY06, added back in FY09. Wall condition is assessed annually. Design to commence in FY17, construction work scheduled for FY19-20.
Roof Replacement Phase 1	Added to the CIP in FY10, based on decision to capitalize these costs. Replaced the rubber membrane roof on the Winthrop Terminal, the Administration/Warehouse building, the Cryogenics Facility, and the lower roofs on the Digester Modules. Completed March 2010.
DITP Roof Replacements Phase 2	Also added in FY10, project 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.
Barge Berth and Facility Replacement	Major rehabs of the barge berth & pier facilities due to damage and/or normal wear. Added per the Master Plan. Personnel dock rehabilitation scheduled for FY16 and barge berth/facility work in FY18-19, then on a 20-year cycle.
DITP Roof Replacement Phase 3	Project added in FY13. New roofing was needed at the Grit Facility, North Main Pump Station, Main Switchgear Building, and the gravity thickeners in order to protect the equipment in these buildings. Replacement was completed in July 2014.

<b>Sub-phase</b>	<b>Scope</b>
<i>Utilities:</i>	
Outfall Modifications	Inspection of the old outfall tunnels (decommissioned after startup of the new outfall tunnel). Inspection completed in July 2002.
Electrical Equipment Upgrades (EEU) including future cycles from the Master Plan	The program to replace substation components and bus ducts. Bus duct 2&22 replacement completed October 2001, and EEU - 2 completed by March 2007. EEU-3 began in FY08, completed by August 2011. EEU-4 started in FY13; Under the Master Plan, Phase 5 was added and is scheduled to start in FY19.
VFD Replacements, including Secondary Reactor VFDs	The program to replace obsolete variable frequency drives (VFDs) in the North Main Pump Station (in FY12-16), South System Pump Station (done in FY07-08), Winthrop Terminal Facility (FY15-17), and miscellaneous smaller VFDs throughout the plant (on-going). Future replacements every 12-15 years. In FY14 the scope was revised to include the addition of VFDs to the secondary oxygen reactor batteries A, B and C, to improve system efficiency and reduce energy consumption. This work began in February 2015, with expected completion by August 2016.
NMPS Harmonic Filter Replacement	The second phase of NMPS VFD and motor replacement is installation of new harmonic filters in FY18-20.

<b>Sub-phase</b> <i>Utilities:</i>	<b>Scope</b>
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 - is scheduled for FY16-18.
Thermal Power Plant Modifications – REI	Project covers REI work on 7061A above, modifications in the Thermal Power Plant fuel system. Scheduled to begin in FY16.
TPP Boiler Control Replacement	Replace boiler controls in the Thermal Power Plant that are becoming obsolete. Contract began in November 2014, with expected completion in 2 years.
Switchgear Replacements including future cycles added per the Master Plan	On-going program to sequentially replace obsolete electrical switchgear. Several buildings scheduled for FY18-20, others in FY21-22. Future cycles beyond that period are not currently funded.
Transformer Replacements	Approximately 42 electrical substations and 87 transformers have been in service an average of 13 years. Transformers are replaced when the routine electrical maintenance program identifies them as being near the failure point. Sub-phase eliminated in FY14; replacements are now included in Electrical Equipment Upgrades.
PICS Replacement including future cycles from the Master Plan	Replacement or upgrade of components of the Process Information Control System (PICS) including keypads, consoles, and software due to obsolescence. Project substantially completed in FY13 followed by two years of warranty; and may need to be repeated every 10-12 years.
PICS Distributed Processing Units (DPU) Replacement	Replace the system “backbone”, the 26 DPU cabinets or internal components. Added per the Master Plan, scheduled for FY21-23.
Sodium Hypochlorite Pipe Replacement Design, REI and Construction	Replacement of PVC piping that transports sodium hypochlorite from the storage tanks to the disinfection basins with a better-suited pipe. This project will address issues with leaks, corrosion, and safety hazards in FY18-20.
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 FY19-21.
Heat Loop Pipe Replacement Construction	Rerouting heat loop piping into galleries to reduce underground corrosion and improve accessibility. Phase 1 completed in Dec. 2005, Phase 2 completed in February 2008. Phase 3 completed in June 2011. Includes periodic valve replacements. Another project phase needs to be added to provide redundancy to the heat loop.
Fuel Pipe Abandonment	To cement the existing fuel pipeline in place in FY13 instead of removing it. Project completed December 2012.
North Main Pump Station Motor Control Center (MCC) Construction	Sequential replacement of the MCC equipment that has become obsolete and unreliable. Designed under As-Needed Design task order, construction completed in two sequential phases in FY12-13. See Phase 2 below.
North Main Pump Station Motor Control Center (MCC) Phase 2 Construction and ESDC/REI	New sub-phase, pulled from the project above. Second phase of the work, scheduled to be done in FY17-20.



<b>Sub-phase</b> <i>Utilities:</i>	<b>Scope</b>
CTG Rebuilds	Rebuilds of the combustion turbines in the Thermal Power Plant. Added from the Master Plan, scheduled for FY19-22 with repeat cycles every 15 years. With the addition of the "Combined Heat & Power" facility, this work may eventually be eliminated.
STG System Modifications Design & Construction	Involved adding equipment to the steam turbine generator that will produce additional electricity utilizing the current steam production more efficiently. To help the MWRA meet the energy goals set out by executive order, the project began in FY09. Completed in February 2011. Added Pressure Reducing Valve (PRV) to maximize electrical generation, completed July 2014.
DI Digester Flare #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 the boilers have to be taken off-line. Construction currently scheduled for FY19-20.

<b>Sub-phase</b> <i>Support:</i>	<b>Scope</b>
DISC Application	Hardware, software, and contract services to implement a Deer Island plant-wide computerized database of all plant systems (electrical, gas, water, etc). Current systems deemed sufficient, remaining project removed in FY14.
Document Format Conversion	Conversion of Deer Island construction documents into electronic format and completion of document-reference database. This work is in process, and has several phases. Expect completion by the end of FY17.
As-Needed Design Phases 5, 6, 7, and 8	On-going technical design services and/or construction support to supplement existing engineering resources for specialized or complex engineering issues. Initially, the contracts are issued in tandem and run for two years each. Starting with Phase 6, the contract length was extended to three years each. Phases 6-1 and 6-2 ended by October 2012, followed by phases 7-1, 7-2, and 7-3 (awarded in FY13, at \$1.6M each over three years). Phases 8-1, 8-2, and 8-3 are expected to be awarded in FY16 at \$1.6M each.
Deer Island As-Needed Technical Design	This subphase is a placeholder, used to continue the technical design services and/or construction support in the same fashion as the contracts listed above. Each series of new contracts will be deducted from this placeholder and given their own subphase numbers.

<b>Sub-phase</b> <i>Specialties:</i>	<b>Scope</b>
Sodium Hypochlorite Tank Liner Removal	Removed the failed lining in tank #1 of the four sodium hypochlorite storage tanks. Completed in September 2006.
Hypochlorite Tanks 1&3 Reline	Renamed the "Sodium Hypo Tank Repair 1" subphase in FY08. Included the stripping, repair and relining of tank 3. Completed in November 2007.
Hypochlorite Tanks 2&4 Reline	Added in FY08 per the Master Plan. Strip & reline the two remaining sodium hypochlorite storage tanks. Scope included removing ladders and replacing safety railings on the tanks. Completed in October 2008.
Future Sodium Hypo Tank Rehabilitation or Replacement	Based on condition, expect to start replacing one tank per year beginning in FY21.

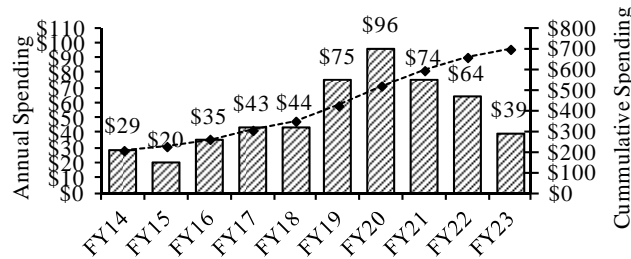
<b>Sub-phase</b> <i>Specialties:</i>	<b>Scope</b>
Sodium Bisulfite and Hypochlorite Tanks Rehabilitation	New sub-phase for FY14 to re-line two Bisulfite tanks. Tank 1 and Tank 2 are in fair condition on the outside (shows staining, rusting, and corrosion). If one tank fails there is no longer any back-up. By FY15, the tanks will have been in service for 20 years. Work expected to begin in FY16. Also, includes future hypochlorite tank rehabs if needed again in FY16-17.
Primary & Secondary Clarifier Rehab – Design (ESDC/REI)	Consultant to provide ESDC/REI services during the Primary & Secondary Clarifier rehab work described below (design done by As-Needed Design consultant). Project scope expanded to include secondary clarifiers due to deterioration in the longitudinal chains and scum collection systems. Work began once the Construction phase listed below was awarded; work completed.
Primary & Secondary Clarifier Rehab Construction	Replace longitudinal and 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 the secondary clarifiers to the scope for FY09 and specified a higher-grade stainless steel, which substantially increased the project cost by \$30M. Separated out the gravity thickener scope due to the need for separate, distinct schedules. Project awarded at \$59.4M; work began in February 2009 and construction was completed in February 2012.
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 the FY14 Final CIP cycle.
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. Multiple phases needed - the first phase (6966) involved replacing some 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.
Gravity Thickener Rehabilitation	Sub-phase pulled from the project above. This final 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 beginning in FY16.
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 and was completed by January 2014.
Ancillary Modifications Design and Construction 4	Dropped the Preliminary Design phase and added ESDC/REI to the scope in FY11. The project involves modifications to the cryogenics facility and plant-wide odor control systems, including the digester gas systems and wet scrubber improvements. This project was moved here from the <i>Plant Optimization</i> project in FY10. Construction currently scheduled for FY19-22.
Clarifier W3H Flushing System	Sub-phase initially called Clarifier Rehab Phase 2 (see project description for that work, below). The assigned contract number was used for this part of the overall project, so the sub-phase was renamed for FY13. Project to replace deteriorated water flushing lines in the clarifier batteries, and was completed in July 2013.

Sub-phase <i>Specialties:</i>	Scope
Clarifier Rehabilitation Phase 2 Design and Construction	Sub-phase pulled from the project above. This project is needed 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 expected to be completed by FY21.
Scum Skimmer (Clarifier Tip Tube) Replacement	Sub-phase also pulled from the W3H flushing project above. Needed a separate project and schedule for replacing the scum tip tubes. Scum tip tubes not working results in scum build-up in primary tanks that has to be manually collected and transported to the gravity thickeners. Project began in FY14 and is expected to be completed in FY17; secondary tip tubes added to scope, increasing the cost.
DI Digester Storage Tank Design/ESDC and Rehabilitation Phase 2	The Deer Island residuals facility includes three digester modules and two gas handling/ sludge storage tanks. During the Digester Mods Pipe Replacement contract (7055), it was noted that other digester equipment has problems and needs replacement. Plugged digester recirculation pipes, mixer failures, and overflow box deterioration resulted in increasing the scope of work needed to correct all deficiencies in this area of DITP. Some steel plates in the digesters are also expected to need repair or replacement and the interior of the digesters needs to be coated. Construction scheduled to begin in late FY18.
Combined Heat & Power (CHP) Design and Construction	A study has been undertaken to evaluate how we can optimize the use of methane gas produced from the existing sludge processing system. One recommendation is to construct a CHP facility that would contain gas-fired turbines which would be more efficient, would increase electrical production and self-generation, and would ensure beneficial re-use of all methane gas in summer months all while still meeting all plant heat requirements. Additionally, this CHP system would be able to handle the increased methane gas quantities associated with co-digestion. Depending on the CHP facility design, portions of the 17 year old On-Site Thermal Power Plant will require modification or elimination. Start design in FY16, construction in FY19.
Digester Gas Pipeline Design and Construction	The existing DITP methane gas distribution system has no redundancy, and it needs to be added. If equipment in the current gas line fails, there is no way to get the methane to the thermal plant, so a second gas pipeline will be required. Project scope moved to Combined Heat & Power Design and Construction phases above during the FY16 Proposed CIP cycle, so this sub-phase is no longer needed.
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 collected at Deer Island. It is expected that food waste will be barged to the treatment plant, pumped into the receiving tank from the barge, then fed through the piping into the digesters. This project will only move forward if the pilot program proves the full scale operation is feasible and cost-effective.
Co-Digestion Temporary Facility	This project is for the “fast track” modifications to the digester piping and barge pumping systems needed to begin the co-digestion pilot program. Moved this sub-phase from the Residuals CIP to Deer Island in the FY16 Proposed budget cycle.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$720,365	\$176,308	\$544,057	\$19,641	\$34,961	\$170,511	\$347,938	\$54,416

**DI Asset Protection**



Project Status 5/15	27.0%	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 completed include: As-Needed Design Phases 6-1 and 6-2, Primary & Secondary Clarifier Rehab Construction, TPP Dump Condenser Replacement, Fuel Transfer Pipe Abandonment, NMPS MCC Construction, Digester Modules Pipe Replacement, PICS Replacement Construction, Clarifier W3H Flushing System, Expansion Joint Repair Construction 2, Gravity Thickener Center Column Replacement, and Roof Replacement Phase 3. Contracts in process include the following: Secondary Reactor Batteries VFD Installation, NMPS VFD Replacement Construction, Electrical Upgrade Construction 4, Centrifuge Backdrive Replacement, Scum Skimmer Replacement, Cryo Chillers Replacement, HVAC Equipment Replacement Design, and Thermal Power Plant Boiler Control Replacement. Fire Alarm System Replacement Design is expected to start in FY16.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$655,558	\$720,365	\$64,807	Jun-48	Jun-48	None	\$178,663	\$170,511	(\$8,152)

**Explanation of Changes**

- The project cost increase is primarily due to updated cost estimate for Combined Heat and Power Design and Construction due to expanded scope for additional turbines which also now includes scope for LOCAT

Scrubber System and Digester Gas Pipeline Design and Construction. Additional, updated cost estimates for Co-Digestion Design/Build and Co-digestion Temporary Facility, Clarifier Rehabilitation 2 Resident Engineer Inspection and Construction, award for Cryo Chillers Replacement, Thermal Power Plant Boiler Control Replacement, Power System Improvements Construction (7061A, Thermal Power Plant Fuel System Upgrade), and inflation adjustments. Increases are partially offset by lower award for Clarifier Phase 2 Design contract, and deleted work for Future Miscellaneous VFD Replacements Design.

- Spending shifted primarily due to several schedule changes including Fire Alarm Replacement Construction, DI CTG Rebuilds, NMPS Motor Control Center Phase 2 Design ESDC and Construction, HVAC Equipment Replacement Construction, DI Switchgear Design, Cryogenics Plant-Equipment Replacement Design, Electrical Equipment Upgrade Phase 5, and Digester Gas Flare #4 Construction phases. These were partially offset by new projects and cost estimates/scope changes noted 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 of \$610,000. Some examples include: Electrical Equipment Upgrades 4 (\$120,000 in FY17), NMPS VFDs (\$200,000 in FY17), Winthrop Terminal Facility VFD Replacement (\$30,000 in FY18), HVAC Equipment Replacement (\$140,000 in FY21-22), and Future SSPS VFD Replacements (\$120,000 beginning in FY21). Any potential impacts of co-digestion and the combined heat and power facility have not yet been quantified or included in the planning estimates.
- Projects that are expected to reduce maintenance time and other resources are the Gravity Thickener Rehabilitation, Cryogenic Plant Chiller Replacements, Thickened Primary Sludge Pump Replacements and Digested Sludge Pump Replacements.

## 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. Clinton WWTP was previously included in DITP's "Asset Protection – Specialties" program category, but was given its own distinct CIP program in FY08.

### Scope

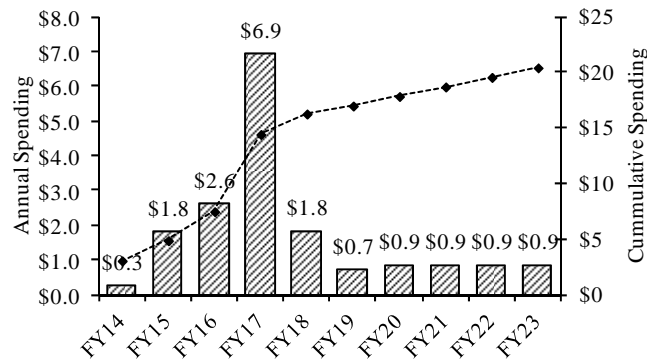
Sub-phase	Scope
Clinton Soda Ash Replacement	The soda ash delivery system required for pH control in the activated sludge process was obsolete and needs to be replaced. The contract was awarded in November 2007 and work was complete by August 2008.
Clinton Permanent Standby Generator	Install a permanent standby generator at the Clinton Wastewater Treatment Plant. Completed in November 2007.
Clinton Digester Cleaning & Rehabs (and Influent Gates)	Clinton's two digesters were approximately 20% filled with compacted grit which was limiting their efficiency. A new discharge permit to be issued soon includes phosphorus limits requiring both digesters to be used at all times. The digester tanks must be emptied, cleaned, and rehabilitated (replace covers, piping, valves, gas lancers, and mixers) to operate under the new permit. Cleaning the first digester was completed by July 2010. In FY12, the scope was expanded to include installing two new 36-inch influent gates to control flow from Clinton and Lancaster to prevent flooding and protect plant assets. These gates would allow for throttling back on the plant flow during extreme flow conditions to protect the treatment plant. The gates would be managed so the plant wet well does not overflow, and damage plant systems. As of FY14, the project scope also includes plant-wide concrete repairs. The concrete walls, walkways and structural support beams across the primary clarifiers are deteriorating to the point that rebar is exposed. The project involves repairing the walls and potentially replacing the walkways and equipment support beams that extend across the tops of the tanks. Construction began in late FY14 and is expected to take 2 years to complete.

Sub-phase	Scope
Clinton Aeration Efficiency Improvement (and Auxiliary Pumps)	A study completed by FS&T recommended installing fine bubble diffusers in three of the six secondary aeration tanks instead of using mechanical mixers, to obtain a better oxygen transfer rate while reducing electricity consumption. In FY12, this project scope was expanded to include the installation of four permanent submersible auxiliary pumps to increase pumping capacity during high flow conditions in the plant. These are needed to avoid the cost of renting additional pumps, which was required four times in the past two years. Work began in late FY12 and was substantially complete in February 2013.
Phosphorus Reduction Design/ESDC and Construction	Latest draft NPDES permit includes lower phosphorus limits. The Authority expects the final permit to be issued soon, with four years allowed to achieve compliance. Current treatment system does not reduce phosphorus to required levels, and new process equipment is needed to achieve the new limit. Design began in early FY14. In the FY16 Proposed CIP, construction of a natural gas pipeline into the plant was added to the scope, in order to save on energy costs by switching from oil to natural gas.
Clinton Roofing Rehabilitation	Added in FY14. Rehabilitate the tar and gravel roofing on the Administrative Building, Chemical Building, Headworks, Digester building, and the Dewatering and Maintenance Shop. Scheduled to begin in FY16.
Clinton Facilities Rehabilitation	Added in FY14. Rehabilitate or replace the grit removal facilities, two belt filter presses, and close Cell #1 of the landfill. Scheduled to begin in FY19.

#### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$20,511	\$2,801	\$17,710	\$1,815	\$2,606	\$13,483	\$4,145	\$358

#### Clinton Wastewater Treatment Plant



Project Status 5/15	21.0%	Status as % is approximation based on project budget and expenditures. Phosphorus Reduction Design commenced in November 2013. Digester Rehabilitation construction began in April 2014.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$19,166	\$20,511	\$1,345	Sep-22	Sep-23	12 mos.	\$12,872	\$13,483	\$611

**Explanation of Changes**

- Project cost and spending increased primarily due to updated cost estimate for Phosphorus Reduction Construction for the addition of a new natural gas pipeline.
- Schedule shifted as a result of updated schedule for Clinton Facilities Rehabilitation.

**CEB Impacts**

- The projects are required to replace obsolete equipment and systems. The aeration efficiency project resulted in decreased electricity usage at Clinton. 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. The phosphorus reduction project is estimated to increase CEB costs for labor, chemicals, utilities and maintenance by approximately \$57,000 per year beginning FY18. This increase is offset by the estimated savings of \$38,000 per year by switching from oil to natural gas.





## S. 271 Residuals Asset Protection

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### 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 2016, most of the major pieces of processing equipment will be 25 years old. The facility is currently in good condition, but significant reinvestment may be necessary beginning in the FY17-20 timeframe. 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 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) is responsible for all facility operation and maintenance including any necessary capital improvements until December 2015. They are 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 sometime in FY15.

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 and Clinton) 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 (FY17-26). 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 Deer Island CIP to achieve that goal. 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 to negotiate 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 includes a \$7 million capital budget funding commitment by the Authority for potential capital projects identified as being necessary over the next five years. Any projects deemed necessary will be separately bid by the MWRA, subject to Board approval. This extension will be followed by another long-term competitive procurement. The additional time in this extension allows for planning and implementation of co-digestion of food waste at DITP if it proves feasible; further evaluation of the efficiency of larger dryer trains recently installed at two other facilities; a potential increase in competition over the next five years; and the opportunity for the Authority to better define the operating parameters 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 are merely placeholders in recognition that some capital improvements will likely be required at Deer Island 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 are not yet 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 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 is now being done. See the 'scope' sections below for additional information regarding which sub-phases are funded and which are currently placeholders.

### Scope

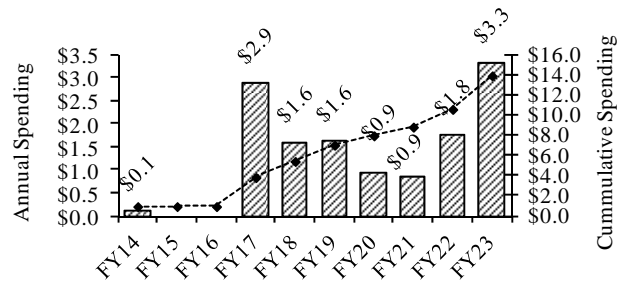
Sub-phase	Scope
Condition Assessment/ Reliability Study	Evaluate the condition of the entire facility at the mid-point of the current contract and then assess other residuals processing options and regulatory changes which may provide cost-saving opportunities. First phase work (present condition assessment) began in May 2009 and finished in July 2010. Work on implementing any short-term recommendations from this phase began in FY11. The 2 <sup>nd</sup> phase, Technology & Regulatory review began in FY13 and finished in January 2014; recommendations were as discussed above.
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.
Residuals Plant Upgrades - Design & Construction	Select a consultant to design and oversee implementation of the first round of needed equipment replacements to coincide with the end of the operations contract. The total project is estimated at \$2M for the design/ESDC and \$10M for various sub-phases, for the duration of 5 years. Design is now expected to begin in July 2018. For FY16, the \$10M in construction funds includes the \$7M commitment to NEFCo as agreed to in the contract extension.
Co-Digestion Pilot	New project for FY14, to evaluate the impacts of adding food waste, oils and greases to the digesters at Deer Island, and determine what changes in sludge characteristics may result that could have an impact on the residuals Plant processes. Moved to DI Asset Protection Project and changed name to Co-digestion Temporary Facility in FY16.

<b>Sub-phase</b>	<b>Scope</b>
Residuals Phase 2 Design and Construction	Sub-phase change made in FY14, to broaden the scope and provide more flexibility in completing the work required. For selection of a consultant to design and oversee implementation of a second round of equipment replacements, (possibly encompassing projects from the list of placeholders below). Funded at \$15M for design/ESDC and \$75M for various unspecified construction phases. Following approval of the five year extension with NEFCo, phase 2 design work was moved out four years, to FY22.
Six Rotary Dryer Replacements-Construction	Replace the rotary dryers. As of FY14, \$0 placeholder. The dryers are core equipment, and the most expensive items at the facility in terms of acquisition, installation, and operational costs.
Six Air Scrubber Replacements - Construction	Replacement of the air scrubbers/packed towers. As of FY14, \$0 placeholder.
Plant MCC Construction	Replacement of the motor control center (MCC) equipment. As of FY14, \$0 placeholder.
FRSA Pier Rehab Design & Construction	To complete a study, and then design for rehabilitation (or demolition) of piers at the Biosolids Processing Facility. This project was deleted in the FY10 cycle.
Rail System Rehab Construction	To rehabilitate portions of the rail system. As of FY14, \$0 placeholder.
Replace 9 Pellet Storage Silos - Construction	To replace the pellet storage silos at the end of their expected useful life of 15 years. As of FY14, \$0 placeholder.
Sludge Feed Conveyor Replacement - Construction	Replacement of the sludge feed conveyors and weigh scales (from the centrifuges to the rotary dryers). As of FY14, \$0 placeholder.
Sludge Storage Tank Rehab	Rehabilitation of the sludge storage tanks and related valves. As of FY14, \$0 placeholder.
Pumping Systems Upgrade - Construction	For the replacement or rehabilitation of the sludge, centrate, and chemical pumps. As of FY14, \$0 placeholder.
Replace 12 Centrifuges – Construction	To replace the sludge thickening centrifuges at the end of their expected 18-year useful life. As of FY14, \$0 placeholder.
Utility Upgrades - Construction	Upgrades to the water, sewer, electrical, and telephone systems. As of FY14, \$0 placeholder.
Odor Control System Upgrade - Construction	Replacement of the pipelines and odor control equipment for treating the off-gases from the sludge storage tanks prior to release to the atmosphere. As of FY14, \$0 placeholder.

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

<b>Total Budget</b>	<b>Payments thru FY14</b>	<b>Remaining Balance</b>	<b>FY15</b>	<b>FY16</b>	<b>FY14-18</b>	<b>FY19-23</b>	<b>Beyond FY23</b>
\$103,832	\$832	\$103,000	\$0	\$0	\$4,570	\$8,470	\$90,067

### Residuals Asset Protection



Project Status 5/15	0.8%	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.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$104,109	\$103,832	(\$277)	Jun-48	Jun-48	None	\$10,384	\$4,570	(\$5,814)

#### Explanation of Changes

- Project cost decreased due to Co-Digestion work transferred to DI Facility Asset Protection project.
- Spending changed due to updated schedules for the Residuals Plant Upgrades Design and Construction phases.

#### 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, 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 permittees 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 permittees 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 (and subsequent modifications), which produced a revised long-term plan for CSO control 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 in September 2013 (for Alewife Brook/Upper Mystic River) and October 2013 (for Lower Charles River Basin). These extensions are in effect until September and October 2016, respectively, when it is expected that DEP will issue new three-year extensions.

The Second CSO Stipulation replaces the stipulation entered in 1987 which 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 the CSO outfalls it owns and operates. These important conditions 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.

The CSO project schedules in Schedule Seven are aggressive and reflect project-specific design, permitting, and construction requirements. The program has and will continue to face cost and schedule challenges, due to unforeseen subsurface conditions, utility conflicts and the need to manage traffic and community impacts in historical, densely populated neighborhoods. Notwithstanding these challenges, MWRA, working in cooperation with the Boston Water and Sewer Commission (BWSC and the City of Cambridge, will continue to manage the CSO program with the goals of controlling project costs, maintaining schedule, and fully achieving the projects' CSO control objectives.

MWRA commenced implementation of the long-term CSO control plan in 1996. Updated project schedules are presented in Table 2. By June 2015, MWRA and the CSO communities had completed 32 of the 35 projects in the plan, and the three remaining projects were well into construction and scheduled to be complete no later than December 2015. With this level of completion, MWRA has achieved significant progress in reducing CSO discharges to Boston Harbor and tributary rivers. The completed CSO projects, together with improvements to MWRA's wastewater conveyance and treatment systems, including the upgraded Deer Island Treatment Plant and associated pump stations, have reduced the total annual volume of CSO discharge in the Typical Rainfall Year from 3.3 billion gallons in 1988 to 0.44 billion gallons today, an 87% reduction, with 91% of the remaining overflow receiving treatment at MWRA's four long-term CSO facilities.

Receiving Water	CSO Discharge Goals (Typical Year Rainfall)		Projects*	Capital Cost* (\$ million)
	Activations	Volume (million gallons)		
Alewife Brook/Upper Mystic River	7 untreated and 3 treated @ Somerville Marginal	7.3 3.5	<ul style="list-style-type: none"> <li>• Cambridge/Alewife Sewer Separation</li> <li>• MWR003 Gate and Rindge Siphon Relief</li> <li>• Interceptor Connections/Floatables</li> <li>• Connection/Floatables at Outfall SOM01A</li> <li>• Somerville Baffle Manhole Separation</li> <li>• Cambridge Floatables Control (portion)</li> </ul>	98.3
Mystic River/Chelsea Creek Confluence and Chelsea Creek	4 untreated and 39 treated @ Somerville Marginal	1.1 57.1	<ul style="list-style-type: none"> <li>• Somerville Marginal CSO Facility Upgrade</li> <li>• Hydraulic Relief at BOS017</li> <li>• Chelsea Trunk Sewer Replacement</li> <li>• Chelsea Branch Sewer Relief</li> <li>• CHE008 Outfall Repairs</li> <li>• East Boston Branch Sewer Relief (portion)</li> </ul>	77.7
Charles River (including Stony Brook and Back Bay Fens)	3 untreated and 2 treated @ Cottage Farm	6.8 6.3	<ul style="list-style-type: none"> <li>• Cottage Farm CSO Facility Upgrade</li> <li>• Stony Brook Sewer Separation</li> <li>• Hydraulic Relief at CAM005</li> <li>• Cottage Farm Brookline Connection and Inflow Controls</li> <li>• Brookline Sewer Separation</li> <li>• Bulfinch Triangle Sewer Separation</li> <li>• MWRA Outfall Closings and Floatables Control</li> <li>• Cambridge Floatables Control (portion)</li> </ul>	88.8
Inner Harbor	6 untreated and 17 treated @ Prison Point	9.1 243.0	<ul style="list-style-type: none"> <li>• Prison Point CSO Facility Upgrade</li> <li>• Prison Point Optimization</li> <li>• BOS019 Storage Conduit</li> <li>• East Boston Branch Sewer Relief (portion)</li> </ul>	61.7
Fort Point Channel	3 untreated and 17 treated @ Union Park	2.5 71.4	<ul style="list-style-type: none"> <li>• Union Park Treatment Facility</li> <li>• BOS072-073 Sewer Separation and System Optimization</li> <li>• BWSC Floatables Control</li> <li>• Lower Dorchester Brook Sewer Modifications</li> </ul>	62.4
Constitution Beach	Eliminate		<ul style="list-style-type: none"> <li>• Constitution Beach Sewer Separation</li> </ul>	3.7
North Dorchester Bay	Eliminate		<ul style="list-style-type: none"> <li>• N. Dorchester Bay Storage Tunnel and Related Facilities</li> <li>• Pleasure Bay Storm Drain Improvements</li> <li>• Morrissey Blvd Storm Drain</li> </ul>	253.7
Reserved Channel	3 untreated	1.5	<ul style="list-style-type: none"> <li>• Reserved Channel Sewer Separation</li> </ul>	72.6
South Dorchester Bay	Eliminate		<ul style="list-style-type: none"> <li>• Fox Point CSO Facility Upgrade (interim improvement)</li> <li>• Commercial Pt. CSO Facility Upgrade (interim improvement)</li> <li>• South Dorchester Bay Sewer Separation</li> </ul>	126.8
Neponset River	Eliminate		<ul style="list-style-type: none"> <li>• Neponset River Sewer Separation</li> </ul>	2.5
Regional			<ul style="list-style-type: none"> <li>• Planning, Technical Support and Land Acquisition</li> </ul>	50.3



<b>TOTAL</b>		<b>410</b>		<b>898.5</b>
<b>Treated</b>		<b>381</b>		

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

MWRA's capital program includes temporary flow metering and other efforts to gather 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 model simulations are essential to verify the predicted benefits of the CSO-related improvements as they are completed, to ensure 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 implementation of the CSO plan in 2015, with a required assessment report due by December 2020.

Project (Shading indicates completed 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

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
<b>MWRA Managed</b>	
North Dorchester Bay & Reserved Channel	Virtually eliminate CSO discharges (25-year storm control) and provide a high 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.

<b>Project</b>	<b>Purpose</b>
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.
<b>Community Managed</b>	
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.

<b>Project</b>	<b>Purpose</b>
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.
<b>CSO Support</b>	
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. 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 a court-mandated CSO performance assessment in the period 2018-20120, and acquisition of land, easements and construction permits required for CSO project implementation.

#### Expenditure Forecast (in \$000s) and Program Status

<b>Total Budget</b>	<b>Payments thru FY14</b>	<b>Remaining Balance</b>	<b>FY15</b>	<b>FY16</b>	<b>FY14-18</b>	<b>FY19-23</b>	<b>Beyond FY23</b>
\$898,455	\$853,285	\$45,170	\$23,327	\$13,228	\$57,749	\$3,002	\$0

Program Status 5/15	97.6%	Status as % is approximation based on project budget and expenditures. MWRA and the CSO communities continue to make significant progress towards completing the remaining CSO projects in compliance with Schedule Seven. (See individual project status and background information).
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#### Changes to Program Scope, Budget, and Schedule

<b>Project Cost</b>			<b>Scheduled Completion Date</b>			<b>FY14-18 Spending</b>		
<b>FY15</b>	<b>FY16</b>	<b>Chge.</b>	<b>FY15</b>	<b>FY16</b>	<b>Chge.</b>	<b>FY15</b>	<b>FY16</b>	<b>Chge.</b>
\$892,449	\$898,455	\$6,007	Dec-15	Dec-15	None	\$53,481	\$57,749	\$4,268

## **Explanation of Changes**

- **MWRA Managed +\$0.8M**

Project Changes: MWR003 Gate & Siphon +\$0.8M.

- **Community Managed +\$5.2M**

Project Changes: Reserved Channel Sewer Separation +\$3.7M, Cambridge Sewer Separation +\$1.7M, Morrissey Boulevard Drain (\$0.2M), Brookline Sewer Separation (\$0.1M).

## **CEB Impacts**

- Completion and start-up of these projects will result in a total net increase of \$350,000 starting in FY18 (for periodic cleaning of the North Dorchester Bay Tunnel) every five years per the 2004 Supplemental Environmental Impact Report).

# S. 339 North Dorchester Bay CSO Project

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## Project Purpose and Benefits

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

*The project will eliminate CSO discharges and provide a high level of stormwater control to greatly reduce beach closings along North Dorchester Bay in South Boston. The project is court mandated and is in accordance with revisions to MWRA's approved long-term CSO control plan recommended in the Supplemental Facilities Plan and Environmental Impact Report for North Dorchester Bay and the Reserved Channel filed with MEPA in April 2004. The project is necessary to meet DEP water quality standards, which prohibit CSO discharges to North Dorchester Bay and similar sensitive receiving waters (i.e. where swimming and/or shell fishing occur).*

## Project History and Background

Under MWRA's original (1997) recommended plan for CSO control in South Boston, CSO flows along North Dorchester Bay and the Reserved Channel would be captured by two consolidation conduits (near-surface tunnels). In small storms, the tunnels would hold all CSO and stormwater flows and be dewatered, after each storm, to the South Boston Interceptor for transport to the Columbus Park Headworks and Deer Island. In storms when flows exceed the tunnel storage capacity, the excess flows would be discharged to Reserved Channel through a 600 mgd CSO treatment and pumping facility that MWRA had proposed to construct on vacant land off East First Street, adjacent to the Massachusetts Bay Transportation Authority (MBTA) power plant. This proposed site and facility was designated "Site J."

Despite MWRA's belief at the time it filed the related *1999 Notice of Project Change* that the projects could be implemented as outlined in that Notice, opposition by elected officials and some residents to siting the Reserved Channel CSO Facility on Site J intensified. In December 1999, elected officials representing South Boston informed the MWRA's Board of Directors that they would block efforts by MWRA to obtain legislation necessary to build parts of the project on or under designated parkland.

MWRA suspended design work on all elements of the project in January 2000, and was unable to commence construction by September 2000 as required. In April 2001, MWRA filed a Notice of Project Change with MEPA, recommending a reassessment of the project and overall CSO control approach for North Dorchester Bay and Reserved Channel. The reassessment was completed in April 2004 when MWRA filed the Supplemental Facilities Plan and Environmental Impact Report for North Dorchester Bay and the Reserved Channel (the "SEIR"), recommending a new plan.

The new plan calls for a larger diameter tunnel along the North Dorchester Bay beaches, sized to provide storage of CSO flows up to the 25-year design storm and, together with a recommended storm drain along Morrissey Boulevard, provide a 5-year level of stormwater control for the beaches. The tunnel will be dewatered with a 15 mgd pumping station to be located at Massport's Conley Terminal. At the upstream end of the tunnel, a ventilation building to provide tunnel ventilation will be constructed adjacent to CSO outfall BOS087 and the State Police building. Surface piping, diversion chambers and control gates will be constructed at each existing outfall to direct CSO and stormwater flows into the tunnel. The Morrissey Boulevard storm drain (included in the CSO CIP under "Community Managed Projects") will allow large stormwater flows at outfall BOS087 to be redirected away from the tunnel to Savin Hill Cove (South Dorchester Bay) in storms greater than the one-year design storm, to further increase the level of stormwater control afforded by the project to the beaches and to dedicate the tunnel to CSO control in the largest storms. Finally, the North Dorchester Bay plan also includes improvements to the Department of Conservation and Recreation's stormwater system along Pleasure Bay to redirect stormwater that discharges into Pleasure Bay Beach to the Reserved Channel, which does not support primary contact recreation.

MWRA began design of the revised plan for North Dorchester Bay in August 2004. In June 2005, MWRA filed a motion with the Federal District Court seeking revisions to the court milestones to substitute the original plan and schedule for North Dorchester Bay and the Reserved Channel with the new plans and a new schedule. The Court allowed the motion on June 30, 2005. In compliance with the revised court milestones, MWRA completed construction of the Pleasure Bay storm drain improvements in March 2006 and commenced construction of the North Dorchester Bay tunnel in August 2006. MWRA completed the North Dorchester Bay tunnel and related facilities (including dewatering pumping station, force main/sewers and ventilation building) in May 2011, in compliance with Schedule Seven. For the Morrissey Boulevard storm drain, the revised milestones required MWRA, in cooperation with BWSC, to commence design by June 2005, commence construction by December 2006, and complete construction by June 2009.

### Scope

Sub-phase	Scope
Design/ESDC: Tunnel and Pleasure Bay	Design and engineering services during construction for the North Dorchester Bay tunnel and CSO/stormwater control structures and the Pleasure Bay drainage improvements; preliminary design for the dewatering pump station, sewers and ventilation building.
Tunnel Construction	Construction of the North Dorchester Bay tunnel, drop shafts, access shafts and CSO/stormwater diversion structures.
Dewatering Pump Station & Sewers Construction	Construction of the 15 mgd dewatering pump station at Conley Terminal and connecting sewers.
Tunnel and Facilities CM Services	Construction management services for the North Dorchester Bay tunnel, dewatering and odor control facilities, related piping and diversion/control structures and Pleasure Bay drainage improvements, including final design review and assistance during facilities start-up and optimization. Start-up activities for the CSO tunnel and facilities are included.
Pleasure Bay Construction	Construction of Pleasure Bay drainage improvements.
Final Design ESDC/CSO Facilities	Final Design and engineering services during construction for the dewatering pump station, sewers and ventilation building.
Ventilation Building Construction	Construction of the ventilation building on DCR land at the upstream end of the tunnel.
Communications Systems	Installation of communications systems at the Dewatering Pumping Station and Ventilation Building to include antennas, repeaters and radios.
North Dorchester Outfall Study/Design	This project includes a study/design for a periodic inspection at four of the remaining five outfalls that can discharge to the beaches of North Dorchester Bay to maintain service for the North Dorchester Bay CSO Project in the long-term. The four outfalls are potentially prone to sediment deposition and shifting in the long-term.

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$221,597	\$221,602	(\$5)	(\$5)	\$0	(\$23)	\$0	\$0

Project Status 5/15	100%	Status as % is approximation based on project budget and expenditures. The CSO storage tunnel, dewatering pump station & sewers and ventilation building were substantially complete and brought into full environmental service in May 2011.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$221,606	\$221,597	(\$9)	May-13	May-13	None	(\$14)	(\$23)	(\$9)

**Explanation of Changes**

- Project cost and spending decreased primarily due to lower final project costs.

**CEB Impacts**

- Estimate of \$350,000 in FY18 for periodic cleaning of the North Dorchester Bay Tunnel (every five years per the 2004 Supplemental Environmental Impact Report).



# S. 347 East Boston Branch Sewer Relief

## Project Purpose and Benefits

- Contributes to improved public health*
- Provides environmental benefits*
- Fulfills a regulatory requirement*
- Extends current asset life*

*To 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 and Boston Inner Harbor and facilitating the beneficial uses of these receiving water segments most of the time. 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 will relieve the interceptor system serving most of East Boston, minimizing CSO discharges to Boston Harbor and Chelsea Creek through outfalls BOS003-014. Existing sewers will be replaced using a combination of construction methods including micro-tunneling, pipe bursting and open cut. Some were rehabilitated using relining method. The rehabilitation construction contract commenced in March 2003 and was substantially completed in May 2004. Other design and construction was delayed pending completion of a project reassessment to assure cost benefit. Regulatory agreement that the original hydraulic relief project is the appropriate plan for East Boston CSO control was achieved in March 2006. In June 2006, Design 2/CS was awarded for completion of design and construction administration for the micro-tunneling and pipe-bursting contracts. In July 2008, the East Boston Branch Relief Sewer contract (micro-tunneling) was awarded. In April 2009, Sections 38 & 207 Replacement contract (pipe-bursting) was awarded. Project was substantially complete in July 2010.

## Scope

Sub-phase	Scope
Design/CS/RI	Design, project reassessment, and construction administration/resident inspection for rehabilitation contract.
Design 2/CS	Completion of design for replacement of sewers by micro-tunneling and pipe-bursting contracts, and construction administration for these contracts.
Resident Inspection Services	Resident Inspection Services for the Design 2 construction contracts.
East Boston Branch Relief Sewer Construction	Construction of 13,500 feet of replacement sewers primarily by micro-tunneling.
East Boston Branch Sewer Rehab Construction	Rehabilitation of 5,400 feet of existing sewer.
Sections 38 & 207 Replacement Construction	Replacement of 6,000 feet of existing sewers by pipe-bursting.

## Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$85,637	\$85,637	\$0	\$0	\$0	(\$9)	\$0	\$0

Project Status 5/15	100%	Status as % is approximation based on project budget and expenditures. The rehabilitation contract was substantially complete in May 2004. Design 2/CS was awarded in June 2006. East Boston Branch Relief Sewer and Section 38 & 207 construction contracts were substantially complete in July 2010.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$85,638	\$85,637	(\$1)	Jul-10	Jul-10	None	(\$8)	(\$9)	(\$1)

**Explanation of Changes**

- Project cost and spending decreased due to final cost adjustment for Design 2 Construction Services.

**CEB Impacts**

- No impacts identified at this time.

## S. 355 MWR003 Gate and Siphon

### Project Purpose and Benefits

- Contributes to improved public health*
- Provides environmental benefits*
- Fulfills a regulatory requirement*
- Improves system operability and reliability*

*Minimizes CSO discharges to Alewife Brook as part of MWRA's Alewife Brook CSO control plan. 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 determinations.*

### Project History and Background

The MWR003 Gate and Siphon project was recommended in the *Notice of Project Change for the Long Term CSO Control Plan for Alewife Brook, April 2001*, (the "NPC") and is part of the revised recommended CSO plan for Alewife Brook. The project consists of the following elements recommended in the NPC: an automated electric relief (weir) gate and associated controls at CSO regulator RE031 overflow upstream of CSO outfall MWR003; a 48-inch diameter inverted siphon barrel to replace the existing 30-inch inverted siphon barrel used to convey overflows from the Alewife Brook Sewer CSO regulator RE032 to the Alewife Brook Connector CSO regulator RE031; and floatables control in CSO regulator RE031 overflow discharge to outfall MWR003. In 2009, MWRA moved the recommended interceptor connection relief and floatables control at Somerville Outfall SOM01A to this project from the Cambridge Floatables Control project in the CIP. Implementation of this project and other elements of the recommended plan for Alewife Brook are required by the Court Order and by conditions in the Alewife Brook/Upper Mystic River CSO Variance extension, last issued by DEP on September 1, 2013, and expected to be reissued every three years through 2020.

### Scope

Sub-phase	Scope
Design	Design and engineering services during construction.
Construction 1	Interceptor connection relief and floatables controls at outfall SOM01A.
Construction 2	Automated gate and controls at MWR003, relief of MWRA's Rindge Ave siphon, and floatables control.

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$4,562	\$1,374	\$3,188	\$2,396	\$787	\$3,914	\$0	\$0

Project Status 5/15	81.7%	Status as % is approximation based on project budget and expenditures. Design contract was awarded in March 2012. Interceptor connection relief and floatables controls at outfall SOM01A was substantially complete in December 2013. MWR003/Rindge Ave NTP was issued in August 2014.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$3,716	\$4,562	\$846	Oct-15	Oct-15	None	\$3,067	\$3,914	\$847

**Explanation of Changes**

- Budget and spending increased due to Construction 2 award amount being greater than the engineer's estimate.

**CEB Impacts**

- No impacts identified at this time.

# S. 340 South Dorchester Bay Sewer Separation (Fox Point)

## Project Purpose and Benefits

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

*This project, together with sewer separation at Commercial 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 existing combined sewers for use as sanitary sewers. The plan calls for construction of approximately 71,000 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 Fox Point CSO Facility in November 2007. Property is currently being surveyed and once completed, legislation will be filed for surplus of this property.

## Scope

Sub-phase	Scope
Design	Design services for construction contracts to be bid, awarded and managed by BWSC.
Construction	Construction of 71,000 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.

## Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$54,626	\$54,626	\$0	\$0	\$0	\$473	\$0	\$0

Project Status 5/15	100%	Status as % is approximation based on project budget and expenditures.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$54,626	\$54,626	\$0	Nov-06	Nov-06	None	\$474	\$473	(\$1)

**Explanation of Changes**

- N/A

**CEB Impacts**

- No impacts identified at this time.

# 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 2019.

## Scope

Sub-phase	Scope
Design	Design services for construction contracts to be bid, awarded, and managed by BWSC.
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.

## Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$64,174	\$60,323	\$3,851	\$220	\$400	\$1,287	\$1,740	\$0

Project Status 5/15	94.3%	Status as % is approximation based on project budget and expenditures.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$64,174	\$ 64,174	\$0	Jun-16	Jun-16	None	\$3,026	\$1,287	(\$1,739)

**Explanation of Changes**

- Spending decreased due to updated schedules from Boston Water & Sewer Commission.

**CEB Impacts**

- No impacts identified at this time.



# S. 344 Stony Brook Sewer Separation

## Project Purpose and Benefits

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

*To minimize CSO discharges to Stony Brook Conduit and the Back Bay Fens, both of which drain to the Charles River, by separating combined sewer systems in parts of Roxbury and Jamaica Plain. Implementation of the recommended sewer separation plan will reduce the number of overflows to the Stony Brook Conduit from as many as 22 to zero in the Typical Year. 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

This project, which involves constructing approximately 73,000 feet of new storm drains, is managed by Boston Water & Sewer Commission (BWSC) with MWRA funds and oversight. The CIP reflects the 1997 FEIR recommendation for sewer separation. BWSC has agreed to complete the project and fund any costs in excess of \$45 million plus appropriate inflation adjustments.

BWSC commenced construction in July 2000 and completed the sewer separation work in September 2006, in compliance with Schedule Seven. Street paving, flow metering, and analyses to verify the project's intended hydraulic performance and level of CSO control was performed in 2007 and 2008.

## Scope

Sub-phase	Scope
Design CS/RI	Design services managed by BWSC.
Construction	Construction of 73,000 feet of new storm drains, managed by BWSC.

## Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$44,246	\$44,246	\$0	\$0	\$0	\$48	\$0	\$0

Project Status 5/15	100%	Status as % is approximation based on project budget and expenditures.
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## Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$44,247	\$44,246	(\$1)	Sep-06	Sep-06	None	\$48	\$48	\$0

**Explanation of Changes**

- N/A

**CEB Impacts**

- No impacts identified at this time.

## S. 346 Cambridge Sewer Separation

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### 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 under 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 of four construction contracts (contracts 8A, 8B, 9, and Concord Lane) to complete the CAM004 sewer separation project, in compliance with Schedule Seven. Contract 8A subsurface work is substantially complete. Cambridge issued the notice to proceed with Contract 8B in September 2013 and issued the notice to proceed for Contract 9 in February 2014. Cambridge advertised the Concord Lane contract on December 10, 2014 and issued the notice to proceed in March 2015.

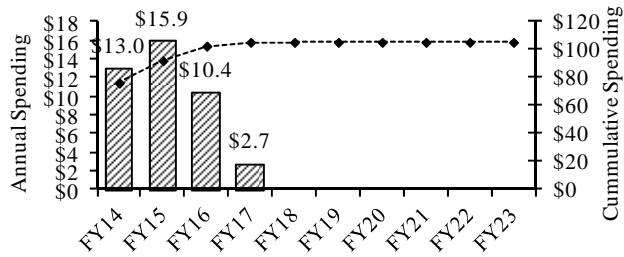
**Scope**

<b>Sub-phase</b>	<b>Scope</b>
Design CS/RI	Design services.
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.

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

<b>Total Budget</b>	<b>Payments thru FY14</b>	<b>Remaining Balance</b>	<b>FY15</b>	<b>FY16</b>	<b>FY14-18</b>	<b>FY19-23</b>	<b>Beyond FY23</b>
\$92,563	\$63,494	\$29,069	\$15,911	\$10,430	\$42,079	\$0	\$0

## Cambridge CAM002-004 Sewer Separation



Project Status 5/15	85.8%	Status as % is approximation based on project budget and expenditures.
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### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY14	FY15	Chge.
\$90,847	\$92,563	\$1,716	Dec-15	Dec-15	None	\$40,363	\$42,079	\$1,716

### Explanation of Changes

- Project cost and spending increased primarily due to updated construction and engineering services during construction costs primarily for Concord Lane, Contract 8B, and Contract 8A.

### CEB Impacts

- No impacts identified at this time.

# S. 358 Morrissey Boulevard Drain

## Project Purpose and Benefits

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

Reroute stormwater from the BOS087 area (and the North Dorchester Bay consolidation storage tunnel) to Savin Cove to increase level of stormwater control to the beaches.

## Project History and Background

In April 2001, MWRA filed a Notice of Project Change with MEPA, recommending a reassessment of the overall CSO control approach for North Dorchester Bay and Reserved Channel. The Secretary's Certificate, issued in June 2001, approved the reassessment as scoped by MWRA. MWRA began the reassessment in September 2001, which included updating the planning assumptions and water quality information and evaluating a full range of CSO control goals and technologies. The reassessment was completed in April 2004, when MWRA filed the Supplemental Facilities Plan and Environmental Impact Report for North Dorchester Bay and the Reserved Channel. The revised recommended plan included rerouting stormwater away from the North Dorchester Bay storage tunnel to Savin Hill Cove in storms greater than the 1 year design storm, in order to provide a 5-year level of stormwater control along the South Boston beaches. Boston Water & Sewer Commission (BWSC) began design in June 2005 and commenced the first construction contract in December 2006. BWSC awarded a second and much larger construction contract in July 2007. BWSC substantially completed all work associated with this project in July 2009 and conducted post-construction water quality monitoring in Savin Hill Cove through June 2013.

## Scope

Sub-phase	Scope
Design CS/RI	Design services for construction contracts bid, awarded and managed by BWSC.
Construction	Construction of a new storm drain and appurtenant structures along Morrissey Boulevard to Savin Hill Cove.

## Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$32,186	\$32,188	(\$2)	\$0	(\$2)	(\$161)	\$0	\$0

Project Status 5/15	100%	Status as % is approximation based on project budget and expenditures. Construction was substantially complete in July 2009.
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## Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$32,339	\$32,186	(\$153)	Jun-09	Jun-09	None	(\$8)	(\$161)	(\$153)

**Explanation of Changes**

- Budget and spending decreased due to final cost adjustments.

**CEB Impacts**

- No impacts identified at this time.

# S. 359 Reserved Channel Sewer Separation

## Project Purpose and Benefits

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

To minimize CSO discharges to the Reserved Channel by separating combined sewer systems in an area of South Boston. Implementation of the recommended sewer separation plan will reduce the number of overflows to the Reserved Channel from as many as 37 to 3 in the Typical Year. 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

In April 2001, MWRA filed a Notice of Project Change with MEPA, recommending a reassessment of the overall CSO control approach for North Dorchester Bay and the Reserved Channel. The reassessment was completed in April 2004, when MWRA filed the Supplemental Facilities Plan and Environmental Impact Report for North Dorchester Bay and the Reserved Channel, which recommended a new plan for controlling CSO discharges to the Reserved Channel, by separating sewers in a 355 acre drainage area tributary to the Channel. Schedule Seven in the Federal District Court Order requires MWRA, in cooperation with Boston Water & Sewer Commission (BWSC), to commence design by July 2006, commence construction by May 2009 and complete construction by December 2015. In May 2009, BWSC issued the Notice to Proceed for the first of nine planned construction contracts for this project and has since completed or issued notices to proceed for the remaining eight construction contracts. The outfall cleaning contract (BWSC Contract 1), two sewer separation contracts (Contracts 2 and 3A) and the initial paving contract (Contract 7) are all complete, and the two remaining major sewer separation contracts, 3B and 4, are both substantially complete. Contract 5, the sewer and cleaning contract (ineligible), Contract 8, the second of two paving contracts and Contract 6, downspout disconnects, are all underway. All work is scheduled to be completed by December 2015, in compliance with Schedule Seven.

## Scope

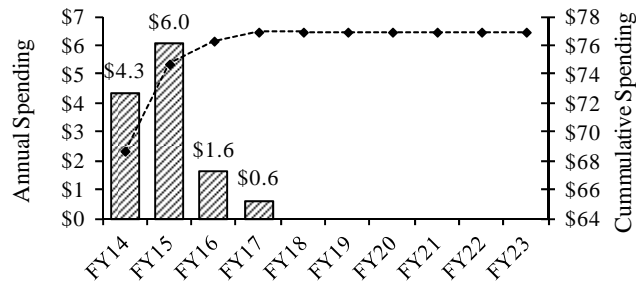
Sub-phase	Scope
Design CS/RI	Design services managed by BWSC for construction contracts to be bid, awarded and managed by BWSC.
Construction	Construction of new storm drains and appurtenant structures within a 355-acre area tributary to the SBI-NB. Relocation of storm runoff connections from the existing combined sewers to the new storm drains. Rehabilitation of the existing combined sewers for use as sanitary sewers.

## Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$72,613	\$64,361	\$8,251	\$6,034	\$1,596	\$12,573	\$0	\$0



**Reserved Channel  
Sewer Separation**



Project Status 5/15	96.9%	Status as % is approximation based on project budget and expenditures. BWSC began design in July 2006 and completed Contract 2 in December 2010, Contract 1 in December 2011, Contract 7 in April 2012, Contract 3A in October 2012, and Contract 3B in December 2014, and Contract 4 in May 2015. BWSC awarded 8 in FY13. Construction 6 was awarded in January 2014. Construction 5 (ineligible) Notice to Proceed was issued in May 2014.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$68,902	\$72,613	\$3,711	Dec-15	Dec-15	None	\$8,862	\$12,573	\$3,711

**Explanation of Changes**

- Project cost and spending increased primarily due to updated cost estimates for contracts 3B and 4.

**CEB Impacts**

- No impacts identified at this time.

# S. 360 Brookline Sewer Separation

## Project Purpose and Benefits

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

To minimize CSO discharges to the Charles River by separating combined sewer systems in several areas of Brookline. Implementation of the recommended sewer separation plan will reduce the number of overflows to the Charles River. 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

In response to the long-term CSO control plan MWRA recommended in 1997, DEP and EPA issued variances to water quality standards for the Charles River. With the variance, DEP approved (and required implementation of) MWRA's plan for the Charles River Basin, but maintained the water quality standard Class B pending the collection of additional water quality information and the evaluation of higher levels of CSO control. The original variance, issued in October 1998, and subsequent extensions to the variance required MWRA to prepare a report assessing the performance of the upgraded Cottage Farm CSO treatment facility. The report also evaluated the cost and benefit of constructing additional storage at this facility to lower treated discharges to the Basin. MWRA submitted the Cottage Farm CSO Facility Assessment Report to MEPA and DEP in January 2004. While concluding that additional storage at Cottage Farm would not be cost effective, the report also concluded that further CSO control could be achieved through system optimization and inflow removal such as with sewer separation projects already underway or planned by the City of Cambridge and the Town of Brookline. This project separated several areas of Brookline, totaling 72 acres, where there were remaining combined sewers tributary to MWRA's Charles River Valley Sewer. The project is intended to reduce discharges to the Charles River at the Cottage Farm facility. The Town of Brookline completed the sewer separation project in April 2013, ahead of the July 2013 milestone in Schedule Seven.

## Scope

Sub-phase	Scope
Design CS/RI	Design services for construction contracts bid, awarded and managed by the Town of Brookline.
Construction	Construction of new storm drains and appurtenant structures within a 72-acre tributary to MWRA's Charles River Valley Sewer, managed by the Town of Brookline. Cleaning of Outfall MWR010 managed by MWRA.

## Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$24,716	\$25,997	(\$1,282)	(\$1,282)	\$0	(\$1,282)	\$0	\$0

Project Status 5/15	100%	Status as % is approximation based on project budget and expenditures. The Town of Brookline began design in November 2006, completed the first construction contract in November 2009 and completed the second and final construction contract in April 2013. MWRA cleaning of outfall MWR010 began in June 2012 and was completed in August 2012.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$24,802	\$24,716	(\$86)	Jul-13	Jul-13	None	(1,195)	(\$1,282)	(\$87)

**Explanation of Changes**

- Project cost increased primarily due to updated cost information from Brookline.

**CEB Impacts**

- No impacts identified at this time.

# S. 361 Bulfinch Triangle Sewer Separation

## Project Purpose and Benefits

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

To minimize CSO discharges to the Charles River by separating combined sewer systems in several areas of Boston, bounded by North Station, Haymarket Station, North Washington Street, and Cambridge Street. Implementation of the recommended sewer separation plan will reduce the number of overflows to the Charles River. 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

In response to the long-term CSO control plan MWRA recommended in 1997, DEP and EPA issued variances to water quality standards for the Charles River. With the variance, DEP approved (and required implementation of) MWRA's plan for the Charles River Basin, but maintained the water quality standard Class B pending the collection of additional water quality information and the evaluation of higher levels of CSO control. The original variance, issued in October 1998, and subsequent extensions to the variance required MWRA to prepare a report assessing the performance of the upgraded Cottage Farm CSO treatment facility. The report also evaluated the cost and benefit of constructing additional storage at this facility to lower treated discharges to the Basin. MWRA submitted the Cottage Farm CSO Facility Assessment Report to MEPA and DEP in January 2004. While concluding that additional storage at Cottage Farm would not be cost effective, the report also concluded that further CSO control could be achieved through system optimization and inflow removal, such as with sewer separation projects already underway or planned by the City of Cambridge and the Town of Brookline. In 2005, MWRA identified and recommended a set of system optimization measures and inflow removal projects to further reduce treated CSO discharges at Cottage Farm. This project will separate the combined sewers in the area of Boston bounded by North Station, Haymarket Station, North Washington St, and Cambridge St. The project is intended to reduce discharges to the Charles River, reduce overflows to the Prison Point CSO facility and allow BWSC to permanently close outfall BOS049. BWSC attained substantial completion of this project in July 2010, in compliance with Schedule Seven.

## Scope

Sub-phase	Scope
Design CS/RI	Design services for construction contracts to be bid, awarded and managed by BWSC.
Construction	Construction to separate the combined sewers in the area of Boston including North Station, Haymarket Station, North Washington St, Cambridge St and immediate environs, managed by BWSC.

## Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$9,054	\$9,054	\$0	\$0	\$0	(\$803)	\$0	\$0

Project Status 5/15	100%	Status as % is approximation based on project budget and expenditures. Construction was substantially complete in July 2010.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$9,054	\$9,054	\$0	Jul-10	Jul-10	None	(\$803)	(\$803)	\$0

**Explanation of Changes**

- N/A

**CEB Impacts**

- No impacts identified at this time.

## S. 324 CSO Planning and Support

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### 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.

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.

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 new NPDES permit.

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

### Scope

Sub-phase	Scope
Technical Assistance	Preliminary planning services prior to and in support of the 1988-90 Facilities Planning/EIR efforts.
Planning/EIR	Facilities planning and environmental review of CSO control alternatives (1990 Recommended CSO Control Plan).
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.
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.
Modeling	Receiving water quality modeling support to the Master Planning efforts.
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.
System Assessment	Temporary flow metering and other efforts to gather and evaluate new data on system performance.
Technical Review	Technical assistance for the entire CSO control plan including affordability analysis.
Land/Easements	Acquisition of land and easements for construction of MWRA-implemented projects. Also, permits not covered in design and construction contracts.

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$50,248	\$48,189	\$2,060	\$13	\$18	(\$378)	\$1,262	\$0

Project Status 5/15	95.9%	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.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$50,264	\$50,248	(\$16)	Dec-20	Dec-20	None	(\$362)	( \$378)	(\$16)

**Explanation of Changes**

- Project cost and spending decreased due to updated cost estimates.

**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 5,000 miles of community sewers. These sewers are of varying size, shape, age, material, depth, and conditions. All contribute some quantity of infiltration and inflow.

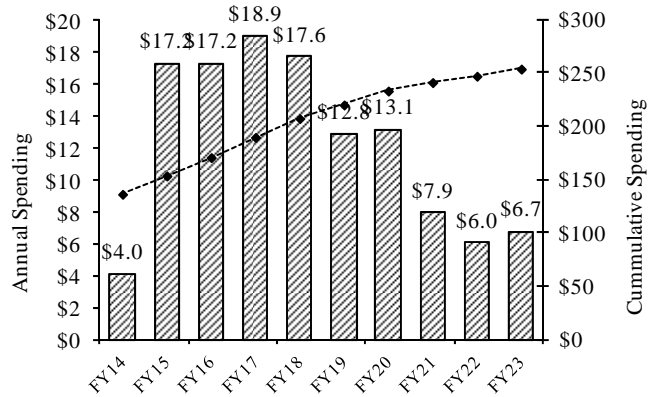
In August 1992, the Board of Directors approved \$25 million to fund the initial phase of the I/I Local Financial Assistance Program. In June 1995, the Board approved \$38.8 million to fund a second phase of the program. Both Phase 1 and 2 funds were distributed as 25% grants and 75% interest-free loans. 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. 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 FY2025.

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$242,585	\$132,262	\$110,323	\$17,207	\$17,213	\$75,009	\$46,475	(\$7,114)

Project Distribution Status 5/15	62.5%	Through May 2015, MWRA has distributed \$121.1 million in grants and \$166.7 million in interest-free loans to fund over 481 separate projects in 43 communities under the I/I Local Financial Assistance Program.
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**I/I Local Financial Assistance**



Project Repayment Status 5/15	63.3%	Through May 2015, a total of \$138.0 million has been repaid by member communities receiving interest-free loans.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$242,585	\$242,585	\$0	Jun-35	Jun-35	None	\$59,020	\$75,009	\$15,989

**Explanation of Changes**

- Project spending increased due to timing of grant and loan distributions and repayments.

**CEB Impacts**

- No impacts identified at this time.

# **Integrated Water Supply Improvement Program**

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MWRA's Integrated Water Supply Improvement Program is a 10-year, \$1.7 billion initiative consisting of a series of projects to protect reservoir watersheds, build new water treatment and transmission facilities, and upgrade distribution storage and MWRA and community pipelines. 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 and the principle components were completed by 2005. 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 1986 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. MWRA's Water Master Plan also identifies additional storage facilities, including the 20 million gallon Spot Pond Storage Facility, which is under construction and is scheduled to be completed in FY15.

**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.

## S. 542 Carroll Water Treatment Plant

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### 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 44 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 would 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
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.
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.
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.
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.
<i>Cryptosporidium</i> Inactivation Study	Determination of the site-specific efficacy of inactivating <i>Cryptosporidium</i> 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.
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.
Immediate Disinfection-MECo	Massachusetts Electric Co. power line installation to support the disinfection process at the Cosgrove Disinfection Facility.
Distribution Water Consultant	To provide technical assistance related to distribution system management.
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.
Design/CS/RI: Walnut Hill WTP	Design and Engineering Services During Construction for the water treatment plant and associated components.
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.

<b>Sub-phase</b>	<b>Scope</b>
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.
WHCP3: Site Work and Storage Tank	Includes clearing and excavation, site access roads, yard piping, and construction of a 45-million gallon storage tank.
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.
WHCP6: Late Site Work	Final grading, landscaping, and paving of treatment facility site.
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 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.
Design Management Support	Professional services and value engineering support to MWRA in review of the water treatment plant design.
Construction Management/RI	Construction management and resident inspection during construction of the water treatment plant.
Cosgrove Disinfection Facility Underwater Improvements	Installation of underwater piping needed to apply sodium hypochlorite at Shaft A.
Community Chlorine Analyzers	Purchase of free chlorine residual analyzers for eight communities to work in association with interim chloramination facilities.
OCIP	Owner Controlled Insurance Program, providing pollution liability, workers' compensation, general liability, and excess loss coverage during construction of the CWTP.
Professional Services	As needed legal, insurance, design, and construction specialty services for the Carroll Water Treatment Plant.
Marlborough MOA	Agreement to mitigate the impacts of the construction of the Carroll Water Treatment Plant on Marlborough.
WHWTP – MEdCo	Relocation of electric power lines.
Site Security Services	Site security services at the Carroll Water Treatment Plant.
CSX Crossing	Railroad track improvements adjacent to CWTP.
Wachusett Algae Design and Construction	Design and Construction of automated chemical dispensing system for algae control.
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.
Security Equipment	Design and installation of card access, improved motion and intrusion alarm systems, video surveillance, and monitoring equipment for MWRA facilities.
WHCP8– Cosgrove Screens Design/CS/RI and Construction	Replace existing manual screens with finer automatically controlled traveling screens.

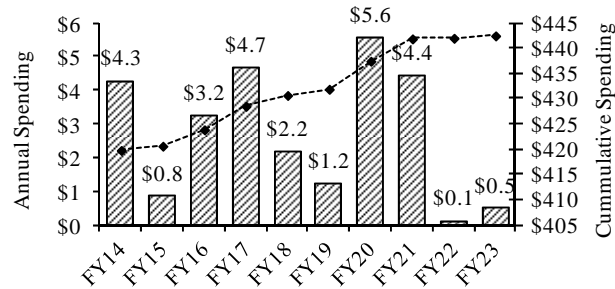


<b>Sub-phase</b>	<b>Scope</b>
AWWARF-Evaluation Ozone and UV	Study of the effects of ozone and ultraviolet treatment on cryptosporidium to ensure inactivation in Wachusett Reservoir.
Fitout/Construction	Non-construction related items for start-up and operation of the new water treatment plant including furnishings, shop and maintenance equipment, audio/visual supplies, laboratory equipment, and miscellaneous consumable supplies.
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.
As-Needed Technical Assistance #1 and #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.
Ancillary Modifications Construction 1	Follow-up construction from the As-Needed Technical Assistance contracts.
Ancillary Modifications Construction 2	Address improvements in reliability, optimization of plant performance and/or reduce plant operating costs.
Ancillary Mods Design 3 and 4	Additional As-Needed design services as a follow-up for additional improvements at the Carroll Water Treatment Plant.
Technical Assistance #5 and #6	Continuation of as-needed engineering technical assistance for ancillary modifications design and plant optimization.
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.
Technical Assistance #7 and #8	The next two phases of as-needed engineering technical assistance for ancillary modifications design and plant optimization.
CWTP Asset Protection	A consultant's evaluation of CWTP's capital assets and recommendations for upgrades or modifications to ensure operational efficiency of these assets.

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

<b>Total Budget</b>	<b>Payments thru FY14</b>	<b>Remaining Balance</b>	<b>FY15</b>	<b>FY16</b>	<b>FY14-18</b>	<b>FY19-23</b>	<b>Beyond FY23</b>
\$438,192	\$415,485	\$22,707	\$840	\$3,248	\$15,166	\$11,797	\$20

## Carroll Water Treatment Plant



Project Status 5/15	94.9%	Status as % is approximation 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. Technical Assistance 7 was awarded in June 2013. Technical Assistance 8 is scheduled to be awarded in October 2015. Carroll Ultraviolet Disinfection Facility Construction reached substantial completion in February 2014. Existing Facilities Modifications CP-7 NTP is expected in July 2015.
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### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$433,712	\$438,192	\$4,480	Dec-19	Dec-20	12 mos.	\$20,611	\$15,166	(\$5,445)

### Explanation of Changes

- Project cost increased due to updated cost estimates for Carroll Water Treatment Plant Storage Tank Roof Drainage System, Ancillary Modifications Construction 2, and updated cost estimate for Existing Facilities Modifications CP-7 sub-phases. This was partially offset by updated cost estimate for Existing Facilities Modifications CP-7 Design.
- Schedule shifted as a result of updated schedule for Wachusett Algae Construction due to project priorities.
- Spending decreased primarily due to updated schedule for Carroll Water Tank Roof Drainage System and Wachusett Aqueduct Algae Design and Construction contracts. Also, updated cost and schedule for Existing Facilities Modifications Construction 2 contract.

### CEB Impact

- Impacts are reflected in the Field Operations FY16 CEB for utilities, maintenance, labor and chemicals for UV Disinfection. Expect \$35,000 in FY21 & FY22 for Wachusett Algae Facility.

## S. 543 Quabbin Water Treatment Plant

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### Project Purpose and Benefits

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

*To improve the quality of drinking water delivered to the Chicopee Valley Aqueduct (CVA) communities of Chicopee, Wilbraham, and South Hadley Fire District No. 1, and to ensure that the water delivered meets the drinking water quality standards established by the federal Safe Drinking Water Act. Improvements to the CVA system thus far have included the construction of covered storage at Nash Hill and construction of disinfection and contact time (CT) monitoring facilities. This project also includes the addition of ultraviolet treatment as a second primary disinfectant.*

### Project History and Background

MWRA provides water to the three CVA communities under long-term contracts. The three communities pay assessments based on actual capital and operating costs for the CVA system. MWRA expects that these agreements will continue beyond the contract dates. In the event the communities do not choose to extend the contracts, they would be required to reimburse MWRA for the capital investment to improve the CVA system.

Quabbin Reservoir is the source of the water delivered to the CVA communities. Massachusetts DEP has granted a conditional waiver from filtration for Quabbin Reservoir water serving the CVA. MWRA and DEP signed a consent order covering activities to support the continuation of the filtration waiver under the Surface Water Treatment Rule (SWTR) in December 1991. It required new disinfection facilities and the replacement of the open Nash Hill Reservoir with covered storage. The Nash Hill Covered Storage Facilities were constructed and put on-line in March 1999 in compliance with the consent order requirements. In February 1994, MWRA submitted to DEP a consent order schedule for design and construction of permanent disinfection facilities, which were needed to comply with the federal and state drinking water standards. Under the consent order, the approved treatment processes for disinfection were chlorination for primary disinfection, and chloramination for residual disinfection.

The publication of new regulations (Enhanced Surface Water Treatment Rule (ESWTR) and Disinfectant/Disinfection By-Products Rule (D/DBPR)), and discussions regarding a possible *Cryptosporidium* rule raised questions regarding the long-term efficacy of these treatment technologies and whether future modifications would be required. A life cycle cost analysis performed in 1995 as part of an action plan for the CVA system determined that disinfection with chlorine/chloramine was the most cost-effective treatment option, even if the treatment processes had to be upgraded as early as two years later. MWRA issued the notice to proceed for construction of the chlorination and chloramination facilities in November 1998. After commencement of field construction activities in March 1999, citizen opposition arose relative to the siting of the secondary disinfection facility resulting in the cancellation of construction of the secondary disinfection facility in Ludlow. Instead, MWRA built a CT monitoring station at the Ludlow site. Both the primary disinfection facility and the Ludlow monitoring facility went on-line in summer 2000, in compliance with the consent order schedule, which is now closed out.

EPA issued new regulations in January 2006 (LT2ESWTR and Stage 2 D/DBP, see Carroll Water Treatment Plant project description) that will require cryptosporidium inactivation and the addition of a second primary disinfectant to the CVA system. MWRA conducted an evaluation of the application of ultraviolet technology and determined it was the most cost-effective and efficient upgrade for the system. Design and construction of the addition of UV treatment to the existing Ware Disinfection Facility are included in this project. The UV system in the renamed Brutsch Water Treatment Facility was placed in service in September 2014.

**Scope**

Sub-phase	Scope
Quabbin WTP: Design/CA/RI and Construction	System hydraulics study, design, construction administration, resident inspection, and construction of disinfection and CT monitoring facilities.
Ware Fire Department MOA	“First Responder” training and protective clothing for the Ware Fire Department for Quabbin Disinfection Facility emergency scenarios.
CVA Shea Ave Leak Repair	Repair of pipeline leak and replacement of 36-inch valve on the Chicopee Valley Aqueduct.
WQ Analysis Equipment	Water quality analysis equipment for the Quabbin Disinfection Facility in Ware.
Quabbin Ultraviolet Water Treatment Plant: Study/Pilot, Design CS/RI, and Construction	Evaluation and implementation of ultraviolet technology at the Quabbin Disinfection Facility to meet new regulations requiring cryptosporidium inactivation and two primary disinfectants for unfiltered systems.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$19,719	\$18,359	\$1,360	\$1,307	\$54	\$6,951	\$0	\$0

Project Status 5/15	99.3%	Status as % is approximation based on project budget and expenditures. The Quabbin Study/Pilot was completed in December 2005. Quabbin UVWTP Design CS/RI notice-to-proceed issued in December 2008. Construction was substantially complete in September 2014. Shea Ave Leak Repair was substantially complete in October 2014.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY15	Chge.	FY15	FY16	Chge.
\$19,305	\$19,719	\$414	Oct-14	Oct-14	None	\$6,536	\$6,951	\$415

**Explanation of Changes**

- Project cost, schedule, and spending changed primarily due to additional amendment for the Quabbin Ultraviolet Design and change order work for Shea Ave Leak repair.

**CEB Impact**

- Impacts are included in the FY16 CEB.

## S. 545 Blue Hills Covered Storage

### Project Purpose and Benefits

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

*To ensure sufficient distribution storage for MWRA's Southern High Service Area. Prior to this project, the area relied on the old open reservoir for non-potable emergency storage, creating the potential for supply disruption and a boil water order if repairs were needed on a major transmission line for Quincy and other communities in the Southern High Service Area. Covered distribution storage equalizes pressure at the extremities of the Southern High pressure zone and provides potable emergency storage in case of unexpected interruptions of supply. New covered storage facilities at the Blue Hills Reservation has a capacity of 20 million gallons.*

### Project History and Background

Blue Hills Reservoir was constructed in the 1950's and was removed from active service in 1981 due to contamination from birds and animals. The reservoir was used as non-potable emergency supply. The new covered storage facility in the Southern High Service Area equalizes water pressure during periods of peak demand and works in conjunction with surface mains and the Chestnut Hill emergency pump station to supply water to the Southern High service area in the event that the Dorchester Tunnel requires repairs. Two 10 million-gallon buried drinking water storage tanks have been constructed in the east end of the existing Blue Hills Reservoir. In addition, this facility will supply water to Quincy and Milton if the northern portion of Section 22 is shut down because of a break or for repairs. A citizens' working group was formed to participate in the EIR/Conceptual Design process.

The Blue Hills Working Group was formed in 1997 to review alternatives and met periodically for 3-1/2 years to provide input to the MWRA. MWRA has worked closely with various interested parties to include features that have mitigated environmental impacts and improved the look of the finished site. The new covered tank was put into service in August 2009.

### Scope

Sub-phase	Scope
EIR/Conceptual Design/OR	Completion of an Environmental Impact Report, Conceptual Design and wetlands permitting. Preparation of Design/Build contract scope and specifications and technical support throughout Design/Build process.
Roadway Resurfacing Design & Construction	Design and Construction for Roadway paving adjacent to the site.
Design/Build Field Oversight	Field oversight and administration of the Design/Build contract will be performed by in-house staff.
Design/Build	Design/Build of a 20 million gallon covered storage facility.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$40,555	\$40,083	\$472	\$24	\$54	\$228	\$364	\$0

Project Status 5/15	98.8%	Status as % is approximation based on project budget and expenditures. Design/Build contract was awarded on November 15, 2006. The new tanks were put into service in August 2009. Construction contract reached substantial completion in April 2010.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$40,547	\$40,555	\$8	Jan-18	Jan-19	12 mos.	\$584	\$228	(\$356)

**Explanation of Changes**

- Project cost changed due to inflation adjustments
- Schedule changed due to updated schedule for Roadway Resurfacing work.

**CEB Impact**

- The storage facilities will require periodic inspection, maintenance, and water quality testing.

## S. 550 Spot Pond Storage Facility

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### 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. Once Spot Pond is replaced with a covered distribution reservoir it will be possible to operate the system as it was originally designed. 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 will replace Spot Pond Reservoir in Stoneham.

The new Spot Pond Storage Facility will be supplied through a pressure reducing valve on WASM 4 via the West Spot Pond Supply Main. At night, when water demand is low, the capacity of the Low Service transmission mains will be used to fill the Spot Pond Storage Facility by gravity. During peak demand periods of the day, water will flow 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, will be 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 will be supplied with water reduced in pressure from WASM 4.

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

## Scope

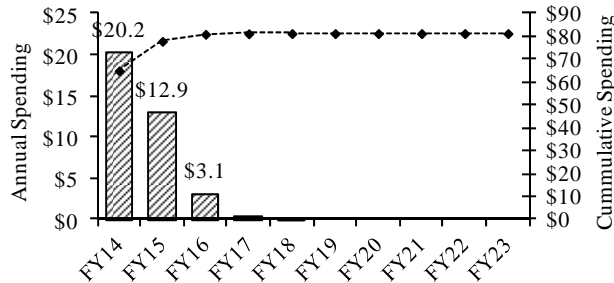
<b>Sub-phase</b>	<b>Scope</b>
Environmental Reviews and Conceptual Design	Preliminary engineering for tank siting, environmental reviews and conceptual design.
Design/Build	Design and construction by a single contractor of a 20 million gallon water storage tank and pump station.
Owner's Representative	Provision of technical program management for the design/build contract procurement, monitoring, and administration.
Easements/Land Acquisition	To provide adequate land for construction of the water storage tank.
Early Construction Water Connection	Construction of piping and meter connection to replace existing water supply to be removed as part of tank construction.
Fells Reservoir Microwave Tower Replacement Construction	Install a microwave tower and a communication building to replace the existing microwave tower at Fells reservoir in Stoneham. The existing microwave tower is 92 feet tall which is not high enough to transmit signals for our current needs and therefore will be replaced with a tower that is 160 feet tall.



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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$61,152	\$44,840	\$16,312	\$12,902	\$3,075	\$36,558	\$0	\$0

**Spot Pond Storage Facility**



Project Status 5/15	90.0%	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.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$59,624	\$61,152	\$1,528	Nov-14	Aug-16	21 mos.	\$35,030	\$36,558	\$1,528

**Explanation of Changes**

- Project cost and spending increased primarily due to change orders for the Design/Build contract, separate sub-phase added for Fells Reservoir Microwave Tower Construction, and amendment for the Owners' Representative contract.
- Project schedule shifted due Fells Reservoir Microwave Tower Construction phase added.

**CEB Impact**

- Impacts included in FY16 CEB.

# 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 and Winsor Station Upgrades - To replace the antiquated and unreliable shutter system at Shaft 12 with a roller gate to control flow in the Quabbin Aqueduct and inspect the Quabbin Tunnel and recommend maintenance or repairs. Also, rehabilitate Winsor Power Station, Shaft 12 buildings and equipment, and make structural repairs to Shaft 2.
- Hatchery Pipeline- To convey cold, well-oxygenated hypolimnetic water from Quabbin Reservoir to the downstream trout hatchery via a new pipeline. A hydro turbine will be located in a vault near the connection of the pipeline to the CVA that would capture some of the hydraulic energy contained in the pipeline as the water is conveyed to the hatchery. The power generated will be utilized at the Brutsch Water Treatment Facility and surplus power will be sold back to the grid.

## Scope

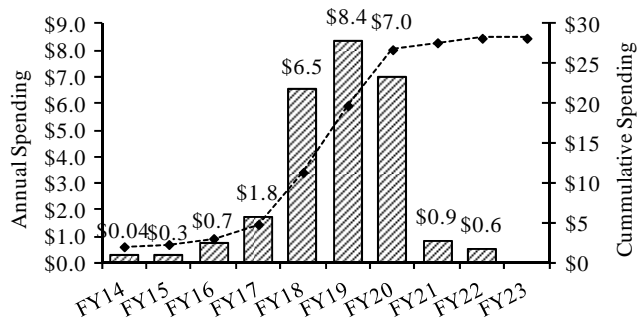
Sub-phase	Scope
Preliminary Permit Study	Study to determine project feasibility.
Design and Construction Quabbin Aqueduct and Winsor Station Upgrades	Design to address station piping improvements for water supply and Swift River discharge. The work also includes rehabilitation and improvements at Shafts 2 and 12, and inspection of the Quabbin Aqueduct. Installation of a roller gate to control flow at Shaft 12, the intake to the Quabbin Aqueduct, thereby improving safety and reliability of the transmission system. Construction to address piping improvements and building rehabilitation for water supply and Swift River discharge. Design contract to be re-procured due to substantial scope changes.

Hatchery Pipeline Design and Construction	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 for use at the Ware Disinfection Facility and surplus sold back to the grid. The hydro turbine portion is funded under the Alternative Energy Initiatives project and Massachusetts Leading by Example Program.
Winsor Station Chapman Valve Repair	Construction of replacement valving for the existing 36" Chapman Butterfly Valve (design by Technical Assistance consultant).
Purchase of Sleeve Valves	For replacing the damaged Chapman Butterfly Valve.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$27,883	\$1,735	\$26,148	\$286	\$738	\$9,661	\$16,827	\$0

**Winsor Station/Pipeline Improvements**



Project Status 5/15	6.9%	Status as % is approximation based on project budget and expenditures. Winsor Station Chapman Valve Repair was completed in November 2009. Design for Quabbin Aqueduct and Winsor Station Upgrades Notice-to-Proceed was issued in February 2010. Hatchery Pipeline Design/ESDC/RI commenced in August 2013.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY6	Chge.
\$27,434	\$27,883	\$449	Jan-19	Jan-20	12 mos.	\$17,182	\$9,661	(\$7,521)

**Explanation of Changes**

- Project cost increased primarily due to inflation adjustments for Winsor Station Rehabilitation & Improvements, Shaft 2 & 12 Construction, and amendment for Quabbin Aqueduct and Winsor Power Station Upgrades Design. This was partially offset by updated cost estimate for Hatchery Pipeline Construction contract.
- Schedule and planned spending shift primarily due to updated schedules for Winsor Station Rehabilitation & Improvements, Shaft 2 & 12 Construction, and Hatchery Pipeline Construction contracts.

**CEB Impacts**

- None identified at this time.

## S. 604 MetroWest Water Supply Tunnel

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### 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 includes 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 western 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 I 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.

With the MetroWest Tunnel and the John Carroll Water Treatment Plant now in service, the Hultman Aqueduct is being inspected and rehabilitated. Surface distribution facilities, including piping, valve chambers, and risers will connect the tunnel to the Hultman Aqueduct and local community services. Intermediate connections between the MetroWest Tunnel and the Hultman Aqueduct will 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
Study	Study of the aqueduct/tunnel system to determine the best alternative to improve hydraulic capacity and create redundancy.
Construction-Sudbury Pipe Bridge	Rehabilitation of the Siphon Pipe Bridge at the Weston Aqueduct which experienced significant leakage.
Design/EIR-Tunnel-Engineering Services During Construction	Environmental impact report (EIR) process and design of the 17.6-mile long, 14-foot diameter tunnel. Construction support services, including environmental and safety compliance, claims assistance, contract administration, quality assurance testing, and community relations.
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.

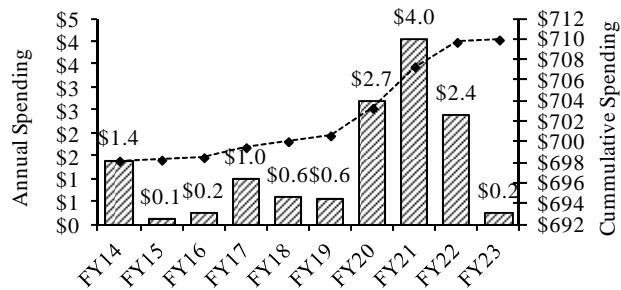
Sub-phase	Scope
Construction: Middle Tunnel Segment – CP2	Construction of approximately 11.9 miles of tunnel between Southborough and Weston. Construction was staged from Shaft L, located at a sand and gravel pit in Framingham, where a permanent connection to the Hultman will be constructed. Along the 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 will include construction of valve chambers and surface piping to allow connections to the Hultman Aqueduct and Norumbega Reservoir. The design at Shaft N includes provisions for future connections to the Norumbega Covered Storage Facility and the proposed Metropolitan Tunnel Loop.
Construction: Shaft 5A- CP3	Shaft 5A was excavated near the intersection of Route 128 and the Massachusetts Turnpike.
Construction: Eastern Tunnel Segment – CP3A	Construction of the eastern portion of the tunnel. An approximately 4,400-foot long, 12-foot 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.
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.
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 includes the disinfection and dechlorination of the Wachusett Aqueduct and the piping connections through Walnut Hill to MetroWest Shaft D.
Construction: Loring Road Covered Storage- CP8	Construction of surface facilities at the Shaft W site including a 20 million-gallon storage facility that replaces 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 will be 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-foot diameter branch of the Hultman Aqueduct. Also includes rehabilitation of 4,100 linear feet of 60-inch pipe and four master meters.
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.
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.
Hultman Leak Repair	Test pit excavation and leak repair on the Hultman Aqueduct.
Hultman Repair Bands	Purchase of external repair bands to be installed as part of Hultman investigation and repair.
Hultman Investigation and Repair	Evaluation of various segments of the Hultman Aqueduct and installation of repair bands at major leak sites.

<b>Sub-phase</b>	<b>Scope</b>
Land Acquisition	Easements along the 17.5-mile tunnel construction route, as well as land at the Shaft W and Shaft L sites.
Professional Services	Services such as construction safety, contractor audit, legal services, risk management consulting services, and other miscellaneous services.
Framingham MOU	Agreement to mitigate the impacts of the construction on the Town of Framingham.
Weston MOU	Agreement to mitigate the impacts of the construction on the Town of Weston.
Southborough MOU	Agreement to mitigate the impacts of the construction on the Town of Southborough.
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.
Community Technical Assistance	Funds to assist communities with the redesign of utility plans.
Owner Controlled Insurance	Owner controlled insurance program providing workers' compensation, general liability, and pollution liability insurance for MetroWest construction.
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.
Construction: Hultman CP9	Construction of Valve Chamber E-3.
Interim Disinfection	Temporary disinfection related to CP-7 sub-phase.
Equipment prepurchase	Pre-purchased one 10-foot diameter butterfly valve for installation in Valve Chamber E3.
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.
Construction 6A Demolition	Demolition of existing chlorine storage building to allow for construction of a new valve chamber on the Hultman Aqueduct.
CP6 Easements	Easements for CP-6 Contract.
Valve Chamber and Storage Tank Access Improvements Design and Construction	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.
Valve Chamber Modifications	Design and construction of an additional isolation valve on the Hultman Aqueduct to improve operational flexibility and reliability; and security hardening of key valve chambers.



Sub-phase	Scope
Shafts 5A/5, E & L Surface Piping and Section W16 Cathodic Protection Replacement Design (7368) and Construction (7477)	Inspection and testing of cathodic protection systems for surface piping at Shafts 5A / 5, E & L and Section W16 area. Design and construction to replace cathodic protection systems.
Shaft 5 Electrical Upgrade	Upgrade of electrical service, switchgear, and motor control centers. Existing electrical system is approaching the end of its useful life and will need to be replaced. Maintenance of the current system will become increasingly more difficult due to the lack of available spare parts.

### Metro West Tunnel



#### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$708,664	\$696,777	\$11,888	\$93	\$234	\$3,260	\$9,888	\$118

Project Status 5/15	98.3%	Status as % is approximation based on project budget and expenditures. MetroWest Tunnel was placed into service in November 2003. Hultman Interconnect Final Design/CA contract was awarded in September 2005. CP6A Lower Hultman Rehab was substantially complete in May 2013. Upper Hultman CP6B contract was substantially complete in June 2013.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$708,490	\$708,664	\$174	Jul-20	Dec-22	29 mos.	\$4,981	\$3,260	(\$1,721)

**Explanation of Changes**

- Project cost increased primarily due to inflation adjustments.
- Schedule and spending changed primarily due revised schedule for Valve Chamber & Storage Tank Access Improvements and Shaft 5/5A Surface Piping Improvements/Restoration contracts.
- Schedule changed due to schedule for Valve Chamber Modification Construction and contracts listed above.

**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
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.
Oakdale Valves Phase 1	Study, design, and construction for the rehabilitation/replacement of two valves and miscellaneous support equipment at the Oakdale facility.
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.
Oakdale Phase 1A Design & Construction	Upgrade the 60 year old Oakdale facility and electrical control systems & the switchyard which are antiquated and unsafe to personnel. Will lower the station service voltage from 2,200 to 480.

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.
CVA Intake Motorized Screen Replacement Design and Construction	Replace current motorized screens on the CVA Intake which are nearing the end of their useful life. The screens keep debris from entering CVA.
Rehabilitation of Oakdale Turbine	Rehabilitate turbine. Turbine was last rehabilitated in 1986 and we will be approaching thirty years which is the expected life of an overhaul.
Geo-thermal Heat Wachusett Gatehouse	Convert from propane fueled boilers to geo-thermal heating utilizing the internal water in the piping located in the building. The existing heating isn't sufficient to keep building warm enough and therefore remaining moisture contributes to accelerated deterioration.
Rehabilitate Wachusett Gatehouse Chamber Piping & Bastion Design/CA/RI and Construction	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.
<b>Oakdale High Line Replacement</b>	<b>Replacement of 70 year old 69kv overhead transmission line and ground operated switch that supplies power and delivers power from the Oakdale Power Station.</b>

#### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$15,457	\$7,457	\$8,000	\$0	\$0	\$773	\$7,481	\$0

Project Status 5/15	48.2%	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.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$13,592	\$15,457	\$1,865	Jan-21	Jun-22	17 mos.	\$2,240	\$773	(\$1,467)

#### Explanation of Changes

- Project cost increased due to updated cost estimate for the Rehabilitation of Wachusett Gatehouse Piping and Bastion Construction. Also, a new project was added for the Oakdale High Line Replacement.

- Spending changed primarily due to updated schedules for Ware River Intake Valves, CVA Motorized Screens Replacement, and Rehabilitation of Wachusett Gatehouse Design CA/RI work.
- Schedule changed due to updated schedule for the Rehabilitation of Wachusett Gatehouse Piping and Bastion Construction and other phases listed above.

**CEB Impacts**

- None identified at this time.

## S. 617 Sudbury/Weston Aqueduct Repairs

### Project Purpose and Benefits

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

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

### Project History and Background

This project includes the inspection of the Sudbury Aqueduct in preparation for future repairs. This aqueduct is 120 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 100 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
Hazardous Materials	Remove contaminated sediment from aqueduct.
Sudbury Aqueduct Inspection	Inspection of the Sudbury Aqueduct to identify need for future repair work.
Ash Street Sluice Gates Design and Construction	Design and construct (rehabilitate) a means to isolate the Weston Reservoir from a break west of Ash Street. Investigate Ash Street and Happy Hollow Siphon. Existing gates in siphon are in need of repair.
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).
Rosemary Brook Building Repair	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.
Evaluation of Farm Pond Buildings-Waban Arches	Assessment of historic structures to determine measures to repair and stabilize facilities. Will include Massachusetts Historical Commission review of proposed alternative.
<b>Weston Aqueduct Flow Control Valve</b>	<b>Replacement of existing Golden Anderson valve that controls flow from the Hultman Aqueduct to the Weston Aqueduct. The valve is also used for CWTP half plant operation and for emergency redundancy for the Boston Low Service area.</b>

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$7,149	\$660	\$6,489	\$0	\$1,226	\$3,146	\$3,343	\$0

Project Status 5/15	9.2%	Status as % is approximation based on project budget and expenditures. Inspection of Sudbury Aqueduct was completed in October 2006. Rosemary Brook Building repair is expected to begin in January 2016.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$5,968	\$7,149	\$1,181	Jul-19	Jan-21	18 mos.	\$3,211	\$3,146	(\$65)

**Explanation of Changes**

- Project cost increased due to the addition of a new project for the Weston Aqueduct Flow Control Valve and updated cost estimate for Rosemary Brook Building Repair contract.
- Schedule and spending shift for Sudbury Short-Term Repairs Phase 2 and Ash St Sluice Gates. This decrease was partially offset by new project added above.

**CEB Impacts**

- None identified at this time.

## S. 621 Watershed Land

### Project Purpose and Benefit

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

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

### Project History and Background

The Watershed Protection Act (WsPA) regulates land use and activities within critical areas of the Quabbin Reservoir, Ware River, and Wachusett Reservoir watersheds for the purpose of protecting the quality of drinking water. Since the passage of 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

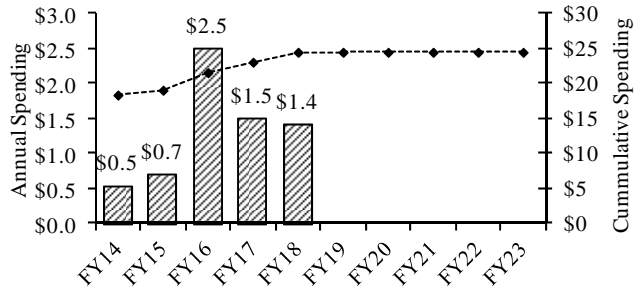
Sub-phase	Scope
Land Acquisition	Acquire parcels of real estate or interests in real estate critical to protection of the watershed and source water quality.

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$24,000	\$17,882	\$6,118	\$700	\$2,500	\$6,658	\$0	\$0



### Watershed Land



Project Status 5/15	75.4%	Status as % is approximation based on project budget and expenditures. MWRA began purchasing land in FY07.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$24,000	\$24,000	\$0	Jun-18	Jun-18	None	\$6,658	\$6,658	\$0

#### Explanation of Changes

- N/A

#### 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
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.
Oakdale Dam Design/ESDC/RI and Construction	Provide final design, ESDC/RI, and construction for the removal of the Oakdale 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.

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$4,538	\$3,095	\$1,443	\$493	\$0	\$978	\$475	\$0

Project Status 5/15	68.1%	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 commenced in August 2011 and reached substantial completion in September 2012.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$4,540	\$4,538	(\$2)	Dec-17	Dec-19	24 mos.	1,412	\$978	(\$434)

**Explanation of Changes**

- Spending decreased due to updated schedules for Oakdale Dam Design Engineering Services During Construction/Resident Inspection and Construction contracts.

**CEB Impacts**

- None identified at this time.

## S. 625 Long Term Redundancy

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### 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 and the Cosgrove Tunnel.

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

The tunnels in the Metropolitan Boston area, i.e. the City Tunnel, City Tunnel Extension, and Dorchester Tunnel remain a weak link in the water transmission system. While the integrity of the underground tunnel sections is believed to be good based on very low, unaccounted for water 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 planned distribution system storage projects like the Blue Hills and the Spot Pond Storage Facilities 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 line (scheduled for major rehabilitation) and WASM 4 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. The recommendations of the study now form the basis for

subsequent projects for MEPA environmental review, permitting, design and construction. In June 2010, staff presented to the Board of Directors the findings and redundancy recommendations for the metropolitan tunnel system.

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.

For the Metropolitan system, the recommended plan includes both northern and southern components. The southern components are identified below in the Sudbury Aqueduct Design/CA/RI and Construction. The northern components are addressed in the Weston Aqueduct Supply Mains (WASM) 3 and Spot Pond Storage Facility projects.

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**

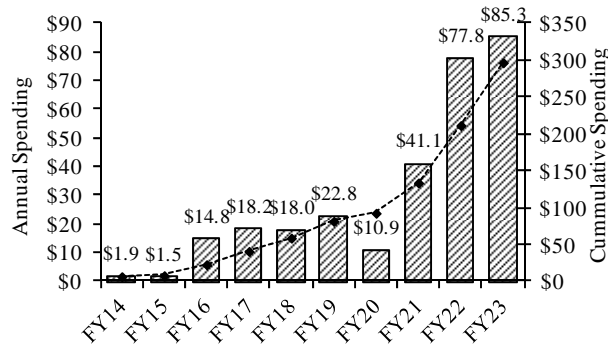
Sub-phase	Scope
Water Transmission Redundancy Plan	Evaluation and recommendations of alternatives for long term redundancy.
Wachusett Aqueduct Pump Station Design/ESDC/RI and Construction	Design and construction of an emergency pump station to pump water from the Wachusett Aqueduct to the Carroll Water Treatment Plant. Pump station will provide redundancy in the event of 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 pumping 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 completion of the on-going 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.
Sudbury Aqueduct Preliminary Design/EIR, Design CA/RI; MWWST/Sudbury Aqueduct Connection Construction; Sudbury Aqueduct Slipline Construction; Chestnut Hill Final Connections Construction	Design and construction for providing redundancy for the Southern Metropolitan area. The southern component consists of pressurizing the Sudbury Aqueduct from Needham to Chestnut Hill and connecting it to the Chestnut Hill Emergency Pump Station, and constructing a tunnel or surface pipe from the Sudbury Aqueduct to either Shaft 5/5A or the Norumbega site of the Metro West Supply Tunnel/Hultman Aqueduct system. Design and construction of an emergency generator for the Chestnut Hill Emergency Pump Station is included in the Chestnut Hill Connecting Mains project.

Sub-phase	Scope
Tops of Shafts Rehab Design CA/RI and Construction	Design and construction of rehabilitation/replacement of connecting pipes and valves at the top of tunnel shafts throughout the metropolitan tunnel system.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$409,381	\$4,783	\$404,598	\$1,450	\$14,807	\$54,336	\$237,886	\$114,317

**Long Term Redundancy**



Project Status 5/15	1.6%	Status as % is approximation based on project budget and expenditures. An engineering services contract for the Water Transmission Redundancy Plan was completed in September 2011. Wachusett Aqueduct Redundancy Pump Station Design/ESDC/RI contract was awarded in January 2012. Sudbury Aqueduct MEPA Review was awarded in September 2012. Wachusett Aqueduct Pump Station Construction is now expected to commence in October 2015.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$390,588	\$409,381	\$18,793	Dec-25	Dec-25	None	\$62,363	\$54,336	(\$8,027)

**Explanation of Changes**

- Project cost increased primarily due to updated cost for Wachusett Aqueduct Pump Station Construction and expected Wachusett Aqueduct Pump Station Design amendment as well as, inflation adjustments on unawarded contracts.
- Spending changed primarily due to updated costs and schedules for the Wachusett Aqueduct Pump Station Design and Construction contracts.

**CEB Impacts**

- None identified at this time.

# S. 618 Northern High Northwest Transmission Sections 70-71-79

### Project Purpose and Benefits

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

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

To improve service reliability by completing a study to rehabilitate more than 10 miles of pipeline serving the northern high service area.

### Project History and Background

The Northern High System Pipeline Sections 70, 71 and 79 are the primary distribution mains that supply water to seven north shore communities. These water mains are constructed of steel and cast-iron pipes installed in the 1950s. Rehabilitation of these pipelines will extend their useful life and postpone the need for more costly pipe replacement in the future. This project includes an initial planning phase that will assess the existing pipe condition and develop a sequence of work that would ensure uninterrupted service to the north shore communities while pipeline segments are out of service for rehabilitation. Future phases for design and construction of the rehabilitation will be added to this project based on the results of the planning phase.

### Scope

Sub-phase	Scope
Planning	Planning phase for the rehabilitation of more than 10 miles of NHS Sections 70, 71 and 79.

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$1,000	\$0	\$1,000	\$0	\$0	\$474	\$526	\$0

Project Status 5/15	0.0%	Status as % is approximation based on project budget and expenditures. Planning is expected to begin in January 2018.
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### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$1,000	\$1,000	\$0	Jun-16	Jan-19	31 mos.	\$1,000	\$474	(\$526)

### Explanation of Changes

- Schedule and spending shifted due to project priorities.



## **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 retrofit approximately 500 blow-off valves and replace 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 1,109 blow-off valves and 1,246 main line valves. Some blowoff 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 blowoffs 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
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.
Construction - Phase 1	Purchase and installation of 27 blow-off valve retrofits.
Construction - Phase 2	Purchase and installation of 10 blow-off valve retrofits and 10 main line valve replacements.
Construction - Phase 3	Purchase and installation of 10 blow-off valve retrofits and 12 main line valve replacements as well as rehabilitation of two meters.
Construction - Phases 4, 5 & 6	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 includes 4 blow-off valve retrofits, 8 main line valve replacements and 9 globe valves (tank isolation).

Sub-phase	Scope
Construction Phases 7, 8 & 9	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.
Design CA/RI Phases 8 & 9	Design/Contract Administration/Resident Inspection for Construction 8 and 9.
Equipment Purchase	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.

#### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$22,702	\$12,016	\$10,686	\$209	\$836	\$2,717	\$3,619	\$4,351

Project Status 5/15	52.9%	Status as % is approximation based on project budget and expenditures. Phases 1-6 are complete. Phase 7 was completed in April 2013. Design CA/RI for Phases 8 is expected to commence in FY19.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$22,540	\$22,702	\$162	Jun-21	Jun-28	84 mos.	\$3,411	\$2,717	(\$694)

#### Explanation of Changes

- Project cost increased due to inflation adjustments on unawarded contracts.
- Project spending and schedule changed primarily due to project priorities.

#### 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 an adjacent pipeline, Section 35.

### Scope

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

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$1,092	\$124	\$968	\$0	\$5	\$178	\$790	\$0

Project Status 5/15	11.3%	Status as % is approximation based on project budget and expenditures.
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### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$1,071	\$1,092	\$21	Nov-19	Nov-19	None	\$178	\$178	\$0

**Explanation of Changes**

- Project cost increased due to inflation adjustment.

**CEB Impacts**

- None identified at this time.

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

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### 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 Section 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-foot long, 30-inch 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 main has been completed. The Revere portion of Section 53 has been sliplined with steel pipe. In addition to feeding into the new 48-inch Saugus/Lynn pipeline, this pipeline will play 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 3,000-foot, 48 or 60-inch diameter pipeline (proposed Section 53A) is needed to reinforce Sections 49 and 49A. An 850-foot, 20-inch diameter, portion of Section 68, interconnects Section 53 with the new Saugus/Lynn pipeline. This section is undersized and needs to be reinforced with 850 feet of 48-inch pipeline to improve hydraulic capacity. The Shaft 9A-D Extension will provide a more reliable connector to the Section 99 pipeline that serves as the suction line to the Gillis Pump Station.

Construction of the Malden Section 53 and Revere Beach pipelines were substantially completed in September and October 1994 respectively. Sliplining of Section 53 Revere was completed in August 2009.

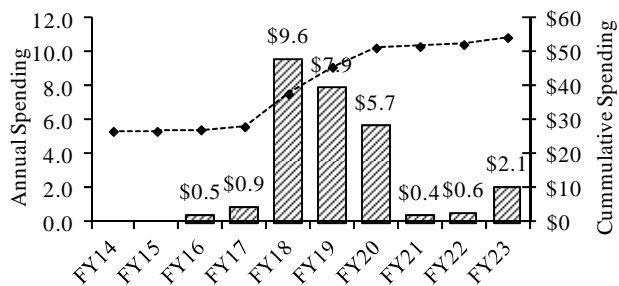
**Scope**

<b>Sub-phase</b>	<b>Scope</b>
Design/CS/RI – Revere/Malden	Design, construction services, and resident inspection for Section 53 in Malden and Sections 97 and 97A in Revere.
Construction Revere Beach	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.
Construction Malden Section 53	Installation of 11,907 feet of 48-inch diameter pipeline in Malden on Section 53.
Construction Linden Square	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.
Construction Revere Section 53	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.
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.
Construction Control Valves	Installation of control valves needed to regulate water pressure and fill the Winthrop standpipe.
Construction DI Pipeline Cleaning & Lining (C&L)	Design and cleaning and lining of the 2,000 linear feet, 8-inch diameter water supply main to Deer Island.
Construction – Winthrop C&L	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.
Design and Construction Section 53 Connections	Design, Construction Administration, Resident Inspection, and Construction of 850 linear feet of new 48-inch pipe in Revere and 3,000 linear feet of new 48-inch pipe in Malden. These proposed pipelines will eliminate hydraulic restrictions and better integrate the Section 53 distribution main into the system.
Shaft 9A-D Extension Design and Construction	Design CA/RI, and Construction of approximately 2,000 linear feet of new pipeline in Malden connecting Shaft 9A-D line to Section 99.
Section 56 Repl./Saugus River Feasibility Study (7500), Design CA/RI (7454) and Construction (7486)	Feasibility Study, Design CA/RI, and Construction to replace failed 30” steel water main crossing of the Saugus River by trenchless methods. Main was installed in 1934 and is leaking. This main provides redundancy to Section 26 which is currently out of service for maintenance.
NHS Area Study	A study of the NHS service area to look at hydraulics and redundancy in the distribution system in the Shaft 9A area.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$55,161	\$26,833	\$28,328	\$0	\$460	\$11,020	\$16,607	\$702

**NHS - Revere & Malden Pipeline Improvements**



Project Status 5/15	48.6%	Status as % is approximation based on project budget and expenditures. Revere Beach, Malden Section 53, Revere Section 53 Construction and Linden Square construction are complete. Section 56 Feasibility Study expected to begin in January 2016.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$48,988	\$55,161	\$6,173	Nov-20	Nov-23	36 mos.	\$12,814	\$11,020	(\$1,794)

**Explanation of Changes**

- Project cost increased primarily due to increased scope of Section 53 Design Construction Administration/Resident Inspection and Construction phases. Also, a new sub-phase for NHS Area Study was added.
- Schedule and spending changed due to restructuring and re-scheduling future phases including Section 53, Section 56, and Shaft 9A-D phases.

**CEB Impacts**

- None identified at this time.



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

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### 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; 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 to the Intermediate High Service system to create a unified Intermediate High Service area connecting the Belmont and Commonwealth Avenue pump stations will also be possible.*

### 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 89-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 pipeline through Newton and Waltham has been eliminated in favor of a shorter 36-inch pipeline in Waltham from Meter 182 to the Waltham transmission system; and the rehabilitation of Sections 23, 24, and 47 has been delayed until the Long Term Redundancy study is finalized.

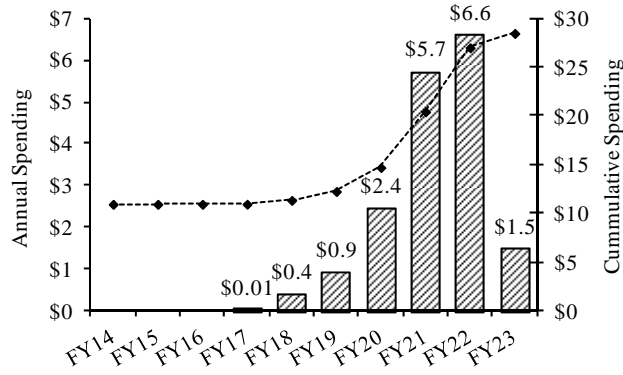
**Scope**

<b>Sub-phase</b>	<b>Scope</b>
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.
Routing Study (5163)	Identification of alternatives to determine the optimum approach for providing additional strong connections to WASM 3.
Design/CA/RI-DP1 (6383)	Design, construction administration and residential 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.
Design DP2/4 Meter 120 (6384)	Design services for CP-3, 5 and Meter 120. Construction Administration and Resident Inspection services to be performed by in-house staff.
Design and Construction CP2 C&L Sections 59 & 60 (7086/6548)	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.
South Segment CP3 (6392)	Cleaning and lining of 6,900 linear feet of 20-inch pipe (Section 24) from Meter 120 to WASM 4, 5,350 linear feet of 36-inch (Section 23) and 10,170 linear feet of 20-inch (Sections 24 and 47) pipe, and 2,950 linear feet of 20-inch pipe along Section 24 from WASM 4 to Meter 40.
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.
Replacement of Section 25 Design (6955) and Construction (6956)	Replacement of existing Section 25 (approximately 4,800 linear feet of existing 16" pipe) with a new pipeline.
Section 75 Extension Design and Construction	Addition of approximately 6,000 feet of new 30-inch pipe to extend Section 75 from the Commonwealth Avenue pump station in Newton to Section 23, also in Newton, to provide a redundant feed to the Intermediate High Service area supplying Belmont and Watertown. Requires replacement of Section 25.

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

<b>Total Budget</b>	<b>Payments thru FY14</b>	<b>Remaining Balance</b>	<b>FY15</b>	<b>FY16</b>	<b>FY14-18</b>	<b>FY19-23</b>	<b>Beyond FY23</b>
\$34,296	\$10,961	\$23,335	\$0	\$0	\$403	\$17,111	\$5,821

## New Connecting Mains



Project Status 5/15	33.0%	Status as % is approximation based on project budget and expenditures. Northeast Segment CP-5 construction contract was completed in November 2011.
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### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$33,902	\$34,296	\$394	Jun-21	May-25	47 mos.	\$6,105	\$403	(\$5,702)

### Explanation of Changes

- Project cost increased primarily due to inflation adjustments on unawarded contracts.
- Schedule and spending changed due to restructuring and re-scheduling future phases including Section 75, CP-2 Cleaning & Lining Sections 59/60, and Replacement of Section 25 phases.

### 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 pumping 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 several years ago.

The Brattle Court, Reservoir Road, Hyde Park, Belmont, and Spring Street stations are between 40 and 80 years old and are 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, and Canton. 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 is inoperable, and system demand patterns have 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 into two contracts. The first contract (Construction - Interim Automation), based on a fast-track design and 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. 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, Lexington Street, and Commonwealth Avenue pumping stations.

### Scope

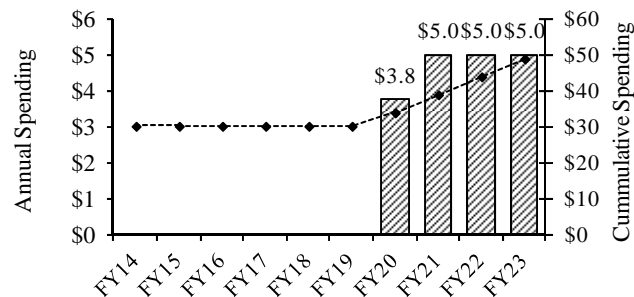
Sub-phase	Scope
Preliminary Design	Planning and conceptual design including inspection and evaluation of the HVAC systems, buildings, pipes, valves, and other systems at the pump stations; determination of the need for improvements; and preparation of a conceptual design report.
Design 1/CA/RI	Design, Construction Administration and Resident Inspection for rehabilitation of five pump stations, including installation of SCADA systems.
Construction II and C	Installation of instrumentation at five pump stations to enable remote operation and monitoring.
Rehab of 5 Pump Stations	Rehabilitation of Belmont, Brattle Court, Spring Street, Hyde Park, and Reservoir Road pump stations, including installation of new mechanical, electrical, instrumentation, and security systems, and building and site refurbishment, and SCADA installation.

Sub-phase	Scope
Proprietary Equipment Purchases	Purchase of proprietary materials for SCADA system for Interim Instrumentation and Control.
Design 2 CS/RI	Final Design, construction services, and resident inspection for rehabilitation of five pump stations.
Pump Station Rehabilitation	Rehabilitation of the Commonwealth Avenue, Gillis, Lexington Street, and Newton Street pump stations. The pumps in these stations will be 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. Commonwealth Avenue, Gillis, and Lexington Street are the only pump stations for their respective service areas.

#### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$55,058	\$30,058	\$25,000	\$0	\$0	\$0	\$18,750	\$6,250

#### Rehab of Other Pump Stations



Project Status 5/15	54.6%	Status as % is approximation based on project budget and expenditures. Construction rehabilitation of 5 pump stations (Belmont, Brattle Court, Spring Street, Hyde Park, and Reservoir Road) was substantially complete in June 2010.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$55,058	\$55,058	\$0	Jun-24	Jun-24	None	\$0	\$0	\$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 main.*

## Project History and Background

Sections 34 and 45 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 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.

## Scope

Sub-phase	Scope
Design/CA/RI and construction – Sections 45, 63, and 83.	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, 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.
Design (7404) and Construction (6522) Sections 34 & 45	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).

## Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$7,863	\$3,632	\$4,231	\$6	\$36	\$61	\$3,495	\$675

Project Status 5/15	46.2%	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 and 45 scheduled to start in FY19.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$7,776	\$7,863	\$87	Dec-20	Dec-23	36 mos.	\$1,206	\$61	(\$1,145)

**Explanation of Changes**

- Project cost increased due to inflation adjustments.
- Schedule and spending changed due to project priorities.

**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 pipelines from corrosion.*

### Project History and Background

Within the MWRA water system there are approximately 300 miles of distribution pipe, 10 active pumping stations, and 12 distribution storage facilities. A majority of the pipes are made of steel, cast iron and ductile iron and as a result 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
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.
Task 1(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.
Tasks 2 & 3	Follow-up on recommendations from Task 1 and evaluate the need for upgrading existing cathodic protection systems, and adding cathodic protection to unprotected pipes.

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$1,668	\$141	\$1,527	\$0	\$254	\$509	\$763	\$254

Project Status 5/15	8.4%	Status as % is approximation based on project budget and expenditures. Project Planning phase is complete. Corrosion Control Program-Task 1 is expected to commence in FY16.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$1,636	\$1,668	\$32	Jul-23	Jul-23	None	\$498	\$509	\$11

**Explanation of Changes**

- Project cost and spending increased due to inflation adjustments.

**CEB Impacts**

- None identified at this time.

## S. 713 Spot Pond Supply Mains - Rehabilitation

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### 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 will serve as distribution mains to the eight communities and will 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 will interconnect the new Spot Pond Covered Storage Facility to the system when it is completed in FY16.

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 have been significantly reduced as a result of the build up of rust deposits (tubercules) and other matter along the pipe walls, which also contributes to water quality deterioration in the Low Service System. The ability of the mains to withstand service pressures is drastically reduced in some areas due to exterior corrosion of pipes. In addition, inoperable or poorly operating valves along the mains make 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 Supply Mains 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 planned 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 will be 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 will be 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
Preliminary Design and Design/CA/RI	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.
North (Medford/Melrose) Construction- CP1	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.
Middle (Medford/Somerville) Construction – CP2	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.
South (Cambridge/Boston) CA/RI Construction – CP3	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 11, Brighton and Cambridge).
Early Valve Replacement Contract	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.
Construction 4 – Bridge Truss Design and Construction	Section 4 Bridge Truss at Walnut Street spans New Hampshire-Maine Line is in need of repair, painting and replacement.
Early Valve Equipment Purchase	Purchase Order for 12 valves that were installed from 1998-2001 as a precursor to the cleaning and lining contracts.
Section 4 Webster Ave Bridge Pipe Rehabilitation Design and Construction	Section 4 is a 48” cast iron main crossing the Webster Ave Bridge in Somerville that needs to be rehabilitated and is currently out of service due to pipe deflection and leakage. This project will return a currently isolated pipeline to service to provide redundancy.
Section 50 Pipe Rehabilitation Design and Construction	Section 50 is several hundred feet of 20” cast iron main on exposed pilings which is need of rehabilitation.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$66,807	\$61,169	\$5,638	\$294	\$1,730	\$2,713	\$3,112	\$0

Project Status 5/15	92.1%	Status as % is approximation based on project budget and expenditures. Work in Contract 2(Middle) and Contract 3 (South) are complete. Section 4 Webster Ave Bridge Pipe Replacement Construction commenced in May 2015.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY14	FY15	Chge.
\$66,470	\$66,807	\$337	Jun-19	Jun-20	12 mos.	3,261	\$2,713	(\$548)

**Explanation of Changes**

- Project cost increased primarily due to actual award for Section 4 Webster Ave Pipe Rehabilitation was greater than the budgeted estimate.
- Spending changed as a result of updated schedules for Section 50 and Bridge Trusses phases.

**CEB Impacts**

- None identified at this time.

## S. 719 Chestnut Hill Connecting Mains

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### 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 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 System, Northern Intermediate High System, Northern Extra High System, and the Dorchester Tunnel, which goes south to supply the Southern High System and the Southern Extra High System. 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 Service System, the Northern Low Service System, and the Southern High Service System.

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 newly constructed 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 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 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. Future design efforts will relocate the reservoir level control functions and provide an emergency electric generator for the pump station. 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**

<b>Sub-phase</b>	<b>Scope</b>
Design/CA/RI and Construction – Pump Station Potable Connection	Construction of potable suction and discharge piping to the emergency pump station, restructuring piping to permit surplus of Chestnut Hill pumping 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 surplus 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.
Preliminary Engineering	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.
Design/CS/RI and Construction – Emergency Pump Relocation	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.
Boston Paving	Payment(s) to the City of Boston for paving work provided.
BECO Emergency Pump Connection	Payment to Boston Edison Company for installation of electrical service to meet special requirements.
Equipment Pre-Purchase	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.
Demolition of Garages	Demolition of garages prior to transfer of property to the Commonwealth, at request of state Department of Capital Asset Management.
Chestnut Hill Emergency Pump Station Emergency Generator/Electric Rehabilitation Final Design CA/RI and Construction	Final Design CA/RI services and construction for the Chestnut Hill Emergency Pump Station Emergency Generator and electrical rehabilitation. The Chestnut Hill Underground Pump Station groundwater is extremely high and has entered the electrical equipment and caused electrical equipment to fail. Part of this project is to relocate electrical conduits out of the concrete slab to prevent further failures.
Design and Construction Shaft 7 Building	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.

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

<b>Total Budget</b>	<b>Payments thru FY14</b>	<b>Remaining Balance</b>	<b>FY15</b>	<b>FY16</b>	<b>FY14-18</b>	<b>FY19-23</b>	<b>Beyond FY23</b>
\$32,035	\$17,487	\$14,548	\$0	\$0	\$316	\$10,156	\$4,076

Project Status 5/15	54.6%	Status as % is approximation based on project budget and expenditures. Chestnut Hill Emergency Pump Station Emergency Generator/Electric Upgrade Final Design CA/RI is expected to commence in July 2017.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$31,731	\$32,035	\$304	Jan-26	Jan-26	None	\$805	\$316	(\$489)

**Explanation of Changes**

- Project increased due to inflation adjustments on unawarded contracts.
- Spending shifted due to updated schedule for the Emergency Generator/Electric Upgrades Design Construction Administration/Resident Inspection contract.

**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, and Canton.

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 contract for Section 107 Phase 1 and Phase 2 were completed in January 2009 and January 2012, respectively.

### Scope

Sub-phase	Scope
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 main, and installation of 17,000 linear feet of 36- to 48-inch main. Rehabilitation to consist of cleaning and cement mortar lining, and replacement of the main line valves, blow-off valves, and appurtenances.
Section 22 South Construction	Rehabilitation of approximately 10,000 linear feet of existing 48-inch Section 22 South, and installation of 1,700 linear feet of new pipe.
Adams Street Bridge	Relocation of a pipeline made necessary by the reconstruction of this bridge by the MBTA.
Southern High Ext Study	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.
Section 22 North Facility Plan/EIR	Facility Plan/EIR for Section 22 North.
Section 22 North Design/ESDC	Design/ESDC for Section 22 North.

Sub-phase	Scope
Section 22 North Construction	Rehabilitation of 17,300 linear feet of existing 48-inch Section 22 North.
Section 20 and 58 Rehabilitation Design and Construction	Rehabilitation of approximately 19,000 feet of 36-inch steel and cast iron water main in Morton Street from Shaft 7C of the Dorchester Tunnel to Washington Street.
Section 107 Phase 1 Construction	Construction of 4,400 linear feet of new 48-inch water main from East Milton Square to Furnace Brook Parkway in Milton and Quincy.
Section 107 Phase 2 Construction	Replacement of existing Sections 21 and 43 with 9,200 linear feet of new 48-inch water main from Dorchester Lower Mills in Boston to East Milton Square, and cleaning and lining of 4,000 feet of existing water mains.
Contract 1 A Construction	Rehabilitation of 4,400 linear feet of Section 22 South.

#### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$74,773	\$36,681	\$38,092	\$0	\$1	\$369	\$4,037	\$33,676

Project Status 5/15	49.1%	Status as % is approximation based on project budget and expenditures. Construction of Contracts 1 and 1A for Section 22 South is completed. Section 107 Phase 1 Construction was substantially complete in January 2009. Section 107 Phase 2 Construction was substantially complete in January 2012.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$74,073	\$74,773	\$700	May-27	May-27	None	\$390	\$369	(\$21)

#### Explanation of Changes

- Project cost increased primarily due to inflation adjustments for Section 22 North Construction and Section 20 & 58 Design & Construction.
- Spending decreased due to final cost adjustment for Sections 21, 43 & 22 Design.

#### 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-ironed 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

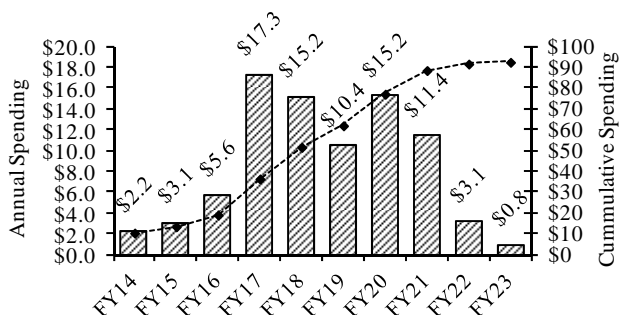
Sub-phase	Scope
Concept Plan, ENF, and Mobile Pump Unit	Developed a concept level plan to evaluate options to reduce the risk and the impacts of potential failures in Sections 29 and 89. Measures evaluated included valve improvements, improved community interconnections, pipeline redundancy, targeted 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.
Design CA/RI NIH Impr./Gillis PS Impr./Reading-Stoneham Interconnection	This phase (Contract 7045) includes the design and construction of short-term measures identified in the conceptual plan including Gillis PS Improvements and the Reading/Stoneham Interconnection.
Design CA/RI and Construction Section 89/29 Redundancy Phases 1A, 1B, 1C	The Concept Plan has developed preliminary route alternatives in order to provide redundancy to Section 89. The route selected is under review with MWRA staff. Final route has been selected based consultations with local elected officials, consideration of permitting requirements, project impacts and the location of the recommended storage for the NIH system. Contract 6906 includes design and CA/RI for the redundant pipeline only (approximately 7 miles). Phase 1 consists of West Street Pipeline Reading

& 2	Construction Phase 1A (7066) and Section 89/29 Redundancy Phase 1B (7471), and Phase 1C (7478). Phase 2 consists of Section 89/29 Redundancy Pipeline Stoneham (7067) contract.
NIH Storage Design & Constr.	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.
<b>Sub-phase</b>	<b>Scope</b>
Section 89/29 Rehab Design and Construction (Ph 1 and 2)	There must be a redundant pipeline prior to Section 89 being taken off line for repairs. At that point, the pipeline can be inspected and rehabilitated as necessary. These phases include design and construction of Section 89/29 rehabilitation.

#### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$90,187	\$8,145	\$82,042	\$3,073	\$5,614	\$43,327	\$40,885	\$0

#### NIH Redundancy & Covered Storage



Project Status 5/15	12.0%	Status as % is approximation based on project budget and expenditures. Concept planning began in February 2006. Design for Short-term Improvements contract began in September 2009. Mobile Pump Unit purchase was made in FY10. 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 commenced in June 2013. West St Pipeline Reading Construction Phase 1A was substantially complete in May 2015. Phase 1B expected to begin in August 2015.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$88,723	\$90,187	\$1,464	Jun-22	Jun-22	None	\$39,821	\$43,327	\$3,506

**Explanation of Changes**

- Project cost increased primarily due to inflation adjustments on unawarded contracts as well as change orders for Gillis Pump Station Improvements. These increases were partially offset by West Street Reading Construction being awarded less than the engineer's estimate.
- Project spending changed primarily due to project cost changes above along with updated cash flows for Section 89 & 29 Redundancy Phases 1B, 1C, and 2.

**CEB Impacts**

- The proposed storage facilities will require periodic inspection, maintenance, and water quality testing but impacts are not quantified yet.

## 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 an unlined cast-iron pipeline serving a portion of the Northern Low System. This pipeline, Section 8, has reduced carrying capacity because of rust build-up, and has experienced leaks at above average rates. Improvements will consist primarily of replacement of a portion of Section 8 and cleaning, lining, and valve repairs along nearly 1.5 miles of water main. Rehabilitation of Sections 37 and 46 will improve the service to East Boston and will allow the shutdown of Section 8 for rehabilitation. 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 1913 and serves Malden, Everett, Chelsea, and East Boston. The Section 8 pipeline 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 pipeline walls. 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. The existing Sections 37 and 46, located in Chelsea, are older 36-inch cast iron mains. These two pipe sections connect between Section 57, previously rehabilitated, and the two Chelsea River crossings to East Boston at Sections 8 and 38. It is anticipated that these two pipelines will need cleaning and cement mortar lining. Section 97A, a new 16-inch pipeline 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
Survey, Design CA/RI and Construction – Section 8	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.
Rehab Sections 37 and 46 Chelsea, East Boston Design and Construction	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.
Section 97A Construction	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.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$23,334	\$2,321	\$21,013	\$1	\$14	\$553	\$20,459	\$0

Project Status 5/15	9.9%	Status as % is approximation based on project budget and expenditures. Section 97A Construction contract was substantially complete in October 2009.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$22,964	\$23,334	\$370	Jul-22	Jul-22	None	\$754	\$553	(\$201)

**Explanation of Changes**

- Project cost increased primarily due to inflation adjustments for Section 8 Design and Construction.
- Spending decreased due to updated schedule for Rehabilitation of Sections 37 & 46 Chelsea/Boston Design Construction Administration/Resident Inspection sub-phase.

**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 Section 77 and 88 to the single spine mains serving 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 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 three 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
Concept Plan	A study to assess storage, capacity and condition of existing distribution pipes, new pipeline routing options and tank sites will be identified.
University Ave Water Main (Section 108)	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.

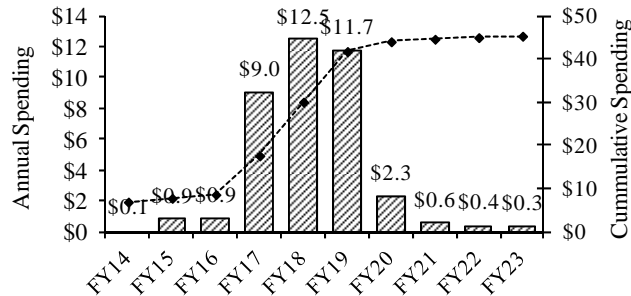


Sub-phase	Scope
Redundancy Pipeline Section 111 Design & Construction Ph 1 Contracts 1, 2, and 3	The first phase funds the design and construction of a pipeline from the Bellevue storage tank to East Street in Westwood, which will provide redundancy to Sections 77 & 88.
Storage Design & Construction Phase 2	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.
Storage Design & Construction Phase 3 Second Tank	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.
Section 77/88 Design/Constr.	Rehab of Sections 77 & 88 after redundant pipeline is in place.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$99,544	\$6,831	\$92,713	\$856	\$853	\$23,224	\$15,274	\$54,289

**SEH Redundancy & Storage**



Project Status 5/15	7.6%	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.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$97,774	\$99,544	\$1,770	Dec-35	Dec-35	None	\$18,130	\$23,224	5,094

**Explanation of Changes**

- Project cost increased due to inflation adjustments on unawarded contracts.
- Project spending changed due to updated cash flows for Redundancy/Storage Phase 1 Final Design Construction Administration/Resident Inspection and Redundant Pipeline Section 111 Phase 1 Construction sub-phases.

**CEB Impacts**

- None identified at this time.

## S. 730 Weston Aqueduct Supply Mains (WASMs)

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### 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 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 cement-lined 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 build up 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. 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, analysis has shown that failure of WASM 3 is one of the highest risks in the MWRA distribution system. The Waltham Connection project will provide redundancy so that the main can be rehabilitated/replaced in phases. Based on the recommendations of the Transmission Redundancy Study, approximately 8 of the 11 miles of WASM 3 will be replaced with a larger 72-inch diameter pipe. The remaining 3 miles will be rehabilitated. 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
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).

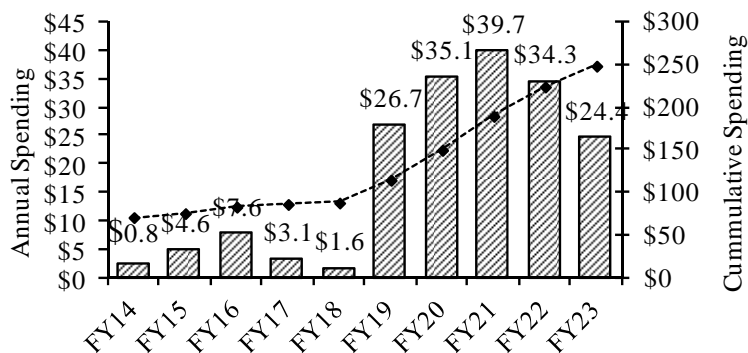
<b>Sub-phase</b>	<b>Scope</b>
Design/CA/RI - WASM 4 (5147)	Design, construction administration, and resident inspection for the rehabilitation of WASM 4 (construction contracts 6203, 6175, 6312, 6176, and 6313).
Construction - Newton WASMs 1 & 2 (6280)	Construction work on WASM 1 and WASM 2 along Commonwealth Avenue and WASM 1 through Centre Street to the Newton Commonwealth Golf Course.
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.
Design/CA/RI WASM 3 (6539)	Design, construction administration and resident inspection for construction phases CP2, CP3 and CP4.
Construction - Waltham WASM3 CP2 (6543)	Replacement of the westerly portion of WASM 3 with a new 72-inch pipe generally located between the Hultman Branch and the Watertown Branch.
Construction - Belmont WASM 3 CP3 (6544)	Replacement of the middle portion of WASM 3 with a 72-inch pipe generally located between the Watertown Branch and the Spring Street Pumping Station.
Construction - Arlington WASM 3 CP4 (6545)	Rehabilitation of the easterly portion of WASM 3 and a short segment of Section 51 generally located between the Spring Street Pumping Station and the Shaft 9 line (Section 5-9A).
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.
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.
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.
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.

Sub-phase	Scope
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.
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).
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, replacement of butterfly valve S9-A in Medford, and a new connection to Waltham from the Northern Extra High service area (construction contracts 7222, 7448 and 7457).
Construction Watertown Section (7222)	Rehabilitation of approximately 5,795 linear feet of the Watertown Section.
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.
Construction Section 101/Watertown Section (7457)	Construction of 8.800 linear feet of a new connection to Waltham from the Northern Extra High Service Area.
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).

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$281,137	\$68,491	\$212,646	\$4,645	\$7,585	\$19,422	\$160,114	\$35,557

**Weston Aqueduct Supply Mains**



Project Status 5/15	25.5%	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. WASM 3 MEPA/Design/CA/RI commenced in July 2013. Watertown Section Rehabilitation was substantially complete in December 2013. Section 36/W11/S- 9-A11-A Valve commenced in November 2014.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY15	Chge.	FY15	FY16	Chge.
\$276,475	\$281,137	\$4,662	Aug-25	Aug-25	None	\$31,939	\$19,422	(\$12,517)

#### Explanation of Changes

- Project cost increased primarily due to inflation adjustments on unawarded contracts. Also, award of the Section 36/W11/S9-A11-A Valve award was greater than the engineer's estimate.
- Project spending changed due to updated schedule for Section 36/WS/Waltham Construction Design Construction Administration/Resident Inspection and Section 101 Construction. Also, updated cash flow for WASM 3 Design/Massachusetts Environmental Policy Act (MEPA)/Design Construction Administration/Resident Inspection. This decrease was partially offset by Section 36/W11/S9-A11-A Valve actual award above.

#### CEB Impacts

- None identified at this time.

## S. 731 Lynnfield Pipeline

### Project Purpose and Benefits

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

*To meet high demands in Lynnfield by installing approximately 4,700 linear feet 24-inch water main, 1,800 feet of 36-inch water main and 6,000 feet of 12-inch water main The Lynnfield Water District serves a portion of the Town of Lynnfield. The community meter is served by an 8-inch main, approximately 7,000 feet long. The main is undersized and its capacity is inadequate to meet high water demands. Rehabilitation of the main will not increase the capacity sufficiently.*

### Project History and Background

MWRA supplies Lynnfield Water District via Meter 169 located adjacent to Route 1 at the Saugus/Lynnfield town line. An eight-inch diameter cast iron main, approximately 7,000 feet long, connects Meter 169 to Section 70 in Saugus. This main does not have the hydraulic capacity to serve the meter during high demand periods. This project includes construction of a supplemental main (Section 109) from Section 70 to the meter and construction of approximately 6,000 feet of distribution piping for the town of Saugus. The cost of this project was shared by MWRA and the town of Saugus. An interim interconnection to the Saugus system was constructed in FY08 and construction of Section 109 was completed in FY13.

### Scope

Sub-phase	Change/Explanation
Temporary Interconnect Construction Ph 1	Install approximately 150 feet of 24" main.
Design and Construction Ph 2	Construction of 4,700 linear feet of new 24-inch main, 1,800 feet of 36-inch water main and 6,000 feet of 12-inch water main.

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$5,626	\$5,626	\$0	\$0	\$0	(\$52)	\$0	\$0

Project Status 5/15	100%	Status as % is approximation based on project budget and expenditures. Temporary Interconnect Construction Phase I reached substantial completion in December 2007. Construction (Phase 2) reached substantial completion in December 2012.
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### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$5,774	\$5,626	(\$148)	Dec-12	Dec-12	None	\$97	(\$52)	(\$149)



**Explanation of Changes**

- Project cost and spending decreased based on final cost adjustments for Design Construction Administration/Resident Inspection and Construction Phase 2.

**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 Route 128/95. 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 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 allowable limits. Failure of Section 80 would create huge traffic challenges on this major metro-Boston highway.

## Scope

Sub-phase	Scope
Section 80 Design CA/RI and Construction	Design and rehabilitation of approximately 16,197 feet of pipeline in Section 80 along route 128/95.

## Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$9,836	\$0	\$9,836	\$0	\$0	\$558	\$9,278	\$0

Project Status 5/15	0.0%	Status as % is approximation based on project budget and expenditures.
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## Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$9,630	\$9,836	\$206	Dec-20	Dec-20	None	\$656	\$558	(\$98)

## Explanation of Changes

- Project cost increased due to inflation adjustments.
- Project spending changed due to updated cash flows.

**CEB Impact**

- None identified at this time.

## S. 753 Central Monitoring System

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### 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
Study	Study to determine the implementation phases.
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.
Communications Structures	Installation of two radio towers, five antennas, one satellite dish, and an equipment shelter.
CS/Start-Up Services	Construction and startup services for the metropolitan Operations Control Center, as well as metering and monitoring construction.
Equipment Pre-Purchase	Purchase of instrumentation equipment, mechanical equipment, and new master meters.
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.
SCADA Implementation	Purchase of Supervisory Control and Data Acquisition System (SCADA) equipment for monitoring, control and metering sites.
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.
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.
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.
Study and Design – Waterworks Monitoring & Control Communications Network	Provision of microwave antennas and radio equipment at twelve facilities.
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.

Sub-phase	Scope
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. Also, upgrade the overhead power line from Winsor Power Station to Quabbin Tower to insure uninterrupted service of the communication network. Increased security will be provided at Shaft 12, Winsor Power Station, CVA Intake, and Winsor Dam.
<b>Waterworks SCADA/PLC Upgrade</b>	<b>Replacement of existing SCADA PLC's nearing their end of life with a current PLC platform. New PLC platforms further provide increased security capabilities and improved program functionality. Secondary goals include standardizing PLC logic and HMI graphics, and upgrading aging field instrumentation.</b>

#### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$39,006	\$15,804	\$23,203	\$384	\$1,494	\$6,297	\$6,220	\$10,686

Project Status 5/15	41.0%	Status as % is approximation based on project budget and expenditures. Quabbin Power Communications & Security Design commenced in July 2014. Construction expected to commence in October 2015.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY14	FY16	Chge.
\$19,592	\$39,006	\$19,414	Dec-17	Oct-31	166 mos.	\$3,789	\$6,297	\$2,508

#### Explanation of Changes

- Project cost, schedule, and spending increased primarily due to the inclusion of a new project for the Waterworks SCADA/PLC Upgrade. Also, updated cost estimates for Quabbin Power Communications & Security Construction and utility fees and permits.

#### 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
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.
Data Purchase	Purchase of project related data from Boston Edison.
Records Development	Automation of MWRA record drawings.
Update of Record Drawings	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.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$2,299	\$1,036	\$1,263	\$0	\$0	\$914	\$348	\$0

Project Status 5/15	45.1%	Status as % is approximation based on project budget and expenditures. Update of Record Drawings and Records Development are expected to begin in FY17.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$1,799	\$2,299	\$500	Dec-17	Jan-19	13 mos.	\$763	\$914	\$151

**Explanation of Changes**

- Project cost increased due to updated cost for the Update of Record Drawings.
- Schedule shifted as a result of updated cost for sub-phase above partially offset by updated schedule for Records Development.

**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 FY20 with repayments scheduled for FY12 through FY30. 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.

### Scope

Sub-phase	Scope
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.
Community Repayments	Principal repayment over a ten-year period beginning one year after origination of the loans.
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.
Local Water System Assistance Program Repayments	Principal repayment over a ten-year period beginning one year after origination of the loans.
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.
CVA Repayments	Principal repayment over a ten-year period beginning one year after origination of the loans.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$0	\$128,313	(\$128,313)	(\$1,398)	(2,157)	(\$4,508)	(\$53,490)	(\$68,861)

Project Status 5/15	70.6%	Through May 2015, \$305.2 million in loans were distributed to member communities.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$0	\$0	\$0	Jun-30	Jun-30	None	(\$2,581)	(\$4,508)	(\$1,927)

**Explanation of Changes**

- Spending shift is due to updated cash flows.

**CEB Impact**

- The annual interest paid for the Commercial Paper program supporting the Local Water Assistance Program initiative is over \$328,000 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 2028 for construction, the Waterworks Facility Asset Protection project will be ongoing throughout the useful life of the facilities.

## Scope

Sub-phase	Scope
Meter Vault Manhole Retrofits Design and Construction	Retrofit approximately 195 meter manholes.
Design and Construction Walnut Hill Tank	Full structural analysis of the Walnut Hill Elevated Tank based on corrosion discovered. Rehabilitation of the tank based on the structural analysis.
Waltham Pipe Bridge Replacement	Replacement of approximately 100 feet of 30-inch steel pipe over commuter rail tracks in Waltham including a bridge crossing.
Design and Construction Cosgrove Valve Replacement	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.
Transformer at Cosgrove Intake Building	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.
Covered Storage Tank Rehabilitation Design and Construction	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.

Elevated Water Storage Tank Repainting Design and Construction	Repaint 5 steel water storage tanks (Bellevue 1, Bellevue 2, Park Circle, Turkey Hill, and Walnut Hill). All were painted in 2000. Bellevue 1 and 2 are in the same service area (SEH); Park Circle, Turkey Hill and Walnut Hill are in the same service area (NEH). As noted, the various tanks are redundant to each other. Redundancy is maintained by performing this project and keeping the tanks in good condition and in service.
<b>Sub-phase</b>	<b>Scope</b>
Shaft 9 Rehabilitation Design and Construction	Ground water leakage is filling the access shaft. The piping and components in the access shaft need to be evaluated and repair work performed.
Electrical Distribution Upgrades at Southborough	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.
Water Meter Upgrade Replacement	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.
Beacon Street Line Repair Design CA/RI (7474) and Construction	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. Project is currently under final design.
<b>Cosgrove Flat Roof Replacement</b>	<b>Replace the damaged roof that leaks. In particular there are issues around roof penetrations and along the parapet wall.</b>

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$21,043	\$546	\$20,497	\$127	\$769	\$5,058	\$12,719	\$2,721

Project Status 5/15	3.0%	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 Design CA/RI commenced in December 2014 and construction is expected to begin in FY16.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$20,628	\$21,043	\$415	Jul-23	Aug-28	61 mos.	\$10,781	\$5,058	(\$5,723)

**Explanation of Changes**

- Project cost increased due to the inclusion of a new project for the Cosgrove Flat Roof Replacement as well as, inflation adjustments.
- Schedule and spending changed primarily due to restructuring and re-phasing future phases including Shaft 9 Rehabilitation, and Elevated Water Storage Tank Repainting. Also, updated schedule for Water Meter Upgrade and Meter Vault Retrofits partially offset by cost changes above.

**CEB Impacts**

- None identified at this time.

## S. 881 Equipment Purchase

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### 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
Security Equipment & Installation	Design and installation of security systems at various MWRA facilities and sites.
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.
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.
<i>Vehicles:</i>	
Closed Circuit TV Inspection Truck	Purchase of TV Inspection Truck to support Wastewater Pipeline Unit of Field Operations Department.
High Lift Fork Loader (Lull)	Purchase High Lift Fork Loader (Lull) to move equipment and materials at Deer Island.
Front-End Loader	Purchase front-end loaders to move equipment, sand, and gravel at Deer Island.
Prior Vehicle Purchases	Vehicle purchases including TV Inspection Truck, Two Back Hoes, Vector 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.
Ramp Truck	Purchase of Ramp Truck to support Fleet Services.
Street Sweeper	Purchase of Street Sweeper to support MWRA facilities and community assistance.
FY11-13 Vehicle Purchases	Vehicle purchases planned for FY11-13.
FY14-18 Vehicle Purchases	Future vehicle purchases planned for FY14-18.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$23,168	\$13,348	\$9,819	\$3,478	\$3,001	\$10,063	\$997	\$0

Project Status 5/15	66.2%	Status as % is approximation based on project budget and expenditures. Purchase and installation of security equipment is in process and will continue through FY17.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$20,491	\$23,168	\$2,677	Mar-19	Mar-20	12 mos.	\$7,460	\$10,063	\$2,603

**Explanation of Changes**

- Project cost increased primarily due to revised cost estimates for Security Equipment and Installation and Vehicle Purchases.
- Project spending increased due to updated cost estimate for Security Equipment and Installation and FY14-18 Vehicle Purchases. This increase was partially offset by updated schedule for Major Laboratory Instrumentation.
- Schedule shifted as a result of revised schedule for Major Laboratory instrumentation.

**CEB Impacts**

- No impacts identified at this time.

## S.925 Technical Assistance

### **Project Purpose**

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

### **Project History and Background**

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

### **Scope**

Sub-phase	Scope
Technical Assistance	MWRA technical assistance contracts include the following: mechanical, materials testing, surveying, hazardous materials assessment, instrumentation control, and wetland/environmental.

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

### **Expenditure Forecast (in \$000s)**

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$ 1,125	\$0	\$1,125	\$0	\$375	\$1,125	\$0	\$0

### **Changes in Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY15	Chge.
\$1,125	\$1,125	\$0	Jun-17	Jun-18	12 mos.	\$1,125	\$1,125	\$0

### **Explanation of Changes**

- Schedule shifted to reflect continuation of contracts for an additional year

### **CEB Impacts**

- When Technical Assistance contracts are used to support a project in the operating budget, the costs are charged to the Current Expense Budget (CEB).



## **S. 931 Business Systems Plan**

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### **Project Purpose**

*To develop, improve, and procure management information systems (MIS) to adapt to the changing business needs associated with managing the waterworks and sewerage systems. For updated MIS Business Plan refer to the new projects (S.940, S.942, S.944, & S.946) that are based on the MIS 5-Year Strategic Plan.*

### **Project History and Background**

During the process of developing the FY94-96 Capital Improvement Program, it became evident that MWRA needed to invest in the upgrade, enhancement, and expansion of its Management Information Systems (MIS) to adapt to the changing business needs of the waterworks and sewerage systems, and to respond to new regulatory requirements. To address these needs, MWRA initiated and implemented a business system planning effort to determine future MIS support requirements. Annual plan updates have assisted staff, external constituencies, and the Board of Directors in understanding the critical role of information systems in carrying out MWRA's environmental and economic mission.

The initial business systems plan focused primarily on FY95-97 (Phase 1) with the goal of getting greater use out of existing systems. Implementation of Phase I improvements was completed in June 1997.

Phase II (FY97-10) built on the progress made during Phase I and continued the development of economies of scale through optimization of existing assets, technology conversion promoting database integration, and infrastructure improvement. Except for improvements to the TRAC Information System (TRAC/IS), Phase II is complete. The TRAC I/S was competitively bid in FY07 and the project is was completed FY13.

Phase III (FY99-01) focused on implementing a newly, integrated financial, procurement and human resources/payroll system (Lawson) which replaces three separate and obsolete software products. This project was substantially completed in May 2000 and met schedule and budgetary targets. Implementation of a Treasury application (XRT) and integration with MAXIMO was completed by the close of FY01. The system reduces duplication of databases, streamlines several business processes, and improves staff ability to perform trend analysis.

Phase IV of the Business Systems Plan supported MWRA's effort in anticipation of the year 2000 to assess systems and applications and implement corrective actions to avoid systems failures. This phase was completed in February 2000, and MWRA did not experience any major system failures or disruptions. In addition, approximately 65% of Phase IV spending was for items that would have been purchased under normal circumstances and the items have a useful life well beyond 2000.

Phase V (FY01-10) supports MWRA's ongoing program of information system improvements. The focus is on development of a Waterworks Operations Management system similar to the one used to support Deer Island management, implementation of MAXIMO for the Field Operations Department (completed), and improvements to the Laboratory Information Management System (LIMS) to ensure MWRA keeps pace with changing business needs and technology standards. The LIMS contract was awarded in FY08 and the project was completed in Q2 FY10. In addition, Phase V includes replacement of obsolete minicomputers and improvements to GIS and TV Inspection systems based on benchmarking results (completed).

Phase VI (FY04-12) supports the replacement of obsolete PBXs at major sites, the re-licensing of Microsoft Office products, storage/server improvements for Computer Center operations, and the conversion of Lawson portfolio to a current supported operating system. Lawson hardware was procured in FY08; software procurement and implementation was completed in May 2009.

The major areas of focus are: replacing aging systems and the network architecture, improving disaster recovery, enhancing data integration, consolidating server/computing resources, and implementing applicable best practices. The goal is to continue to support efficient administrative, financial, operational, engineering and planning functions with cost-effective technologies. Key projects remaining include: records management software and Laboratory Instrument Data Management.

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

Sub-phase	Scope
Phase I (FY95-03)	<p><u>(Complete)</u>: Upgrade of BHP minicomputers; Unix-based minicomputer for GIS integration; implementation and enhancement of the Sewerage Analysis and Management System (SAMS) including high-end workstations to incorporate improved hydraulic modeling capabilities, condition information, mapping, and GIS data so that CSO Master Plan and Transport data requirements are met; PC replacements; storage and functionality improvements for TRAC (IS) and wastewater flow data; leasing of three replacement minicomputers for administration and finance systems to address capacity and performance issues; implementation of CADD software and related tools including the establishment of a document management system to index thousands of engineering documents maintained by the Records Management Center and technical information centers at CNY and Deer Island; and development of a network plan for Business Systems Plan updates to address industry changes, maintenance/replacement concerns and functionality needs.</p>
Phase II (FY97-13)	<p><u>(Complete)</u>: Server consolidation, network scalability program, database integration program, PBX replacement, records management inventory program, maintenance management and waterworks programming services are completed.</p> <p><u>(On-going)</u>: The new TRAC I/S replacement was in production by September 2009 and the CIP includes 3 years of maintenance through FY13 and efforts customizing based on MWRA business needs and regulatory requirements. The Authority accepted the system in October 2010.</p>
Phase III (FY99-04)	<p><u>(Complete)</u>: Procurement of new integrated financial, procurement and human resources/payroll system. Purchase and installation of a back-up generator for Building 36 in the Charlestown Navy Yard and network project support.</p>
Phase IV	<p><u>(Complete)</u>: Year 2000 assessment and improvements.</p>

Sub-phase	Scope
Phase V (FY01-12)	<p><u>(Complete):</u>  <u>Waterworks Operations Management System (OMS) project:</u> Establishment of a system to integrate SCADA, water quality, flow, and related data for management reporting and analysis. SCADA incorporation to Process Book is complete. In FY06, a Harbor Outfall Monitoring Database project was identified and the system was completed in FY08. Data warehouse was completed in Q2 FY10.</p> <p><u>(Complete):</u>  <u>Geographical Information Management System (GIS):</u> Conversion of GIS from UNIX to NT based on vendor software changes (complete). Also, completed recommendations from a TV Inspection Benchmarking Project by purchasing new software to improve data and operational efficiencies. New business requirements, including expansion of GeoXH handhelds to collect information on manhole inspections and its incorporation into GIS, were handled under the CEB.</p> <p><u>(Complete):</u>  <u>GIS Projects and Enhancements Project:</u> In FY01, the scope of this project was expanded to include Open-VMS minicomputers replacement project, which is the project to replace Deer Island VMS servers. In FY08, the Open VMS project was renamed GIS Projects and Enhancements Project and an RFB was published Q1 FY09.</p> <p><u>(Complete):</u>  <u>Laboratory Information Management System:</u> Implementation of software improvements to stay current with industry standards and meet ongoing business needs. A competitive bid was awarded in FY08. Development and testing continued during FY09 with final system acceptance in Q3 FY10. The LIMS will process both water and wastewater samples. Phase One, water testing, of the LabWare LIMS implementation went live in Q3 FY09 as planned. Phase Two, wastewater testing, was completed in Q3 FY10. LIMS replacement is complete.</p>

Sub-phase	Scope
Phase VI (FY04–12)	<p><u>(Complete):</u> <u>Telecommunications:</u> Replacement of the Deer Island PBX (completed in FY04).</p> <p><u>(Complete)</u> <u>Lawson Minicomputer:</u> The original plan was to purchase a backup UNIX minicomputer to be used for Lawson processing and storage improvements for all MWRA's minicomputer and server resources (scheduled for FY08). However, in order to maintain vendor support for the Lawson System, new OS and server replacements, application environment and upgrades needed to be implemented in FY08/FY09. New servers were procured for Chelsea (production) and Deer Island (disaster recovery/test/development) in FY08. Application Environment upgrade was procured and installed in FY08.</p> <p><u>(Complete):</u> <u>Disaster Recovery:</u> In FY06, as part of the MWRA-wide Continuity of Operations Planning project, it was determined that a permanent disaster recovery computer center would be located at the Interim Corrosion Control Facility at the CWTP. A disaster recovery computer center was viewed as a higher priority than the originally budgeted server consolidation line item. This project has changed. The ICCF plan was not viable due to limited space and Weston was identified as a preferred alternative site. However, Weston requires time for design and cost analysis. Pending a review of the viability and cost of a redundant network connection via microwave technology, a third option, utilizing the existing DITP Data Center as the permanent Disaster Recovery was investigated. However, since the Commonwealth is opening a new Disaster Recovery site in Springfield, the MIS Department is working closely with state officials to explore utilizing the space at the new site scheduled to open in the Spring of 2012. The approach will allow the MWRA to save money by leveraging the existing infrastructure (i.e. environmental equipment, generator, security, UPS, etc). To be consolidated under MIS Strategic 5-Year Plan.</p> <p><u>(Complete):</u> <u>Microsoft Licensing:</u> Microsoft's current strategy is 2 years of final maintenance on a version once a newer version has been released. The remaining CIP provides for approximately 350 future Office 2007 licenses (previous re-licensing programs yielded a credit); however, MIS used the funding for Microsoft Server licenses. The outstanding Microsoft office licenses were purchased under the CEB in FY09 and FY10.</p> <p><u>(Complete):</u> <u>Document Management:</u> The replacement of InfoStar, the MWRA Document Management System, was originally part of this phase but it was eliminated in December 2004 and is requested for FY15. Project not funded during the FY09 Cycle but was resubmitted in FY10 and was budgeted under the FY11 CIP. Staff evaluated various software.</p>

Sub-phase	Scope
DITP/OMS	(Complete): Establishment of a system to integrate SCADA, water quality, flow, and related data for management reporting and analysis. SCADA incorporation to Process Book is ongoing. Data warehouse completed in FY10. Budget deleted in FY13 Final CIP process.
GIS/TV Inspection	(Complete): Conversion of GIS from UNIX to NT based on vendor software changes was completed. Also, completed recommendations from a TV Inspection Benchmarking Project by purchasing new software to improve data and operational efficiencies. New business requirements, including expansion of GeoXH handhelds to collect information on manhole inspections and its incorporation into GIS, were handled under the CEB.
MIS Licensing	(Complete): Funding for Microsoft Licensing Suite of products – Office Professional 2003 was completed. Remaining funds were used for MS VISTA and Office Professional 2007 Test Licenses.
Lawson Conversion	(Complete): Original funding of \$600,000. The remainder of funding came from Phase V projects where bids were awarded at a lower than anticipated cost. The project includes funding for new OS, server replacements and application environment (new servers were procured for Chelsea (production) and Deer Island (disaster recovery/test/development) in FY08). Application Environment upgrade was completed in FY08. The application software upgrade, including technical support and professional services was successfully completed in Q4 FY10.
Cyber Security	(Complete): Funding for Development Contract executed in December 2007 for Internet Data Protection 24X7 Monitoring costs. Cyber Security Monitoring continues to provide multiple layers of protection against internal and external threats to our networks and systems. Updates to software and hardware completed.
Original SAN	(Complete): The original amount of \$680,004 funded from Phase II project. Funding will be used for Hardware, Software and Technical Support. This project provides increased data storage with high availability, centralized storage management and more energy-efficient operations

#### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$24,552	\$24,516	\$36	\$36	\$0	\$101	\$0	\$0

Project Status 5/15	99.9%	Status as % is approximation based on project budget and expenditures. Phases V and VI are complete. The first phase of Cyber Security was completed in September 2011.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$24,535	\$24,552	\$17	Oct-14	Oct-14	None	\$84	\$101	\$17

**Explanation of Changes**

- Project cost and spending increased due to final cost estimates.

**CEB Impacts**

- None identified at this time.

## 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 \$7 billion for fiscal years 1986 through 2013.

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.

In the FY01-03 CIP the Capital Maintenance Planning/Development project was part of the first phase of the Wastewater Facilities Asset Management Program (FAMP). This initial phase of FAMP consisted of evaluating maintenance strategies for equipment and systems at Deer Island, and led to the adoption of Reliability Centered Maintenance (RCM) as the maintenance strategy for Deer Island and subsequently the rest of MWRA. As a result of the decision to implement RCM throughout MWRA, the Capital Maintenance Planning/Development project was created. The remaining FAMP components, which address equipment system monitoring, Maximo improvements, and improved business practices at Deer Island, have been renamed Deer Island Treatment Plant Asset Protection.

### Scope

Sub-phase	Scope
Inventory & Evaluation Phases 1 & 2	Development of a comprehensive, strategic maintenance plan for MWRA. (Completed by July 2005).
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 1-16.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$16,721	\$11,058	\$5,663	\$1,167	\$1,871	\$6,597	\$0	\$0

Project Status 5/15	68.6%	Status as % is approximation based on project budget and expenditures. All tasks in <i>Inventory &amp; Evaluation Phases 1 &amp; 2</i> are complete. As-Needed Design 7 was substantially completed in July 2012. As-Needed Design 8 was substantially completed in February 2012. As-Needed Contracts 9 and 10 were substantially complete in January and February 2014, respectively. As-Needed Design contracts 11-13 were awarded in November 2013.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
13,971	\$16,721	\$2,750	Feb-16	Jan-18	23 mos.	\$3,847	\$6,597	\$2,750

**Explanation of Changes**

- Project cost, schedule and planned spending increased due to continuation of As-Needed Design with Phases 14-16 added.

**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
Design & Engineering Services	Design and engineering services to support space plan.
Facilities Construction	Construction of modifications to MWRA facilities in accordance with space plan.
Facilities Fit-out	Purchase of furniture and other items to fit-out new and/or modified facilities.

### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$2,151	\$371	\$1,780	\$0	\$0	\$0	\$1,780	\$0

Project Status 5/15	17.2%	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 rehabilitate or demolish old Administration Building on DI.
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### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$2,151	\$2,151	\$0	Sep-20	Sep-20	None	\$0	\$0	\$0

**Explanation of Changes**

- N/A.

**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**

<b>Sub-phase</b>	<b>Scope</b>
DI Solar Residuals Odor Control (ROC)	Design and construction of 100 kw photovoltaic array. Projected annual output estimated at 105,000 kwh.
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.
DI Solar Maintenance/War ehouse	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”).
Future DI Wind (Battery D Location)	Design and construction of up to two 600 kw wind turbines at Deer Island. Projected annual output estimated at 1,150,000 kwh per turbine.
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.
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.
Energy Adv Con Services	Consultant for comprehensive energy advisory services on throughout the Authority.
Technical Assistance	Various technical assistance contracts to aid solar, wind, and hydro initiatives.
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.

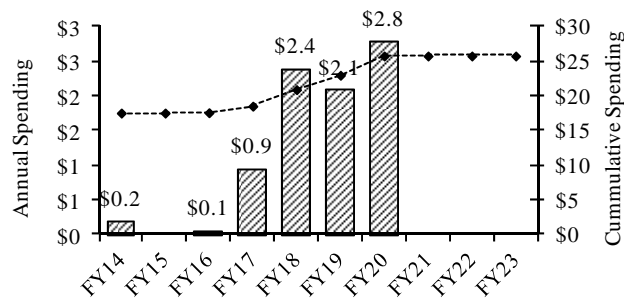
Charlestown Wind	Design and construction of 1.5 MW wind turbine system. Projected annual output estimated at 3,000,000 kwh. Project funding includes \$4.8 million from the ARRA program.
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Sub-phase	Scope
DI Wind Phase 2 Construction	Installation of one 600 kw wind turbine at Deer Island. Projected annual output estimated at 1,150,000 kwh.

#### Expenditure Forecast (in \$000s) and Project Status

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$25,630	\$17,388	\$8,242	\$0	\$52	\$3,576	\$4,857	\$0

#### Alternative Energy Initiatives



Project Status 5/15	67.8%	Status as % is approximation based on project budget and expenditures. Carroll Water Treatment Solar and Loring Road Hydro Construction were completed in May 2011. Carroll Water Treatment Plant Solar Construction and Charlestown Wind Project were completed in 2011. DITP Solar PPA was completed in 2011.
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#### Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$26,522	\$25,630	(\$892)	Sep-20	Dec-19	(9) mos.	\$5,707	\$3,576	(\$2,131)

**Explanation of Changes**

- Project cost and spending decreased primarily due to the deletion of Shaft E Hydro In-Conduit Design and Construction sub-phases. Also, updated cost estimate for Fish Hatch Pipeline Hydro. This was partially offset by inflation adjustments on unawarded contracts.
- Schedule changed due to updated schedule for Future DI Wind Construction (Battery D Location) phase.

**CEB Impacts**

- Assume \$30,000 in avoided costs in FY18 and \$30,000 in FY19 for the Hatchery Pipeline Hydropower project.

# Information Technology (IT) Strategic Plan

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The Board recommended that staff develop a five-year strategic plan for the Management Information Systems Department (MIS) to ensure alignment of business goals, objectives, processes, and technology within the Authority. At the July 13, 2011 meeting, the Board approved the recommendation of a Selection Committee to award a contract to Westin Engineering, Inc. (Westin) for the development of a Five-Year Information Technology Strategic Plan (IT Plan). Westin's scope of work included evaluating MWRA's current applications, IT systems and infrastructure, as well as the MIS Department's organizational structure and staffing requirements. After Westin completed its review, it was charged with developing plans for future improvements to MWRA's IT systems and organizational approach and structure.

Based on the recommendation of the Five-Year IT Strategic Plan which was conducted during FY12, the structure of the MIS projects going forward were classified into four major programs, as follows:

**Application Improvement Program (Includes 4 subprograms)** - These four subprograms will 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. This program relates to 123 applications with 227 modules that support various business functions across the Authority. Seventy-seven, or 63%, of these applications are commercially available off the shelf packages.

**Information Security Program (Includes 2 subprograms)** - These two subprograms focus on the resiliency and sustainability of the MWRA's data security practices. They will establish policies, procedures, and information security awareness. The work under this subprogram will also review each IT system and make recommendations to improve its security profile in accordance with the Department of Homeland Security Guidelines.

**Information Technology Management Program (Includes 2 subprograms)** -These two programs are intended to improve the organization of MIS and the oversight processes for selecting and implementing IT solutions throughout the MWRA. To accomplish those goals, the study recommends that MWRA:

- Develops an Information Technology Service Management (ITSM) Program to improve service delivery.
- Adopts a Standardized Software Development Lifecycle (SDLC) to improve the quality of software delivered.
- Implements a more robust Project Management Program to improve the predictability of deliverables and cost associated with information technology projects.
- Updates the IT Task Force Program to ensure that the business and technology priorities of the MWRA are aligned and are being met.

**Information Technology Infrastructure Program (Includes 4 subprograms)** - These four subprograms will assess and implement consolidated and optimized versions of core IT infrastructure elements and improve and optimize data management practices, including: storage, backup, archive and purge processes, and technologies. These improvements will cover the 1,238 desktops, 160 laptops, 105 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**

Currently there are 123 applications that have 227 modules. Seventy seven of these applications are “commercially available off the shelf” (COTS) packages. These applications support business functionality for the Operations, Administration & Finance, Internal Audit, Public Affairs, Law Divisions along with the Office of Emergency Preparedness and the Office of the Executive Director. 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 credibility of the MWRA’s data resources. It will further enhance the integrations and availability of data to provide a more holistic view of the overall operational status for seamless access to the detailed data.

The applications implementation program includes upgrades to applications such as Lawson, Maximo and PIMS. The program also includes significant expansion to GIS, Mobile Integration, and Enterprise Content Management technologies.

This program is scheduled to be completed by FY19.

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

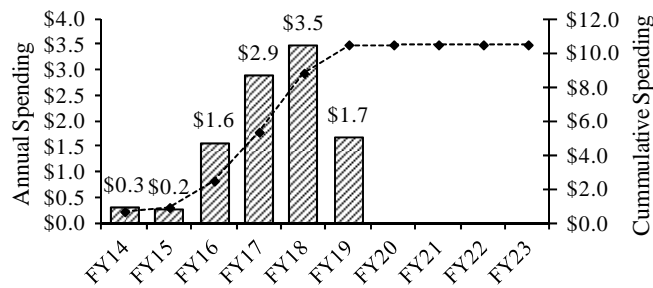
Sub-phase	Scope
GIS Applications & Integration	Expand role of GIS technology for scientific, environmental and engineering applications. Projected expenses include Hardware, Installations, Support, Software, Customizations and Technical Support. This project will assess the current state of the GIS Program and make recommendations for improvements in the future state.
Lawson Enhancements	New releases and implementation of ERP System hardware, environment, and application replacement or upgrades. Implement contract management, strategic sourcing and process flow integrator modules.
Maximo Upgrade	Complete migration to Maximo 7.5, acquire new modules and add richer integrations (e.g. GIS). Hardware replacements and enhancements to the system based on current useful life.
Pre-Treatment Information Mgmt System (PIMS) Enhancements	The system is used by the MWRA to monitor the pretreatment program pursuant to MWRA’s NPDES permit and EPA regulations. Hardware replacements and enhancements to the system based on current useful life. This project will assess the current state of the PIMS implementation to develop and execute a plan for addressing functional issues and complying with new regulations.
Enterprise Performance Management Enhancements	Implement automated tools to support the compilation of monthly and quarterly performance reports, including tools for extracting data from existing operational applications, managing data quality, generating reports and automating report assembly.
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.

Mobile Integrations	Define integrated business strategy for mobile computing. Expand the application of mobile computing to meet the Authority's business requirements in the Laboratory, DITP Operations and Maintenance and other Operations and management areas.
LIMS Enhancement	Laboratory Information Management System (LIMS) Enhancements: The e-Lab is a new project that will improve productivity of staff and reduce the amount of paper being generated. This initiative adds a new module into LIMS called Electric Laboratory Notebook (ELN). ELN will replace paper based laboratory notebooks with tablets that are connected to LIMS and integrated into the core product. This project includes the purchase of tablets, ELN licenses and services required to implement the new module.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$10,176	\$366	\$9,810	\$244	\$1,566	\$8,437	\$1,666	\$0

**Application Improvements Program**



Project Status 5/15	4.8%	Status as % is approximation based on project budget and expenditures.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$10,050	\$10,176	\$126	Sep-18	Mar-19	6 mos.	\$9,795	\$8,437	(\$1,358)



**Explanation of Changes**

- Project cost and schedule changed primarily due to updated cost estimate and schedule for Maximo Upgrade.
- Project spending changed due to updated schedules for Enterprise Content Management and Maximo Upgrade.

**CEB Impacts**

- Annual increased costs associated with Maximo Upgrade of \$50,000 in FY17 and Lawson Enhancements of \$100,000 in FY18 and \$75,000 in FY20 for the Application Improvement Program.

## S. 942 Information Security Program

### Project Purpose

*To develop, improve, and procure a new and improved oversight process for selecting and implementing Information technology solutions throughout the MWRA.*

### 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 will establish policies, procedures and an information security awareness program for all of the MWRA. This program includes designing both an information security program and electronic security plans in order to provide a more formal, comprehensive IT security framework that is better compliant with Federal Standards than the Authority's existing decentralized activities.

This program is scheduled to be completed by FY19.

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

Sub-phase	Scope
IT Security Program	<p>Information Security Program Development and Implementation Project – To develop and coordinate an IT Security program to provide a holistic approach to physical and cyber security efforts. Define and coordinate implementation of an Authority-wide information security plan, electronic security plans, and a cyber security plan including standards, policies, and practices. This project started in FY13.</p> <p>Electronic Security Plan Development and Implementation Project - Coordinate a system-by-system development of Electronic Security Plan (ESP) to apply security controls and standards to each system within MWRA's application portfolio.</p> <p>Information Security Awareness Program Development and Delivery Project – 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.</p> <p>Information Security Protection Infrastructure Upgrade – Upgrade the existing hardware and software infrastructure that protects MWRA's information from internal and external threats. These infrastructure components are at the end of their useful life, and need to be upgraded in order to keep MWRA's protection current and vigilant. This project also includes installation and configuration services.</p>
Electronic Security Implementation	<p>Information Security Monitoring Program – Next phase of Cyber Security to provide new appliances, software upgrades, and hardware replacement in addition to the current 24 hour day monitoring to outfit the 2<sup>nd</sup> MIS Data Center. This project started in FY12 and will continue through FY16.</p>

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$2,385	\$820	\$1,566	\$212	\$352	\$1,595	\$255	\$0

Project Status 5/15	34.4%	Status as % is approximation based on project budget and expenditures.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY16	Chge.
\$1,343	\$2,385	\$1,042	Jun-16	Jan-19	31 mos.	\$808	\$1,595	\$787

**Explanation of Changes**

- Project cost, schedule, and spending increased due to additional work for Information Security Infrastructure Upgrade.

**CEB Impacts**

- Annual increased costs are estimated at \$30,000 in FY18.

## S. 944 Information Technology Management Program

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### Project Purpose

*To develop, improve, and procure management information systems (MIS) to adapt to the changing business needs associated with managing the waterworks and sewerage systems.*

### Project History and Background

This program and associated projects are intended to bring to the MWRA a new and improved Management Information Systems Department and an improved oversight process for selecting and implementing Information Technology solutions throughout the MWRA by establishing:

- a. An Information Technology Service Management (ITSM) Program to improve service delivery
- b. A Standardized Software Development Lifecycle (SDLC) to improve the quality of software delivered
- c. A Project Management Program to improve the predictability of deliverables and cost associated with information technology projects
- d. An updated IT Task Force Program to ensure that the business and technology priorities of the MWRA are aligned and are being met
- e. Organizational changes to reflect the changing technologies and processes

This program is scheduled to be completed by FY18 at an estimated cost of \$0.9 million.

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

Sub-phase	Scope
Implement IT Task Force	Implement formal practices for allocating IT resources among competing demands and prioritizing requests for IT services. Define and implement roles and responsibilities for allocation of technology related policies and standards.
MIS Organization and Change Management	Reorganize MIS Department to better align responsibilities with current and emerging requirements. Implement a focus on problem resolution and customer service issues.  Change Management – Enhance capabilities for planning and implementing organizational change, integrated with software development lifecycle, project management and information technology service management.

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$923	\$0	\$923	\$0	\$58	\$863	\$59	\$0

Project Status 5/15	0%	Status as % is approximation based on project budget and expenditures.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY15	Chge.
\$923	\$923	\$0	Jun-17	Jun-18	12 mos.	\$923	\$863	(\$60)

**Explanation of Changes**

- Project schedule and spending changed based on updated schedules for Software Development Life Cycle, IT Project Management Methodology, and MIS Reorganization phases.

**CEB Impacts**

- Annual increased cost are estimated at \$70,000 in FY17.

# 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 1,238 desktops, 108 servers, 20 Wide Area Network Circuits and associated equipment. It also manages in excess of 7 Terabytes of data stored in 148 data bases; and an additional 12 Terabytes of unstructured data on file shares. This program will assess and implement consolidated and optimized versions of these core IT infrastructure elements as utility like services and commodities. Furthermore, it will look to improve and optimize data management practices, including: storage, backup, archive and purge processes and technologies.

This program is scheduled to be completed by FY19.

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

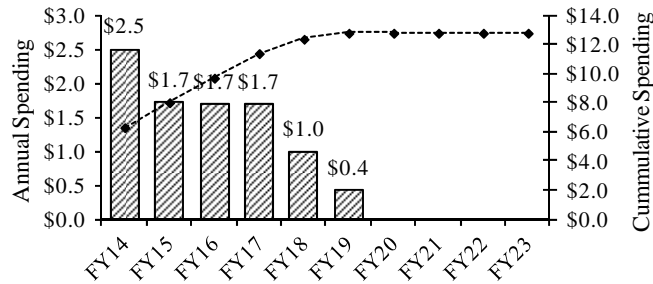
Sub-phase	Scope
IT Infrastructure Upgrades	<p>IT System Architecture - This effort will focus on the development of a MWRA Technical Reference Model (TRM). The TRM will provide an architectural framework used to identify the standards, specifications and technologies that support the MWRA’s computing environment. The TRM will identify both the current state and the target state of the MWRA’s computing environment. Elements of the TRM will include the following domains:</p> <ol style="list-style-type: none"> <li>1. Access - Addresses how information, transactions and services are delivered to and accessed by the MWRA’s staff, constituents and business partners.</li> <li>2. Information – Addresses standards and guidelines for Data Interoperability, Data Management, Data Formats and Records Management.</li> <li>3. Application – Defines how applications are designed and developed, and identifies open standards to facilitate rapid service-oriented development, integration and implementation of new applications and business processes.</li> <li>4. Integration – Addresses how information, transactions, security, systems management and Business Services are integrated across intra-enterprise entities, e.g. SCADA, PICS, Security &amp; MIS, as well as extra-enterprise entities, e.g. business partners.</li> <li>5. Management – Introduces service management concepts using Information Technology Infrastructure Library (ITIL) Guidelines for the management of traditional IT infrastructure and business services.</li> <li>6. Security – Addresses the approach, methodology and technology components necessary to provide the appropriate level of protection for the information assets of the MWRA, its constituents and business partners.</li> </ol>

	<p>Data center Upgrades – The Chelsea facility hosts the computer Center, Operations Control Center (OCC) and the primary Emergency Operations Center. Specialty fire suppression systems, UPS equipment, environmental control and alarming systems, console apparatus, etc. was purchased in 2000/01 with the facility opening. All of this equipment has a useful life of approximately 15 years and will require replacement in FY15.</p>
	<p>Network Infrastructure Project - Plan and coordinate upgrades to IT infrastructure elements, including networks, servers, storage, etc. The Net 2020 DITP/Southborough includes Copper cable upgrade to CAT6 since the existing cabling and fiber are non-compliant with current standards. The new standards and fiber upgrade will support increased backbone capacity for 10GIG.</p> <p>Storage Upgrades - 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.</p> <p>Backup Upgrades – Evaluate need for tape backup versus alternative means for different record types. Plan and implement backup capabilities to expand backup coverage (user data).</p> <p>Server Management – 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.</p> <p>Enterprise Application Integration – Develop systems architecture as framework for infrastructure changes. Coordinate activities needed to support Enterprise Application Integration, Data Management and application improvements. Adopt Service-Oriented Architecture (SOA). Select SOA toolkits and approaches that maximize ability to integrate existing and current applications.</p>
E-Mail Upgrades	<p>E-Mail Upgrades - Complete migration to Exchange 2010. Increase default attachment size. Substantially increase total email capacity. Establish procedures for managing PST files, including managing on local hard disks, archiving, and automated backups. Explore automation tools for managing email, including automated archiving, automated backup, legal holds, indexing and search.</p>
Enterprise Data Management	<p>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.</p>
User Data Management	<p>User Data Management – Implement secure capability for large file transfers and upgrade Authority-wide storage capabilities to better support individual user and work team data sharing.</p>

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

Total Budget	Payments thru FY14	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
\$10,271	\$3,791	\$6,480	\$1,713	\$1,683	\$8,566	\$414	\$0

**IT Infrastructure Program**



Project Status 5/15	50.2%	Status as % is approximation based on project budget and expenditures.
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**Changes to Project Scope, Budget, and Schedule**

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY15	FY16	Chge.	FY15	FY16	Chge.	FY15	FY15	Chge.
\$10,271	\$10,271	\$0	Dec-18	Dec-18	None	\$8,519	\$8,566	\$47

**Explanation of Changes**

- Project spending changed due to updated cash flows.

**CEB Impacts**

- Annual incremental cost for Storage Upgrades are estimated at \$100,000 in FY18 and \$100,000 in FY19; Telecommunications increases are estimated at \$25,000 in FY19; and \$101,000 for the IT Infrastructure Program in FY19.



# APPENDIX 2

## Expenditure Forecast Report with Planned NTP and SC dates

# Understanding the Expenditure Forecasts

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Capital expenditure forecasts, sometimes referred to as project cashflows, are presented in this section of the Final FY16 CIP document. Expenditure forecasts are accrual based, i.e., projected expenditures are estimated based on when services are expected to be rendered. Projects appear in this report in the same order they appear on-line, organized by capital program area. Grant and loan receipts for various projects and programs appear in the section following the expenditure forecasts.

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

<b>Project and Subphase Names</b>	The first column of the expenditure forecast identifies the organizational hierarchy of the CIP: capital program area (e.g., Wastewater System Improvements), program category (e.g., Interception and Pumping), project (e.g., Quincy Pump Facilities), and sub-phases (e.g., Facilities Plan/EIR). Sub-phases represent awarded and unawarded contracts.
<b>Contract Number</b>	<p>To the left of 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.</p> <p>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.</p> <p>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.</p>
<b>Notice to Proceed (NTP) and Substantial Completion (SC)</b>	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.
<b>Contract Value</b>	The Contract Value represents the budget amount for the capital program, program category, project, or sub-phase. 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.
<b>Payments through FY14</b>	Payments through FY14 includes actual and accrued expenditures since the inception of the contract through the end of FY14.
<b>Remaining Balance</b>	Remaining Balance is calculated by subtracting Payments through FY14 from the Contract Amount. This amount is then spread in the columns to the right, for FY14-18, FY19-23, and Beyond FY23.

**APPENDIX 2**  
**FINAL FY16 FIVE-YEAR CIP BY MAJOR PROGRAM CATEGORY**  
**FY16 by Quarters**

CAPITAL IMPROVEMENT PROGRAM													
EXPENDITURE FORECAST FY2014-2018													
(\$000)													
	Total Contract Amount	Project Payments Thr. FY14	Balance as of 6/30/14	FY14	FY15	QI FY16	QII FY16	QIII FY16	QIV FY16	FY16	FY17	FY18	5-Year Total FY14-18
<b>Wastewater System Improvements</b>	2,974,567	1,791,690	1,182,877	55,690	71,538	17,799	17,583	22,982	29,745	88,109	108,292	95,716	419,344
<b>Waterworks System Improvements</b>	2,909,436	1,915,649	993,787	40,966	26,293	8,644	6,869	12,303	15,615	43,430	62,919	77,658	251,266
<b>Business &amp; Operations Support</b>	128,393	82,949	45,443	5,507	6,850	2,410	1,181	1,665	3,702	8,958	9,626	9,980	40,922
<b>Total MWRA</b>	6,012,395	3,790,288	2,222,107	102,163	104,680	28,852	25,633	36,950	49,062	140,498	180,837	183,354	711,532
<b>Contingency</b>	153,965		153,965		4,688	1,341	1,289	1,813	3,192	7,635	11,064	11,399	34,786
<b>Total MWRA w/ Contingency</b>	6,166,360	3,790,288	2,376,072	102,163	109,368	30,193	26,922	38,763	52,254	148,133	191,901	194,753	746,318

**Massachusetts Water Resources Authority  
Final FY16 Expenditure Forecast**

Program/Project/Subphase	Contract No.	Notice To Proceed	Substantial Completion	Total Contract Amount	Payments through FY14	Remaining Balance	FY15	FY16	FY17	FY18	FY14 - FY18	FY19-FY23	Beyond FY23
<b>Total MWRA</b>				<b>6,012,395,317</b>	<b>3,790,288,064</b>	<b>2,222,107,252</b>	<b>104,680,414</b>	<b>140,497,933</b>	<b>180,836,564</b>	<b>183,354,195</b>	<b>711,532,304</b>	<b>1,223,762,003</b>	<b>388,976,133</b>
<b>Wastewater</b>				<b>2,974,567,125</b>	<b>1,791,690,217</b>	<b>1,182,876,908</b>	<b>71,537,574</b>	<b>88,109,253</b>	<b>108,291,514</b>	<b>95,715,879</b>	<b>419,343,793</b>	<b>634,898,652</b>	<b>184,324,035</b>
<b>Interception &amp; Pumping</b>				<b>890,031,273</b>	<b>527,413,833</b>	<b>362,617,440</b>	<b>9,547,661</b>	<b>20,101,234</b>	<b>32,215,430</b>	<b>29,285,543</b>	<b>98,023,637</b>	<b>224,869,580</b>	<b>46,597,991</b>
<b>102 Quincy Pump Facilities</b>			<b>completed project</b>	<b>25,907,202</b>	<b>25,907,202</b>	<b>-</b>							
<b>104 Braintree-Weymouth Relief Facilities</b>				<b>232,454,622</b>	<b>227,703,644</b>	<b>4,750,978</b>	<b>977</b>			<b>309,146</b>	<b>309,835</b>	<b>4,440,854</b>	
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	-					(573)		
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	24,629	978	977				1,262		
Mill Cove Siphon Sluice Gates - Design	10479_7326	Jul-17	Dec-18	150,000	-	150,000				75,000	75,000	75,000	
Mill Cove Sluice Gates - Construction	10480_7327	Jul-18	Dec-18	600,000	-	600,000						600,000	
B/W Improvements - Construction	10493_7366	Sep-18	Aug-20	3,200,000	-	3,200,000						3,200,000	
B/W Improvements - Design/CS/RI	19567_9586	Apr-17	Aug-20	800,000	-	800,000				234,146	234,146	565,854	
<b>105 New Neponset Valley Relief Sewer</b>			<b>completed project</b>	<b>30,300,303</b>	<b>30,300,303</b>	<b>-</b>							
<b>106 Wellesley Extension Replacement Sewer</b>			<b>completed project</b>	<b>64,358,543</b>	<b>64,358,543</b>	<b>-</b>							
<b>107 Framingham Extension Relief Sewer</b>			<b>completed project</b>	<b>47,855,986</b>	<b>47,855,986</b>	<b>-</b>							
<b>127 Cummingsville Replacement Sewer</b>			<b>completed project</b>	<b>8,998,768</b>	<b>8,998,768</b>	<b>-</b>							
<b>130 Siphon Structure Rehabilitation</b>				<b>6,634,725</b>	<b>939,770</b>	<b>5,694,955</b>						<b>5,694,954</b>	
Planning	10253_6017	Jan-96	Nov-98	937,670	937,670	-							
Land Acquisition	10280_6165	Jul-19	Jun-20	50,000	2,100	47,900						47,900	
Design/CS/RI	10293_6224	Jul-18	Jun-22	1,369,266	-	1,369,266						1,369,266	
Construction	10294_6225	Jul-20	Jun-21	4,277,788	-	4,277,788						4,277,788	
<b>131 Upper Neponset Valley Sewer System</b>			<b>completed project</b>	<b>54,174,078</b>	<b>54,174,078</b>	<b>-</b>							

**Massachusetts Water Resources Authority  
Final FY16 Expenditure Forecast**

Program/Project/Subphase	Contract No.	Notice To Proceed	Substantial Completion	Total Contract Amount	Payments through FY14	Remaining Balance	FY15	FY16	FY17	FY18	FY14 - FY18	FY19-FY23	Beyond FY23
<b>132 Corrosion &amp; Odor Control</b>				<b>19,781,890</b>	<b>3,001,406</b>	<b>16,780,484</b>		<b>87,500</b>	<b>182,882</b>	<b>272,121</b>	<b>542,503</b>	<b>16,237,981</b>	
Planning/Study	10279_6137	Jan-97	Dec-98	587,422	587,422	-							
Land Acquisition	10323_6549	Aug-02	Jun-05	3,341	3,341	-							
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 Tunnel Rehab - Construction	10405_6918	Jul-19	Jun-20	6,800,000	-	6,800,000						6,800,000	
FES/FERS Biofilters - Design	10406_6919	Jul-18	Apr-21	1,136,634	-	1,136,634						1,136,634	
FES Tunnel Rehab - Design/CS/RI	10453_7196	Jul-18	Jun-21	1,700,000	-	1,700,000						1,700,000	
FES/FERS Biofilters - Construction	10456_7215	Apr-19	Apr-20	1,768,472	-	1,768,472						1,768,472	
System-wide Odor Control - Study	10491_7364	Jul-18	Jul-20	1,000,000	-	1,000,000						1,000,000	
NI System-wide Odor Control - Design ESDC/REI	10492_7365	Feb-17	Dec-21	970,000	-	970,000			32,882	197,288	230,170	739,830	
NI System-wide Odor Control - Evaluation	10495_7494	Sep-15	Sep-16	312,333	-	312,333		87,500	150,000	74,833	312,333		
NI System-wide Odor Control Upgrade - Construction	10496_7495	Jul-18	Dec-20	3,093,045	-	3,093,045						3,093,045	
<b>136 West Roxbury Tunnel</b>				<b>11,313,573</b>	<b>10,313,573</b>	<b>1,000,000</b>						<b>1,000,000</b>	
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-19	Jun-20	1,000,000	-	1,000,000						1,000,000	
<b>137 Wastewater Central Monitoring</b>				<b>27,482,036</b>	<b>19,782,036</b>	<b>7,700,000</b>			<b>150,000</b>	<b>610,000</b>	<b>759,836</b>	<b>2,910,000</b>	<b>4,030,000</b>
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	-							
Wastewater SCADA/PLC Upgrades	10356_6656	Oct-16	Oct-31	7,000,000	-	7,000,000		150,000	470,000	620,000	620,000	2,350,000	4,030,000
Equipment Prepurchase	10398_6861	Apr-05	Dec-09	65,303	65,303	-					(165)		
Wastewater Redundant Communications	10490_7363	Jul-17	Mar-21	700,000	-	700,000				140,000	140,000	560,000	
<b>139 South System Relief Project</b>				<b>4,939,244</b>	<b>3,439,244</b>	<b>1,500,000</b>						<b>1,500,000</b>	
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-19	Dec-20	1,500,000	-	1,500,000						1,500,000	

**Massachusetts Water Resources Authority  
Final FY16 Expenditure Forecast**

Program/Project/Subphase	Contract No.	Notice To Proceed	Substantial Completion	Total Contract Amount	Payments through FY14	Remaining Balance	FY15	FY16	FY17	FY18	FY14 - FY18	FY19-FY23	Beyond FY23
<b>141 Wastewater Process Optimization</b>				<b>10,382,688</b>	<b>1,216,655</b>	<b>9,166,033</b>	<b>220,443</b>	<b>64,688</b>	<b>218,883</b>	<b>875,532</b>	<b>1,391,021</b>	<b>5,816,539</b>	<b>1,969,948</b>
Planning	10367_6733	Aug-01	Aug-04	930,308	930,308	-							
North System Hydraulic Study	10412_6930	Nov-11	Jun-15	571,477	286,346	285,131	220,443	64,688			296,606		
Somerville Sewer - Design	10413_6931	Oct-19	Mar-22	200,000	-	200,000						200,000	
Somerville Sewer - Construction	10414_6932	Mar-21	Mar-22	1,088,879	-	1,088,879						1,088,879	
Siphon - Planning	10415_6933	Nov-18	Jun-19	150,000	-	150,000						150,000	
Hydraulic Flood Engineering - Design & Const. N. System	19401_7412	Jan-17	Jun-25	7,442,023	-	7,442,023			218,883	875,532	1,094,415	4,377,660	1,969,948
<b>142 Wastewater Meter System - Equipment Replace.</b>				<b>27,737,912</b>	<b>5,137,912</b>	<b>22,600,000</b>		<b>358,974</b>	<b>615,385</b>	<b>5,461,539</b>	<b>6,435,898</b>	<b>1,564,102</b>	<b>14,600,000</b>
Planning / Study / Design	10371_6739	Dec-15	Dec-18	2,000,000	-	2,000,000		358,974	615,385	615,385	1,589,744	410,256	
Equipment Purchase & Installation	10379_6793	Nov-03	Jun-08	5,137,912	5,137,912	-							
Design	10410_6928			-	-	-							
Construction	10411_6929	Apr-17	Jun-18	2,000,000	-	2,000,000				1,846,154	1,846,154	153,846	
WW Metering Asset Protection - Equipment Purchases	10451_7191	Jul-17	Jul-29	18,600,000	-	18,600,000				3,000,000	3,000,000	1,000,000	14,600,000
<b>143 Regional I/I Management Planning</b>	<b>completed project</b>			<b>168,987</b>	<b>168,987</b>	<b>-</b>							
<b>145 Facility Asset Protection</b>				<b>311,790,717</b>	<b>24,115,727</b>	<b>287,674,990</b>	<b>9,326,241</b>	<b>19,590,072</b>	<b>31,048,280</b>	<b>21,757,204</b>	<b>88,584,545</b>	<b>179,955,150</b>	<b>25,998,043</b>
Prison Point HVAC Upgrades - Construction	10380_6795	Dec-10	Dec-13	2,912,188	2,912,181	7	7				466,377		
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	Aug-15	Dec-17	10,393,401	-	10,393,401		3,100,000	4,600,000	2,693,401	10,393,401		
Rehab of Section 93A Lexington	10383_6798	Jul-03	Apr-04	1,565,742	1,565,742	-							
Chelsea Creek Upgrades - REI	10387_6802	Dec-15	Jun-19	2,256,046	-	2,256,046		214,861	644,585	644,585	1,504,031	752,015	
Technical Assistance	10392_6829	Jul-02	Mar-22	81,916	47,885	34,031	1,848		8,688	4,344	14,880	19,151	
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	Nov-08	10,204	10,204	-					1,293		
Remote Headworks Concept Plan	10399_6886	May-08	Sep-09	670,436	670,436	-							
Interceptor Renewal 2, Cambridge Branch - Construction	10418_6936	Jan-19	Dec-20	14,404,873	-	14,404,873						14,404,873	
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	452,205	441,387	10,818	10,818						
93A Force Main Replacement	10423_6987	May-06	Jan-07	461,962	461,962	-							
Mill Brook Valley Sewer Section 79 & 92	10424_7004	Jun-04	Mar-05	542,292	542,292	-							
Hingham Pump Station Isolation Gate - Construction	10427_7033	Sep-11	May-12	124,500	124,500	-							
Alewife Brook Pump Station - Final Design/REI	10428_7034	Mar-12	Dec-18	1,739,721	834,067	905,653	60,002	281,348	340,713	203,214	1,094,910	20,376	
Caruso Pump Station Improvements - Design/CA/REI	10431_7037	Aug-12	Mar-18	865,096	399,302	465,794	100,000	171,300	171,300	23,194	641,655		
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	Dec-15	Jun-19	54,815,664	-	54,815,664		8,099,132	18,297,395	9,297,395	35,693,922	19,121,742	
Pump Stations & CSOs Condition Assessment	10446_7162	Jan-17	Jan-19	3,119,058	-	3,119,058			381,960	1,527,840	1,909,800	1,209,258	
Interceptor Renewal 1, Reading Ext. - Design/CA/REI	10447_7163	May-15	Mar-19	989,774	-	989,774	20,000	340,000	340,000	250,000	950,000	39,774	
Interceptor Renewal 1, Reading Ext. Sewer - Construction	10448_7164	Dec-16	Mar-18	3,640,221	-	3,640,221			2,399,999	1,240,221	3,640,220		
Chelsea Creek Upgrades - Design/CA	10455_7206	Jul-10	Jun-20	7,889,631	3,433,989	4,455,642	1,603,500	806,000	682,000	682,000	4,916,276	682,142	
Malden & Melrose Hydraulics & Structural - Study/Design	10457_7216	Jan-19	Dec-19	300,000	-	300,000						300,000	
Malden & Melrose Hydraulics & Structural - Construction	10458_7217	Jul-20	Jul-22	1,000,000	-	1,000,000						1,000,000	
Nut Island Fire Pump Building - Study	10459_7218	Jul-16	Sep-17	300,000	-	300,000		240,000	60,000		300,000		
NI Mechanical & Electrical Replacements	10460_7219	Jul-16	Jun-19	3,000,000	-	3,000,000			750,000	1,000,000	1,750,000	1,250,000	
Headworks Effluent Shaft - Study	10463_7237	Jul-16	Jul-18	500,000	-	500,000			187,500	250,000	437,500	62,500	
Interceptor Renewal 3, Dorchester Intercep. Sewer-Const.	10467_7279	Jul-21	Jun-23	3,973,041	-	3,973,041						3,406,143	566,897
Interceptor Renewal 4, Everett Sections 23 & 24 - Const.	10468_7280	Sep-24	Dec-25	3,000,000	-	3,000,000							3,000,000
Cottage Farm Fuel System Upgrade	10469_7281	Jun-12	Apr-13	497,558	497,558	-							
NI Electrical & Grit/Sreens Conveyance - Design	10477_7312	Mar-11	May-16	1,249,477	808,843	440,634	359,972	77,662	3,000		626,326		
NI Electrical & Grit/Sreens Conveyance - Construction	10478_7313	Jul-13	May-15	5,278,130	2,734,558	2,543,573	2,478,174	65,399			5,278,130		
Interceptor Renewal No. 5 - Milton Sec. 607, 609, 610	10481_7328	Sep-27	Dec-28	4,000,000	-	4,000,000							4,000,000
Interceptor Renewal No. 6 - Chelsea Sec. 12, 14, 15, 62	10482_7329	Sep-30	Dec-31	11,000,000	-	11,000,000							11,000,000
Prison Pt./C.F. Pump & Gearbox Rebuilds -ESDC	10483_7330	Feb-14	Jul-16	361,988	98,323	263,665	179,947	66,974	16,744		361,987		

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Somerville/Marginal Influent Gates Replacement	10484_7344	Jul-11	Nov-11	366,848	366,848	-							
Prison Point/Cottage Farm - Design/CA/RI	10486_7359	Jul-16	Mar-21	1,115,923	-	1,115,923			173,333	208,000	381,333	734,590	
System Relief & Contingency Planning	10487_7360	Jul-20	Jun-23	500,000	-	500,000						458,334	41,666
Caruso Pump Station Improvements - Construction	10489_7362	Dec-15	Mar-17	2,926,359	-	2,926,359		1,920,543	1,005,816		2,926,359		
Pump Station Rehab - Preliminary Design/Study	10500_7375	Jul-19	Jul-20	750,000	-	750,000						750,000	
Cottage Farm Construction 1 (PCB)	10501_7389	Jul-17	Jul-18	2,146,006	-	2,146,006				1,609,503	1,609,503	536,503	
Cottage Farm PCB Abatement - Design/CA	10502_7392	Jul-16	Jul-19	536,502	-	536,502			134,126	178,836	312,962	223,541	
Section 156 Rehab - Design/Build	10503_7393	Jul-11	Jul-12	2,562,778	2,562,773	5	5				5		
Interceptor Renewal 2, Cambridge Br. - Design/CA/REI	10504_7410	Jan-17	Dec-21	3,016,183	-	3,016,183			147,761	591,043	738,804	2,277,379	
Sections 4,5,6 North Metropolitan Sewer - Design CS/RI	10505_7421	Jul-18	Jul-23	2,400,000	-	2,400,000						2,280,000	120,000
Sections 4,5,6 North Metropolitan Sewer - Construction	10506_7422	Jul-20	Jul-22	12,000,000	-	12,000,000						12,000,000	
Rehab of Sections 186 & 4 Construction	10507_7423	Aug-18	Jul-19	3,751,454	-	3,751,454						3,751,454	
Ward St. & Columbus Park Headworks - Design/CA/REI	10510_7429	Dec-16	Jun-24	10,265,009	-	10,265,009			451,209	1,353,628	1,804,837	6,768,140	1,692,032
Ward St. & Columbus Park Headworks - Construction	10511_7430	Jan-19	Jun-23	100,394,047	-	100,394,047						94,816,599	5,577,448
Chelsea Screenhouse Upgrades	10512_7431	Jun-15	Jun-16	3,608,553	-	3,608,553		3,608,553			3,608,553		
Prison Pt./Cott. Farm Engine Pump & Gearbox Rebuilds	10515_7452	Oct-13	Jul-15	6,510,131	1,859,060	4,651,071	4,511,968	139,103			6,510,131		
Prison Point Piping Rehab	10518_7459	Oct-15	Jun-16	350,493	-	350,493		233,662	116,831		350,493		
Prison Point Rehab - Construction	10519_7462	Jul-18	Mar-20	5,579,616	-	5,579,616						5,579,616	
Cottage Farm Rehab - Construction	10520_7463	Oct-18	Jul-20	7,511,021	-	7,511,021						7,511,021	
Chelsea Screenhouse - ESDC/REI	10521_7490	Jun-15	Jun-17	360,855	-	360,855		225,535	135,320		360,855		
<b>146 D.I. Cross Harbor Tunnel</b>				<b>5,000,000</b>	<b>-</b>	<b>5,000,000</b>						<b>5,000,000</b>	
Tunnel Shaft Repairs - Planning/Design/Construction	10454_7199	Jul-18	Jun-20	5,000,000	-	5,000,000						5,000,000	
<b>147 Randolph Trunk Sewer Relief</b>				<b>750,000</b>	<b>-</b>	<b>750,000</b>						<b>750,000</b>	
Study	10461_7220	Jul-18	Jun-20	750,000	-	750,000						750,000	
<b>Treatment</b>				<b>775,572,590</b>	<b>213,805,783</b>	<b>561,766,807</b>	<b>21,455,942</b>	<b>37,566,920</b>	<b>50,189,164</b>	<b>45,698,838</b>	<b>183,993,877</b>	<b>352,082,969</b>	<b>54,772,976</b>
<b>182 DI Primary and Secondary Treatment</b>	<b>completed project</b>			<b>(957,878)</b>	<b>(957,878)</b>	<b>-</b>							
<b>200 DI Plant Optimization</b>	<b>completed project</b>			<b>33,426,679</b>	<b>33,426,679</b>	<b>-</b>							
<b>206 DI Treatment Plant Asset Protection</b>				<b>720,365,098</b>	<b>176,308,421</b>	<b>544,056,676</b>	<b>19,640,864</b>	<b>34,960,571</b>	<b>43,246,572</b>	<b>43,854,861</b>	<b>170,510,713</b>	<b>347,938,363</b>	<b>54,415,448</b>
DITP Roof Replacements	18045_6196	Jun-10	Jun-11	2,299,881	2,299,881	-							
DISC Application	19162_6241			125,077	125,077	-							
Pump Packing Replacement	19176_6422	Sep-03	Jun-08	732,447	732,447	-							
Deminerlizer Construction	19177_6423	Jul-00	Dec-00	50,527	50,527	-							
Equipment Replacement Projection	19182_6478	Jul-18	Jun-23	25,000,000	-	25,000,000						25,000,000	
Ancillary Modifications - Construction 4	19188_6538	Oct-18	Oct-21	11,638,890	-	11,638,890						11,638,890	
Equipment Condition Monitoring	19193_6594	May-04	Jan-05	1,776,946	1,776,946	-							
NMPS & WTF ESDC/REI	19194_6598	Dec-14	Jun-17	2,299,946	-	2,299,946	224,663	595,000	766,649	713,634	2,299,946		
Expansion Joint Repair - Design	19204_6668	Apr-99	Oct-04	149,421	-	149,421							
Expansion Joint Repair - Construction 1	19205_6669	Aug-02	Nov-03	304,726	304,726	-							
Expansion Joint Repair - Construction 2	19217_6704	Aug-12	Feb-14	1,893,500	1,893,500	-					1,207,968		
Expansion Joint Repair - Construction 3	19218_6705	May-17	May-19	1,929,706	-	1,929,706				964,853	964,853	964,853	
As-needed Design Phase 6-1	19220_6721	May-09	Oct-12	1,918,433	1,918,433	-							
As-needed Design Phase 6-2	19221_6722	May-09	Aug-12	1,743,843	1,743,843	-							
Eastern Seawall Design - 1	19222_6723	Jan-17	Jan-20	643,235	-	643,235		107,206	214,412	321,618	321,618	321,617	
Eastern Seawall Construction - 1	19223_6724	Jan-19	Jan-20	3,752,207	-	3,752,207						3,752,207	
Digester Gas Flare No. 4 - Design	19227_6728	Jul-17	Jul-19	519,843	-	519,843				259,921	259,921	259,922	
Digester Gas Flare No. 4 - Construction	19228_6729	Jul-18	Jul-19	1,143,655	-	1,143,655						1,143,655	
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	-							

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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-17	145,275	68,110	77,165		38,582	38,583		89,577		
Outfall Modification - Inspection	19243_6811	Dec-01	Jul-02	173,500	173,500	-							
Secondary Clarifier Access	19244_6812	Sep-01	Jul-02	274,874	274,874	-							
Transformer Replacement	19245_6813			1,703,072	1,703,072	-							
DSL Pump Replacement - Phase 2	19246_6821	Oct-15	Oct-17	4,659,000	-	4,659,000		1,582,375	1,829,500	1,247,125	4,659,000		
Co-Digestion Design/Build	19247_6822	Mar-17	Sep-18	5,000,000	-	5,000,000			1,277,778	2,333,333	3,611,111	1,388,889	
Reline Hypochlorite Tanks 2 & 4	19250_6849	Apr-08	Oct-08	2,241,692	2,241,692	-							
Chemical Pipe Replacement - Design	19252_6851	Jun-18	Jun-21	623,812	-	623,812						623,812	
Chemical Pipe Replacement - Construction	19253_6852	Jun-19	Jun-21	2,074,202	-	2,074,202						2,074,202	
Sodium Hypochlorite Pipe Replacement - Design	19254_6853	Sep-16	Oct-20	1,800,000	-	1,800,000			450,000	450,000	900,000	900,000	
Sodium Hypochlorite Pipe Replacement - Construction	19255_6854	Apr-18	Oct-19	4,000,000	-	4,000,000						4,000,000	
Electrical Equipment Upgrades - Construction 3	19256_6855	Feb-08	Aug-11	15,173,750	15,173,750	-							
WTF VFD Replacement - Construction	19258_6875	Sep-15	Sep-17	4,159,788	-	4,159,788		1,866,622	1,579,894	713,272	4,159,788		
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	3,175,694	932,451	2,243,243		1,301,622	941,621		2,243,243		
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	Dec-17	1,302,198	1,041,287	260,911	172,424	71,321	17,166		370,369		
Primary & Secondary Clarifier Rehab - Construction	19268_6899	Feb-09	Feb-12	56,786,629	56,786,629	-							
Electrical Equipment Upgrades - Construction 4	19270_6901	May-13	May-16	10,923,310	3,747,372	7,175,938	720,494	4,227,736	2,227,708		10,923,310		
NMPS VFD Replacement - Design/ESDC	19271_6902	Dec-07	Apr-12	1,275,969	1,275,969	-							
NMPS VFD Replacement - Construction	19272_6903	Dec-11	Mar-16	24,414,520	16,982,350	7,432,170	3,674,934	3,757,236			17,868,456		
Fire Alarm System Replacement - Design	19273_6904	Jun-15	May-20	2,100,000	-	2,100,000		583,333	466,667	291,667	1,341,667	758,333	
Combined Heat & Power - Design	19274_6963	Jan-16	Jul-22	6,000,000	-	6,000,000		750,000	1,750,000	500,000	3,000,000	3,000,000	
Combined Heat & Power - Construction	19275_6964	Jul-18	Jul-22	83,000,000	-	83,000,000						83,000,000	
Primary & Second Clarifier Rehab - Design	19276_6965	Mar-09	Sep-13	1,677,666	1,677,666	-					(13,326)		
Gravity Thickener Improvements - Construction	19277_6966	Apr-10	Jun-12	733,118	733,118	-							
STG System Modifications - Design	19278_6967	Jun-09	Apr-11	405,732	405,732	-							
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	-					3,451		
STG System Modifications - Construction	19284_6973	May-10	Apr-11	2,569,673	2,569,673	-							
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	May-17	May-20	16,000,000	-	16,000,000				4,444,444	4,444,444	11,555,556	
Digester & Storage Tank Rehab - Design/ESDC	19290_7052	Oct-16	Jun-21	3,000,000	-	3,000,000			750,000	750,000	1,500,000	1,500,000	
Thickened Primary Sludge Pump Replacement Constructio	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	7,043,305	53,029	53,030				1,203,504		
Centrifuge Backdrive Replacement	19295_7057	Feb-13	Mar-15	3,964,870	1,833,071	2,131,799	2,131,800				3,643,953		
Switchgear Replacement - Design	19296_7058	Jun-16	Nov-19	1,608,089	-	1,608,089		670,037		268,014	938,051	670,037	
Switchgear Replacement - Construction	19297_7059	Nov-17	Nov-19	4,497,068	-	4,497,068				749,511	749,511	3,747,557	
Power Consultant Recommendations - Design	19298_7060	Jan-06	Jul-09	2,097,404	2,097,404	-							
Power System Improvements - Construction	19299_7061	Jan-09	Sep-17	9,722,664	5,422,658	4,300,006		1,575,000	1,900,000	825,006	4,300,006		
NMPS VFD Replacement - REI	19300_7062	Dec-12	Jun-16	1,321,624	322,192	999,432	231,546	252,000	515,887		1,278,868		
Heat Loop Pipe Replacement - Construction 3	19301_7063	Jun-09	Jun-11	11,435,558	11,338,800	96,758	96,758				96,758		
Ancillary Modifications - Final Design 4	19303_7088	Apr-16	Oct-21	4,288,236	-	4,288,236		178,677	1,965,441		2,144,118	2,144,118	
Sodium Hypochlorited 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	-							
TPP Fuel System Modifications - REI	19307_7094	Sep-15	Sep-17	800,000	-	800,000		200,000	400,000	200,000	800,000		
HVAC Equipment Replacement - Design/ESDC	19309_7111	Mar-14	Oct-20	1,957,522	333,946	1,623,576	288,751	356,065	209,734	279,646	1,468,142	489,381	
HVAC Equipment Replacement - Construction	19310_7110	Sep-16	Mar-20	17,100,600	-	17,100,600			4,664,414	3,885,886	8,550,300	8,550,300	
Deer Island As-needed Technical Design	19311_7121	Dec-18	Dec-25	16,250,000	-	16,250,000						10,446,430	5,803,570
Digester Sludge Pump Replacement - Construction	19313_7123	Oct-09	Dec-14	2,122,299	1,549,124	573,174	573,175				615,795		
Electrical Equipment Upgrades - Phase 5	19314_7124	Dec-18	Jun-26	23,161,875	-	23,161,875						12,980,830	10,181,045
Future SSPS VFD Replacements - Design	19316_7126	Jul-17	Nov-20	4,800,000	-	4,800,000				1,800,000	1,800,000	3,000,000	



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Future SSPS VFD Replacements - Construction	19317_7127	Nov-18	Nov-20	19,200,000	-	19,200,000						19,200,000	
Future NMPS VFD Replacements - Design	19318_7128	Jun-21	Sep-24	4,420,000	-	4,420,000						2,762,500	1,657,500
Future NMPS VFD Replacements - Construction	19319_7129	Sep-22	Sep-24	17,680,000	-	17,680,000						4,420,000	13,260,000
Future Misc. VFD Replacements - Construction	19321_7131	May-17	May-20	5,334,000	-	5,334,000				1,481,667	1,481,667	3,852,333	
DI Switchgear Replacement - Design	19322_7132	Jul-18	Jul-22	4,500,000	-	4,500,000						4,500,000	
DI Switchgear Replacement - Construction	19323_7133	Jul-20	Jul-22	16,000,000	-	16,000,000						16,000,000	
DI PICS Replacement - Construction	19324_7134	Feb-21	Feb-23	5,400,000	-	5,400,000						5,400,000	
DI Dystor Membrane Replacements	19325_7135	Jul-16	Nov-16	3,000,000	-	3,000,000			1,200,000			1,200,000	1,800,000
DI CTG Rebuilds	19326_7136	Jul-18	Jul-21	6,000,000	-	6,000,000						6,000,000	
DI Centrifuge Replacements - Design	19327_7137	Dec-18	Jul-23	4,160,000	-	4,160,000						953,333	3,206,667
DI Centrifuge Replacements - Construction	19328_7138	Jul-21	Jul-23	16,640,000	-	16,640,000						3,466,667	13,173,333
Cryogenics Plant Equipment Replacement - Design	19329_7139	Dec-18	Oct-21	1,600,000	-	1,600,000						1,600,000	
Cryogenics Plant Equipment Replacement - Construction	19330_7140	Apr-20	Oct-21	5,300,000	-	5,300,000						5,300,000	
Future Sodium Hypochlorite Tank Rehab	19332_7142	Jul-20	Jul-24	10,000,000	-	10,000,000						6,666,667	3,333,333
Barge Berth and Facility Replacement	19334_7168	Oct-15	Apr-19	2,264,750	-	2,264,750		750,000				750,000	1,514,750
South System Pump Station Lube System Replacement	19335_7169	Jul-18	Jul-20	2,900,000	-	2,900,000						2,900,000	
East/West Odor Control Air Handler Replacement	19336_7170	Jun-25	Jun-30	2,000,000	-	2,000,000							2,000,000
PICS Distributed Process Units Replacement	19338_7172	Feb-21	Feb-23	8,000,000	-	8,000,000						8,000,000	
NMPS & WTF Butterfly Valve Replacement	19339_7275	Jun-14	Jun-17	17,060,425	250,000	16,810,425	743,794	4,500,000	5,153,475	6,413,156	17,060,425		
Digester & Storage Tank Rehab - Construction	19345_7373	Jun-18	Jun-21	21,700,000	-	21,700,000						21,700,000	
Clarifier W3H Flushing System	19346_7374	Jul-12	Jul-13	1,262,406	1,262,406	-						48,612	
Clarifier Rehab Phase 2 - Design	19347_7394	Jan-15	Oct-21	2,237,401	-	2,237,401	213,182	645,900	592,075	205,921	1,657,078	580,323	
Clarifier Rehab Phase 2 - Construction	19348_7395	Apr-17	Oct-20	35,000,000	-	35,000,000			2,000,000	7,166,667	9,166,667	25,833,333	
Scum Skimmer Replacement	19349_7396	Oct-13	Oct-16	20,224,820	6,894,493	13,330,327	8,740,719	4,589,608				20,224,820	
Clarifier Rehab Phase 2 - REI	19351_7397	Apr-17	Oct-20	1,500,000	-	1,500,000				392,857	392,857	1,107,143	
Cryogenics Chillers Replacement	19352_7398	Oct-14	Oct-16	3,235,800	-	3,235,800	488,969	1,772,800	974,031			3,235,800	
As-Needed Design 7-1	19353_7399	Oct-12	Oct-15	1,500,000	1,082,881	417,119	388,426	28,694				1,047,669	
As-Needed Design 7-2	19354_7400	Oct-12	Oct-15	1,500,000	646,457	853,543	184,067	669,476				1,203,507	
TPP Boiler Controls Replacement	19355_7401	Nov-14	Nov-16	1,691,952	-	1,691,952	104,464	1,587,488				1,691,952	
NMPS Harmonic Filter Replacement	19557_7414	May-18	May-20	3,000,000	-	3,000,000						3,000,000	
Fuel Pipe Abandonment	19558_7415	Aug-12	Jan-13	230,000	230,000	-							
Electrical Equipment Upgrades 4 - REI	19559_7416	May-14	Aug-16	1,039,371	16,900	1,022,471	287,587	276,000	458,884			1,039,371	
NMPS Motor Control Ctr. Phase 2 - Design/ESDC/REI	19560_7419	Jul-16	Apr-20	2,000,000	-	2,000,000			500,000	500,000	1,000,000	1,000,000	
NMPS Motor Control Center Phase 2 - Construction	19561_7420	Apr-18	Apr-20	6,085,725	-	6,085,725						6,085,725	
Roof Replacement Phase 3	19562_7424	Sep-13	Jul-14	610,500	560,460	50,040	50,040					610,500	
Fire System Replacement - REI	19563_7426	May-17	May-20	1,800,000	-	1,800,000				500,000	500,000	1,300,000	
Gravity Thickener Center Column Replacement	19564_7427	Jan-13	Jan-14	825,457	825,457	-						537,657	
Gravity Thickener Rehab	19565_7428	Dec-15	Dec-17	5,786,060	-	5,786,060		1,150,000	3,393,030	1,243,030		5,786,060	
As-Needed Design 7-3	19566_7434	Oct-12	Oct-15	1,500,000	326,438	1,173,562	263,526	910,035				1,445,208	
As-Needed Design 8-1	19600_7501	Nov-15	Nov-18	1,600,000	-	1,600,000		165,000	540,000	600,000	1,305,000	295,000	
As-Needed Design 8-2	19601_7502	Nov-15	Nov-18	1,600,000	-	1,600,000		165,000	540,000	600,000	1,305,000	295,000	
As-Needed Design 8-3	19602_7503	Nov-15	Nov-18	1,490,000	-	1,490,000		165,000	430,000	600,000	1,195,000	295,000	
Co-Digestion Temporary Facilities	26073_7148	Sep-13	Sep-16	2,300,000	425,316	1,874,684	8,516	250,000	1,616,168			2,300,000	
Sodium Bisulfite & Hypochlorite Tanks Rehab	40256_7449	Jun-16	Jan-18	6,581,463	-	6,581,463			3,320,624	3,260,839		6,581,463	

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<b>210 Clinton Wastewater Treatment Plant</b>				<b>20,511,018</b>	<b>2,800,886</b>	<b>17,710,131</b>	<b>1,815,078</b>	<b>2,606,349</b>	<b>6,942,592</b>	<b>1,843,977</b>	<b>13,483,163</b>	<b>4,144,606</b>	<b>357,528</b>
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	4,954,756	110,133	4,844,623	1,763,929	1,586,509	1,494,185		4,866,156		
Clinton Aeration Efficiency Improvement	19342_7278	Apr-12	Feb-13	1,864,562	1,864,561	-					(12,283)		
Clinton WWTP Influent Gates	19343_7371			-	8,803	(8,803)	(8,803)						
Phosphorus Removal - Design/ESDC	19350_7377	Nov-13	Aug-18	1,212,860	257,113	955,746	59,952	240,000	414,000	30,000	1,001,066	211,794	
Phosphorus Removal - Construction	19400_7411	Feb-16	Aug-17	7,091,932	-	7,091,932		550,000	4,727,955	1,813,977	7,091,932		
Clinton Roofing Rehab	19405_7450	Dec-15	Dec-16	536,293	-	536,293		229,840	306,452		536,292		
Clinton Facilities Rehab	19406_7451	Sep-18	Sep-23	4,290,340	-	4,290,340						3,932,812	357,528
<b>211 Laboratory Services</b>		<b>completed project</b>		<b>2,227,674</b>	<b>2,227,674</b>	<b>-</b>							
<b>Residuals</b>				<b>167,642,622</b>	<b>64,642,623</b>	<b>103,000,000</b>	<b>-</b>	<b>-</b>	<b>2,868,000</b>	<b>1,595,500</b>	<b>4,570,307</b>	<b>8,469,507</b>	<b>90,066,993</b>
<b>261 Residuals</b>		<b>completed project</b>		<b>63,810,848</b>	<b>63,810,848</b>	<b>-</b>							
<b>271 Residuals Asset Protection</b>				<b>103,831,775</b>	<b>831,775</b>	<b>103,000,000</b>			<b>2,868,000</b>	<b>1,595,500</b>	<b>4,570,307</b>	<b>8,469,507</b>	<b>90,066,993</b>
Residual Facility Plan / EIR	26069_7143	Jan-20	Jan-25	1,000,000	-	1,000,000						666,667	333,333
Residuals Facility Upgrade - Design	26070_7145	Jul-17	Dec-24	2,000,000	-	2,000,000				625,000	625,000	1,166,667	208,333
Residuals Facility Upgrade - Construction	26071_7146	Jul-16	Dec-24	10,000,000	-	10,000,000			2,868,000	970,500	3,838,500	5,073,673	1,087,827
Condition Assessment/Technology & Regulatory Review	26072_7147	May-09	Jan-14	831,775	831,775	-					106,807		
Residuals Phase 2 - Design	26074_7149	Jul-22	Jan-32	15,000,000	-	15,000,000						1,562,500	13,437,500
Residuals Phase 2 - Construction	26075_7150	Jan-24	Jan-32	75,000,000	-	75,000,000							75,000,000
<b>CSO</b>				<b>898,454,777</b>	<b>853,284,951</b>	<b>45,169,826</b>	<b>23,327,072</b>	<b>13,228,016</b>	<b>4,106,801</b>	<b>1,506,630</b>	<b>57,747,155</b>	<b>3,001,304</b>	<b>-</b>
<b>MWRA Managed</b>				<b>433,759,856</b>	<b>430,576,324</b>	<b>3,183,532</b>	<b>2,391,000</b>	<b>786,531</b>	<b>6,000</b>	<b>-</b>	<b>3,881,389</b>	<b>-</b>	<b>-</b>
<b>339 North Dorchester Bay</b>				<b>221,597,299</b>	<b>221,601,931</b>	<b>(4,632)</b>	<b>(4,632)</b>				<b>(23,295)</b>		
North Dorchester Outfall-Design/CA/RI	10426_7032	Mar-11	May-13	422,197	424,718	(2,522)	(2,521)						
Tunnel - Design/ESDC	32660_6220	Aug-97	Aug-12	23,035,137	23,037,248	(2,111)	(2,111)				(14,199)		
Tunnel - Construction (Ch30)	32661_6244	Aug-06	Nov-09	147,511,347	147,511,347	-							
Dewatering Pump Station & Sewers-Con	32662_6245	Apr-09	Apr-11	27,144,169	27,144,169	-							
Tunnel & Facilities - CM Services	32726_6993	Oct-05	Oct-12	9,031,711	9,031,711	-					(9,096)		
Pleasure Bay - Construction	32732_7012	Sep-05	May-06	3,194,885	3,194,885	-							
Design/ESDC/Facilities	32733_7013	Nov-06	Jul-12	4,784,696	4,784,696	-							
Tunnel Rescue/Emergency Response	32744_7103	Mar-07	Dec-09	793,354	793,354	-							
Ventilation Building - Construction	32745_7259	Dec-09	May-11	5,462,321	5,462,321	-							
Communication Systems	32746_7345	Jul-10	May-11	217,482	217,482	-							
<b>347 East Boston Branch Sewer Relief</b>		<b>completed project</b>		<b>85,637,164</b>	<b>85,637,164</b>	<b>-</b>					<b>(8,831)</b>		
<b>348 BOS019 Storage Conduit</b>		<b>completed project</b>		<b>14,287,581</b>	<b>14,287,581</b>	<b>-</b>							
<b>349 Chelsea Trunk Sewer</b>		<b>completed project</b>		<b>29,779,319</b>	<b>29,779,319</b>	<b>-</b>							
<b>350 Union Park Detention Treatment Facility</b>		<b>completed project</b>		<b>49,583,406</b>	<b>49,583,406</b>	<b>-</b>							
<b>353 Upgrade Existing CSO Facilities</b>		<b>completed project</b>		<b>22,385,200</b>	<b>22,385,200</b>	<b>-</b>							

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<b>354 Hydraulic Relief Projects</b>	<b>completed project</b>			<b>2,294,549</b>	<b>2,294,549</b>	<b>-</b>							
<b>355 MWR003 Gate &amp; Siphon</b>				<b>4,562,261</b>	<b>1,374,097</b>	<b>3,188,164</b>	<b>2,395,632</b>	<b>786,531</b>	<b>6,000</b>		<b>3,913,516</b>		
Design	32722_6952	Mar-12	Sep-16	1,651,643	1,138,130	513,513	235,981	271,531	6,000		1,002,898		
Construction 1	32723_6953	Sep-13	Jan-14	235,783	235,783	-					235,783		
Construction 2	32755_7409	Aug-14	Oct-15	2,674,835	184	2,674,651	2,159,651	515,000			2,674,835		
<b>357 Charles River CSO Controls</b>	<b>completed project</b>			<b>3,633,077</b>	<b>3,633,077</b>	<b>-</b>							
<b>CSO Community Managed</b>				<b>414,446,801</b>	<b>374,520,110</b>	<b>39,926,691</b>	<b>20,922,997</b>	<b>12,423,485</b>	<b>4,094,801</b>	<b>745,767</b>	<b>54,243,723</b>	<b>1,739,639</b>	<b>-</b>
<b>340 Dorchester Bay Sewer Separation (Fox Point)</b>	<b>completed project</b>			<b>54,625,590</b>	<b>54,625,590</b>	<b>-</b>					<b>473,295</b>		
<b>341 Dorchester Bay Sewer Sep. (Commercial Point)</b>				<b>64,173,625</b>	<b>60,322,568</b>	<b>3,851,057</b>	<b>219,884</b>	<b>400,000</b>	<b>745,767</b>	<b>745,767</b>	<b>1,286,836</b>	<b>1,739,639</b>	
Design	32650_6154	Jun-96	Jun-16	17,692,322	16,642,551	1,049,770	170,827	(150,000)	195,321	195,321	416,285	638,302	
Construction	32665_6248	Apr-99	Jun-16	46,481,303	43,680,017	2,801,287	49,057	550,000	550,446	550,446	870,551	1,101,337	
<b>342 Neponset River Sewer Separation</b>	<b>completed project</b>			<b>2,549,086</b>	<b>2,549,086</b>	<b>-</b>					<b>104,692</b>		
<b>343 Constitution Beach Sewer Separation</b>	<b>completed project</b>			<b>3,731,315</b>	<b>3,731,315</b>	<b>-</b>					<b>(37,573)</b>		
<b>344 Stony Brook Sewer Separation</b>	<b>completed project</b>			<b>44,246,462</b>	<b>44,246,462</b>	<b>-</b>					<b>48,079</b>		
<b>346 Cambridge Sewer Separation</b>				<b>92,562,714</b>	<b>63,493,803</b>	<b>29,068,911</b>	<b>15,910,978</b>	<b>10,430,000</b>	<b>2,727,934</b>		<b>42,078,510</b>		
Design/CS/RI	32654_6161	Jan-97	Jun-16	30,329,064	23,958,960	6,370,104	3,845,983	1,570,000	954,121		9,093,717		
Construction	32672_6255	Jul-98	Dec-15	62,233,650	39,534,842	22,698,808	12,064,994	8,860,000	1,773,813		32,984,793		
<b>351 BWSC Floatables Controls</b>	<b>completed project</b>			<b>945,936</b>	<b>945,936</b>	<b>-</b>	<b>1</b>				<b>12,957</b>		
<b>352 Cambridge Floatables Controls</b>				<b>1,126,708</b>	<b>1,086,925</b>	<b>39,783</b>	<b>39,783</b>				<b>39,783</b>		
Design	32655_6162	Jan-97	Nov-10	468,069	428,286	39,783	39,783				39,783		
Construction	32684_6267	Oct-02	Dec-08	658,639	658,639	-					-		
<b>356 Fort Point Channel Sewer Separation</b>	<b>completed project</b>			<b>11,917,090</b>	<b>11,917,090</b>	<b>-</b>					<b>(89,619)</b>		
<b>358 Morrissey Boulevard Drain</b>				<b>32,185,790</b>	<b>32,188,262</b>	<b>(2,472)</b>		<b>(2,472)</b>			<b>(160,999)</b>		
Construction	32713_6696	Dec-06	Jun-09	28,320,841	28,320,840	1		-			194		
Design	32735_7015	Jun-05	Jun-13	3,864,949	3,867,422	(2,473)		(2,473)			(161,193)		
<b>359 Reserved Channel Sewer Separation</b>				<b>72,612,534</b>	<b>64,361,307</b>	<b>8,251,228</b>	<b>6,034,170</b>	<b>1,595,958</b>	<b>621,100</b>		<b>12,572,633</b>		
Construction	32727_6994	May-09	Dec-15	57,185,343	50,483,876	6,701,467	5,524,966	722,881	453,620		9,776,799		
Design	32734_7014	Jul-06	Jun-16	15,427,191	13,877,430	1,549,761	509,204	873,077	167,480		2,795,834		
<b>360 Brookline Sewer Separation</b>				<b>24,715,545</b>	<b>25,997,364</b>	<b>(1,281,819)</b>	<b>(1,281,819)</b>				<b>(1,281,819)</b>		
Design/CS/RI	32736_7076	Nov-06	Jul-14	4,967,938	5,342,000	(374,062)	(374,062)				(374,062)		
Construction	32737_7077	Nov-08	Sep-13	19,747,607	20,655,364	(907,757)	(907,757)				(907,757)		
<b>361 Bulfinch Triangle Sewer Separation</b>	<b>completed project</b>			<b>9,054,405</b>	<b>9,054,405</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>(803,052)</b>		

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<b>CSO Planning &amp; Support</b>				<b>50,248,120</b>	<b>48,188,517</b>	<b>2,059,603</b>	<b>13,075</b>	<b>18,000</b>	<b>6,000</b>	<b>760,863</b>	<b>(377,957)</b>	<b>1,261,665</b>	<b>-</b>
<b>324 CSO Support</b>				<b>50,248,120</b>	<b>48,188,517</b>	<b>2,059,603</b>	<b>13,075</b>	<b>18,000</b>	<b>6,000</b>	<b>760,863</b>	<b>(377,957)</b>	<b>1,261,665</b>	
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	-					(1,183,721)		
Watershed Planning	32645_6036	Dec-94	Apr-01	877,134	877,134	-							
Technical Review	32648_6150	Jul-96	Dec-20	2,278,585	528,932	1,749,653				500,000	500,000	1,249,653	
Land Acquisition/Easement	32658_6169	Jul-96	Jun-20	12,875,388	12,820,301	55,087	13,075	18,000	6,000	6,000	50,901	12,012	
System Assessment	32691_6372	May-97	Dec-20	323,500	68,637	254,863				254,863	254,863		
<b>Other Wastewater</b>				<b>242,865,861</b>	<b>132,543,027</b>	<b>110,322,835</b>	<b>17,206,899</b>	<b>17,213,083</b>	<b>18,912,120</b>	<b>17,629,369</b>	<b>75,008,817</b>	<b>46,475,291</b>	<b>(7,113,925)</b>
<b>128 I/I Local Financial Assistance</b>				<b>242,584,985</b>	<b>132,262,151</b>	<b>110,322,835</b>	<b>17,206,899</b>	<b>17,213,083</b>	<b>18,912,120</b>	<b>17,629,369</b>	<b>75,008,817</b>	<b>46,475,291</b>	<b>(7,113,925)</b>
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)	(42,078,422)	(271,578)	(271,578)				(587,977)		
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)	(20,381,211)	(1,618,789)	(756,007)	(482,025)	(380,758)		(3,143,571)		
Phase VI - Grants	10441_7107	Nov-06	Jun-21	18,000,000	15,229,353	2,770,647	929,363	675,000	180,000	986,285	3,436,468		
Phase VI - Loans	10442_7108	Nov-06	Jun-21	22,000,000	18,613,653	3,386,347	1,135,888	825,000	220,000	1,205,459	4,200,127		
Phase VI - Repayments	10443_7109	Nov-07	Jun-26	(22,000,000)	(11,958,567)	(10,041,433)	(2,576,188)	(2,290,888)	(1,742,149)	(1,385,538)	(10,896,240)	(2,046,669)	
Phase VII - Grants	10471_7293	Aug-09	Jun-21	18,000,000	12,937,167	5,062,834	1,406,745	1,800,000	1,800,000	56,089	6,242,289		
Phase VII - Loans	10472_7294	Aug-09	Jun-21	22,000,000	15,812,094	6,187,907	1,719,355	2,200,000	2,200,000	68,552	7,629,463		
Phase VII - Repayments	10473_7295	Aug-10	Jun-26	(22,000,000)	(5,744,693)	(16,255,307)	(3,122,874)	(3,104,262)	(3,007,495)	(2,707,871)	(14,843,509)	(4,312,805)	
Phase VIII - Grants	10474_7296	Aug-12	Jun-21	18,000,000	8,081,381	9,918,619	3,117,532	2,025,000	2,137,500	2,480,117	13,653,212	158,470	
Phase VIII - Loans	10475_7297	Aug-12	Jun-21	22,000,000	9,877,245	12,122,755	3,810,316	2,475,000	2,612,500	3,031,255	16,687,260	193,684	
Phase VIII - Repayments	10476_7298	Aug-13	Jun-26	(22,000,000)	(1,060,855)	(20,939,145)	(2,255,756)	(2,659,742)	(3,457,479)	(3,979,979)	(13,413,811)	(8,586,189)	
Phase IX Grants	10560_7464	Jul-14	Jun-21	60,000,000	-	60,000,000	10,710,900	9,000,000	11,250,000	11,250,000	42,210,900	17,789,100	
Phase IX Loans	10561_7465	Jul-14	Jun-21	20,000,000	-	20,000,000	3,570,300	3,000,000	3,750,000	3,750,000	14,070,300	5,929,700	
Phase IX Repayment	10562_7466	Jul-15	Jun-31	(20,000,000)	-	(20,000,000)	(211,075)	(250,000)	(550,000)	(925,000)	(1,936,075)	(8,650,000)	(9,413,925)
Phase X Grants	10563_7467	Jul-16	Jun-25	60,000,000	-	60,000,000		3,000,000	3,000,000	3,000,000	9,000,000	37,500,000	13,500,000
Phase X Loans	10564_7468	Jul-16	Jun-25	20,000,000	-	20,000,000		1,000,000	1,000,000	1,000,000	3,000,000	12,500,000	4,500,000
Phase X Repayment	10565_7469	Jul-16	Jun-35	(20,000,000)	-	(20,000,000)			(100,000)	(200,000)	(300,000)	(4,000,000)	(15,700,000)
<b>138 Sewerage System Mapping Upgrades</b>	<b>completed project</b>			<b>280,876</b>	<b>280,876</b>	<b>-</b>							

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<b>Waterworks</b>				<b>2,909,435,666</b>	<b>1,915,648,552</b>	<b>993,787,114</b>	<b>26,292,803</b>	<b>43,430,312</b>	<b>62,919,235</b>	<b>77,657,864</b>	<b>251,266,386</b>	<b>578,834,798</b>	<b>204,652,098</b>
<b>Drinking Water Quality Improvements</b>				<b>666,291,655</b>	<b>625,440,011</b>	<b>40,851,644</b>	<b>15,072,338</b>	<b>6,430,927</b>	<b>4,900,000</b>	<b>2,267,534</b>	<b>58,903,283</b>	<b>12,160,835</b>	<b>20,009</b>
<b>542 Carroll Water Treatment Plant</b>				<b>438,191,551</b>	<b>415,484,707</b>	<b>22,706,844</b>	<b>839,639</b>	<b>3,248,294</b>	<b>4,650,000</b>	<b>2,151,901</b>	<b>15,166,026</b>	<b>11,797,000</b>	<b>20,009</b>
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	72,108	72,108	-							
Wachusett WTP - Design/CS/RI	53301_5017	Oct-96	Sep-06	46,605,542	46,605,542	-							
Permit Fees	53304_5157	Jul-93	Mar-16	87,037	84,657	2,380	1,375	1,005			6,786		
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 Mgmt Study	53376_6206	Nov-98	Sep-02	1,453,825	1,453,825	-							
Wachusett and Cosgrove Intakes - CP1	53377_6207	Jun-00	Jun-03	15,489,314	15,489,314	-							
Construction Management / RI	53378_6208	Aug-98	Sep-06	31,437,824	31,437,824	-							
Cosgrove Disinfection - Phase II	53390_6365	Apr-98	May-99	2,169,292	2,169,292	-							
Cosgrove Disinfection - Phase I	53391_6397	Jul-97	Oct-97	150,380	150,380	-							
Distribution Water Consultant	53392_6401	Jul-97	Jun-98	3,200	3,200	-							
Immediate Disinfection - MECO	53393_6406	Jul-97	Jul-97	10,300	10,300	-							
Cosgrove Disinfection 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	Jul-15	Jun-17	6,657,094	-	6,657,094		2,493,000	3,330,000	834,094	6,657,094		
CSX Crossing	53427_6670	Aug-01	Dec-01	64,700	64,700	-							
Wachusett Algae - Design CS/RI	53428_6671	Jul-18	Dec-21	450,000	-	450,000						450,000	
Public Health Research	53432_6691	Jul-00	Jun-07	1,702,560	1,702,560	-							
Security Equipment	53435_6756	Jun-00	Jun-00	570,721	570,721	-							
Cosgrove Screens, CP8 - Construction	53437_6773	Aug-03	Aug-04	3,238,306	3,238,306	-							
AWWARF - Evaluation Ozone & UV	53443_6815	Jul-01	Jan-04	301,750	301,750	-							
Fitout / Construction	53445_6827	Oct-03	Jun-18	1,500,000	545,193	954,807				954,807	954,430		
Wachusett Algae - Construction	53448_6889	Feb-19	Dec-20	1,800,000	-	1,800,000						1,800,000	
CWTP Ultraviolet Disinfection - Design/ESDC/REI	53450_6923	Jul-08	Apr-15	4,393,797	3,781,252	612,545	257,625	354,920			1,863,074		
CWTP Ultraviolet Disinfection - Construction	53451_6924	Apr-11	Feb-14	32,015,063	31,770,820	244,243	244,243				2,783,296		
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	949,207	15,539	15,540				15,540		
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 2	53457_7085	Jan-09	Jul-23	8,255,510	4,828,501	3,427,009	40,000	1,050,000	20,000	1,305,070	2,297,000	20,009	
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	-					(18,000)		
Technical Assistance 6	53465_7316	Sep-10	Mar-13	407,989	407,989	-					37,736		
CWTP Storage Tank Roof Drainage System	53470_7376	Apr-19	Nov-20	7,000,000	-	7,000,000						7,000,000	
Technical Assistance 7	75530_7406	Jun-13	Nov-15	748,000	267,774	480,226	280,857	199,369			748,000		
Technical Assistance 8	75531_7407	Oct-15	Oct-17	563,000	-	563,000		200,000	270,000	93,000	563,000		
CWTP - Asset Protection	75546_7455	Jul-17	Jun-19	500,000	-	500,000				250,000	250,000	250,000	

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<b>543 Quabbin Water Treatment Plant</b>				<b>19,718,993</b>	<b>18,358,535</b>	<b>1,360,458</b>	<b>1,306,909</b>	<b>53,549</b>			<b>6,950,751</b>		
Quabbin WTP - Design/CA/RI	53363_6043	May-95	Aug-01	3,793,701	3,793,701	-							
Permit Fees	53380_6210	Jan-98	Aug-14	56,171	53,540	2,631	2,631				20,175		
Utilities	53381_6211	Aug-98	Jan-12	13,400	13,400	-							
Construction	53382_6212	Nov-98	Sep-00	5,070,892	5,070,892	-							
CVA Shea Avenue Leak Repair	53405_6468	Mar-14	Oct-14	950,777	722,707	228,071	228,071				950,777		
Ware Fire Department - MOA	53433_6706	Oct-99	Jul-00	25,000	25,000	-							
Water Quality Analysis Equipment	53434_6711	Jan-01	Jun-06	48,620	48,620	-							
Quabbin UVWTP - Design/CA/RI	53439_6775	Dec-08	Apr-15	2,018,740	1,654,124	364,616	311,067	53,549			1,073,801		
Quabbin UVWTP - Construction	53440_6776	Jan-13	Sep-14	6,599,421	5,834,280	765,140	765,140				4,905,998		
Quabbin UVWTP -Study/Pilot	53442_6804	May-02	Dec-05	1,142,272	1,142,272	-							
<b>544 Norumbega Covered Storage</b>			<b>completed project</b>	<b>106,674,146</b>	<b>106,674,146</b>	<b>-</b>							
<b>545 Blue Hills Covered Storage</b>				<b>40,554,905</b>	<b>40,082,823</b>	<b>472,082</b>	<b>23,891</b>	<b>53,723</b>		<b>30,633</b>	<b>228,247</b>	<b>363,835</b>	
Technical Support & Permit Compliance	53385_6215	Apr-02	Dec-15	104,000	26,400	77,600	23,877	53,723			77,600		
Design / Build	53386_6216	Jan-07	Apr-10	37,664,524	37,664,510	14	14				120,014		
Roadway Resurfacing - Design	53460_7213	Jul-17	Jan-19	64,667	-	64,667				30,633	30,633	34,034	
Roadway Resurfacing - Construction	53461_7214	Apr-18	Jan-19	329,802	-	329,802						329,802	
EIR/Preliminary Design/OR	68025_6139	May-97	Jun-10	2,391,913	2,391,913	-							
<b>550 Spot Pond Storage Facility</b>				<b>61,152,059</b>	<b>44,839,800</b>	<b>16,312,259</b>	<b>12,901,898</b>	<b>3,075,361</b>	<b>250,000</b>	<b>85,000</b>	<b>36,558,258</b>		
Environmental Review	53400_6455	Apr-02	Feb-03	232,830	232,830	-							
Design / Build	53402_6457	Nov-11	Aug-15	51,363,117	37,317,376	14,045,742	11,874,567	2,061,174	25,000	85,000	33,771,387		
Easement/Land Acquisition/Permits	53447_6868	Oct-08	Dec-14	6,000,000	5,359,171	640,829	150,529	490,300			651,296		
Owners' Representative	53462_7233	Mar-10	Dec-16	3,034,096	1,708,407	1,325,689	876,802	373,887	75,000		1,835,575		
Early Construction Water Connection	53463_7314	Jul-11	Feb-12	222,016	222,016	-							
Fells Reservoir Microwave Tower Replacement Construct.	53467_7506	Jan-16	Dec-16	300,000	-	300,000		150,000	150,000		300,000		

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<b>Transmission</b>				<b>1,224,184,761</b>	<b>759,501,011</b>	<b>464,683,749</b>	<b>3,021,894</b>	<b>19,503,960</b>	<b>24,304,762</b>	<b>27,518,628</b>	<b>78,812,098</b>	<b>275,899,672</b>	<b>114,434,833</b>
<b>597 Winsor Station Pipeline</b>				<b>27,883,243</b>	<b>1,734,958</b>	<b>26,148,286</b>	<b>285,808</b>	<b>737,822</b>	<b>1,769,750</b>	<b>6,528,083</b>	<b>9,660,830</b>	<b>16,826,822</b>	
Preliminary Permit, Study & Licensing	60032_6276	Nov-97	Jun-99	38,382	38,382	-					100		
Quabbin Aqueduct TV Inspection	60033_6277	Jul-18	Oct-21	2,955,023	-	2,955,023						2,955,023	
Hatchery Pipeline - Design/ESDC/REI	60077_7017	Aug-13	Sep-19	749,577	255,494	494,083	38,097	101,330	101,330	101,330	597,437	151,996	
Quabbin Aqueduct & WPS Upgrades - Design/CA/RI	60087_7114	Feb-10	Jan-19	2,517,000	656,388	1,860,612	247,711	430,107	430,107	430,107	1,621,950	322,580	
Winsor Station Rehab & Improvement	60088_7115	Jul-17	Jan-20	9,839,793	-	9,839,793				2,856,714	2,856,714	6,983,079	
Shaft 2 & I2 Construction	60095_7197	Jul-17	Jan-20	9,038,112	-	9,038,112				2,623,968	2,623,968	6,414,144	
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	Feb-16	Aug-17	1,960,662	-	1,960,662		206,385	1,238,313	515,964	1,960,662		
<b>601 Sluice Gate Rehabilitation</b>		<b>completed project</b>		<b>9,158,411</b>	<b>9,158,411</b>	<b>-</b>							
<b>604 MetroWest Tunnel</b>				<b>708,664,247</b>	<b>696,776,534</b>	<b>11,887,713</b>	<b>93,303</b>	<b>233,508</b>	<b>970,000</b>	<b>585,000</b>	<b>3,259,835</b>	<b>9,888,122</b>	<b>117,781</b>
Study	59794_5043	Jun-84	Oct-89	414,770	414,770	-							
Design/EIR - Tunnel/ESDC	59795_5044	Apr-92	Mar-07	37,939,302	37,939,302	-							
Sudbury Pipe Bridge - Construction	59796_5048	Nov-91	Jun-92	295,910	295,910	-							
West Tunnel Segment - CP1	59798_6054	Apr-97	Apr-03	147,774,009	147,774,009	-							
Construction Management/Resident Inspection	59799_5284	May-95	Apr-04	39,427,799	39,427,799	-							
Technical Assistance	59804_5976	Jun-84	Jun-98	131,400	131,400	-							
Land Acquisition	59805_5139	Oct-95	Jul-13	6,258,741	6,258,741	-							
Hultman Study	59806_5141	Apr-95	Mar-05	1,863,998	1,863,998	-							
DEP Permit Fees	60012_6037	Oct-94	Sep-14	58,000	56,178	1,822	1,822				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	-					295,920		
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	56,214,488	48,419	48,418				74,812		
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	60066_6911	Sep-05	Sep-14	5,883,901	5,667,623	216,278	45,769	170,508			646,691		
Valve Chamber Modifications - Design CA/RI	60072_6950	Jul-18	Dec-23	1,224,781	-	1,224,781						1,107,000	117,781
Lower Hultman Rehab -CP6A	60073_6975	Sep-09	May-13	52,288,860	52,286,138	2,722	2,722				476,873		
Hultman Interconnect - RI Services	60083_7082	Jan-10	Jan-15	1,870,346	1,875,775	(5,429)	(5,429)				144,904		
CP6 Easements	60085_7105	Jan-08	Apr-14	32,865	32,865	-					814		
CP6A Demolition	60086_7106	Sep-08	Jan-09	57,222	57,222	-							
Valve Chamber & Storage Tank Access Improve. - Design	60109_7283	Jul-17	Jun-22	600,000	-	600,000				120,000	120,000	480,000	
Shaft 5 Electrical Upgrade	60128_7367	Jan-19	Jan-20	1,000,000	-	1,000,000						1,000,000	

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Shaft 5A/5 Surface Piping Cathodic Protection - Design/CA	60129_7368	Aug-15	Feb-19	500,000	-	500,000		63,000	400,000	35,000	498,000	2,000	
Valve Chamber & Storage Tank Access Improve. - Const.	60160_7476	Jul-19	Jun-21	2,400,000	-	2,400,000						2,400,000	
Shaft 5A/5 Surface Piping Cathodic Protection - Construct.	60161_7477	Jul-16	Feb-19	1,000,000	-	1,000,000			570,000	430,000	1,000,000		
Valve Chamber Modifications - Construction	75525_7755	Jan-20	Dec-22	4,899,122	-	4,899,122						4,899,122	
<b>615 Chicopee Valley Aqueduct Redundancy</b>			<b>completed project</b>	<b>8,666,292</b>	<b>8,666,292</b>	<b>-</b>							
<b>616 Quabbin Transmission System</b>				<b>15,456,914</b>	<b>7,456,913</b>	<b>8,000,000</b>		<b>500,000</b>	<b>18,750</b>	<b>773,199</b>	<b>7,481,250</b>		
Facilities Inspection	60055_6828	Oct-05	Oct-07	1,005,413	1,005,413	-							
Oakdale High Line Replacement	60068_6940	Aug-16	Feb-17	500,000	-	500,000		500,000			500,000		
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	-					77,651		
Oakdale Phase 1A Electrical - Construction	60104_7230	Apr-12	Jul-13	2,260,002	2,260,001	1					176,798		
Ware River Intake Valve Replacement - Design	60108_7282	Jul-18	Jun-23	300,000	-	300,000						300,000	
CVA Motorized Screens Replacement - Design	60112_7332	Jul-17	Jun-21	100,000	-	100,000				18,750	18,750	81,250	
Rehab Wachusett Gatehse/Piping & Bastion-Design CA/RI	60113_7333	Jul-18	Jun-23	800,000	-	800,000						800,000	
Rehabilitate Oakdale Turbine	60135_7378	May-20	Jan-21	1,000,000	-	1,000,000						1,000,000	
Geo-Thermal Heat Wachusett Gatehouse	60136_7379	May-19	Nov-19	200,000	-	200,000						200,000	
Rehab Wachusett Gatehouse/Piping & Bastion - Construct.	60137_7380	Jul-20	Jun-22	3,800,000	-	3,800,000						3,800,000	
Ware Rver Intake Valve Replacement - Construction	60138_7487	Jul-20	Jun-22	900,000	-	900,000						900,000	
CVA Motorized Screens Replacement - Construction	60139_7488	Jul-19	Jun-20	400,000	-	400,000						400,000	
Oakdale Valves - Phase I Construction	75491_6690	Oct-05	Jun-06	1,811,309	1,811,309	-							
Oakdale Valves - Phase I Study & Design	75496_6831	Apr-04	Jun-07	1,070,290	1,070,290	-							
<b>617 Sudbury/Weston Aqueduct Repairs</b>				<b>7,148,957</b>	<b>659,948</b>	<b>6,489,009</b>		<b>1,226,039</b>	<b>1,349,167</b>	<b>571,200</b>	<b>3,146,406</b>	<b>3,342,603</b>	
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	-							
Weston Aqueduct Flow Control Valve	60071_6948	Jul-16	Jul-17	900,000	-	900,000		675,000	225,000	900,000			
Sudbury Short-Term Repairs	60076_7016	Jul-17	Jun-18	440,803	-	440,803				323,700	323,700	117,103	
Sudbury Short-Term Repairs - Phase 2	60110_7317	Jul-18	Jul-19	2,098,000	-	2,098,000						2,098,000	
Ash Street Sluice Gates - Construction	60130_7369	Jan-20	Jan-21	800,000	-	800,000						800,000	
Rosemary Brook Building Repair	60150_7472	Jan-16	Dec-16	1,796,049	-	1,796,049	1,200,000	596,049			1,796,049		
Evaluation of Farm Pond Buildings - Waban Arches	60151_7473	Jan-16	Dec-16	104,157	-	104,157	26,039	78,118			104,157		
Ash Street Sluice Gates - Design	60152_7491	Jan-18	Jan-22	350,000	-	350,000				22,500	22,500	327,500	
Hazardous Material Sudbury Aqueduct	75486_6617	Apr-99	May-05	265,428	265,428	-							
<b>620 Wachusett Reservoir Spillway Improvements</b>			<b>completed project</b>	<b>9,287,460</b>	<b>9,287,460</b>	<b>-</b>							
<b>621 Watershed Land</b>				<b>24,000,000</b>	<b>17,882,400</b>	<b>6,117,600</b>	<b>700,000</b>	<b>2,500,000</b>	<b>1,500,000</b>	<b>1,417,600</b>	<b>6,657,600</b>		
Land Acquisition	60081_7069	Apr-06	Jun-18	24,000,000	17,882,400	6,117,600	700,000	2,500,000	1,500,000	1,417,600	6,657,600		
<b>623 Dam Projects</b>				<b>4,538,205</b>	<b>3,094,856</b>	<b>1,443,349</b>	<b>492,783</b>	<b>71</b>	<b>43,140</b>	<b>432,356</b>	<b>978,024</b>	<b>474,999</b>	
Dam Safety Modifications & Repairs - Construction	60094_7194	Aug-11	Sep-12	2,054,559	2,054,554	5	5					5	
Dam Safety Modifications & Repairs - Design/ESDC	60100_7211	Sep-09	Jun-14	1,532,646	1,039,868	492,778	492,778				502,377		
Oakdale Dam Permits	60118_7346	Jan-16	Dec-17	1,000	434	566		71	283	212	641		
Oakdale Dam - Design/ESDC/RI	60119_7347	Jul-16	Dec-19	200,000	-	200,000			42,857	57,144	100,001	99,999	
Oakdale Dam Removal - Construction	60120_7348	Jul-17	Dec-19	750,000	-	750,000				375,000	375,000	375,000	



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<b>625 Long Term Redundancy</b>				<b>409,381,031</b>	<b>4,783,239</b>	<b>404,597,792</b>	<b>1,450,000</b>	<b>14,806,520</b>	<b>18,172,705</b>	<b>17,965,639</b>	<b>54,336,204</b>	<b>237,885,876</b>	<b>114,317,052</b>
Water Transmission Redundancy Plan	60035_6273	Oct-08	Sep-11	1,396,572	1,396,572	-					(1,848)		
Wachusett Aqueduct Pump Station - Design/ESDC/RI	60090_7156	Feb-12	Jun-20	6,573,896	2,421,657	4,152,239	1,000,000	1,000,000	1,000,000	1,000,000	5,246,214	152,239	
Wachusett Aqueduct Pump Station - Construction	60091_7157	Sep-15	Jun-19	60,500,000	-	60,500,000		13,206,520	15,782,608	11,782,611	40,771,739	19,728,261	
Sudbury Aqueduct - Design/CA/RI	60092_7159	Jul-17	Jun-25	55,285,632	-	55,285,632				5,183,028	5,183,028	34,553,520	15,549,084
Sudbury Aqueduct Slipline - Construction	60093_7160	Jul-21	Jun-24	101,064,804	-	101,064,804						58,954,469	42,110,335
MWWST/Sudbury Aqueduct Connection - Construction	60107_7291	Jul-20	Jun-24	163,694,315	-	163,694,315						112,539,843	51,154,472
Sudbury Aqueduct - MEPA Review	60122_7352	Oct-12	Dec-16	3,405,107	965,010	2,440,097	450,000	600,000	1,390,097		3,137,071		
Chestnut Hill Final Connection - Construction	60123_7353	Jul-20	Dec-22	11,667,835	-	11,667,835						11,667,835	
Tops of Shafts Rehab - Design/CA/RI	60126_7356	Jan-22	Dec-26	1,158,833	-	1,158,833						289,709	869,124
Tops of Shafts Rehab - Construction	60127_7357	Jan-24	Dec-25	4,634,037	-	4,634,037							4,634,037
<b>Distribution And Pumping</b>				<b>949,122,944</b>	<b>377,520,183</b>	<b>571,602,761</b>	<b>9,085,221</b>	<b>17,388,581</b>	<b>31,876,988</b>	<b>42,623,703</b>	<b>105,791,100</b>	<b>324,977,156</b>	<b>145,651,109</b>
<b>618 Northern High NW Transmission Section 70</b>				<b>1,000,000</b>	<b>-</b>	<b>1,000,000</b>				<b>474,000</b>	<b>474,000</b>	<b>526,000</b>	
Planning	60063_6895	Jan-18	Jan-19	1,000,000	-	1,000,000				474,000	474,000	526,000	
<b>677 Valve Replacement</b>				<b>22,702,289</b>	<b>12,016,378</b>	<b>10,685,911</b>	<b>208,990</b>	<b>835,962</b>	<b>835,962</b>	<b>835,962</b>	<b>2,716,876</b>	<b>3,618,703</b>	<b>4,350,327</b>
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	4,037,670	1,111,804	2,925,866	208,990	835,962	835,962	835,962	2,716,876	208,990	
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	May-10	2,542	2,542	-							
Easements	68240_6860	Jan-02	May-10	5,770	5,770	-							
Construction 8	68300_7195	Jan-21	Jun-23	3,233,350	-	3,233,350						2,910,015	323,335
Construction 9	68307_7236	Jun-25	Jun-28	3,233,350	-	3,233,350							3,233,350
Phase 8 - Design/CA/RI	68330_7417	Jan-19	Jun-24	646,670	-	646,670						499,698	146,972
Phase 9 - Design/CA/RI	68331_7418	Jun-23	Jun-27	646,670	-	646,670							646,670
<b>678 Boston Low Service - Pipe &amp; Valve Rehab.</b>	<b>completed project</b>			<b>23,690,864</b>	<b>23,690,864</b>	<b>-</b>							
<b>683 Heath Hill Road Pipe Replacement</b>	<b>completed project</b>			<b>19,358,036</b>	<b>19,358,036</b>	<b>-</b>							
<b>689 James L. Gillis Pump Station</b>	<b>completed project</b>			<b>33,419,006</b>	<b>33,419,006</b>	<b>-</b>							
<b>692 Northern High Service - Section 27 Improvement</b>				<b>1,091,568</b>	<b>123,646</b>	<b>967,922</b>	<b>380</b>	<b>4,550</b>	<b>12,550</b>	<b>160,026</b>	<b>177,506</b>	<b>790,416</b>	
Section 27 - Construction	67769_6333	Mar-18	Nov-19	966,997	26,581	940,416				150,000	150,000	790,416	
Easements	68192_6589	Apr-16	Mar-18	22,800	-	22,800		3,000	11,000	8,800	22,800		
Technical Assistance	68211_6712	Oct-99	Mar-18	64,500	59,794	4,706	380	1,550	1,550	1,226	4,706		
Surveying	68229_6809	Jun-01	Mar-17	37,271	37,271	-							

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<b>693 NHS - Revere &amp; Malden Pipeline Improvements</b>				<b>55,160,861</b>	<b>26,832,740</b>	<b>28,328,121</b>		<b>460,000</b>	<b>921,000</b>	<b>9,639,000</b>	<b>11,020,000</b>	<b>16,606,767</b>	<b>701,355</b>
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	Jul-17	Jul-18	11,792,649	-	11,792,649				8,163,000	8,163,000	3,629,649	
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	-							
Shaft 9A-D Extension - Construction	68258_6958	Mar-22	Nov-23	3,004,733	-	3,004,733						2,380,000	624,733
Easements	68265_6978	Jul-06	Dec-20	30,000	-	30,000			5,000	10,000	15,000	15,000	
Permits	68280_7049	Apr-05	Mar-22	5,000	-	5,000			1,000	1,000	2,000	3,000	
Section 53 Connections - Design CA/RI	75526_7402	Oct-15	Sep-19	2,144,118	-	2,144,118		360,000	715,000	715,000	1,790,000	354,118	
Shaft 9A-D Extension - Design/CA/RI	75527_7403	Mar-20	Nov-24	651,622	-	651,622						575,000	76,622
Section 56 Replace./Saugus River Cross. - Design CA/RI	75545_7454	Jan-17	Jul-21	1,500,000	-	1,500,000		100,000	400,000	500,000	500,000	1,000,000	
Northern High System Area Study	75548_7485	Jul-17	Jul-19	700,000	-	700,000				350,000	350,000	350,000	
Section 56 Replace./Saugus River Cross. - Construction	75549_7486	Jul-18	Jul-20	8,300,000	-	8,300,000						8,300,000	
Section 56 Replace./Saugus River Cross. - Feasibility Study	75565_7500	Jan-16	Feb-17	200,000	-	200,000		100,000	100,000		200,000		
<b>702 New Connecting Mains - Shaft 7 to WASM 3</b>				<b>34,295,531</b>	<b>10,960,807</b>	<b>23,334,725</b>			<b>10,000</b>	<b>393,000</b>	<b>403,000</b>	<b>17,110,668</b>	<b>5,821,056</b>
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 - Final Design/CA/RI	68112_6385	Jul-17	Jun-23	1,500,883	-	1,500,883				350,000	350,000	1,150,883	
CP1 A&B - Easements	68114_6387			16,919	16,919	-							
CP3 - Easements	68115_6388	Jan-18	Dec-18	40,000	-	40,000				20,000	20,000	20,000	
CP5 - Easements	68117_6390	Dec-06	Jan-11	21,659	21,659	-							
CP3 - South Segment	68119_6392	Jul-19	Jun-22	7,746,055	-	7,746,055						7,746,055	
CP5 - Northeast Segment	68121_6394	Aug-09	Nov-11	5,547,607	5,547,606	1							
CP2 - Clean & Line Sections 59 & 60 - Construction	68174_6548	May-23	May-25	5,205,047	-	5,205,047							5,205,047
CP2 - Easements	68175_6547	May-17	Nov-17	33,000	-	33,000		10,000	23,000	33,000	33,000		
Replacement of Section 25 - Design/CA/RI	68255_6955	Oct-18	May-23	561,455	-	561,455						561,455	
Replacement of Section 25 - Construction	68256_6956	Oct-20	May-22	2,807,275	-	2,807,275						2,807,275	
Section 59 & 60 - Design/CA/RI	68286_7086	May-21	May-26	1,041,009	-	1,041,009						425,000	616,009
Section 75 Extension - Design CA/RI	68315_7284	Oct-18	Oct-23	880,000	-	880,000						880,000	
Section 75 Extension - Construction	68350_7484	Oct-20	Oct-22	3,520,000	-	3,520,000						3,520,000	
<b>704 Rehab of Other Pump Stations</b>				<b>55,057,852</b>	<b>30,057,852</b>	<b>25,000,000</b>						<b>18,750,000</b>	<b>6,250,000</b>
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 Rehabilitation	75522_7383	Jul-19	Jun-24	25,000,000	-	25,000,000						18,750,000	6,250,000
<b>706 NHS - Connecting Mains from Section 91</b>		<b>completed project</b>		<b>2,360,194</b>	<b>2,360,194</b>	<b>-</b>							

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<b>708 Northern Extra High Service - New Pipelines</b>				<b>7,863,498</b>	<b>3,632,119</b>	<b>4,231,379</b>	<b>6,100</b>	<b>36,400</b>	<b>17,114</b>	<b>1,500</b>	<b>61,114</b>	<b>3,495,000</b>	<b>675,266</b>
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 - Construction	68162_6522	Jul-20	Dec-23	3,475,222	-	3,475,222						2,900,000	575,222
Public Participation	68176_6554	Jul-15	Dec-20	5,000	-	5,000	500	2,000	2,000	500	5,000		
Legal	68177_6555	Jul-15	Dec-20	5,000	-	5,000		2,000	2,000	1,000	5,000		
Technical Assistance	68210_6707	Nov-10	Jan-17	54,000	7,886	46,114	5,000	30,000	11,114		46,114		
PLC Equipment Purchases	68215_6749	Dec-99	Dec-00	4,219	4,220	(1)							
Permits	68281_7050	Nov-10	Jan-17	5,000	-	5,000	600	2,400	2,000		5,000		
Section 34 & 45 - Design/CA/RI	75528_7404	Jul-18	Dec-24	695,044	-	695,044						595,000	100,044
<b>712 Cathodic Protection Of Distribution Mains</b>				<b>1,667,849</b>	<b>140,913</b>	<b>1,526,935</b>		<b>254,490</b>	<b>254,490</b>		<b>508,980</b>	<b>763,470</b>	<b>254,490</b>
Planning Phase I	68002_6058	Apr-95	Dec-97	107,680	107,680	-							
Corrosion Control Program - Task 1	68129_6438	Jul-15	Jul-17	508,979	-	508,979		254,490	254,490		508,980		
Corrosion Control Program - Task 2	68130_6439	Jul-18	Jul-20	508,979	-	508,979						508,980	
Corrosion Control Program - Task 3	68131_6440	Jul-22	Jul-23	508,979	-	508,979						254,490	254,490
Technical Assistance	68216_6751	Jan-00	May-09	33,233	33,233	-							
<b>713 Spot Pond Supply Mains Rehab</b>				<b>66,806,744</b>	<b>61,168,728</b>	<b>5,638,016</b>	<b>293,865</b>	<b>1,730,000</b>	<b>299,843</b>	<b>202,257</b>	<b>2,712,693</b>	<b>3,112,051</b>	
Section 4 Webster Avenue Bridge Pipe Rehab - Design	60114_7334	Oct-13	Mar-17	685,536	186,728	498,808	227,965	230,000	40,843		685,536		
Section 4 Webster Avenue Bridge Pipe Rehab - Construct.	60115_7335	May-15	Dec-16	1,759,000	-	1,759,000		1,500,000	259,000		1,759,000		
Section 50 Pipe Rehab - Design/ESDC/RI	60116_7336	Jul-17	Jun-21	500,000	-	500,000				150,000	150,000	350,000	
Section 50 Pipe Rehab - Construction	60117_7337	Jul-19	Jun-20	1,500,000	-	1,500,000						1,500,000	
Bridge Trusses - Construction	60145_7483	Apr-20	Dec-21	1,000,000	-	1,000,000						1,000,000	
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	-							
Bridge Trusses - Design	68209_6697	Apr-18	Dec-19	312,051	-	312,051				50,000	50,000	262,051	
Easements - CP5	68225_6784	Jul-14	Jun-20	70,000	1,843	68,157	65,900			2,257	68,157		
CA/RI - CP3	68274_7003	Sep-04	Apr-09	924,656	924,656	-							
<b>714 Southern Extra High - Sections 41 &amp; 42</b>		<b>completed project</b>		<b>3,657,243</b>	<b>3,657,243</b>	<b>-</b>							

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<b>719 Chestnut Hill Connecting Mains</b>				<b>32,035,145</b>	<b>17,486,675</b>	<b>14,548,470</b>				<b>316,000</b>	<b>316,000</b>	<b>10,156,494</b>	<b>4,075,977</b>
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	-							
Shaft 7 Building - Design & Construction	68052_6302	Jan-22	Jan-26	5,926,977	-	5,926,977						1,851,000	4,075,977
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	-							
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	-							
CHEPS Emergency Generator/Electric Upgrade-Construct	68267_6982	Jul-19	Jul-21	6,897,195	-	6,897,195						6,897,195	
CHEPS Emergency Gen./Electric Upg. - Final Des/CA/RI	68268_6995	Jul-17	Jun-22	1,724,299	-	1,724,299				316,000	316,000	1,408,299	
<b>720 Warren Cottage Line Rehab</b>			<b>completed project</b>	<b>1,204,822</b>	<b>1,204,822</b>	<b>-</b>							
<b>721 Southern Spine Distribution Mains</b>				<b>74,773,200</b>	<b>36,681,373</b>	<b>38,091,827</b>		<b>1,269</b>	<b>1,269</b>	<b>376,270</b>	<b>368,533</b>	<b>4,036,837</b>	<b>33,676,182</b>
Sections 21, 43 & 22 - Design	68083_6290	Sep-00	May-13	7,113,087	7,113,087	-					(10,275)		
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	-							
Section 20 & 58 - Design	68089_6296	Jun-23	Nov-28	3,017,861	-	3,017,861							3,017,861
Section 20 & 58 - Easements	68090_6297	Sep-21	Sep-25	35,070	-	35,070						13,883	21,187
Section 20 & 58 - Construction	68091_6298	Sep-25	May-27	14,202,193	-	14,202,193							14,202,193
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	Jan-23	Jan-25	17,332,895	-	17,332,895						2,166,612	15,166,283
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		1,269	1,269	1,270	3,808		
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	Jul-20	Jan-26	2,500,000	-	2,500,000						1,231,342	1,268,658
Section 22 North - Facility Plan/EIR	68299_7155	Jul-17	Jun-19	1,000,000	-	1,000,000				375,000	375,000	625,000	

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<b>722 NIH Redundancy &amp; Storage</b>				<b>90,186,811</b>	<b>8,145,032</b>	<b>82,041,778</b>	<b>3,073,457</b>	<b>5,613,910</b>	<b>17,292,260</b>	<b>15,176,781</b>	<b>43,327,077</b>	<b>40,885,371</b>	
Concept Plan	53454_6954	Feb-06	Aug-10	796,748	796,748	-							
Easements	68093_6306	Jul-14	Jun-16	300,000	-	300,000		275,000	25,000		300,000		
Section 89/29 Redundancy - Design	68252_6906	Mar-11	Aug-20	6,172,381	1,031,873	5,140,508	718,519	804,000	804,000	804,000	3,334,949	2,009,989	
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	825,171	769,898	55,273	27,364	27,910			232,393		
Permits	68278_7047	Jan-10	Dec-18	5,000	-	5,000	2,000	2,000	1,000		5,000		
Technical Assistance	68279_7048	Jan-10	Dec-18	18,000	-	18,000	4,000	5,000		4,000	18,000		
West Street Pipeline Reading - Construction Phase 1A	68282_7066	Jun-14	May-15	1,932,369	-	1,932,369	1,932,369				1,932,369		
Section 89/29 Redundancy - Construction Phase 2	68283_7067	Nov-16	Aug-19	21,235,014	-	21,235,014		4,624,000	7,687,520		12,311,520	8,923,494	
NIH Storage - Construction	68284_7068	Jan-19	Jan-21	18,223,184	-	18,223,184						18,223,184	
Section 89/29 Rehab - Design	68294_7116	Jul-17	Jun-23	1,538,941	-	1,538,941				220,000	220,000	1,318,941	
Section 89/29 Rehab - Construction	68295_7117	Jul-19	Jun-22	7,692,305	-	7,692,305						7,692,305	
Gillis Pump Station Improvements	68309_7260	Jun-13	Dec-14	2,178,325	1,789,120	389,205	389,205				2,178,325		
Reading/Stoneham Interconnections	68310_7261	Aug-11	Oct-12	3,466,546	3,466,546	-							
NIH Storage - Design	68316_7311	Jan-17	Dec-22	3,697,458	-	3,697,458			176,000	804,000	980,000	2,717,458	
Section 89/29 Redundancy - Construction Phase 1B	68317_7471	Aug-15	Dec-17	11,000,001	-	11,000,001		4,500,000	4,250,000	2,250,001	11,000,001		
Section 89/29 Redundancy - Construction Phase 1C	68318_7478	Aug-16	Dec-17	10,814,520	-	10,814,520			7,407,260	3,407,260	10,814,520		
<b>723 Northern Low Service Rehab - Section 8</b>				<b>23,333,783</b>	<b>2,320,986</b>	<b>21,012,797</b>	<b>1,333</b>	<b>14,000</b>	<b>14,000</b>	<b>524,088</b>	<b>553,421</b>	<b>20,459,375</b>	
Easements	68094_6321	Jul-15	Jun-22	80,000	-	80,000		10,000	10,000	20,000	40,000	40,000	
Section 8 - Construction	68095_6322	Jul-20	Jul-22	14,125,366	-	14,125,366						14,125,366	
Rehab Sections 37 & 46 Chelsea/East Boston - Constr.	68262_6962	Jul-19	Jun-20	3,200,000	-	3,200,000						3,200,000	
Permits	68263_6977	Jul-05	Jul-18	299,000	284,912	14,088	1,333	4,000	4,000	4,088	13,421	666	
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 - Design/CA/RI	68287_7092	Jul-17	Jul-22	2,825,073	-	2,825,073				300,000	300,000	2,525,073	
Rehab Sections 37 & 46 Chelsea/E. Boston - Des/CA/RI	75529_7405	Jul-17	Jun-21	768,270	-	768,270				200,000	200,000	568,270	
<b>725 Hydraulic Model Update</b>		<b>completed project</b>		<b>598,358</b>	<b>598,358</b>	<b>-</b>							
<b>727 SEH Redundancy &amp; Storage</b>				<b>99,543,770</b>	<b>6,830,942</b>	<b>92,712,829</b>	<b>855,840</b>	<b>853,000</b>	<b>8,985,000</b>	<b>12,456,000</b>	<b>23,223,812</b>	<b>15,273,809</b>	<b>54,289,180</b>
Concept Plan/Preliminary Design/Environmental Review	53397_6452	Feb-07	Feb-14	632,519	632,520	-					13,161		
Redundancy/Storage Phase 1 - Final Design/CA/RI	53398_6453	Feb-14	Aug-21	7,677,305	60,811	7,616,494	801,007	803,000	1,403,000	1,403,000	4,470,817	3,206,488	
Redundancy Pipeline Section III - Construction 1	53399_6454	Aug-16	Jul-18	11,792,649	-	11,792,649			5,589,000	4,152,000	9,741,000	2,051,649	
Redundancy/Storage Phase 2 - Final Design/CA/RI	68135_6444	Jan-26	Dec-31	5,933,847	-	5,933,847							5,933,847
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	1,366,080	-	1,366,080						683,000	683,080
Sections 77 & 88 Rehab - Construction	68293_7113	Apr-23	Apr-25	5,464,321	-	5,464,321							5,464,321
Easements/Agreements	68305_7226	Jul-14	Jul-27	300,000	-	300,000	50,000	50,000	100,000		200,000	100,000	
Permits/Utilities	68306_7227	Aug-08	Jul-27	5,000	167	4,833	4,833				4,833		
Redundancy/Storage Phase 2 - Construction	68308_7245	Jan-28	Dec-30	29,669,233	-	29,669,233							29,669,233
Phase 3, 2nd Tank - Construction	68311_7262	Jan-33	Dec-35	10,448,916	-	10,448,916							10,448,916
Phase 3, 2nd Tank - Design	68312_7263	Jan-31	Dec-36	2,089,783	-	2,089,783							2,089,783
Redundancy Pipeline Section III - Construction 2	68555_7504	Feb-17	Jan-19	10,720,590	-	10,720,590			1,893,000	4,360,000	6,253,000	4,467,590	
Redundancy Pipeline Section III - Construction 3	68556_7505	Aug-17	Jul-19	7,306,082	-	7,306,082				2,541,000	2,541,000	4,765,082	

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<b>730 Weston Aqueduct Supply Mains</b>				<b>281,136,768</b>	<b>68,490,501</b>	<b>212,646,267</b>	<b>4,645,255</b>	<b>7,585,000</b>	<b>3,120,500</b>	<b>1,623,819</b>	<b>19,421,782</b>	<b>160,114,416</b>	<b>35,557,276</b>
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	-							
WASM 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	753,000	424,807	328,193	32,070	50,000	70,000	127,500	370,000	48,623	
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	-							
WASM 1 & 2 - Newton	68041_6280	Mar-00	Jun-02	9,218,520	9,218,520	-							
WASM 1 & 2 - Boston	68042_6281	Feb-03	Jun-05	7,038,896	7,038,896	-							
WASM 2 & 4 - Newton	68069_6312	Apr-98	Mar-01	8,281,877	8,281,877	-							
WASM 4 - Allston & Western Avenue Sewer	68070_6313	Feb-02	Dec-04	17,330,800	17,330,800	-							
WASM 3 - MEPA/Design/CA/RI	68166_6539	Jul-13	Aug-26	15,482,625	183,407	15,299,218	648,185	1,195,000	1,195,000	1,195,000	4,416,592	6,275,000	4,791,033
Section 36/WS/Waltham Connection - Design/CA/RI	68167_6540	Jan-11	Dec-22	3,048,155	1,399,454	1,648,700	260,000	260,000	260,000	260,000	1,253,844	608,700	
WASM 3 Waltham - CP2	68170_6543	Jul-18	Sep-21	109,448,546	-	109,448,546						109,448,546	
WASM 3 Belmont - CP3	68171_6544	Oct-21	Dec-23	44,704,488	-	44,704,488						29,802,000	14,902,488
WASM 3 Arlington - CP4	68172_6545	Jan-23	Aug-25	17,504,755	-	17,504,755						1,641,000	15,863,755
Section 28, Arlington - CPI	68173_6546	Aug-09	Feb-11	2,303,626	2,303,626	-							
Survey	68245_6870	Dec-01	Oct-25	210,000	88,681	121,319		40,000	40,000	41,319	121,319		
Arlington Pipe Work	68269_6996	Dec-09	May-10	401,035	401,035	-							
WASM 3 Section 12 Replacement - Construction	68272_7000	Oct-04	Sep-05	2,113,693	2,113,693	-							
WASM 3 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	2,668,298	2,618,297	50,000	50,000				2,009,526		
Section 36/C/S9 - A11 Valve	68332_7448	Nov-14	May-17	11,250,500	-	11,250,500	3,655,000	6,040,000	1,555,500		11,250,500		
Section 101 Construction	68333_7457	Jul-20	Jun-22	12,290,547	-	12,290,547						12,290,547	
<b>731 Lynnfield Pipeline</b>			<b>completed project</b>	<b>5,625,832</b>	<b>5,625,828</b>	<b>-</b>					<b>(51,693)</b>		
<b>732 Walnut St. &amp; Fisher Hill Pipeline Rehab</b>			<b>completed project</b>	<b>2,717,140</b>	<b>2,717,140</b>	<b>-</b>							
<b>735 Section 80 Rehabilitation</b>				<b>9,835,779</b>	<b>-</b>	<b>9,835,779</b>			<b>113,000</b>	<b>445,000</b>	<b>558,000</b>	<b>9,277,779</b>	
Section 80 - Construction	68249_6891	Jan-19	Dec-20	7,868,623	-	7,868,623						7,868,623	
Section 80 - Design/CS/RI	68250_6892	Jan-17	Dec-21	1,967,156	-	1,967,156			113,000	445,000	558,000	1,409,156	
<b>Other Waterworks</b>				<b>69,836,306</b>	<b>153,187,346</b>	<b>(83,351,040)</b>	<b>(886,650)</b>	<b>106,845</b>	<b>1,837,485</b>	<b>5,247,999</b>	<b>7,759,905</b>	<b>(34,202,866)</b>	<b>(55,453,852)</b>
<b>753 Central Monitoring System</b>				<b>39,006,328</b>	<b>15,803,729</b>	<b>23,202,599</b>	<b>384,397</b>	<b>1,494,498</b>	<b>2,977,830</b>	<b>1,439,874</b>	<b>6,296,599</b>	<b>6,220,000</b>	<b>10,686,000</b>
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-15	2,101,110	1,912,416	188,694	188,694				188,694		
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 I	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	18,500,000	-	18,500,000		350,000	1,244,000	1,594,000	6,220,000	10,686,000	
Microwave Equipment	75474_6125	Mar-96	Dec-01	781,987	781,987	-							
Microwave Communication 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 - Construct.	75512_7338	Oct-15	Apr-17	3,400,000	-	3,400,000		1,133,334	2,266,666		3,400,000		
Quabbin Power, Communication & Security-Design/CA/RI	75540_7461	Jul-14	Dec-17	813,905	-	813,905	187,370	227,831	227,831	170,873	813,905		
Utility Fees and Permits	75541_7475	Jul-14	Dec-17	300,000	-	300,000	8,333	133,333	133,333	25,001	300,000		

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<b>763 Distribution Systems Facilities Mapping</b>				<b>2,298,919</b>	<b>1,036,368</b>	<b>1,262,551</b>			<b>282,819</b>	<b>631,276</b>	<b>914,095</b>	<b>348,456</b>	
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	Jan-17	Jan-19	762,551	-	762,551			95,319	381,276	476,595	285,956	
Update of Record Drawings	75600_7489	Jul-16	Jun-18	500,000	-	500,000			187,500	250,000	437,500	62,500	
<b>764 Local Water Infrastructure Rehab</b>	<b>completed project</b>			<b>7,487,762</b>	<b>7,487,762</b>	<b>-</b>							
<b>765 Local Water Pipeline Assistance Program</b>				<b>-</b>	<b>128,313,468</b>	<b>(128,313,468)</b>	<b>(1,398,128)</b>	<b>(2,156,653)</b>	<b>(2,497,708)</b>	<b>89,849</b>	<b>(4,508,413)</b>	<b>(53,489,976)</b>	<b>(68,860,852)</b>
Community Loans	75485_6608	Aug-00	Jun-13	222,317,575	222,317,575	-							
Community Repayment	75493_6759	Aug-01	Jun-23	(222,317,575)	(150,535,458)	(71,782,117)	(15,333,004)	(13,395,462)	(11,726,517)	(9,128,960)	(66,781,631)	(22,198,174)	
Local Water System Assistance Loans	75513_7339	Aug-10	Jun-20	200,000,000	61,286,437	138,713,563	20,272,019	19,000,000	19,000,000	21,000,000	101,989,345	59,441,544	
Local Water System Assistance Repayment	75514_7340	Aug-11	Jun-30	(200,000,000)	(6,538,085)	(193,461,915)	(6,128,643)	(8,542,691)	(10,442,691)	(12,342,691)	(41,313,627)	(90,946,346)	(65,058,852)
CVA Loans	75515_7350	Nov-10	Jun-20	10,000,000	2,085,000	7,915,000		1,100,000	1,100,000	1,100,000	3,300,000	4,615,000	
CVA Repayments	75516_7351	Nov-11	Jun-30	(10,000,000)	(302,000)	(9,698,000)	(208,500)	(318,500)	(428,500)	(538,500)	(1,702,500)	(4,402,000)	(3,802,000)
<b>766 Waterworks Facility Asset Protection</b>				<b>21,043,297</b>	<b>546,018</b>	<b>20,497,278</b>	<b>127,081</b>	<b>769,000</b>	<b>1,074,543</b>	<b>3,087,000</b>	<b>5,057,624</b>	<b>12,718,655</b>	<b>2,721,000</b>
Meter Vault Manhole Retrofits - Design	75490_6689	Sep-18	Jun-21	406,222	-	406,222						406,222	
Walnut Hill Tank - Design	75497_6832	Jul-16	Jul-19	300,000	-	300,000			113,000	150,000	263,000	37,000	
Walnut Hill Tank - Construction	75498_6833	Jul-17	Jul-18	1,000,000	-	1,000,000				750,000	750,000	250,000	
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	9,156	7,184		4,000	3,184		7,184		
Cosgrove Flat Roof Replacement	75505_7022	Sep-16	Mar-17	300,000	-	300,000			300,000		300,000		
Cosgrove Valve Replacement - Construction	75509_7064	Jul-19	Dec-19	1,819,485	-	1,819,485						1,819,485	
Cosgrove Valve Replacement - Design	75510_7065	Jul-18	Dec-20	214,057	-	214,057						214,057	
Transformer at Cosgrove Intake Building	75511_7228	Jun-11	Jul-12	299,313	299,313	-							
Shaft 9 Rehab - Design CA/RI	75520_7381	Jul-25	Aug-29	400,000	-	400,000							400,000
Elevated Water Storage Tank Repaint - Design	75523_7384	Jul-16	Jul-19	500,000	-	500,000			125,000	167,000	292,000	208,000	
Covered Storage Tank Rehab - Design CA/RI	75524_7385	Jul-19	Jun-24	1,000,000	-	1,000,000						919,000	81,000
Electrical Distribution Upgrades at Southborough	75535_7425	Jul-17	Jun-18	400,000	-	400,000				400,000	400,000		
Water Meter Upgrade Replacement	75536_7453	Sep-18	Jun-21	1,000,000	-	1,000,000						1,000,000	
Beacon Street Line Repair - Construction	75537_7458	Jan-16	Sep-16	1,000,000	-	1,000,000		500,000	500,000		1,000,000		
Beacon Street Line Repair - Design CA/RI	75538_7474	Nov-14	Jul-17	425,440	-	425,440	127,081	265,000	33,359		425,440		
Meter Vault Manhole Retrofits - Construction	75550_7479	Sep-19	Jun-21	1,624,891	-	1,624,891						1,624,891	
Shaft 9 Rehab - Construction	75551_7492	Mar-27	Aug-28	1,600,000	-	1,600,000							1,600,000
Covered Storage Tank Rehab - Construction	75553_7482	Jul-21	Jul-23	4,000,000	-	4,000,000						3,360,000	640,000
Elevated Water Storage Tank Repaint - Construction	77552_7493	Jul-17	Jun-19	4,500,000	-	4,500,000				1,620,000	1,620,000	2,880,000	

**Massachusetts Water Resources Authority  
Final FY16 Expenditure Forecast**

Program/Project/Subphase	Contract No.	Notice To Proceed	Substantial Completion	Total Contract Amount	Payments through FY14	Remaining Balance	FY15	FY16	FY17	FY18	FY14 - FY18	FY19-FY23	Beyond FY23
<b>Business &amp; Operations Support</b>				<b>128,392,526</b>	<b>82,949,295</b>	<b>45,443,231</b>	<b>6,850,037</b>	<b>8,958,368</b>	<b>9,625,815</b>	<b>9,980,451</b>	<b>40,922,125</b>	<b>10,028,554</b>	<b>-</b>
<b>881 Equipment Purchase</b>				<b>23,167,626</b>	<b>13,348,295</b>	<b>9,819,331</b>	<b>3,477,824</b>	<b>3,000,882</b>	<b>1,440,625</b>	<b>903,000</b>	<b>10,063,297</b>	<b>997,000</b>	
Security Equipment & Installation	92374_6760	Jan-01	Jun-17	9,839,978	6,926,501	2,913,477	1,448,846	1,039,006	425,625		3,172,601		
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	6,887,696	981,842	5,905,854	2,028,978	1,961,876	835,000	630,000	6,437,696	450,000	
FY14-18 Major Lab Instrumentation	98458_7310	Mar-17	Mar-20	1,000,000		1,000,000			180,000	273,000	453,000	547,000	
Front-End Loader	98467_7325	Oct-10	Dec-10	121,221	121,221								
<b>925 Technical Assistance</b>				<b>1,125,000</b>	<b>-</b>	<b>1,125,000</b>		<b>375,000</b>	<b>375,000</b>	<b>375,000</b>	<b>1,125,000</b>		
Land Appraisal	77000 LAND			150,000	-	150,000		50,000	50,000	50,000	150,000		
Surveying	80000 SURV			75,000	-	75,000		25,000	25,000	25,000	75,000		
Hazardous Material	90000 HAZM			900,000	-	900,000		300,000	300,000	300,000	900,000		
<b>930 MWRA Facility - Chelsea</b>			<b>completed project</b>	<b>9,813,633</b>	<b>9,813,633</b>	<b>-</b>							
<b>931 Business Systems Plan</b>				<b>24,551,785</b>	<b>24,515,683</b>	<b>36,102</b>	<b>36,102</b>				<b>100,555</b>		
Network - Phase I	92322_6015	Jul-94	Dec-96	141,610	141,610	-							
Phase I (FY95-97)	92338_6014	Jul-94	Mar-03	1,146,321	1,146,321	-							
Hardware - Phase I	92339_6013	Jul-94	Dec-96	440,770	440,770	-							
Phase II (FY97-10)	92343_6177	Jul-96	Oct-13	4,174,368	4,150,292	24,076	24,076				24,076		
Phase III (FY99-01)	92347_6362	Dec-97	Jun-04	10,746,841	10,746,841	-							
Phase IV / Year 2000 Improvements	92352_6508	Jul-98	Jan-00	3,018,373	3,018,373	-							
Phase V (FY01-10)	92353_6509	Jul-01	Oct-14	2,203,314	2,191,288	12,026	12,026				76,479		
Phase VI (FY04-09)	92380_6865	Jan-03	Jun-11	2,036,689	2,036,689	-							
GIS/TV Inspection	92419_7250	Apr-09	Jun-10	80,644	80,644	-							
MIS Licensing	92423_7254	Jul-08	Mar-10	14,060	14,060	-							
Lawson Conversion	92424_7255	Jun-08	Jun-11	188,887	188,887	-							
Cyber Security	92425_7256	Apr-09	Sep-11	104,862	104,862	-							
Original SAN	92426_7257	Jul-09	Jun-11	255,046	255,046	-							
<b>932 Environmental Remediation</b>			<b>completed project</b>	<b>1,478,602</b>	<b>1,478,602</b>	<b>-</b>					<b>(200)</b>		
<b>933 Capital Maintenance Planning &amp; Development</b>				<b>16,720,749</b>	<b>11,057,829</b>	<b>5,662,920</b>	<b>1,166,787</b>	<b>1,871,133</b>	<b>1,500,000</b>	<b>1,125,000</b>	<b>6,596,524</b>		
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	-					(46,988)		
As-Needed Design Contract 9	98470_7390	Jul-11	Jan-14	1,769,062	1,609,621	159,441	159,441				374,983		
As-Needed Design Contract 10	98471_7391	Aug-11	Feb-14	1,879,913	1,861,612	18,301	18,300				518,529		
As-Needed Design Contract 11	98473_7436	Feb-14	Aug-15	550,000	78,808	471,192	284,045	187,148			550,000		
As-Needed Design Contract 12	98474_7437	Jan-14	Jan-16	1,100,000	186,014	913,986	336,449	577,537			1,100,000		
As-Needed Design Contract 13	98485_7456	Feb-14	Feb-16	1,100,000	-	1,100,000	368,552	731,448			1,100,000		
As-Needed Design Contract 14	98487_7496	Jan-16	Jan-18	1,000,000	-	1,000,000		125,000	500,000	375,000	1,000,000		
As-Needed Design Contract 15	98488_7497	Jan-16	Jan-18	1,000,000	-	1,000,000		125,000	500,000	375,000	1,000,000		
As-Needed Design Contract 16	98489_7498	Jan-16	Jan-18	1,000,000	-	1,000,000		125,000	500,000	375,000	1,000,000		



**Massachusetts Water Resources Authority  
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Program/Project/Subphase	Contract No.	Notice To Proceed	Substantial Completion	Total Contract Amount	Payments through FY14	Remaining Balance	FY15	FY16	FY17	FY18	FY14 - FY18	FY19-FY23	Beyond FY23
<b>934 MWRA Facilities Management</b>				<b>2,150,535</b>	<b>370,533</b>	<b>1,780,002</b>						<b>1,780,002</b>	
Design/Engineering Services	92389_6983	Jul-18	Sep-19	150,000	(2)	150,002						150,002	
Facilities Construction	92390_6984	Sep-19	Sep-20	2,000,535	370,535	1,630,000						1,630,000	
<b>935 Alternative Energy Initiatives</b>				<b>25,629,544</b>	<b>17,387,564</b>	<b>8,241,980</b>		<b>52,000</b>	<b>947,000</b>	<b>2,385,920</b>	<b>3,575,680</b>	<b>4,857,055</b>	
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 DI Wind Construction (Battery D Location)	92430_7270	Oct-18	Dec-19	4,679,055	-	4,679,055						4,679,055	
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	-					(600)		
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 I - 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	-					169,070		
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	-					22,290		
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	-							
Renewable Energy Technical Assistance - Wind & Solar	98453_7305	Jan-16	Jan-19	650,000	-	650,000		52,000	210,000	210,000	472,000	178,000	
Loring Road Hydro - Construction	98459_6974F	Jan-10	May-11	1,882,218	1,882,218	-							
DI Wind Phase II Construction	98463_7321	Jan-17	Mar-18	2,500,000	37,080	2,462,920			492,000	1,970,920	2,462,920		
Fish Hatchery Pipeline Hydro	98465_7323	Feb-16	Aug-17	450,000	-	450,000			245,000	205,000	450,000		
<b>940 Application Improvement Program</b>				<b>10,176,000</b>	<b>366,135</b>	<b>9,809,865</b>	<b>243,988</b>	<b>1,566,064</b>	<b>2,868,500</b>	<b>3,465,510</b>	<b>8,437,071</b>	<b>1,665,804</b>	
GIS Applications & Integration	92420_7251	Jan-14	Jun-17	350,000	17,450	332,550	47,110	126,862	126,862	31,716	350,000		
Lawson Enhancements	92435_7286	Oct-15	Jun-18	1,750,000	-	1,750,000		318,182	636,364	636,364	1,590,910	159,090	
Maximo Upgrade	92436_7287	Jul-15	Mar-19	2,626,000	-	2,626,000		863,001	587,666	587,666	2,038,333	587,667	
PIMS Enhancements	92437_7288	Jun-16	Sep-18	400,000	-	400,000			142,857	171,429	314,286	85,714	
Enterprise Performance Management Enhancements	92469_7386	Jan-16	Jun-17	200,000	80,900	119,100		19,850	79,400	19,850	126,875		
Enterprise Content Management	98475_7438	Aug-16	Dec-18	4,000,000	-	4,000,000			1,166,667	2,000,000	3,166,667	833,333	
Mobile Integrations	98476_7439	Apr-14	Jul-16	300,000	21,512	278,488	59,521	164,226	54,741		300,000		
LIMS Enhancement	98484_7447	Mar-15	Jun-17	550,000	246,273	303,727	137,357	73,943	73,943	18,485	550,000		
<b>942 Information Security Program (ISP)</b>				<b>2,385,411</b>	<b>819,825</b>	<b>1,565,586</b>	<b>212,253</b>	<b>351,667</b>	<b>406,666</b>	<b>340,000</b>	<b>1,595,221</b>	<b>255,000</b>	
Information Security Protection Infrastructure -Equipment	92434_7285	Sep-11	Jun-14	647,000	501,414	145,586	145,586				145,586		
Information Security Protection Infrastructure Upgrade	92500_7499	Jan-16	Jan-19	1,020,000	-	1,020,000		85,000	340,000	340,000	765,000	255,000	
Electronic Security Plan Development & Implementation	98477_7440	Jun-14	Jun-16	400,000	-	400,000	66,667	266,667	66,666		400,000		
Information Security Program (ISP) Develop. & Implemen	98483_7446	May-13	Jun-14	318,411	318,411	-					284,635		
<b>944 Information Technology Management Program</b>				<b>922,640</b>	<b>-</b>	<b>922,640</b>		<b>58,230</b>	<b>404,633</b>	<b>400,443</b>	<b>863,306</b>	<b>59,334</b>	
Implement IT Task Force	92412_7240	Jun-16	Nov-17	100,000	-	100,000			55,557	44,443	100,000		
Service Delivery & Best Practices	92421_7252	Jul-15	Dec-17	110,640	-	110,640		58,230	52,410		110,640		
Reorganize MIS Department	92422_7253	Jul-16	Jun-18	150,000	-	150,000			62,500	75,000	137,500	12,500	
IT Project Management Methodology	98472_7408	Jun-16	Jun-18	200,000	-	200,000			83,333	100,000	183,333	16,667	
Software Development Life Cycle (SDLC)	98478_7441	Jun-16	Jun-18	362,000	-	362,000			150,833	181,000	331,833	30,167	

**Massachusetts Water Resources Authority  
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Program/Project/Subphase	Contract No.	Notice To Proceed	Substantial Completion	Total Contract Amount	Payments through FY14	Remaining Balance	FY15	FY16	FY17	FY18	FY14 - FY18	FY19-FY23	Beyond FY23
<b>946 IT Infrastructure Program</b>				<b>10,271,000</b>	<b>3,791,196</b>	<b>6,479,804</b>	<b>1,713,084</b>	<b>1,683,392</b>	<b>1,683,391</b>	<b>985,578</b>	<b>8,565,670</b>	<b>414,359</b>	
IT System Architecture	92404_7200	Sep-12	Jun-17	750,000	692,305	57,695	9,883	21,250	21,250	5,312	287,227		
Net 2020/Net 2020 DITP/Southborough	92405_7201	Mar-11	Jun-17	2,811,000	915,549	1,895,451	360,020	682,414	682,414	170,603	2,109,973		
Storage Upgrades	92406_7203	Jul-13	Jun-18	1,575,000	697,214	877,786	257,897	190,735	190,735	190,735	1,408,151	47,684	
Backup Upgrades	92407_7204	Jul-13	Sep-18	894,000	525,862	368,138	82,044	81,741	81,741	81,741	853,128	40,872	
Server Management	92408_7205	Oct-13	Jun-18	500,000	242,741	257,259	32,536	69,145	69,145	69,145	482,712	17,288	
Enterprise Application Integration	98480_7443	Jul-14	Dec-18	2,091,000	56,346	2,034,654	492,078	411,354	411,353	411,354	1,782,485	308,515	
E-Mail Upgrades	98481_7444	Jul-15	Jun-17	150,000	8,006	141,994	30,445	49,577	49,577	12,395	141,994		
Enterprise Data Management	98482_7445	Jan-14	Jun-17	1,500,000	653,173	846,827	448,182	177,176	177,176	44,293	1,500,000		

# APPENDIX 3

## New Capital Projects Added During the FY16 CIP

**APPENDIX 3  
New Capital Projects Added to the FY16 CIP**

Program	Project	Subphase	Total Contract Amount	FY16	FY17	FY18	FY14-18	FY19-23	Beyond FY23	Total Expenditures
Interception & Pumping	Wastewater Central Monitoring	Wastewater SCADA/PLC Upgrade	\$ 7,000,000	\$ -	\$ 150,000	\$ 470,000	\$ 620,000	\$ 2,350,000	\$ 4,030,000	\$ 7,000,000
Transmission	Sudbury/Weston Aqueduct Repairs	Weston Aqueduct Flow Control Valve (Southborough)	900,000	-	675,000	225,000	900,000	-	-	900,000
	Quabbin Transmission System	Oakdale High Line Replacement	500,000	-	500,000	-	500,000	-	-	500,000
Other Waterworks	Waterworks Facility Asset Protection	Cosgrove Flat Roof Replacement	300,000	-	300,000	-	300,000	-	-	300,000
	Central Monitoring	Waterworks SCADA/PLC Upgrade	18,500,000	-	350,000	1,244,000	1,594,000	6,220,000	10,686,000	18,500,000
<b>SUMMARY:</b>										
<b>Total Wastewater Projects</b>			\$ 7,000,000	\$ -	\$ 150,000	\$ 470,000	\$ 620,000	\$ 2,350,000	\$ 4,030,000	\$ 7,000,000
<b>Total Waterworks Projects</b>			20,200,000	-	1,825,000	1,469,000	3,294,000	6,220,000	10,686,000	20,200,000
<b>Total Projects</b>			\$ 27,200,000	\$ -	\$ 1,975,000	\$ 1,939,000	\$ 3,914,000	\$ 8,570,000	\$ 14,716,000	\$ 27,200,000

## APPENDIX 4

# Overview of the Final FY16 CIP and Changes from the Final FY15 CIP

**APPENDIX 4**  
**Overview of the Final FY16 and Changes from the Final FY15 CIP**

Program and Project	Final FY15				Final FY16				Change from Final FY15			
	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
<b>Total MWRA</b>	<b>5,852,185</b>	<b>756,279</b>	<b>1,131,090</b>	<b>276,690</b>	<b>6,012,395</b>	<b>711,532</b>	<b>1,223,762</b>	<b>388,976</b>	<b>160,210</b>	<b>(44,747)</b>	<b>92,672</b>	<b>112,286</b>
<b>Wastewater</b>	<b>2,885,828</b>	<b>423,390</b>	<b>620,567</b>	<b>105,869</b>	<b>2,974,567</b>	<b>419,344</b>	<b>634,899</b>	<b>184,324</b>	<b>88,739</b>	<b>(4,046)</b>	<b>14,332</b>	<b>78,455</b>
<b>Interception &amp; Pumping</b>	<b>873,172</b>	<b>108,970</b>	<b>213,926</b>	<b>29,735</b>	<b>890,031</b>	<b>98,024</b>	<b>224,870</b>	<b>46,598</b>	<b>16,859</b>	<b>(10,946)</b>	<b>10,944</b>	<b>16,863</b>
102 Quincy Pump Facilities	25,907	-	-	-	25,907	-	-	-	-	-	-	-
104 Braintree-Weymouth Relief Facilities	232,453	309	4,441	-	232,455	310	4,441	-	2	1	-	-
105 New Neponset Valley Relief Sewer	30,300	-	-	-	30,300	-	-	-	-	-	-	-
106 Wellesley Extension 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	6,520	-	5,580	-	6,635	-	5,695	-	115	-	115	-
131 Upper Neponset Valley Sewer	54,174	-	-	-	54,174	-	-	-	-	-	-	-
132 Corrosion & Odor Control	16,346	1,000	12,344	-	19,782	543	16,238	-	3,436	(457)	3,894	-
136 West Roxbury Tunnel	11,314	-	1,000	-	11,314	-	1,000	-	-	-	-	-
137 Wastewater Central Monitoring	20,482	327	373	-	27,482	760	2,910	4,030	7,000	433	2,537	4,030
139 South System Relief Project	4,939	-	1,500	-	4,939	-	1,500	-	-	-	-	-
141 Wastewater Process Optimization	10,360	1,391	5,794	1,970	10,383	1,391	5,817	1,970	23	-	23	-
142 Wastewater Meter System-Equipment	26,438	7,300	3,000	11,000	27,738	6,436	1,564	14,600	1,300	(864)	(1,436)	3,600
143 Regional I/I Management Planning	169	-	-	-	169	-	-	-	-	-	-	-
145 Facility Asset Protection	306,806	98,644	174,144	16,766	311,791	88,585	179,955	25,999	4,985	(10,059)	5,811	9,233
146 D.I. Cross Harbor Tunnel Inspection	5,000	-	5,000	-	5,000	-	5,000	-	-	-	-	-
147 Randolph Trunk Sewer Relief	750	-	750	-	750	-	750	-	-	-	-	-
<b>Treatment</b>	<b>709,420</b>	<b>191,535</b>	<b>282,292</b>	<b>50,871</b>	<b>775,573</b>	<b>183,994</b>	<b>352,083</b>	<b>54,773</b>	<b>66,153</b>	<b>(7,541)</b>	<b>69,791</b>	<b>3,902</b>
182 DI Primary and Secondary	(958)	-	-	-	(958)	-	-	-	-	-	-	-
200 DI Plant Optimization	33,427	-	-	-	33,427	-	-	-	-	-	-	-
206 DI Treatment Plant Asset Protection	655,558	178,663	278,524	50,871	720,365	170,511	347,938	54,416	64,807	(8,152)	69,414	3,545
210 Clinton Wastewater Treat Plant	19,166	12,872	3,768	-	20,511	13,483	4,145	358	1,345	611	377	358
211 Laboratory Services	2,228	-	-	-	2,228	-	-	-	-	-	-	-
<b>Residuals</b>	<b>167,920</b>	<b>10,384</b>	<b>58,917</b>	<b>34,083</b>	<b>167,643</b>	<b>4,570</b>	<b>8,470</b>	<b>90,067</b>	<b>(277)</b>	<b>(5,814)</b>	<b>(50,447)</b>	<b>55,984</b>
261 Residuals	63,811	-	-	-	63,811	-	-	-	-	-	-	-
271 Residuals Asset Protection	104,109	10,384	58,917	34,083	103,832	4,570	8,470	90,067	(277)	(5,814)	(50,447)	55,984

**APPENDIX 4**  
**Overview of the Final FY16 and Changes from the Final FY15 CIP**

Program and Project	Final FY15				Final FY16				Change from Final FY15			
	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
<b>CSO</b>	<b>892,449</b>	<b>53,481</b>	<b>1,262</b>	<b>-</b>	<b>898,455</b>	<b>57,747</b>	<b>3,001</b>	<b>-</b>	<b>6,006</b>	<b>4,266</b>	<b>1,739</b>	<b>-</b>
340 Dorchester Bay Sewer Separation (Fox Point)	54,626	474	-	-	54,626	473	-	-	-	(1)	-	-
341 Dorchester Bay Sewer Separation (Commercial Point)	64,174	3,026	-	-	64,174	1,287	1,740	-	-	(1,739)	1,740	-
342 Neponset River Sewer Separation	2,549	105	-	-	2,549	105	-	-	-	-	-	-
343 Constitution Beach Sewer Separation	3,731	(38)	-	-	3,731	(38)	-	-	-	-	-	-
344 Stony Brook Sewer Separation	44,247	48	-	-	44,246	48	-	-	(1)	-	-	-
346 Cambridge Sewer Separation	90,847	40,363	-	-	92,563	42,079	-	-	1,716	1,716	-	-
351 BWSC Floatables Controls	946	13	-	-	946	13	-	-	-	-	-	-
352 Cambridge Floatables Control	1,127	40	-	-	1,127	40	-	-	-	-	-	-
356 Fort Point Channel Sewer Separation	11,917	(90)	-	-	11,917	(90)	-	-	-	-	-	-
358 Morrissey Boulevard Drain	32,339	(8)	-	-	32,186	(161)	-	-	(153)	(153)	-	-
359 Reserved Channel Sewer Separation	68,902	8,862	-	-	72,613	12,573	-	-	3,711	3,711	-	-
360 Brookline Sewer Separation	24,802	(1,195)	-	-	24,716	(1,282)	-	-	(86)	(87)	-	-
361 Bulfinch Triangle Sewer Separation	9,054	(803)	-	-	9,054	(803)	-	-	-	-	-	-
339 North Dorchester Bay	221,606	(14)	-	-	221,597	(23)	-	-	(9)	(9)	-	-
347 East Boston Branch Sewer Relief	85,638	(8)	-	-	85,637	(9)	-	-	(1)	(1)	-	-
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	3,716	3,067	-	-	4,562	3,914	-	-	846	847	-	-
357 Charles River CSO Controls	3,633	-	-	-	3,633	-	-	-	-	-	-	-
324 CSO Support	50,264	(362)	1,262	-	50,248	(378)	1,262	-	(16)	(16)	-	-
<b>Other Wastewater</b>	<b>242,866</b>	<b>59,020</b>	<b>64,171</b>	<b>(8,820)</b>	<b>242,866</b>	<b>75,009</b>	<b>46,475</b>	<b>(7,114)</b>	<b>-</b>	<b>15,989</b>	<b>(17,696)</b>	<b>1,706</b>
128 I/I Local Financial Assistance	242,585	59,020	64,171	(8,820)	242,585	75,009	46,475	(7,114)	-	15,989	(17,696)	1,706
138 Sewerage System Mapping Upgrade	281	-	-	-	281	-	-	-	-	-	-	-
<b>Total Waterworks</b>	<b>2,843,684</b>	<b>294,623</b>	<b>503,558</b>	<b>170,821</b>	<b>2,909,436</b>	<b>251,266</b>	<b>578,835</b>	<b>204,653</b>	<b>65,752</b>	<b>(43,357)</b>	<b>75,277</b>	<b>33,832</b>
<b>Drinking Water Quality</b>	<b>659,861</b>	<b>62,761</b>	<b>1,892</b>	<b>-</b>	<b>666,292</b>	<b>58,903</b>	<b>12,161</b>	<b>20</b>	<b>6,431</b>	<b>(3,858)</b>	<b>10,269</b>	<b>20</b>
542 Carroll Water Treatment Plant	433,712	20,611	1,892	-	438,192	15,166	11,797	20	4,480	(5,445)	9,905	20
543 Quabbin Water Treatment Plant	19,305	6,536	-	-	19,719	6,951	-	-	414	415	-	-
544 Norumbega Covered Storage	106,674	-	-	-	106,674	-	-	-	-	-	-	-
545 Blue Hills Covered Storage	40,547	584	-	-	40,555	228	364	-	8	(356)	364	-
550 Spot Pond Storage Facility	59,624	35,030	-	-	61,152	36,558	-	-	1,528	1,528	-	-

**APPENDIX 4**  
**Overview of the Final FY16 and Changes from the Final FY15 CIP**

Program and Project	Final FY15			
	Total Budget Amount	FY14-18	FY19-23	Beyond 23
<b>Transmission</b>	<b>1,201,724</b>	<b>98,047</b>	<b>236,780</b>	<b>111,859</b>
597 Winsor Station Pipeline	27,434	17,182	8,856	-
601 Sluice Gate Rehabilitation	9,158	-	-	-
604 MetroWest Tunnel	708,490	4,981	8,110	-
615 Chicopee Valley Aqueduct Redundancy	8,666	-	-	-
616 Quabbin Transmission System	13,592	2,240	4,150	-
617 Sudbury/Weston Aqueduct Repairs	5,968	3,211	2,098	-
620 Wachusett Reservoir Spillway Improvement	9,287	-	-	-
621 Watershed Land	24,000	6,658	-	-
622 Cosgrove/Wachusett Redundancy	-	-	-	-
623 Dam Projects	4,540	1,412	43	-
625 Long Term Redundancy	390,588	62,363	213,524	111,859
<b>Distribution &amp; Pumping</b>	<b>932,592</b>	<b>121,064</b>	<b>306,096</b>	<b>132,729</b>
618 Northern High NW Tran Sections 70 & 71	1,000	1,000	-	-
677 Valve Replacement	22,540	3,411	7,113	-
678 Boston Low Service-Pipe & Valve Rehabilitation	23,691	-	-	-
683 Heath Hill Road Pipe Replacement	19,358	-	-	-
689 James L. Gillis Pump Station Rehabilitation	33,419	-	-	-
692 NHS - Section 27 Improvements	1,071	178	770	-
693 NHS - Revere & Malden Pipeline Improvement	48,988	12,814	9,342	-
702 New Connect Mains-Shaft 7 to WASM 3	33,902	6,105	16,836	-
704 Rehabilitation of Other Pump Stations	55,058	-	18,750	6,250
706 NHS-Connecting Mains from Section 91	2,360	-	-	-
708 Northern Extra High Service New Pipelines	7,776	1,206	2,938	-
712 Cathodic Protection Of Distribution Mains	1,636	498	748	249
713 Spot Pond Supply Mains Rehabilitation	66,470	3,261	2,227	-
714 Southern Extra High Sections 41 & 42	3,657	-	-	-
719 Chestnut Hill Connecting Mains	31,731	805	8,031	5,408
720 Warren Cottage Line Rehabilitation	1,205	-	-	-
721 South Spine Distribution Mains	74,073	390	4,000	32,992
722 NIH Redundancy & Storage	88,723	39,821	42,928	-
723 Northern Low Service Rehabilitation Section 8	22,964	754	19,889	-
724 Northern High Service - Pipeline Rehabilitation	-	-	-	-
725 Hydraulic Model Update	598	-	-	-
727 Southern Extra High Redundancy & Storage	97,774	18,130	19,731	53,156
730 Weston Aqueduct Supply Mains	276,475	31,939	143,819	34,675
731 Lynnfield Pipeline	5,774	97	-	-
732 Walnut St. & Fisher Hill Pipeline Rehabilitation	2,717	-	-	-
733 NHS Pipeline Rehabilitation 13-18 & 48	-	-	-	-
734 Southern Extra High Pipelines-Sections 30, 39,40, & 44	-	-	-	-
735 Section 80 Rehabilitation	9,630	656	8,974	-

Final FY16			
Total Budget Amount	FY14-18	FY19-23	Beyond 23
<b>1,224,185</b>	<b>78,812</b>	<b>275,900</b>	<b>114,434</b>
27,883	9,661	16,827	-
9,158	-	-	-
708,664	3,260	9,888	118
8,666	-	-	-
15,457	773	7,481	-
7,149	3,146	3,343	-
9,287	-	-	-
24,000	6,658	-	-
-	-	-	-
4,538	978	475	-
409,381	54,336	237,886	114,317
<b>949,123</b>	<b>105,791</b>	<b>324,977</b>	<b>145,651</b>
1,000	474	526	-
22,702	2,717	3,619	4,351
23,691	-	-	-
19,358	-	-	-
33,419	-	-	-
1,092	178	790	-
55,161	11,020	16,607	702
34,296	403	17,111	5,821
55,058	-	18,750	6,250
2,360	-	-	-
7,863	61	3,495	675
1,668	509	763	254
66,807	2,713	3,112	-
3,657	-	-	-
32,035	316	10,156	4,076
1,205	-	-	-
74,773	369	4,037	33,676
90,187	43,327	40,885	-
23,334	553	20,459	-
-	-	-	-
598	-	-	-
99,544	23,224	15,274	54,289
281,137	19,422	160,114	35,557
5,626	(52)	-	-
2,717	-	-	-
-	-	-	-
-	-	-	-
9,836	558	9,278	-

Change from Final FY15			
Total Budget Amount	FY14-18	FY19-23	Beyond 23
<b>22,461</b>	<b>(19,235)</b>	<b>39,120</b>	<b>2,575</b>
449	(7,521)	7,971	-
-	-	-	-
174	(1,721)	1,778	118
-	-	-	-
1,865	(1,467)	3,331	-
1,181	(65)	1,245	-
-	-	-	-
-	-	-	-
(2)	(434)	432	-
18,793	(8,027)	24,362	2,458
<b>16,531</b>	<b>(15,273)</b>	<b>18,881</b>	<b>12,922</b>
-	(526)	526	-
162	(694)	(3,494)	4,351
-	-	-	-
-	-	-	-
21	-	20	-
6,173	(1,794)	7,265	702
394	(5,702)	275	5,821
-	-	-	-
-	-	-	-
87	(1,145)	557	675
32	11	15	5
337	(548)	885	-
-	-	-	-
304	(489)	2,125	(1,332)
-	-	-	-
700	(21)	37	684
1,464	3,506	(2,043)	-
370	(201)	570	-
-	-	-	-
-	-	-	-
1,770	5,094	(4,457)	1,133
4,662	(12,517)	16,295	882
(148)	(149)	-	-
-	-	-	-
-	-	-	-
206	(98)	304	-



**APPENDIX 4**  
**Overview of the Final FY16 and Changes from the Final FY15 CIP**

Program and Project	Final FY15			
	Total Budget Amount	FY14-18	FY19-23	Beyond 23
<b>Other</b>	<b>49,507</b>	<b>12,752</b>	<b>(41,211)</b>	<b>(73,767)</b>
753 Central Monitoring System	19,592	3,789	-	-
763 Distribution Systems Facilities Mapping	1,799	763	-	-
764 Local Water Infrastructure Rehabilitation Assistance	7,488	-	-	-
765 Local Water Pipeline Improvement Loan Program	-	(2,581)	(49,647)	(74,632)
766 Waterworks Facility Asset Protection	20,628	10,781	8,436	865
<b>Business &amp; Operations Support</b>	<b>122,673</b>	<b>38,266</b>	<b>6,965</b>	<b>-</b>
881 Equipment Purchase	20,491	7,460	924	-
925 Technical Assistance	1,125	1,125	-	-
930 MWRA Facility - Chelsea	9,814	-	-	-
931 Business Systems Plan	24,535	84	-	-
932 Environmental Remediation	1,479	-	-	-
933 Capital Maintenance Planning	13,971	3,847	-	-
934 MWRA Facilities Management	2,151	-	1,780	-
935 Alternative Energy Initiatives	26,522	5,707	3,618	-
940 Applicat Improv Program	10,050	9,795	182	-
942 Info Security Program ISP	1,343	808	-	-
944 Info Tech Mgmt Program	923	923	-	-
946 IT Infrastructure Program	10,271	8,519	461	-

Final FY16			
Total Budget Amount	FY14-18	FY19-23	Beyond 23
<b>69,836</b>	<b>7,760</b>	<b>(34,203)</b>	<b>(55,454)</b>
39,006	6,297	6,220	10,686
2,299	914	348	-
7,488	-	-	-
-	(4,508)	(53,490)	(68,861)
21,043	5,058	12,719	2,721
<b>128,393</b>	<b>40,922</b>	<b>10,029</b>	<b>-</b>
23,168	10,063	997	-
1,125	1,125	-	-
9,814	-	-	-
24,552	101	-	-
1,479	-	-	-
16,721	6,597	-	-
2,151	-	1,780	-
25,630	3,576	4,857	-
10,176	8,437	1,666	-
2,385	1,595	255	-
923	863	59	-
10,271	8,566	414	-

Change from Final FY15			
Total Budget Amount	FY14-18	FY19-23	Beyond 23
<b>20,329</b>	<b>(4,992)</b>	<b>7,008</b>	<b>18,313</b>
19,414	2,508	6,220	10,686
500	151	348	-
-	-	-	-
-	(1,927)	(3,843)	5,771
415	(5,723)	4,283	1,856
<b>5,720</b>	<b>2,656</b>	<b>3,064</b>	<b>-</b>
2,677	2,603	73	-
-	-	-	-
-	-	-	-
17	17	-	-
-	-	-	-
2,750	2,750	-	-
-	-	-	-
(892)	(2,131)	1,239	-
126	(1,358)	1,484	-
1,042	787	255	-
-	(60)	59	-
-	47	(47)	-

# APPENDIX 5

## Master Plan/CIP Status

## **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 5  
Master Plan/CIP Status  
(in 000's)**

Listing of Master Plan Projects	Original MP Rating	CIP Year	Rating when added to CIP	NTP	SC	Total Contract Amount	FY14-18	Beyond FY18	Comment
<b>FY16 Budget Cycle</b>									
<b>S. 137 Wastewater Central Monitoring</b>									
Wastewater SCADA/PLC Upgrade	2	FY16	2	Oct-16	Oct-31	7,000	620	6,380	
<b>S.753 Central Monitoring</b>									
Waterworks SCADA/PLC Upgrade	2	FY16	2	Oct-16	Oct-31	18,500	1,594	16,906	
<b>FY16 Master Plan Totals - 2 projects</b>						<b>\$25,500</b>	<b>\$2,214</b>	<b>\$23,286</b>	
<b>FY15 Budget Cycle</b>									
<b>S.145 I&amp;P Facility Asset Protection</b>									
S.10501.7389 Cottage Farm Construction 1 (PCB)	3	FY15	2	Sep-15	Sep-16	2,101	2,101	0	
S.10520.7463 Cottage Farm Rehabilitation Construction 2	3	FY15	2	Jul-17	Jul-19	7,354	2,648	4,707	
S.10519.7462 Prison Point Rehabilitation - Construction	3	FY15	2	Jul-17	Jul-19	5,463	1,967	3,496	
S.60150.7472 Rosemary Brook Building Repair	3	FY15	3	Jul-15	Jun-16	1,527	1,527	0	
<b>FY15 Master Plan Totals - 4 projects</b>						<b>\$16,446</b>	<b>\$8,243</b>	<b>\$8,203</b>	
<b>FY14 Budget Cycle</b>									
<b>S.206 DI Treatment Plant Asset Protection</b>									
S.40256.7449 Sodium Bisulfate Tanks Rehabilitation	4	FY14	2	Jan-15	Jun-16	2,543	2,543	0	
<b>S.210 Clinton Wastewater Treatment Plant</b>									
S.19405.7450 Clinton Roofing Rehabilitation	3	FY14	2	Sep-14	Sep-15	509	509	0	
S.19406.7451 Clinton Facilities Rehabilitation	3	FY14	2	Sep-17	Sep-22	4,069	467	3,602	
<b>S.766 Waterworks Asset Protection</b>									
S.75536.7453 Water Meter Upgrade & Replacement	3	FY14	3	Jun-15	Jun-17	1,000	1,000	0	
<b>S.693 NHS Revere &amp; Malden Pipeline</b>									
S.75545.7454 Section 56 Replacement/Saugus	2	FY14	2	Jul-15	Jul-19	10,000	8,560	1,440	
<b>S. 542 Carroll Water Treatment Plant</b>									
S.75546.7455 CWTP Asset Protection	3	FY14	3	Jul-15	Jun-17	500	500	0	
<b>FY14 Master Plan Totals - 6 projects</b>						<b>\$18,621</b>	<b>\$13,579</b>	<b>\$5,042</b>	

**Appendix 5  
Master Plan/CIP Status  
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Listing of Master Plan Projects	Original MP Rating	CIP Year	Rating when added to CIP	NTP	SC	Total Contract Amount	FY09-13	Beyond FY13	Comment
<b>FY13 Budget Cycle</b>									
<b>S. 542 Carroll Water Treatment Plant</b>									
S.75530.7406 Technical Assistance 7	2	FY13	2	Jan-13	Jan-15	563	70	493	
S.75530.7407 Technical Assistance 8	2	FY13	2	Jan-13	Jan-15	563	70	493	
<b>FY13 Master Plan Totals - 2 projects</b>						<b>\$1,126</b>	<b>\$140</b>	<b>\$986</b>	
<b>FY12 Budget Cycle</b>									
<b>S. 132 Corrosion and Odor Control</b>									
S. 10491.7364 System Wide Odor Control Study	2	FY12	3	Jul-18	Jul-20	1,000	0	1,000	
<b>S.145 I&amp;P Facility Asset Protection</b>									
S.10490.7362 Caruso PS HVAC & Fire Upgrade	3	FY12	2	Apr-12	Mar-14	1,000	500	500	
S.10488.7361 Delauri Pump Station Electrical Room Cooling	3	FY12	2	Jul-12	Jul-13	250	188	62	
S.10486.7359 Prison Point and Cottage Farm CSO Rehabilitation	3	FY12	2	Jul-13	Jun-18	1,000	45	955	
S.10485.7358 Prison Point Dry Weather Flow and Stripping Improvements	3	FY12	3	Jan-13	Dec-15	750	63	687	
S.10501.7389 Prison Point Gearbox Rebuilds	3	FY12	2	Jun-11	Dec-11	440	440	0	
S.10500.7375 Pump Station Rehabilitation - Preliminary Design and Study	3	FY12	2	Jul-14	Jun-19	750	0	750	
S.10503.7393 Section 156 Rehabilitation Design/Build	2	FY12	2	Jun-11	Jun-12	2,000	2000	0	
S.10502.7392 Section 156 Rehabilitation Owners Representative	2	FY12	2	Jun-11	Jun-12	200	200	0	
<b>S.210 Clinton Wastewater Treatment Plant</b>									
S.19950.7377 Phosphorous Removal	3	FY12	2	Jan-13	Jan-16	3,500	292	3,208	
<b>S. 623 Dam Projects</b>									
S.60131.7370 Goodnough Dike Drainage Improvements	3	FY12	2	Jul-13	Jul-14	1,000	0	1,000	
<b>S. 704 Rehabilitation of Other Pump Stations</b>									
S.75522.7383 Pump Station Rehabilitation	4	FY12	3	Jul-19	Jun-24	25,000	0	25,000	
<b>S. Waterworks Facility Asset Protection</b>									
S. 75520.7381 Shaft 9 Rehabilitation	2	FY12	3	Jul-13	Jul-16	2,000	0	2,000	
<b>FY12 Master Plan Totals - 13 projects</b>						<b>\$ 38,890</b>	<b>\$ 3,728</b>	<b>\$ 35,162</b>	
<b>FY11 Budget Cycle</b>									
<b>S.145 I&amp;P Facility Asset Protection</b>									
S.10481.7328 Interceptor # 5 Milton	2	FY11	2	Jul-13	Jul-16	4,000	0	4,000	
S.10482.7329 Interceptor Renewal # 6 Chelsea	2	FY11	2	Jul-13	Jul-16	11,000	0	11,000	
S.10469.7281 Cottage Farm Fuel System Upgr	3	FY11	3	Mar-11	Sep-11	300	300	0	
S.10484.7344 Som/Marginal Gate Replacement	3	FY11	3	Jul-10	Nov-10	300	300	0	
<b>S.542 Carroll Water Treatment Plant</b>									
S.53464.7315 Technical Assistance 5	2	FY11	2	Aug-10	Aug-12	563	563	0	
S.53465.7316 Technical Assistance 6	2	FY11	2	Aug-10	Aug-12	563	563	0	
<b>S.713 Spot Pond Supply Mains - Rehab</b>									
S.60116.7336 Section 50 Pipe Rehab Design /ESDC/RI	3	FY11	3	Jul-12	Jun-15	500	250	250	
S.60117.7337 Section 50 Pipe Rehab Const	3	FY11	3	Jul-13	Jun-14	1,500	0	1,500	
<b>S.765 Local Water Pipeline Imp. Loan Program</b>									
S.75513.7339 Local Water System Loans	3	FY11	3	Aug-10	Jan-00	200,000	35,000	165,000	
S.75514.7340 Local Water System Repayment	3	FY11	3	Aug-11	Jan-00	(200,000)	-3,000	-197,000	
<b>S.753 Central Monitoring System</b>									
S.75512.7338 Winsor Dam High Line Replacement	3	FY11	3	Jan-11	Dec-11	1,000	1,000	0	
<b>FY11 Master Plan Totals - 9 projects</b>						<b>\$ 19,726</b>	<b>\$ 34,976</b>	<b>\$ (15,250)</b>	



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Listing of Master Plan Projects	Original MP Rating	CIP Year	Rating when added to CIP	NTP	SC	Total Contract Amount	FY09-13	Beyond FY13	Comment
<b>FY10 Budget Cycle</b>									
<b>S.128 I/I Local Financial Assistance</b>									
S.10471.7293 Grants-Phase VII	3	FY10	3	Aug-09	Jun-18	18,000	4,950	13,050	One Initiative - 3 subphases
S.10472.7294 Loans - Phase VII	3	FY10	3	Aug-09	Jun-18	22,000	6,050	15,950	
S.10473.7295 Repayments-Phase VII	3	FY10	3	Aug-10	Jun-23	(22,000)	(1,320)	(20,680)	
S.10474.7296 Grants-Phase VIII	3	FY10	3	Aug-13	Jun-21	18,000	0	18,000	One Initiative - 3 subphases
S.10475.7297 Loans - Phase VIII	3	FY10	3	Aug-13	Jun-21	22,000	0	22,000	
S.10476.7298 Repayments-Phase VIII	3	FY10	3	Aug-14	Jun-26	(22,000)	0	(22,000)	
<b>S.210 Clinton Wastewater Treatment Plant</b>									
S.32749.7277 Clinton Digester Cleaning & Rehabs	3	FY10	2	Nov-09	May-11	1,500	1,500	0	
S.32750.7278 Clinton Aeration Efficiency Improvement	3	FY10	3	May-10	May-11	372	372	0	
<b>S.145 I&amp;P Facility Asset Protection</b>									
S.32752.7280 Inter Ren # 4 Everett Sect 23/24/156	2	FY10	2	Jul-15	Jul-16	3,000	0	3,000	
S.32751.7279 Inter Ren # 3 Camb/Some Sect 26/27	2	FY10	2	Jul-13	Jul-14	5,000	0	5,000	
<b>S.616 Quabbin Transmission System</b>									
S.92366.7282 Ware River Intake Valve Replancement	3	FY10	3	Jul-14	Jul-17	1,200	0	1,200	
<b>S.604 MetroWest Tunnel</b>									
S.92367.7283 Valve Chamber Storage Tank Access Imp	3	FY10	2	Jul-11	Jul-13	3,000	2,500	500	
<b>S.702 New Connecting Mains - Shaft 7 to WASM 3</b>									
S.92368.7284 Section 75 Extension	3	FY10	3	Oct-15	Oct-19	4,400	0	4,400	
<b>S.931 Business Systems Plan</b>									
S.92434.7285 Cyber Security	2	FY10	2	Sep-11	Sep-12	1,200	1,200	0	
S.92435.7286 Lawson System Upgrade	2	FY10	2	Sep-13	Sep-15	1,550	0	1,550	
S.92436.7287 Laboratory Infor Mgmt Sys (LIMS)	2	FY10	2	Sep-14	Sep-16	600	0	600	
S.92437.7288 PRE-Treatment Infor Mgmt Sys (PIMS)	2	FY10	2	Sep-14	Sep-16	600	0	600	
S.92436.7289 Document Control System Software Application Replacement	None	FY10	1	Mar-10	Mar-11	250	250	0	While specific mention of the need to replace the InfoStar record drawings indexing tool is made in the Wastewater and Waterworks Master Plan books (pgs. 13-11 & 13-12 and 9-7 & 9-8 respectively, there is no line item estimate provided in Attachment 2A which details dollar estimates for each new project in the Master Plan.
<b>FY10 Master Plan Totals - 14 projects</b>						<b>\$ 58,672</b>	<b>\$ 15,502</b>	<b>\$ 43,170</b>	

**Appendix 5  
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Listing of Master Plan Projects	Original MP Rating	CIP Year	Rating when added to CIP	NTP	SC	Total Contract Amount	FY09-13	Beyond FY13	Comment
<b>FY09 Budget Cycle</b>									
<b>S.145 I&amp;P Facility Asset Protection</b>									
S.10418.6936 Interceptor Renewal No. 2	2	FY09	2	Jul-12	Jul-14	5,429	1,953	3,476	
S.10457.7216 Interceptor Renewal #7 Study	2	FY09	2	Jul-08	Jun-09	300	300	0	
S.10458.7217 Interceptor Renewal #7 Constr	2	FY09	2	Jul-09	Jun-12	1,000	1,000	0	
S.10460.7219 NI Mech & Elec Replacements	3	FY09	3	Jun-09	Jun-12	3,800	3,800	0	
<b>S.130 Siphon Structure Rehabilitation</b>									
S.10293.6224 Design/CS/RI	2	FY09	3	Jun-12	Sep-16	476	114	362	Lower consequence after review
S.10294.6225 Construction	2	FY09	3	Sep-14	Sep-15	1,189	0	1,189	Lower consequence after review
<b>S.147 Randolph Trunk Sewer Relief</b>									
S.10461.7220 Study	3	FY09	3	Jul-11	Jun-13	750	656	94	
<b>S.132 Corrosion &amp; Odor Control</b>									
S.10406.6919 FES/FERS Biofilters Design	3	FY09	3	Jul-09	Apr-13	995	995	0	
S.10456.7215 FES/FERS Biofilters Const.	3	FY09	3	Apr-11	Apr-12	2,140	2,140	0	
<b>S.206 DI Treatment Plant Asset Protection</b>									
S.19278.6967 STG System Modifications-Des	3	FY09	3	Oct-08	May-12	750	751	0	
S.19284.6973 STG System Mods-Constr	3	FY09	3	May-10	May-12	2,500	2,500	0	
<b>S.616 Quabbin Transmission System</b>									
S.60103.7229 Oakdale Phase 1A Elec Des	3	FY09	1	Jul-09	Oct-13	921	915	6	Rising safety and other concerns
S.60104.7230 Oakdale Phase 1A Elec Constr	3	FY09	1	Jan-11	Oct-12	2,150	2,150	0	Rising safety and other concerns
<b>S.735 Section 80 Rehabilitation</b>									
S.68250.6892 Section 80 Design CS/RI	3	FY09	3	Jan-11	May-15	1,524	962	562	
S.68249.6891 Section 80 Construction	3	FY09	3	May-13	May-15	6,096	0	6,096	
<b>S.931 Business Systems Plan</b>									
S.92410.7238 Laboratory Instrument Data Mgmt	3	FY09	3	Mar-09	Mar-10	250	250	0	
S.92411.7239 Major Laboratory Instrumentation	4	FY09	3	Mar-09	Mar-10	1,000	1,000	0	
<b>FY09 Master Plan Totals - 11 projects</b>						<b>\$ 31,270</b>	<b>\$ 19,486</b>	<b>\$ 11,785</b>	
<b>FY08 Budget Cycle</b>									
<b>S.104 Braintree-Weymouth Relief Facilities</b>									
S.10060.5310 Rehab Sections 624 & 652	1	FY08	2	May-10	Jun-13	4,000	4,000	0	
S.10452.7193 Rehab of Section 624 Des	1	FY08	2	Jul-09	Jun-13	1,000	1,000	0	
<b>S.132 Corrosion &amp; Odor Control</b>									
S.10405.6918 FES Tunnel Rehab	2	FY08	2	Dec-15	Jun-17	6,800	0	6,800	
S.10453.7196 FES Tunnel Rehab Des	2	FY08	2	Jul-15	Jun-17	1,700	0	1,700	
<b>S.136 West Roxbury Tunnel</b>									
S.10400.6897 Tunnel Design	1	FY08	1	Mar-08	Sep-10	16,000	8,500	7,500	
S.10401.6898 Tunnel Construction	1	FY08	1	Mar-11	Mar-17	64,000	24,900	39,100	
<b>S.142 Wastewater Meter Sys-Equip Replace</b>									
S.10451.7191 Wastewater Metering Asset Protection	2	FY08	2	Jul-15	Jan-00	20,000	0	20,000	
<b>S.145 I&amp;P Facility Asset Protection</b>									
S.10444.7144 Nut Island Headworks Fire Alarm/Wire	1	FY08	1	Jul-09	Jun-10	200	200	0	
S.10445.7161 HW Fac. Plan Upgrades 3 Older HWKS	1	FY08	2	Jun-10	Dec-28	28,000	3,690	24,310	
S.10446.7162 PS/CSO Condition Assessment	2	FY08	2	Jul-11	Jun-14	3,000	1,900	1,100	
S.10447.7163 Interceptor AP-Interc Renewal Des #1	2	FY08	2	Feb-08	Dec-10	200	184	16	
S.10448.7164 Interceptor AP-Interc Renew #1 Const	2	FY08	2	Dec-10	Jun-11	1,600	1,600	0	
S.10455.7206 HW Facility Plan Upgrades Des	1	FY08	1	Jan-10	Dec-28	7,000	1,480	5,520	

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<b>S.146 D.I. Cross Harbor Tunnel</b>									
S.10454.7199 Tunnel Shaft Repairs Plan/Des/Const	2	FY08	2	Jul-14	Jun-17	5,000	0	5,000	
<b>S.200 DI Plant Optimization</b>									
S.19311.7121 DI As needed Tech Design	1	FY08	1	Sep-13	Jun-27	26,450	0	26,450	
<b>S.206 DI Treatment Plant Asset Protection</b>									
S.19285.6974 Alternative Energy Initiatives	5	FY08	2	Jan-08	Dec-08	7,000	5,000	2,000	Priority changed to reflect acceleration of green energy initiatives.
S.19293.7055 Digester Mod 1&2 Pipe Replc.		FY08	1	Apr-08	Oct-09	8,000	6,000	2,000	
S.19312.7122 DI Digester Sludge Pump Repl Des	1	FY08	1	Jul-09	Nov-11	906	507	399	
S.19313.7123 DI Digester Sludge Pump Repl Const	1	FY08	1	Nov-10	Nov-11	3,624	2,023	1,601	
S.19314.7124 DI Elec Equip Upgrade Ph.5	1	FY08	1	Jan-12	Jan-14	20,662	2,635	18,027	
S.19315.7125 DI Equipment Replacement Projection	2	FY08	2	Jul-08	Jun-27	41,538	700	40,838	
S.19316.7126 Future SSPS VFD Replacements Des	1	FY08	1	Jul-15	Nov-18	4,800	0	4,800	
S.19317.7127 Future SSPS VFD Replacements Constr	1	FY08	1	Nov-16	Nov-18	19,200	0	19,200	
S.19318.7128 Future NMPS VFD Replacements Des	1	FY08	1	Jul-17	Nov-20	4,420	0	4,420	
S.19319.7129 Future NMPS VFD Replacements Constr	1	FY08	1	Nov-18	Nov-20	17,680	0	17,680	
S.19320.7130 Future Misc. VFD Replacements Des	1	FY08	1	Jul-17	Nov-20	1,333	0	1,333	
S.19321.7131 Future Misc. VFD Replacements Constr	1	FY08	1	Nov-18	Nov-20	5,334	0	5,334	
S.19322.7132 DI Switchgear Replacement Design	1	FY08	1	Jul-17	Apr-22	3,250	0	3,250	
S.19323.7133 DI Switchgear Replacement Constr	1	FY08	1	Apr-19	Apr-22	13,000	0	13,000	
S.19324.7134 DI PICS Replacement Construction	1	FY08	1	Jul-21	Jul-22	5,400	0	5,400	
S.19325.7135 DI Dystor Membrane Replacements	1	FY08	1	Jul-14	Oct-14	3,000	0	3,000	
S.19326.7136 DI CTG Rebuilds	1	FY08	1	Jul-14	Jul-16	6,000	0	6,000	
S.19327.7137 DI Centrifuge Replacements Des	1	FY08	1	Jul-13	Oct-15	4,160	0	4,160	
S.19328.7138 DI Centrifuge Replacements Constr	1	FY08	1	Oct-14	Oct-15	16,640	0	16,640	
S.19329.7139 DI Cryogenics Plant-Equip Repl Des	1	FY08	1	Jul-13	May-16	1,600	0	1,600	
S.19330.7140 DI Cryogenics Plant-Equip Repl Constr	1	FY08	1	Nov-14	May-16	6,400	0	6,400	
S.19331.7141 Laboratory As needed Tech Des		FY08	1	Jul-08	Jun-27	4,000	500	3,500	
S.19332.7142 Future Sodium Hypo Tank Rehab	1	FY08	1	Jul-16	Jul-18	10,000	0	10,000	
S.19333.7167 Leak Protection System Upgrade	2	FY08	2	Jul-08	Jul-09	1,138	1,139	-1	
S.19334.7168 Barge Berth and Fac. Replacement	2	FY08	2	Jul-10	Jun-27	2,265	1,265	1,000	
S.19335.7169 South Systm PS Lube System Repl	2	FY08	2	Dec-08	Dec-10	2,019	2,018	1	
S.19336.7170 DI Grit and Odor Control Air Handlers	3	FY08	2	Jan-09	Jan-10	3,265	1,265	2,000	Condition determined to be worse than when Master Plan Priority Ratings assigned.
S.19337.7171 Central Lab Fume Hood Replacement		FY08	2	Jul-08	Jul-12	1,632	1,631	1	
S.19338.7172 DI PICS Dist. Proc. Units Replac	2	FY08	2	Jul-14	Jul-16	8,000	0	8,000	
Deer Island Equipment & Replacement Drop-downs	2	FY08	2			20,572	25,904	-5,332	
<b>S.271 Residuals Asset Protection</b>									
S.26069.7143 Residual Plant System Reliability	1	FY08	1	Sep-07	Sep-09	870	580	290	
S.26070.7145 Residuals Pellet Plant Upgrade Design	1	FY08	1	Jul-10	Jun-18	4,000	4,000	0	
S.26071.7146 Residuals Pellet Plant Upgrade Constr	1	FY08	1	Jul-13	Jul-18	4,000	0	4,000	
S.26093.7187 Utility Upgrades Des.	1	FY08	1	Jan-00	Jan-00	0	0	0	
S.26094.7188 Utility Upgrades Const.	1	FY08	1	Jul-16	Jul-18	6,000	0	6,000	
S.26072.7147 Condition Assessment/Fac Plan	1	FY08	1	Jul-08	Jun-10	1,000	1,000	0	
S.26074.7149 Six Rotary Dryer Replacements Constr	1	FY08	1	Jul-13	Jul-16	60,000	0	60,000	

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S.26076.7151 Six Air Scrubber Replacements Constr	1	FY08	1	Jul-15	Jul-17	9,000	0	9,000	
S.26078.7153 Plant MCC Replacements Const	1	FY08	1	Jul-16	Jul-18	4,500	0	4,500	
S.26079.7173 FRSA Pier Rehab Des	1	FY08	1	Dec-07	Jun-10	140	112	28	
S.26080.7174 FRSA Pier Rehab Const.	1	FY08	1	Dec-08	Jun-10	560	560	0	
S.26082.7176 Rehab Rail System Const.	1	FY08	1	Jul-16	Jul-18	3,000	0	3,000	
S.26084.7178 Replace 9 Pellet Storage Silos Const.	1	FY08	1	Jul-15	Jul-17	6,000	0	6,000	
S.26086.7180 Sludge Conveyor Replacement Const.	1	FY08	1	Jul-14	Jul-15	3,000	0	3,000	
S.26088.7182 Sludge Storage Tank Rehab	1	FY08	1	Jul-15	Jul-16	3,000	0	3,000	
S.26090.7184 Upgrade Pumping System Const.	1	FY08	1	Jul-14	Jul-16	6,000	0	6,000	
S.26092.7186 Replace 12 Centrifuges Const.	1	FY08	1	Jul-14	Jul-16	36,000	0	36,000	
S.26096.7190 Odor Control System Upgrade Const.	1	FY08	1	Jul-17	Jul-18	1,500	0	1,500	
<b>S.542 John J. Carroll Water Treatment Plant</b>									
S.53457.7085 Ancillary Mods Const 2	2	FY08	2	Jan-08	Jun-13	6,080	5,616	464	
S.53458.7192 Ancil Mods Design 3	2	FY08	2	Jan-08	Jan-10	750	613	137	
S.53459.7208 Ancillary Mods Design 4	2	FY08	2	Jan-08	Jan-10	750	613	137	
<b>S.550 Low Service Storage Near Spot Pond</b>									
S.53401.6456 Env Rev Con Des Owners Rep	2	FY08	2	Apr-09	Sep-14	2,500	2,152	348	
S.53402.6457 Design/Build	3	FY08	2	Apr-12	Apr-14	36,093	13,977	22,116	Priority revised as project added to CIP
S.53447.6868 Easement/Land Acquisition		FY08	2	Apr-09	Apr-14	630	563	67	
<b>S.597 Winsor Dam Hydroelectric</b>									
S.60033.6277 Detail Design	4	FY08	2	Jul-09	Feb-11	359	359	0	Priority revised as project added to CIP
S.60044.6526 Construction	4	FY08	2	Aug-10	Feb-11	1,406	1,406	0	Priority revised as project added to CIP
S.60077.7017 Design and Construction		FY08	2	Oct-07	Jun-09	2,000	1,750	250	
S.60087.7114 Winsor Power Station Pipe Des	1	FY08	2	Sep-08	Jun-12	1,012	1,012	0	
S.60088.7115 Winsor Power Station Pipe Constr Ph1	1	FY08	2	Apr-10	Jun-12	4,047	4,047	0	
S.60095.7197 Shft 12 Quabbin Aqdc Sluice Gate Des	2	FY08	2	Jul-08	Jun-12	400	400	0	
S.60096.7198 Shft 12 Quabbin Aqdc Sluice Gate Con	2	FY08	2	Jul-09	Jun-12	1,600	1,600	0	
S.60101.7212 Winsor Power St. Chapman Valve Repair		FY08	2	Mar-09	Dec-09	509	509	0	
<b>S.614 Metropolitan Tunnel Loop</b>									
S.60035.6273 Redundancy Study/Tunnel Insp Fea Study	1	FY08	1	Mar-08	Feb-10	3,500	3,208	292	
<b>S.618 Northern High NW Trans Sect 70-71</b>									
S.60063.6895 Planning	2	FY08	2	Jul-10	Jun-12	1,000	1,000	0	
<b>S.623 Dam Projects</b>									
S.60089.7154 Engineering Studies for Dam Risk	1	FY08	1	Jul-07	Jun-09	460	230	230	
S.60094.7194 Immediate Repair Dams	2	FY08	2	Mar-10	Jun-11	3,255	3,255	0	
S.60100.7211 Immediate Repair Dams-Design	2	FY08	2	Jul-08	Jun-11	814	814	0	
<b>S.624 Wachusett Aqueduct Pressurization</b>									
S.60090.7156 Wachusett Aqueduct Pressurization Des	1	FY08	1	Jul-11	Jun-16	20,000	7,000	13,000	
S.60091.7157 Wachusett Aqueduct Pressurization Con	1	FY08	1	Jul-13	Jun-16	80,000	0	80,000	

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<b>S.625 Long Term Redundancy</b>									
S.60092.7159 Long Term Redundancy Des	1	FY08	1	Jul-13	Jun-23	20,000	0	20,000	
S.60093.7160 Long Term Redundancy Construction	1	FY08	1	Jul-14	Dec-23	80,000	0	80,000	
<b>S.677 Valve Replacement</b>									
S.68300.7195 Valve Replacement 8&9 Construction	2	FY08	2	Jul-10	Jun-16	5,000	2,500	2,500	
<b>S.719 Chestnut Hill Connecting Mains</b>									
S.68052.6302 Construction- Chp 149	2	FY08	2	Jul-10	Jul-12	3,431	3,431	0	
S.68267.6982 Construction-Chp 30	2	FY08	2	Jul-10	Jul-12	2,220	2,220	0	
<b>S.721 Southern Spine Distribution Mains</b>									
S.68299.7155 Southern Spine Sect 22 N Fac Plan/EIR	1	FY08	1	Jul-08	Jun-10	1,000	1,000	0	
<b>S.722 NIH Redundancy &amp; Covered Storage</b>									
S.68252.6906 Section 89/29 Redundancy Design	1	FY08	1	Jul-08	Jun-13	5,059	5,000	59	
S.68282.7066 Sec 89&29 Redundancy Constr	1	FY08	1	Jul-10	Jun-13	19,224	14,949	4,275	
S.68283.7067 NIH Storage Fin Des/CS/RI	1	FY08	1	Jul-08	Sep-12	2,024	2,024	0	
S.68284.7068 NIH Storage Construction	1	FY08	1	Sep-10	Sep-12	8,094	8,094	0	
S.68294.7116 Section 89/29 Rehab Design	1	FY08	1	Jul-13	Jun-17	1,012	0	1,012	
S.68295.7117 Section 89/29 Rehab Construction	1	FY08	1	Jul-15	Jun-17	4,047	0	4,047	
S.68296.7118 NIH Gillis Redundancy Design	1	FY08	1	Jul-13	Jun-18	2,024	0	2,024	
S.68297.7119 NIH Gillis Redundancy Construction	1	FY08	1	Jul-15	Jun-18	8,094	0	8,094	
<b>S.727 SEH Redundancy &amp; Storage</b>									
S.53397.6452 Concept Plan/Prelim Des/Env Rev	1	FY08	2	Feb-07	Aug-08	840	125	715	
S.53398.6453 SEH Storage Final Des/CS/RI	2	FY08	2	Jul-09	Jun-14	2,024	1,539	485	
S.53399.6454 SEH Storage Construction	2	FY08	2	Jul-12	Jun-14	8,094	4,550	3,544	
S.68135.6444 SEH Red Loop Final Des/CA/RI	2	FY08	2	Jul-09	Jun-14	4,047	3,217	830	
S.68136.6445 SEH Redund Loop Construction	2	FY08	2	Jul-11	Jun-14	21,248	12,634	8,614	
S.68292.7112 Design Sect 77/88 Rehab	2	FY08	2	Jul-18	Jun-23	1,012	0	1,012	
S.68293.7113 Section 77/88 Rehab	2	FY08	2	Sep-20	Jun-23	4,047	0	4,047	
<b>S.931 Business Systems Plan</b>									
S.92404.7200 Computer Center - OCC Infrastructure		FY08	2	Jul-14	Jun-16	1,500	0	1,500	
S.92405.7201 Net 2020		FY08	2	Jul-09	Jun-12	1,500	1,500	0	
S.92406.7203 SAN II		FY08	2	Jul-11	Jun-12	600	600	0	
S.92407.7204 SAN III		FY08	2	Jul-14	Jun-15	600	0	600	
S.92408.7205 Telecommunications		FY08	2	Jul-13	Jun-15	750	0	750	
<b>FY08 Master Plan Totals - 67 projects</b>						<b>\$ 955,014</b>	<b>\$ 217,800</b>	<b>\$ 737,214</b>	

Total Projects from the Master Plan:  
Total \$\$ of Projects from the Master Plan

128  
\$1,165,265

# APPENDIX 6

## Project Status Overview

**Appendix 6  
Project Status Overview**

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Subphase/Project	Total Contract Amount	Projected Pmts. Thr. FY14	Status Based on % of Budget Expended	% Complete	Planned Start	Planned End
<b>104 Braintree-Weymouth Relief Facilities</b>	<b>\$232,455</b>	<b>\$227,704</b>	<b>98.0%</b>	<b>98.0%</b>		
10001_5333	Geotechnical - Marine	443	443	Complete	100.0%	
10044_5332	Geotechnical - Land	8	8	Complete	100.0%	
10045_5311	Facilities Planning - Phase 1	331	331	Complete	100.0%	
10046_5312	EIR - Phase 1	514	514	Complete	100.0%	
10047_5313	Design 1/CS/RI	18,882	18,882	Complete	100.0%	
10048_5314	Land Acquisition	12,842	12,842	Complete	100.0%	
10049_5315	Tunnel Construction/Rescue	83,191	83,191	Complete	100.0%	
10050_5316	Intermediate Pump Station-Construction	47,445	47,445	Complete	100.0%	
10051_5303	North Weymouth Relief Interceptor	4,705	4,705	Complete	100.0%	
10052_5373	HDD Siphon - Construction	16,357	16,357	Complete	100.0%	
10054_5375	B-W Replacement Pump Station	17,728	17,728	Complete	100.0%	
10055_5308	Design - Rehab	24	24	Complete	100.0%	
10056_5309	Construction - Rehab	255	255	Complete	100.0%	
10057_5324	Final EIR/Facility Plan	1,111	1,111	Complete	100.0%	
10058_5331	Design 2/CS/RI	14,999	14,999	Complete	100.0%	
10060_5310	Rehabilitation of Section 624 - Const.	2,506	2,506	Complete	100.0%	
10061_5951	Technical Assistance	144	144	Complete	100.0%	
10251_6016	Sedimentation Testing	96	96	Complete	100.0%	
10263_6072	Legal	849	849	Complete	100.0%	
10265_6074	Hazardous Waste	8	8	Complete	100.0%	
10278_6119	Marine Pipeline - Design	1,100	1,100	Complete	100.0%	
10302_6368	Mill Cove Siphon - Construction	2,749	2,749	Complete	100.0%	
10354_6631	Community Technical Assistance	1,111	1,111	Complete	100.0%	
10375_6766	Geotechnical Consultant	56	56	Complete	100.0%	
10378_6792	IPS/RPS Communication System	225	225	Complete	100.0%	
10470_7290	Wetlands Replication	26	25	96.2%	96.2%	
10479_7326	Mill Cove Siphon Sluice Gates-Design	150	0	Future	0.0%	Jul-17
10480_7327	Mill Cove Sluice Gates - Construction	600	0	Future	0.0%	Jul-18
10493_7366	B/W Improvements - Construct	3,200	0	Future	0.0%	Sep-18
19567_9586	B/W Improvements - Des/CS/RI	800	0	Future	0.0%	Apr-17

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Subphase/Project	Total Contract Amount	Projected Pmts. Thr. FY14	Status Based on % of Budget Expended	% Complete	Planned Start	Planned End
<b>128 I/I Local Financial Assistance</b>	<b>\$242,585</b>	<b>\$132,262</b>	<b>54.5%</b>	<b>54.5%</b>		
10232_5300	Community I/I Grants	0	5,800	NA	NA	
10233_5393	Community I/I Loans	0	17,278	NA	NA	
10234_5394	Community I/I Loan Repayments	0	-17,278	NA	NA	
10273_6084	Phase II - Grants	15,929	10,129	63.6%	63.6%	
10274_6085	Phase II - Loans	47,664	30,386	63.8%	63.8%	
10282_6170	Phase II - Repayments	-47,664	-30,386	63.8%	63.8%	
10315_6505	Phase III - Grants	0	16,650	NA	NA	
10316_6506	Phase III - Loans	0	20,350	NA	NA	
10317_6507	Phase III - Repayments	0	-20,350	NA	NA	
10348_6609	Public Participation	6	6	Complete	100.0%	
10368_6736	Phase IV - Grants	34,650	18,000	51.9%	51.9%	
10369_6737	Phase IV - Loans	42,350	22,000	51.9%	51.9%	
10370_6738	Phase IV - Repayments	-42,350	-21,728	51.3%	51.3%	
10407_6925	Phase V - Grants	18,000	18,000	Complete	100.0%	
10408_6926	Phase V - Loans	22,000	22,000	Complete	100.0%	
10409_6927	Phase V - Repayments	-22,000	-20,381	92.6%	92.6%	May-17
10441_7107	Phase VI - Grants	18,000	15,229	84.6%	84.6%	Jun-21
10442_7108	Phase VI - Loans	22,000	18,614	84.6%	84.6%	Jun-21
10443_7109	Phase VI - Repayments	-22,000	-11,959	54.4%	54.4%	Jun-26
10471_7293	Phase VII - Grants	18,000	12,937	71.9%	71.9%	Jun-21
10472_7294	Phase VII - Loans	22,000	15,812	71.9%	71.9%	Jun-21
10473_7295	Phase VII - Repayments	-22,000	-5,745	26.1%	26.1%	Jun-26
10474_7296	Phase VIII - Grants	18,000	8,081	44.9%	44.9%	Jun-21
10475_7297	Phase VIII - Loans	22,000	9,877	44.9%	44.9%	Jun-21
10476_7298	Phase VIII - Repayments	-22,000	-1,061	4.8%	4.8%	Jun-26
10560_7464	Phase IX Grants	60,000	0	Future	0.0%	Jul-14
10561_7465	Phase IX Loans	20,000	0	Future	0.0%	Jul-14
10562_7466	Phase IX Repayment	-20,000	0	Future	0.0%	Jul-15
10563_7467	Phase X Grants	60,000	0	Future	0.0%	Jul-16
10564_7468	Phase X Loans	20,000	0	Future	0.0%	Jul-16
10565_7469	Phase X Repayment	-20,000	0	Future	0.0%	Jul-16
<b>130 Siphon Structure Rehabilitation</b>	<b>\$6,635</b>	<b>\$940</b>	<b>14.2%</b>	<b>14.2%</b>		
10253_6017	Planning	938	938	Complete	100.0%	
10280_6165	Land Acquisition	50	2	4.0%	4.0%	Jun-20
10293_6224	Design/CS/RI	1,369	0	Future	0.0%	Jul-18
10294_6225	Construction	4,278	0	Future	0.0%	Jul-20



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Subphase/Project	Total Contract Amount	Projected Pmts. Thr. FY14	Status Based on % of Budget Expended	% Complete	Planned Start	Planned End
<b>131 Upper Neponset Valley Sewer</b>	<b>\$54,174</b>	<b>\$54,174</b>	<b>Complete</b>	<b>100.0%</b>		
10256_6031 Design/CS/RI	4,585	4,585	Complete	100.0%		
10266_6075 Legal	150	150	Complete	100.0%		
10290_6191 Sewer Sections 685-686 - Replacement	37,005	37,005	Complete	100.0%		
10311_6450 Land Acquisition	1,816	1,816	Complete	100.0%		
10352_6629 Sewer Section 687 Replacement - Const	7,664	7,664	Complete	100.0%		
10393_6830 Boston Paving	610	610	Complete	100.0%		
10439_7072 Resident Engineering/Inspection	2,345	2,345	Complete	100.0%		
<b>132 Corrosion &amp; Odor Control</b>	<b>\$19,782</b>	<b>\$3,001</b>	<b>15.2%</b>	<b>15.2%</b>		
10279_6137 Planning/Study	587	587	Complete	100.0%		
10323_6549 Land Acquisition	3	3	Complete	100.0%		
10325_6551 Legal	2	2	Complete	100.0%		
10327_6553 Design/CS/RI	1,788	1,788	Complete	100.0%		
10373_6743 Interim Corrosion Control	621	621	Complete	100.0%		
10405_6918 FES Tunnel Rehab - Construction	6,800	0	Future	0.0%	Jul-19	
10406_6919 FES/FERS Biofilters - Design	1,137	0	Future	0.0%	Jul-18	
10453_7196 FES Tunnel Rehab - Design/CS/RI	1,700	0	Future	0.0%	Jul-18	
10456_7215 FES/FERS Biofilters - Construction	1,768	0	Future	0.0%	Apr-19	
10491_7364 System-wide Odor Control - Study	1,000	0	Future	0.0%	Jul-18	
10492_7365 NI System-wide Odor Cntrl-Eval & Des	970	0	Future	0.0%	Feb-17	
<b>136 West Roxbury Tunnel</b>	<b>\$11,314</b>	<b>\$10,314</b>	<b>91.2%</b>	<b>91.2%</b>		
10299_6230 Inspection	344	344	Complete	100.0%		
10329_6566 Tunnel Easements & Permits	54	54	Complete	100.0%		
10330_6567 Legal	2	2	Complete	100.0%		
10331_6568 Land Acquisition	440	440	Complete	100.0%		
10332_6569 Construction	6,674	6,674	Complete	100.0%		
10333_6570 Design/CS/RI	1,417	1,417	Complete	100.0%		
10366_6709 Technical Assistance	8	8	Complete	100.0%		
10400_6897 Tunnel - Design	1,375	1,375	Complete	100.0%		
10401_6898 Tunnel Inspection	1,000	0	Future	0.0%	Sep-19	
<b>137 Wastewater Central Monitoring</b>	<b>\$27,482</b>	<b>\$19,782</b>	<b>72.0%</b>	<b>72.0%</b>		
10301_6232 Planning	563	563	Complete	100.0%		
10319_6532 Design and Integration Services	6,344	6,344	Complete	100.0%		
10320_6533 Construction 1 (CP1)	7,662	7,662	Complete	100.0%		
10321_6534 Construction 2 (CP2)	5,139	5,139	Complete	100.0%		
10322_6535 Technical Assistance	7	7	Complete	100.0%		
10356_6656 Wastewater SCADA/PLC Upg	7,000	0	Future	0.0%	Oct-16	
10398_6861 Equipment Prepurchase	65	65	Complete	100.0%		
10490_7363 Wastewater Redundant Communications	700	0	Future	0.0%	Jul-17	

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Subphase/Project	Total Contract Amount	Projected Pmts. Thr. FY14	Status Based on % of Budget Expended	% Complete	Planned Start	Planned End
<b>139 South System Relief Project</b>	<b>\$4,939</b>	<b>\$3,439</b>	<b>69.6%</b>	<b>69.6%</b>		
10309_6419 Archdale - CS/RI	5	5	Complete	100.0%		
10310_6420 Archdale - Construction	211	211	Complete	100.0%		
10318_6519 Sections 70 & 71 HLS - Evaluation	215	215	Complete	100.0%		
10345_6595 Outfall 023 - Design	1	1	Complete	100.0%		
10346_6596 Outfall 023 - Cleaning	1,098	1,098	Complete	100.0%		
10347_6605 Land Acquisition/Easements	5	5	Complete	100.0%		
10349_6611 Sections 70 & 71 HLS - Construction	417	417	Complete	100.0%		
10350_6616 Milton Financial Assistance	1,488	1,488	Complete	100.0%		
10386_6801 Outfall 023 - Structural Improvements	1,500	0	Future	0.0%	Jan-19	
<b>141 Wastewater Process Optimization</b>	<b>\$10,383</b>	<b>\$1,217</b>	<b>11.7%</b>	<b>11.7%</b>		
10367_6733 Planning	930	930	Complete	100.0%		
10412_6930 North System Hydraulic Study	571	286	50.1%	50.1%		Jun-15
10413_6931 Somerville Sewer - Design	200	0	Future	0.0%	Oct-19	
10414_6932 Somerville Sewer - Construction	1,089	0	Future	0.0%	Mar-21	
10415_6933 Siphon - Planning	150	0	Future	0.0%	Nov-18	
19401_7412 Hydr Flood Engr Des & Cons N. Sys	7,442	0	Future	0.0%	Jan-17	
<b>142 Wastewater Meter System-Equipment</b>	<b>\$27,738</b>	<b>\$5,138</b>	<b>18.5%</b>	<b>18.5%</b>		
10371_6739 Planning / Study / Design	2,000	0	Future	0.0%	Dec-15	
10379_6793 Equipment Purchase & Installation	5,138	5,138	Complete	100.0%		
10411_6929 Construction	2,000	0	Future	0.0%	Apr-17	
10451_7191 WW Metering Asset Protect/Equip Purch	18,600	0	Future	0.0%	Jul-17	

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Subphase/Project	Total Contract Amount	Projected Pmts. Thr. FY14	Status Based on % of Budget Expended	% Complete	Planned Start	Planned End
<b>145 Facility Asset Protection</b>	<b>\$311,791</b>	<b>\$24,116</b>	<b>7.7%</b>	<b>7.7%</b>		
10380_6795	Prison Point HVAC Upgrades-Construct.	2,912	2,912	Complete	100.0%	
10381_6796	Remote Headworks Heating Syst Upgrade	1,175	1,175	Complete	100.0%	
10382_6797	Alewife Brook Pump Stn Rehab - Const.	10,393	0	Future	0.0%	Aug-15
10383_6798	Rehab of Section 93A Lexington	1,566	1,566	Complete	100.0%	
10387_6802	Chelsea Creek Upgrades REI	2,256	0	Future	0.0%	Dec-15
10392_6829	Technical Assistance	82	48	58.5%	58.5%	Mar-22
10394_6842	Sections 80 & 83	365	365	Complete	100.0%	
10395_6843	Section 160	1,581	1,581	Complete	100.0%	
10396_6857	Survey	11	11	Complete	100.0%	
10397_6858	Permits	10	10	Complete	100.0%	
10399_6886	Remote Headworks Concept Plan	670	670	Complete	100.0%	
10418_6936	Inter Ren - Cons 2 Cam Br	14,405	0	Future	0.0%	Jan-19
10419_6937	Alewife Brook Pump Stn Rehab - Des/CA	223	223	Complete	100.0%	
10420_6938	Prison Point HVAC Upgrades - Design	452	441	97.6%	97.6%	
10423_6987	93 A Force Main Replacement	462	462	Complete	100.0%	
10424_7004	Mill Brook Valley Sewer Section 79&92	542	542	Complete	100.0%	
10427_7033	Hingham Pump Stn Isolation Gate-Const	125	125	Complete	100.0%	
10428_7034	Alewife Brook PS Final Des/CA/REI	1,740	834	47.9%	47.9%	Dec-18
10431_7037	Caruso PS Improve Des/CA/REI	865	399	46.1%	46.1%	Mar-18
10440_7073	Land/Easements	103	103	Complete	100.0%	
10444_7144	Nut Island Headworks Fire Alarm/Wire	285	285	Complete	100.0%	
10445_7161	Chelsea Creek Upgr Construction	54,816	0	Future	0.0%	Dec-15
10446_7162	Pump Stns & CSOs Condition Assessment	3,119	0	Future	0.0%	Jan-17
10447_7163	Inter Ren 1-Des/CA/REI	990	0	Future	0.0%	May-15
10448_7164	IR-Cons 1 Read Ext Sew	3,640	0	Future	0.0%	Dec-16
10455_7206	Chelsea Creek Upgr Design/CA	7,890	3,434	43.5%	43.5%	Jun-20
10457_7216	Malden&Melrose Hydr&Struc-Study/Design	300	0	Future	0.0%	Jan-19
10458_7217	Malden&Melrose Hydraulics&Struc-Const	1,000	0	Future	0.0%	Jul-20
10459_7218	Nut Island Fire Pump Building - Study	300	0	Future	0.0%	Jul-16
10460_7219	NI Mechanical&Electrical Replacements	3,000	0	Future	0.0%	Jul-16
10463_7237	Headworks Effluent Shaft - Study	500	0	Future	0.0%	Jul-16
10467_7279	IR-Cons 3 Dor Inter Sew	3,973	0	Future	0.0%	Jul-21
10468_7280	IR-Cons 4 Everett 23,24	3,000	0	Future	0.0%	Sep-24
10469_7281	Cottage Farm Fuel System Upgrade	498	498	Complete	100.0%	
10477_7312	NI Elec & Grit/Sreens Conveyance-Des	1,249	809	64.8%	64.8%	May-16
10478_7313	NI Elec & Grit/Sreens Conveyance-Con	5,278	2,735	51.8%	51.8%	May-15
10481_7328	Interceptor Renewal No. 5 - Milton	4,000	0	Future	0.0%	Sep-27
10482_7329	Interceptor Renewal No. 6 - Chelsea	11,000	0	Future	0.0%	Sep-30
10483_7330	Prison PT/CF GB Pump/ESDC	362	98	27.1%	27.1%	Jul-16
10484_7344	Somer/Marginal Influent Gates Replace	367	367	Complete	100.0%	
10486_7359	Prison Pt/Cottage Farm Des/CA/RI	1,116	0	Future	0.0%	Jul-16
10487_7360	System Relief & Contingency Planning	500	0	Future	0.0%	Jul-20

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10489_7362	Caruso PS Improvements - Const	2,926	0	Future	0.0%	Dec-15
10500_7375	Pump Stn. Rehab-Prelim. Design/Study	750	0	Future	0.0%	Jul-19
10501_7389	Cottage Farm Construction 1 (PCB)	2,146	0	Future	0.0%	Jul-17
10502_7392	CF PCB Abatement Des/CA/RI	537	0	Future	0.0%	Jul-16
10503_7393	Sect 156 Rehab - Design/Build	2,563	2,563	Complete	100.0%	
10504_7410	Interceptor Ren #2 Des/CA/REI	3,016	0	Future	0.0%	Jan-17
10505_7421	Sect 4,5,6 North Met Design CS/RI	2,400	0	Future	0.0%	Jul-18
10506_7422	Sect 4,5,6 North Met Construction	12,000	0	Future	0.0%	Jul-20
10507_7423	Rehab of Sects 186 and 4 Construction	3,751	0	Future	0.0%	Aug-18
10510_7429	Ward St & Colu Park HWKS Des/CA/REI	10,265	0	Future	0.0%	Dec-16
10511_7430	Ward St & Columbus Park HWKS Const	100,394	0	Future	0.0%	Jan-19
10512_7431	Chelsea Screenhouse Upgrades	3,609	0	Future	0.0%	Jun-15
10515_7452	PP/CF Engine Pumps Gearbox	6,510	1,859	28.6%	28.6%	Jul-15
10518_7459	Prison Point Piping Rehab	350	0	Future	0.0%	Oct-15
10519_7462	Prison Point Rehab - Const	5,580	0	Future	0.0%	Jul-18
10520_7463	Cottage Farm Rehab	7,511	0	Future	0.0%	Oct-18
<b>146 D.I. Cross Harbor Tunnel Inspection</b>		<b>\$5,000</b>	<b>\$0</b>	<b>Future</b>	<b>0.0%</b>	
10454_7199	Tunnel Shaft Repairs - Plan/Des/Const	5,000	0	Future	0.0%	Jul-18
<b>147 Randolph Trunk Sewer Relief</b>		<b>\$750</b>	<b>\$0</b>	<b>Future</b>	<b>0.0%</b>	
10461_7220	Study	750	0	Future	0.0%	Jul-18

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Subphase/Project	Total Contract Amount	Projected Pmts. Thr. FY14	Status Based on % of Budget Expended	% Complete	Planned Start	Planned End
<b>206 DI Treatment Plant Asset Protection</b>	<b>\$720,365</b>	<b>\$176,308</b>	<b>24.5%</b>	<b>24.5%</b>		
18045_6196	DITP Roof Replacements	2,300	2,300	Complete	100.0%	
19162_6241	DISC Application	125	125	Complete	100.0%	
19176_6422	Pump Packing Replacement	732	732	Complete	100.0%	
19177_6423	Demineralizer Construction	51	51	Complete	100.0%	
19182_6478	Equipment Replacement Projection	25,000	0	Future	0.0%	Jul-18
19188_6538	Ancillary Mods - Construction 4	11,639	0	Future	0.0%	Oct-18
19193_6594	Equipment Condition Monitoring	1,777	1,777	Complete	100.0%	
19194_6598	NMPS WTF ESDC/REI	2,300	0	Future	0.0%	Dec-14
19204_6668	Expansion Joint Repair - Design	149	149	Complete	100.0%	
19205_6669	Expansion Joint Repair - Construct. 1	305	305	Complete	100.0%	
19217_6704	Expansion Joint Repair - Construct. 2	1,894	1,894	Complete	100.0%	
19218_6705	Expansion Joint Repair - Construct. 3	1,930	0	Future	0.0%	May-17
19220_6721	As-needed Design Phase 6-1	1,918	1,918	Complete	100.0%	
19221_6722	As-needed Design Phase 6-2	1,744	1,744	Complete	100.0%	
19222_6723	Eastern Seawall Design - 1	643	0	Future	0.0%	Jan-17
19223_6724	Eastern Seawall Construction - 1	3,752	0	Future	0.0%	Jan-19
19227_6728	Digester Gas Flare #4 - Design	520	0	Future	0.0%	Jul-17
19228_6729	Digester Gas Flare #4 - Construction	1,144	0	Future	0.0%	Jul-18
19230_S464	Roof Replacement - Phase I	2,750	2,750	Complete	100.0%	
19231_6742	Drive Chain Replacement	264	264	Complete	100.0%	
19236_6763	Busduct Replacement (2+22)	196	196	Complete	100.0%	
19237_6764	Reline Hypochlorite Tanks 1 & 3	1,691	1,691	Complete	100.0%	
19238_6765	CTG Modifications	482	482	Complete	100.0%	
19239_6767	Electrical Equipment Upgrade-Const 2	1,913	1,913	Complete	100.0%	
19241_6791	Document Format Conversion	145	68	46.9%	46.9%	Jun-17
19243_6811	Outfall Modification - Inspection	174	174	Complete	100.0%	
19244_6812	Secondary Clarifier Access	275	275	Complete	100.0%	
19245_6813	Transformer Replacement	1,703	1,703	Complete	100.0%	
19246_6821	DSL Pump Repi Ph 2	4,659	0	Future	0.0%	Oct-15
19247_6822	Co-Digestion Des/Bld	5,000	0	Future	0.0%	Mar-17
19250_6849	Reline Hypochlorite Tanks 2 & 4	2,242	2,242	Complete	100.0%	
19252_6851	Chemical Pipe Replacement - Design	624	0	Future	0.0%	Jun-18
19253_6852	Chemical Pipe Replacement - Construct	2,074	0	Future	0.0%	Jun-19
19254_6853	Sodium Hypo Pipe Replacement - Design	1,800	0	Future	0.0%	Sep-16
19255_6854	Sodium Hypo Pipe Replacement - Const.	4,000	0	Future	0.0%	Apr-18
19256_6855	Electrical Equipment Upgrade-Const. 3	15,174	15,174	Complete	100.0%	
19258_6875	WTF VFD Replacement - Construction	4,160	0	Future	0.0%	Sep-15
19259_6876	Heat Loop Pipe Replacement - Constr 1	615	615	Complete	100.0%	
19260_6877	Miscellaneous VFD Replacements	3,176	932	29.3%	29.3%	Aug-16
19264_6881	Grit Air Handler Replacements	2,029	2,029	Complete	100.0%	
19265_6882	CEMS Equipment Replacement	100	100	Complete	100.0%	
19266_6883	Heat Loop Pipe Replacement - Const. 2	1,488	1,488	Complete	100.0%	

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19267_6884	PICS Replacement - Construction	1,302	1,041	80.0%	80.0%		Dec-17
19268_6899	Primary&Second Clarifier Rehab-Const	56,787	56,787	Complete	100.0%		
19270_6901	Electrical Equipment Upgrade-Const 4	10,923	3,747	34.3%	34.3%		May-16
19271_6902	NMPS VFD Replacement - Design/ESDC	1,276	1,276	Complete	100.0%		
19272_6903	NMPS VFD Replacement - Construction	24,415	16,982	69.6%	69.6%		Mar-16
19273_6904	Fire Alarm System Replacement-Design	2,100	0	Future	0.0%	Jun-15	
19274_6963	Combined Heat & Power Design	6,000	0	Future	0.0%	Jan-16	
19275_6964	Combined Heat & Power Constr	83,000	0	Future	0.0%	Jul-18	
19276_6965	Primary&Second Clarifier Rehab-Design	1,678	1,678	Complete	100.0%		
19277_6966	Gravity Thickener Improvements-Constr	733	733	Complete	100.0%		
19278_6967	STG System Modifications - Design	406	406	Complete	100.0%		
19279_6968	Electrical Equipment Upgrade 3 - REI	1,112	1,112	Complete	100.0%		
19283_6972	NMPS Motor Control Center - Constr	914	914	Complete	100.0%		
19284_6973	STG System Modifications - Construct.	2,570	2,570	Complete	100.0%		
19287_7005	Digester Chiller Replacement	635	635	Complete	100.0%		
19288_7006	Dystor Tank Membrane Replacement	640	640	Complete	100.0%		
19289_7051	Fire Alarm System Replacement - Const	16,000	0	Future	0.0%	May-17	
19290_7052	Digester & Storage Tank Rehab Des/ESDC	3,000	0	Future	0.0%	Oct-16	
19292_7054	Thick Primary Sludge Pump Repl-Constr	27	27	Complete	100.0%		
19293_7055	Digester Modules 1 & 2 Pipe Replacemnt	7,096	7,043	Complete	99.3%		
19295_7057	Centrifuge Backdrive Replacement	3,965	1,833	46.2%	46.2%		Mar-15
19296_7058	Switchgear Replacement - Design	1,608	0	Future	0.0%	Jun-16	
19297_7059	Switchgear Replacement - Construction	4,497	0	Future	0.0%	Nov-17	
19298_7060	Power Consultant Recommnd - Design	2,097	2,097	Complete	100.0%		
19299_7061	Power System Improvements - Construct	9,723	5,423	55.8%	55.8%		Sep-17
19300_7062	NMPS VFD Replacement - REI	1,322	322	24.4%	24.4%		Jun-16
19301_7063	Heat Loop Pipe Replacement - Const. 3	11,436	11,339	Complete	99.2%		
19303_7088	Ancillary Modifications - Final Des 4	4,288	0	Future	0.0%	Apr-16	
19304_7089	Sodium Hypo Tank Liner Removal	196	196	Complete	100.0%		
19305_7090	As-needed Design Phase 5-1	955	955	Complete	100.0%		
19306_7091	As-needed Design Phase 5-2	1,056	1,056	Complete	100.0%		
19307_7094	TPP Fuel System Mod REI	800	0	Future	0.0%	Sep-15	
19309_7111	HVAC Equipment Replacement - Des/ESDC	1,958	334	17.1%	17.1%		Oct-20
19310_7110	HVAC Equipment Replacement - Const.	17,101	0	Future	0.0%	Sep-16	
19311_7121	DI As-needed Technical Design	16,250	0	Future	0.0%	Dec-18	
19313_7123	Digester Sludge Pump Repl - Construct	2,122	1,549	73.0%	73.0%		Dec-14
19314_7124	Electrical Equipment Upgrade Phase 5	23,162	0	Future	0.0%	Dec-18	
19316_7126	Future SSPS VFD Replacements - Design	4,800	0	Future	0.0%	Jul-17	
19317_7127	Future SSPS VFD Replacements - Const.	19,200	0	Future	0.0%	Nov-18	
19318_7128	Future NMPS VFD Replacements - Design	4,420	0	Future	0.0%	Jun-21	
19319_7129	Future NMPS VFD Replacements - Const.	17,680	0	Future	0.0%	Sep-22	
19320_7130	Future Misc. VFD Replacements-Design	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
19321_7131	Future Misc. VFD Replacements-Const.	5,334	0	Future	0.0%	May-17	

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19322_7132	DI Switchgear Replacement - Design	4,500	0	Future	0.0%	Jul-18	
19323_7133	DI Switchgear Replacement - Construct	16,000	0	Future	0.0%	Jul-20	
19324_7134	DI PICS Replacement - Construction	5,400	0	Future	0.0%	Feb-21	
19325_7135	DI Dystor Membrane Replacements	3,000	0	Future	0.0%	Jul-16	
19326_7136	DI CTG Rebuilds	6,000	0	Future	0.0%	Jul-18	
19327_7137	DI Centrifuge Replacements - Design	4,160	0	Future	0.0%	Dec-18	
19328_7138	DI Centrifuge Replacements-Construct	16,640	0	Future	0.0%	Jul-21	
19329_7139	Cryogenics Plant-Equip Replace-Design	1,600	0	Future	0.0%	Dec-18	
19330_7140	Cryogenics Plant-Equip Replace-Const.	5,300	0	Future	0.0%	Apr-20	
19332_7142	Future Sodium Hypo Tank Rehab	10,000	0	Future	0.0%	Jul-20	
19334_7168	Barge Berth and Facility Replacement	2,265	0	Future	0.0%	Oct-15	
19335_7169	South Systm PS Lube System Replace.	2,900	0	Future	0.0%	Jul-18	
19336_7170	E/W Odor Control Air Handler Replace.	2,000	0	Future	0.0%	Jun-25	
19338_7172	PICS Distributed Process Units Replac	8,000	0	Future	0.0%	Feb-21	
19339_7275	NMPS & WTF Butterfly Valve Replace.	17,060	250	1.5%	1.5%		Jun-17
19345_7373	Digester & Storage Tank Rehab - Const.	21,700	0	Future	0.0%	Jun-18	
19346_7374	Clarif W3H Flush Syst	1,262	1,262	Complete	100.0%		
19347_7394	Clarifier Ph 2 Des	2,237	0	Future	0.0%	Jan-15	
19348_7395	Clarif Rehab2 Const	35,000	0	Future	0.0%	Apr-17	
19349_7396	Scum Skimr Replac	20,225	6,894	34.1%	34.1%		Oct-16
19351_7397	Clarif Rehab Ph 2 REI	1,500	0	Future	0.0%	Apr-17	
19352_7398	Cryo Chillers Replac	3,236	0	Future	0.0%	Oct-14	
19353_7399	As-Needed Des 7-1	1,500	1,083	72.2%	72.2%		Oct-15
19354_7400	As-Needed Des 7-2	1,500	646	43.1%	43.1%		Oct-15
19355_7401	TPP Boiler Ctrl Replac	1,692	0	Future	0.0%	Nov-14	
19557_7414	NMPS Harmonic Filter Repl	3,000	0	Future	0.0%	May-18	
19558_7415	Fuel Pipe Abandonment	230	230	Complete	100.0%		
19559_7416	Electr Equip Upgr 4 REI	1,039	17	1.6%	1.6%		Aug-16
19560_7419	NMPS MCC Ph 2 DES/ESDC/REI	2,000	0	Future	0.0%	Jul-16	
19561_7420	NMPS MCC Ph 2 Const	6,086	0	Future	0.0%	Apr-18	
19562_7424	Roof Replacement Phase 3	611	560	91.7%	91.7%		Jul-14
19563_7426	Fire Systm Repl REI	1,800	0	Future	0.0%	May-17	
19564_7427	Grav Thick Ctr Col Repl	825	825	Complete	100.0%		
19565_7428	Grav Thicknr Rehab	5,786	0	Future	0.0%	Dec-15	
19566_7434	As-Needed Des 7-3	1,500	326	21.7%	21.7%		Oct-15
26073_7148	Co-Digest Temp Facil	2,300	425	18.5%	18.5%		Sep-16
40256_7449	Sodium Bisulf & Hypo Tks Rehab	6,581	0	Future	0.0%	Jun-16	

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<b>210 Clinton Wastewater Treat Plant</b>	<b>\$20,511</b>	<b>\$2,801</b>	<b>13.7%</b>	<b>13.7%</b>		
19302_7075 Clinton Soda Ash Replacement	267	267	Complete	100.0%		
19308_7095 Clinton Permanent Standby Generator	230	230	Complete	100.0%		
19340_7276 Clinton Concr Rpr - Design	63	63	Complete	100.0%		
19341_7277 Clinton Digester Cleaning & Rehab	4,955	110	2.2%	2.2%		Apr-17
19342_7278 Clinton Aeration Efficiency Improvement	1,865	1,865	Complete	100.0%		
19350_7377 Phos Remov Des/ESDC	1,213	257	21.2%	21.2%		Aug-18
19400_7411 PhosRemov Constr	7,092	0	Future	0.0%	Feb-16	
19405_7450 Clinton Roofing Rehab	536	0	Future	0.0%	Dec-15	
19406_7451 Clinton Facilities Rehab	4,290	0	Future	0.0%	Sep-18	
<b>271 Residuals Asset Protection</b>	<b>\$103,832</b>	<b>\$832</b>	<b>0.8%</b>	<b>0.8%</b>		
26069_7143 Residual Facility Plan / EIR	1,000	0	Future	0.0%	Jan-20	
26070_7145 Residuals Facility Upgrade - Design	2,000	0	Future	0.0%	Jul-17	
26071_7146 Residuals Facility Upgrade-Construct.	10,000	0	Future	0.0%	Jul-16	
26072_7147 Condition Assess/Tech & Reg Review	832	832	Complete	100.0%		
26073_7148 Co-Digest Pilot	2,300	425	18.5%	18.5%		Sep-16
26074_7149 Resid Ph 2 Designs	15,000	0	Future	0.0%	Jul-22	
26075_7150 Resid Ph 2 Constr	75,000	0	Future	0.0%	Jan-24	
<b>324 CSO Support</b>	<b>\$50,248</b>	<b>\$48,189</b>	<b>95.9%</b>	<b>95.9%</b>		
32400_5790 Technical Assistance	228	228	Complete	100.0%		
32401_5791 Planning/EIR	10,769	10,769	Complete	100.0%		
32403_5716 Master Planning	21,763	21,763	Complete	100.0%		
32407_5970 Technical Assistance - Geotech	61	61	Complete	100.0%		
32409_5795 Modeling	300	300	Complete	100.0%		
32411_5767 SOP Program	773	773	Complete	100.0%		
32645_6036 Watershed Planning	877	877	Complete	100.0%		
32648_6150 Technical Review	2,279	529	23.2%	23.2%		Dec-20
32658_6169 Land Acquisition/Easement	12,875	12,820	Complete	99.6%		
32691_6372 System Assessment	324	69	21.3%	21.3%		Dec-20
<b>341 Dorchester Bay Sewer Separation (Commercial Point)</b>	<b>\$64,174</b>	<b>\$60,323</b>	<b>94.0%</b>	<b>94.0%</b>		
32650_6154 Design	17,692	16,643	94.1%	94.1%		Jun-16
32665_6248 Construction	46,481	43,680	94.0%	94.0%		Jun-16
<b>342 Neponset River Sewer Separation</b>	<b>\$2,549</b>	<b>\$2,549</b>	<b>Complete</b>	<b>100.0%</b>		
32652_6156 Design/CS/RI	470	470	Complete	100.0%		
32653_6160 Construction	2,079	2,079	Complete	100.0%		
<b>346 Cambridge Sewer Separation</b>	<b>\$92,563</b>	<b>\$63,494</b>	<b>68.6%</b>	<b>68.6%</b>		
32654_6161 Design/CS/RI	30,329	23,959	79.0%	79.0%		Jun-16
32672_6255 Construction	62,234	39,535	63.5%	63.5%		Dec-15
<b>352 Cambridge Floatables Control</b>	<b>\$1,127</b>	<b>\$1,087</b>	<b>96.5%</b>	<b>96.5%</b>		
32655_6162 Design	468	428	91.5%	91.5%		Nov-10
32684_6267 Construction	659	659	Complete	100.0%		



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<b>355 MWR003 Gate &amp; Siphon</b>	<b>\$4,562</b>	<b>\$1,374</b>	<b>30.1%</b>	<b>30.1%</b>		
32722_6952 Design	1,652	1,138	68.9%	68.9%		Sep-16
32723_6953 Construction 1	236	236	Complete	100.0%		
32755_7409 Construction 2	2,675	0	Future	0.0%	Aug-14	
<b>359 Reserved Channel Sewer Separation</b>	<b>\$72,613</b>	<b>\$64,361</b>	<b>88.6%</b>	<b>88.6%</b>		
32727_6994 Construction	57,185	50,484	88.3%	88.3%		Dec-15
32734_7014 Design	15,427	13,877	90.0%	90.0%		Jun-16

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<b>542 Carroll Water Treatment Plant</b>	<b>\$438,192</b>	<b>\$415,485</b>	<b>94.8%</b>	<b>94.8%</b>		
53293_5023 Study 1	444	444	Complete	100.0%		
53294_5024 Study 2	2,368	2,368	Complete	100.0%		
53296_5042 EIR / Conceptual Design	5,808	5,808	Complete	100.0%		
53300_5997 Technical Assistance	72	72	Complete	100.0%		
53301_5017 Wachusett WTP - Design/CS/RI	46,606	46,606	Complete	100.0%		
53304_5157 Permit Fees	87	85	97.7%	97.7%		Mar-16
53367_6118 Cryptosporidium Inactivation Study	150	150	Complete	100.0%		
53371_6134 Management Support - Design	1,730	1,730	Complete	100.0%		
53375_6182 AWWARF Study	650	650	Complete	100.0%		
53376_6206 Emerg Discharge Reserv Water Mgmt Study	1,454	1,454	Complete	100.0%		
53377_6207 Wachusett and Cosgrove Intakes - CP1	15,489	15,489	Complete	100.0%		
53378_6208 Construction Management / RI	31,438	31,438	Complete	100.0%		
53390_6365 Cosgrove Disinfection - Phase II	2,169	2,169	Complete	100.0%		
53391_6397 Cosgrove Disinfection - Phase I	150	150	Complete	100.0%		
53392_6401 Distribution Water Consultant	3	3	Complete	100.0%		
53393_6406 Immediate Disinfection - MECO	10	10	Complete	100.0%		
53406_6479 Cosgrove Disinfection Fac. - Underwater	217	217	Complete	100.0%		
53410_6485 Community Chlorine Analyzers	49	49	Complete	100.0%		
53412_5522 Wachusett Aqueduct Interim Rehab. - CP2	23,400	23,400	Complete	100.0%		
53413_6488 Sitework & Storage Tanks - CP3	67,368	67,368	Complete	100.0%		
53414_6489 Treatment Facilities - CP4	145,761	145,761	Complete	100.0%		
53416_6491 Late Sitework - CP6	4,088	4,088	Complete	100.0%		
53418_6494 OCIP	5,107	5,107	Complete	100.0%		
53419_6495 Professional Services	2,752	2,752	Complete	100.0%		
53420_6497 Marlboro MOA	5,859	5,859	Complete	100.0%		
53421_6520 CWTP- MECO	128	128	Complete	100.0%		
53425_6613 Site Security Services	1,264	1,264	Complete	100.0%		
53426_6650 Existing Facilities Modifications - CP7	6,657	0	Future	0.0%	Jul-15	
53427_6670 CSX Crossing	65	65	Complete	100.0%		
53428_6671 Wachusett Algae - Design CS/RI	450	0	Future	0.0%	Jul-18	
53432_6691 Public Health Research	1,703	1,703	Complete	100.0%		
53435_6756 Security Equipment	571	571	Complete	100.0%		
53437_6773 Cosgrove Screens, CP8 - Construction	3,238	3,238	Complete	100.0%		
53443_6815 AWWARF - Evaluation Ozone & UV	302	302	Complete	100.0%		
53445_6827 Fitout / Construction	1,500	545	36.3%	36.3%		Jun-18
53448_6889 Wachusett Algae - Construction	1,800	0	Future	0.0%	Feb-19	
53450_6923 CWTP Ultraviolet Disinfection-Des/ESDC/R	4,394	3,781	86.0%	86.0%		Apr-15
53451_6924 CWTP Ultraviolet Disinfection-Constr.	32,015	31,771	Complete	99.2%		
53452_6939 As-needed Technical Assistance #1	491	491	Complete	100.0%		
53453_6951 Existing Fac Modif., CP7 - Design	965	949	98.3%	98.3%		Apr-15
53455_6989 As-needed Technical Assistance	702	702	Complete	100.0%		
53456_7084 Ancillary Modifications - Construct. 1	160	160	Complete	100.0%		

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53457_7085	Ancillary Modifications - Construct. 2	8,256	4,829	58.5%	58.5%	Jul-23
53458_7192	Ancillary Modifications - Design 3	299	299	Complete	100.0%	
53459_7208	Ancillary Modifications - Design 4	527	527	Complete	100.0%	
53464_7315	Technical Assistance 5	255	255	Complete	100.0%	
53465_7316	Technical Assistance 6	408	408	Complete	100.0%	
53470_7376	CWTP Storage Tank Roof Drainage Sys.	7,000	0	Future	0.0%	Apr-19
75530_7406	Technical Assistance 7	748	268	35.8%	35.8%	Nov-15
75531_7407	Technical Assistance 8	563	0	Future	0.0%	Oct-15
75546_7455	CWTP-Asset Protection	500	0	Future	0.0%	Jul-17
<b>543 Quabbin Water Treatment Plant</b>	<b>\$19,719</b>	<b>\$18,359</b>	<b>93.1%</b>	<b>93.1%</b>		
53363_6043	Quabbin WTP - Design/CA/RI	3,794	3,794	Complete	100.0%	
53380_6210	Permit Fees	56	54	96.4%	96.4%	Aug-14
53381_6211	Utilities	13	13	Complete	100.0%	
53382_6212	Construction	5,071	5,071	Complete	100.0%	
53405_6468	CVA Shea Ave Leak Repair	951	723	76.0%	76.0%	Oct-14
53433_6706	Ware Fire Department - MOA	25	25	Complete	100.0%	
53434_6711	Water Quality Analysis Equipment	49	49	Complete	100.0%	
53439_6775	Quabbin UVWTP - Design/CA/RI	2,019	1,654	81.9%	81.9%	Apr-15
53440_6776	Quabbin UVWTP - Construction	6,599	5,834	88.4%	88.4%	Sep-14
53442_6804	Quabbin UVWTP -Study/Pilot	1,142	1,142	Complete	100.0%	
<b>550 Spot Pond Storage Facility</b>	<b>\$61,152</b>	<b>\$44,840</b>	<b>73.3%</b>	<b>73.3%</b>		
53400_6455	Environmental Review	233	233	Complete	100.0%	
53402_6457	Design / Build	51,363	37,317	72.7%	72.7%	Aug-15
53447_6868	Easement/Land Acquis/Permits	6,000	5,359	89.3%	89.3%	Dec-14
53462_7233	Owners' Representative	3,034	1,708	56.3%	56.3%	Dec-16
53463_7314	Early Construction Water Connection	222	222	Complete	100.0%	
<b>597 Winsor Station Pipeline</b>	<b>\$27,883</b>	<b>\$1,735</b>	<b>6.2%</b>	<b>6.2%</b>		
60032_6276	Preliminary Permit, Study & Licensing	38	38	Complete	100.0%	
60033_6277	Quabbin Aqueduct TV Inspection	2,955	0	Future	0.0%	Jul-18
60077_7017	Hatchery Pipeline - Design/ESDC/RI	750	255	34.0%	34.0%	Sep-19
60087_7114	Quabbin Aqueduct & WPS Upg. Design/CA/RI	2,517	656	26.1%	26.1%	Jan-19
60088_7115	Winsor Station Rehab & Improvement	9,840	0	Future	0.0%	Jul-17
60095_7197	Shaft 2 & 12 Construction	9,038	0	Future	0.0%	Jul-17
60101_7212	Winsor Station Chapman Valve Repai	416	416	Complete	100.0%	
60105_7234	Purchase of Sleeve Valves	368	368	Complete	100.0%	
60106_7235	Hatchery Pipeline - Construction	1,961	0	Future	0.0%	Feb-16

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<b>604 MetroWest Tunnel</b>	<b>\$708,664</b>	<b>\$696,777</b>	<b>98.3%</b>	<b>98.3%</b>		
59794_5043 Study	415	415	Complete	100.0%		
59795_5044 Design/EIR - Tunnel/ESDC	37,939	37,939	Complete	100.0%		
59796_5048 Sudbury Pipe Bridge - Construction	296	296	Complete	100.0%		
59798_6054 West Tunnel Segment - CP1	147,774	147,774	Complete	100.0%		
59799_5284 Construction Management/Resident Inspec	39,428	39,428	Complete	100.0%		
59804_5976 Technical Assistance	131	131	Complete	100.0%		
59805_5139 Land Acquisition	6,259	6,259	Complete	100.0%		
59806_5141 Hultman Study	1,864	1,864	Complete	100.0%		
60012_6037 DEP Permit Fees	58	56	96.6%	96.6%		Sep-14
60013_6055 Middle Tunnel Segment - CP2	245,809	245,809	Complete	100.0%		
60014_6056 MHD Salt Sheds - CP5	1,314	1,314	Complete	100.0%		
60015_6059 Shaft 5A - CP3	5,816	5,816	Complete	100.0%		
60017_6063 Local Supply Contingency - Design/CA/RI	859	859	Complete	100.0%		
60018_6067 Community Technical Assistance	297	297	Complete	100.0%		
60020_6117 Professional Services	731	731	Complete	100.0%		
60021_6122 OCIP	26,022	26,022	Complete	100.0%		
60022_6128 Hultman Leak Repair	307	307	Complete	100.0%		
60023_6129 Framingham MOU	2,444	2,444	Complete	100.0%		
60024_6130 Local Supply Contingency - Construction	4,298	4,298	Complete	100.0%		
60025_6131 Local Supply Contingency - Legal/Easemen	9	9	Complete	100.0%		
60026_6140 Hultman Repair Bands	28	28	Complete	100.0%		
60029_6203 Loring Road Storage Tanks - CP-8	41,368	41,368	Complete	100.0%		
60030_6204 Testing & Disinfection - CP7	3,612	3,612	Complete	100.0%		
60031_6205 Upper Hultman Rehab - CP6B	5,849	5,849	Complete	100.0%		
60038_6366 Southboro MOA	255	255	Complete	100.0%		
60039_6367 Weston MOA	1,006	1,006	Complete	100.0%		
60040_6374 East Tunnel Segment - CP3A	56,263	56,214	Complete	99.9%		
60042_6430 Hultman Investigation and Repair	1,604	1,604	Complete	100.0%		
60043_6492 Hultman Repair Bands 98-99	116	116	Complete	100.0%		
60053_6762 Wayland MOA	35	35	Complete	100.0%		
60054_6777 Equipment Prepurchase	198	198	Complete	100.0%		
60058_6856 Hultman Rehab - CP9	3,257	3,257	Complete	100.0%		
60059_6872 Interim Disinfection	1,245	1,245	Complete	100.0%		
60066_6911 Hultman Interconnect - Final Design/CA/I	5,884	5,668	96.3%	96.3%		Sep-14
60072_6950 Valve Chamber Modifications - Design CA/	1,225	0	Future	0.0%	Jul-18	
60073_6975 Lower Hultman Rehab -CP6A	52,289	52,286	Complete	100.0%		
60083_7082 Hultman Interconnect - RI Services	1,870	1,876	Complete	100.3%		
60085_7105 CP6 Easements	33	33	Complete	100.0%		
60086_7106 CP6A Demolition	57	57	Complete	100.0%		
60109_7283 Valve Chamber & Storage Tank Access Impr	600	0	Future	0.0%	Jul-17	
60128_7367 Shaft 5 Electrical Upgrade	1,000	0	Future	0.0%	Jan-19	
60129_7368 Shaft 5A/5 Surface Piping Inspec./Resto	500	0	Future	0.0%	Aug-15	

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75525_7755 Valve Chamber Modifications - Constructi	4,899	0	Future	0.0%	Jan-20	
<b>616 Quabbin Transmission System</b>	<b>\$15,457</b>	<b>\$7,457</b>	<b>48.2%</b>	<b>48.2%</b>		
60055_6828 Facilities Inspection	1,005	1,005	Complete	100.0%		
60068_6940 Oakdale High Line Repl	500	0	Future	0.0%	Aug-16	
60075_7007 Equipment Pre-purchase	534	534	Complete	100.0%		
60103_7229 Oakdale Phase 1A Electrical - Design	776	776	Complete	100.0%		
60104_7230 Oakdale Phase 1A Electrical - Constructi	2,260	2,260	Complete	100.0%		
60108_7282 Ware Rvr Intake Vlve Rpt-DES	300	0	Future	0.0%	Jul-18	
60112_7332 CVA Motorized Screens Rep-DES	100	0	Future	0.0%	Jul-17	
60113_7333 Rehab Wach Gateh Des CA/RI	800	0	Future	0.0%	Jul-18	
60135_7378 Rehabilitate Oakdale Turbine	1,000	0	Future	0.0%	May-20	
60136_7379 Geo-Thermal Heat Wachusett Gatehouse	200	0	Future	0.0%	May-19	
60137_7380 Rehab Wach Gths Pip HAC-Const	3,800	0	Future	0.0%	Jul-20	
60138_7487 Ware Rver Intake Vlve Rep Const	900	0	Future	0.0%	Jul-20	
60139_7488 CVA Motorized Screens Repl-Const	400	0	Future	0.0%	Jul-19	
75491_6690 Oakdale Valves - Phase 1 Construction	1,811	1,811	Complete	100.0%		
75496_6831 Oakdale Valves - Phase 1 Study & Design	1,070	1,070	Complete	100.0%		
<b>617 Sudbury/Weston Aqueduct Repairs</b>	<b>\$7,149</b>	<b>\$660</b>	<b>9.2%</b>	<b>9.2%</b>		
60056_6838 Sudbury Aqueduct Inspection	370	370	Complete	100.0%		
60057_6839 Technical Assistance	25	25	Complete	100.0%		
60071_6948 Weston Aqued Flow Contr Valve	900	0	Future	0.0%	Jul-16	
60076_7016 Sudbury Short-Term Repairs	441	0	Future	0.0%	Jul-17	
60110_7317 Sudbury Short-Term Repairs - Phase 2	2,098	0	Future	0.0%	Jul-18	
60130_7369 Ash Street Sluice Gates-Const	800	0	Future	0.0%	Jan-20	
60150_7472 Rosemary Brook Building Repair	1,796	0	Complete	Complete		
60151_7473 Eval Farm Pond Bldgs-Waban Arches	104	0	Complete	Complete		
60152_7491 Ash St Sluice Gates Design	350	0	Future	0.0%	Jan-18	
75486_6617 Hazardous Material Sudbury Aqueduct	265	265	Complete	100.0%		
<b>618 Northern High NW Tran Sections 70 &amp; 71</b>	<b>\$1,000</b>	<b>\$0</b>	<b>Future</b>	<b>0.0%</b>		
60063_6895 Planning	1,000	0	Future	0.0%	Jan-18	
<b>621 Watershed Land</b>	<b>\$24,000</b>	<b>\$17,882</b>	<b>74.5%</b>	<b>74.5%</b>		
60081_7069 Land Acquisition	24,000	17,882	74.5%	74.5%		Jun-18
<b>623 Dam Projects</b>	<b>\$4,538</b>	<b>\$3,095</b>	<b>68.2%</b>	<b>68.2%</b>		
60094_7194 Dam Safety Modificat. & Repairs - Constr	2,055	2,055	Complete	100.0%		
60100_7211 Dam Safety Modificat. & Repairs Design/C	1,533	1,040	67.8%	67.8%		Jun-14
60118_7346 Oakdale Dam Permits	1	0	Future	0.0%	Jan-16	
60119_7347 Oakdale Dam - Design/ESDC/RI	200	0	Future	0.0%	Jul-16	
60120_7348 Oakdale Dam Removal - Construction	750	0	Future	0.0%	Jul-17	

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<b>625 Long Term Redundancy</b>	<b>\$409,381</b>	<b>\$4,783</b>	<b>1.2%</b>	<b>1.2%</b>		
60035_6273	Water Transmission Redundancy Plan	1,397	1,397	Complete	100.0%	
60090_7156	Wachusett Aqueduct PS Des/ESDC/RI	6,574	2,422	36.8%	36.8%	Jun-20
60091_7157	Wachusett Aqueduct PS Const	60,500	0	Future	0.0%	Sep-15
60092_7159	Sudbury Aqueduct - Design/CA/RI	55,286	0	Future	0.0%	Jul-17
60093_7160	Sudbury Aqueduct Slipline - Construction	101,065	0	Future	0.0%	Jul-21
60107_7291	MWWST/Sudbury Aqueduct Connection Const	163,694	0	Future	0.0%	Jul-20
60122_7352	Sudbury Aqueduct - MEPA Review	3,405	965	28.3%	28.3%	Dec-16
60123_7353	Chestnut Hill Final Connection - Constru	11,668	0	Future	0.0%	Jul-20
60126_7356	Tops of Shafts Rehab - Design/CA/RI	1,159	0	Future	0.0%	Jan-22
60127_7357	Tops of Shafts Rehab - Construction	4,634	0	Future	0.0%	Jan-24
<b>677 Valve Replacement</b>	<b>\$22,702</b>	<b>\$12,016</b>	<b>52.9%</b>	<b>52.9%</b>		
67559_5126	Construction 1	718	718	Complete	100.0%	
67560_5124	Technical Assistance	125	125	Complete	100.0%	
68005_6088	Equipment Purchase	4,038	1,112	27.5%	27.5%	Jun-18
68012_6105	Construction 2	1,357	1,357	Complete	100.0%	
68039_6278	Construction 3	1,338	1,338	Complete	100.0%	
68079_6345	Construction 4	1,540	1,540	Complete	100.0%	
68080_6346	Construction 5	1,389	1,389	Complete	100.0%	
68126_6435	Construction 6	1,572	1,572	Complete	100.0%	
68127_6436	Construction 7	2,859	2,859	Complete	100.0%	
68239_6859	Permits	3	3	Complete	100.0%	
68240_6860	Easements	6	6	Complete	100.0%	
68300_7195	Construction 8	3,233	0	Future	0.0%	Jan-21
68307_7236	Construction 9	3,233	0	Future	0.0%	Jun-25
68330_7417	Phase 8 Design/CA/RI	647	0	Future	0.0%	Jan-19
68331_7418	Phase 9 Design/CA/RI	647	0	Future	0.0%	Jun-23
<b>692 NHS - Section 27 Improvements</b>	<b>\$1,092</b>	<b>\$124</b>	<b>11.4%</b>	<b>11.4%</b>		
67769_6333	Section 27 - Construction	967	27	2.8%	2.8%	Nov-19
68192_6589	Easements	23	0	Future	0.0%	Apr-16
68211_6712	Technical Assistance	64	60	93.8%	93.8%	Mar-18
68229_6809	Surveying	37	37	Complete	100.0%	

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<b>693 NHS - Revere &amp; Malden Pipeline Improvement</b>	<b>\$55,161</b>	<b>\$26,833</b>	<b>48.6%</b>	<b>48.6%</b>		
67780_5185	Revere & Malden - Design/CS/RI	1,786	1,786	Complete	100.0%	
67781_5186	Revere Beach - Construction	6,314	6,314	Complete	100.0%	
67782_5176	Malden Section 53 - Construction	10,026	10,026	Complete	100.0%	
67784_5177	Revere Section 53 - Construction	2,938	2,938	Complete	100.0%	
67785_5191	Control Valves - Construction	949	949	Complete	100.0%	
67786_5179	DI Pipeline Cleaning & Lining - Construc	158	158	Complete	100.0%	
67787_5178	Winthrop Cleaning & Lining - Constructio	575	575	Complete	100.0%	
67790_6335	Sect 53 Connections Constr	11,793	0	Future	0.0%	Jul-17
67791_5986	Technical Assistance	246	246	Complete	100.0%	
67792_5238	Linden Square - Construction	1,849	1,849	Complete	100.0%	
67793_5239	Linden Square - Construction Admin.	125	125	Complete	100.0%	
67996_6033	Road Restoration - Design/CA/RI	77	77	Complete	100.0%	
67997_6034	Road Restoration - Construction	1,714	1,714	Complete	100.0%	
68020_6113	Malden Section 53 - Landscaping	20	20	Complete	100.0%	
68033_6183	Sidewalk Restoration	54	54	Complete	100.0%	
68258_6958	Shaft 9A-D Extension - Construction	3,005	0	Future	0.0%	Mar-22
68265_6978	Easements	30	0	Future	0.0%	Jul-06
68280_7049	Permits	5	0	Future	0.0%	Apr-05
75526_7402	Sect 53 Connections Des CA/RI	2,144	0	Future	0.0%	Oct-15
75527_7403	Shaft 9A-D Design/CA/RI	652	0	Future	0.0%	Mar-20
75545_7454	Sections 56 Replacement/Saugus	1,500	0	Future	0.0%	Jan-17

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<b>702 New Connect Mains-Shaft 7 to WASM 3</b>	<b>\$34,296</b>	<b>\$10,961</b>	<b>32.0%</b>	<b>32.0%</b>		
67846_5163	Routing Study	397	397	Complete	100.0%	
68035_6199	Watertown MOU	167	167	Complete	100.0%	
68110_6383	CP1- Design/CA/RI	3,533	3,533	Complete	100.0%	
68111_6384	Des/CA/RI DP2/4 Meter 120	1,278	1,278	Complete	100.0%	
68112_6385	CP3 - Final Design/CA/RI	1,501	0	Future	0.0%	Jul-17
68114_6387	CP1 A&B - Easements	17	17	Complete	100.0%	
68115_6388	CP3 - Easements	40	0	Future	0.0%	Jan-18
68117_6390	CP5 - Easements	22	22	Complete	100.0%	
68119_6392	CP3 - South Segment	7,746	0	Future	0.0%	Jul-19
68121_6394	CP5 - Northeast Segment	5,548	5,548	Complete	100.0%	
68174_6548	CP2- Clean&Line Sections 59&60 - Constr	5,205	0	Future	0.0%	May-23
68175_6547	CP2 -Easements	33	0	Future	0.0%	May-17
68255_6955	Replacement of Section 25 - Design/CA/RI	561	0	Future	0.0%	Oct-18
68256_6956	Replacement of Section 25 - Construction	2,807	0	Future	0.0%	Oct-20
68286_7086	Section 59 & 60 - Design/CA/RI	1,041	0	Future	0.0%	May-21
68315_7284	Section 75 Extension	880	0	Future	0.0%	Oct-18
<b>704 Rehabilitation of Other Pump Stations</b>	<b>\$55,058</b>	<b>\$30,058</b>	<b>54.6%</b>	<b>54.6%</b>		
67885_5153	Preliminary Design	351	351	Complete	100.0%	
68017_6110	Design/CS/RI	2,546	2,546	Complete	100.0%	
68072_6304	Construction II & C	639	639	Complete	100.0%	
68102_6375	Rehab of 5 Pump Stations	21,848	21,848	Complete	100.0%	
68179_6557	Legal	6	6	Complete	100.0%	
68204_6676	Proprietary Equipment Purchases	158	158	Complete	100.0%	
68266_6980	Design 2 CS/RI	4,510	4,510	Complete	100.0%	
75522_7383	Pump Station Rehabilitation	25,000	0	Future	0.0%	Jul-19
<b>708 Northern Extra High Service New Pipelines</b>	<b>\$7,863</b>	<b>\$3,632</b>	<b>46.2%</b>	<b>46.2%</b>		
67970_5242	Design/CA/RI	588	588	Complete	100.0%	
67972_6340	Construction	3,032	3,032	Complete	100.0%	
68162_6522	Sections 34 & 45 - Construction	3,475	0	Future	0.0%	Jul-20
68176_6554	Public Participation	5	0	Future	0.0%	Jul-15
68177_6555	Legal	5	0	Future	0.0%	Jul-15
68210_6707	Technical Assistance	54	8	14.8%	14.8%	Jan-17
68215_6749	PLC Equipment Purchases	4	4	Complete	100.0%	
68281_7050	Permits	5	0	Future	0.0%	
75528_7404	Section 34 & 45 Design/CA/RI	695	0	Future	0.0%	Jul-18
<b>712 Cathodic Protection Of Distribution Mains</b>	<b>\$1,668</b>	<b>\$141</b>	<b>8.5%</b>	<b>8.5%</b>		
68002_6058	Planning Phase I	108	108	Complete	100.0%	
68129_6438	Corrosion Control Program - Task 1	509	0	Future	0.0%	Jul-15
68130_6439	Corrosion Control Program - Task 2	509	0	Future	0.0%	Jul-18
68131_6440	Corrosion Control Program - Task 3	509	0	Future	0.0%	Jul-22
68216_6751	Technical Assistance	33	33	Complete	100.0%	



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<b>713 Spot Pond Supply Mains Rehabilitation</b>	<b>\$66,807</b>	<b>\$61,169</b>	<b>91.6%</b>	<b>91.6%</b>		
60114_7334	Sec 4 Webster Ave Bridge Pipe Rehab Des	686	187	27.3%	27.3%	Mar-17
60115_7335	Sec 4 Webster Ave Bridge Pipe Rehab Con	1,759	0	Future	0.0%	May-15
60116_7336	Section 50 Pipe Rehab - Design/ESDC/RI	500	0	Future	0.0%	Jul-17
60117_7337	Section 50 Pipe Rehab - Construction	1,500	0	Future	0.0%	Jul-19
68038_6223	Preliminary Design & Design/CA/RI	10,869	10,869	Complete	100.0%	
68059_6316	Easements & Paving - CP1	143	143	Complete	100.0%	
68060_6317	North (Medford/Melrose)	6,597	6,597	Complete	100.0%	
68106_6379	Easements - CP2	50	50	Complete	100.0%	
68107_6380	Easements - CP3	80	80	Complete	100.0%	
68108_6381	Middle (Medford/Somerville)	22,177	22,177	Complete	100.0%	
68109_6382	South (Cambridge/Boston)	17,590	17,590	Complete	100.0%	
68150_6475	Early Valve Replacement Contract	2,387	2,387	Complete	100.0%	
68151_6476	Easements - CP4	1	1	Complete	100.0%	
68153_6483	Early Valve Equipment Purchase	161	161	Complete	100.0%	
68209_6697	Construction 4 - Bridge Trusses	312	0	Future	0.0%	Apr-18
68225_6784	Easements - CP5	70	2	2.9%	2.9%	Jun-20
68274_7003	CA/RI - CP3	925	925	Complete	100.0%	
<b>719 Chestnut Hill Connecting Mains</b>	<b>\$32,035</b>	<b>\$17,487</b>	<b>54.6%</b>	<b>54.6%</b>		
68026_6141	Pump Stn. Potable Connect.-Design/CA/RI	1,360	1,360	Complete	100.0%	
68051_6301	Preliminary Engineering	457	457	Complete	100.0%	
68052_6302	Shaft 7 Building - Design & Construct.	5,927	0	Future	0.0%	Jan-22
68053_6303	Easements	81	81	Complete	100.0%	
68155_6501	Emergency Pump Relocation - Const.	6,502	6,502	Complete	100.0%	
68157_6503	Emergency Pump Relocation - Design/CA/RI	1,121	1,121	Complete	100.0%	
68180_6558	Boston Paving	133	133	Complete	100.0%	
68182_6560	Legal	1	1	Complete	100.0%	
68199_6623	BECo Emergency Pump Construction	431	431	Complete	100.0%	
68203_6651	Pump Station Potable Connection - Const	7,132	7,132	Complete	100.0%	
68230_6814	Equipment Pre-purchase	154	154	Complete	100.0%	
68231_6820	Demolition of Garages	72	72	Complete	100.0%	
68244_6869	Utilities	44	44	Complete	100.0%	
68267_6982	CHEPS Emerg Gen/Elec Upgr Constr	6,897	0	Future	0.0%	Jul-19
68268_6995	CHEPS Emerg Gen/Elec Upgr Final Des/CA	1,724	0	Future	0.0%	Jul-17

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Subphase/Project	Total Contract Amount	Projected Pmts. Thr. FY14	Status Based on % of Budget Expended	% Complete	Planned Start	Planned End
<b>721 South Spine Distribution Mains</b>	<b>\$74,773</b>	<b>\$36,681</b>	<b>49.1%</b>	<b>49.1%</b>		
68083_6290	Sections 21, 43 & 22 - Design	7,113	7,113	Complete	100.0%	
68084_6291	Sections 21, 43 & 22 - Easements	107	107	Complete	100.0%	
68085_6292	Section 22 South - Construction	4,993	4,993	Complete	100.0%	
68089_6296	Section 20 & 58 - Design	3,018	0	Future	0.0%	Jun-23
68090_6297	Section 20 & 58 - Easements	35	0	Future	0.0%	Sep-21
68091_6298	Section 20 & 58 - Construction	14,202	0	Future	0.0%	Sep-25
68122_6396	Adams Street Bridge	154	154	Complete	100.0%	
68193_6601	Southern High Public Participation	15	15	Complete	100.0%	
68194_6602	Southern High Extension Study	242	242	Complete	100.0%	
68228_6787	Boston Paving	3	3	Complete	100.0%	
68235_6844	Section 22 North - Construction	17,333	0	Future	0.0%	Jan-23
68236_6845	Section 107 Phase 1 - Construction	6,184	6,184	Complete	100.0%	
68237_6846	Legal	5	1	20.0%	20.0%	May-27
68238_6847	Technical Assistance	28	28	Complete	100.0%	
68247_6885	Contract 1A - Construction	2,859	2,859	Complete	100.0%	
68290_7099	Section 107 Phase 2 - Construction	14,847	14,847	Complete	100.0%	
68291_7104	Milton Pressure Regulator Valve	135	135	Complete	100.0%	
68298_7120	Section 22 North - Design/ESDC	2,500	0	Future	0.0%	Jul-20
68299_7155	Section 22 North - Facility Plan/EIR	1,000	0	Future	0.0%	Jul-17
<b>722 NIH Redundancy &amp; Storage</b>	<b>\$90,187</b>	<b>\$8,145</b>	<b>9.0%</b>	<b>9.0%</b>		
53454_6954	Concept Plan	797	797	Complete	100.0%	
68093_6306	Easements	300	0	Future	0.0%	Jul-14
68252_6906	Section 89/29 Redundancy - Design	6,172	1,032	16.7%	16.7%	Aug-20
68276_7026	Purchase Mobile Pump Unit	291	291	Complete	100.0%	
68277_7045	Short Term Improvements - Design/CA/RI	825	770	93.3%	93.3%	May-15
68278_7047	Permits	5	0	Future	0.0%	Jan-10
68279_7048	Technical Assistance	18	0	Future	0.0%	Jan-10
68282_7066	West St Pipe Reading Constr Ph1A	1,932	0	Future	0.0%	Jun-14
68283_7067	Sec 89 & 29 Redundancy Const. Phase 2	21,235	0	Future	0.0%	Nov-16
68284_7068	NIH Storage - Construction	18,223	0	Future	0.0%	Jan-19
68294_7116	Section 89 & 29 Rehab - Design	1,539	0	Future	0.0%	Jul-17
68295_7117	Section 89 & 29 Rehab - Construction	7,692	0	Future	0.0%	Jul-19
68309_7260	Gillis Pump Station Improvements	2,178	1,789	82.1%	82.1%	Dec-14
68310_7261	Reading/Stoneham Interconnections	3,467	3,467	Complete	100.0%	
68316_7311	NIH Storage - Design	3,697	0	Future	0.0%	Jan-17
68317_7471	Sec 89/29 Redund Constr Ph 1B	11,000	0	Future	0.0%	Aug-15

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<b>723 Northern Low Service Rehabilitation Section 8</b>	<b>\$23,334</b>	<b>\$2,321</b>	<b>9.9%</b>	<b>9.9%</b>		
68094_6321 Easements	80	0	Future	0.0%	Jul-15	
68095_6322 Section 8 - Construction	14,125	0	Future	0.0%	Jul-20	
68262_6962 Rehab Sects. 37 & 46 Chelsea/EB Constr.	3,200	0	Future	0.0%	Jul-19	
68263_6977 Permits	299	285	95.3%	95.3%		Jul-18
68264_6979 Technical Assistance	44	44	Complete	100.0%		
68275_7021 Section 97A - Construction	1,992	1,992	Complete	100.0%		
68287_7092 Section 8 - Design/CA/RI	2,825	0	Future	0.0%	Jul-17	
75529_7405 Rehab Sec 37&46 Chel/BosDes/CA/RI	768	0	Future	0.0%	Jul-17	
<b>727 Southern Extra High Redundancy &amp; Storage</b>	<b>\$99,544</b>	<b>\$6,831</b>	<b>6.9%</b>	<b>6.9%</b>		
53397_6452 Concept Plan/Prelim. Design/Env. Review	633	633	Complete	100.0%		
53398_6453 Redundancy/Storage Ph 1 Final Des/CA/RI	7,677	61	0.8%	0.8%		Aug-21
53399_6454 Redundant Pipeline Sect 111 Ph 1 Constr	11,793	0	Future	0.0%	Aug-16	
68135_6444 Redundancy/Storage Ph 2 Final Des/CA/RI	5,934	0	Future	0.0%	Jan-26	
68136_6445 University Avenue Water Main	6,137	6,137	Complete	100.0%		
68292_7112 Sections 77 & 88 Rehab - Design	1,366	0	Future	0.0%	Mar-21	
68293_7113 Sections 77 & 88 Rehab - Construction	5,464	0	Future	0.0%	Apr-23	
68305_7226 Easements/Agreements	300	0	Future	0.0%	Jul-14	
68306_7227 Permits/Utilities	5	0	Future	0.0%	Aug-08	
68308_7245 Redundancy/Storage Phase 2 Construct.	29,669	0	Future	0.0%	Jan-28	
68311_7262 Phase 3, 2nd Tank - Construction	10,449	0	Future	0.0%	Jan-33	
68312_7263 Phase 3, 2nd Tank - Design	2,090	0	Future	0.0%	Jan-31	

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<b>730 Weston Aqueduct Supply Mains</b>	<b>\$281,137</b>	<b>\$68,491</b>	<b>24.4%</b>	<b>24.4%</b>		
59774_5034 Newton Water Mains - Construction	669	669	Complete	100.0%		
59776_5975 Technical Assistance	186	186	Complete	100.0%		
67865_5147 WASM 4 - Design/CA/RI	5,978	5,978	Complete	100.0%		
68027_6142 WASMs 1 & 2 - Design/CA/RI	5,060	5,060	Complete	100.0%		
68030_6174 Appraisal / Easement	753	425	56.4%	56.4%		Oct-18
68031_6175 WASM 1, 2 & 4 - Auburndale	4,001	4,001	Complete	100.0%		
68032_6176 Meter 103 - Construction	61	61	Complete	100.0%		
68041_6280 WASMs 1 & 2 - Newton	9,219	9,219	Complete	100.0%		
68042_6281 WASMs 1 & 2 - Boston	7,039	7,039	Complete	100.0%		
68069_6312 WASMs 2 & 4 - Newton	8,282	8,282	Complete	100.0%		
68070_6313 WASM 4 - Allston & Western Ave. Sewer	17,331	17,331	Complete	100.0%		
68166_6539 WASM 3 - MEPA/Design/CA/RI	15,483	183	1.2%	1.2%		Aug-26
68167_6540 Sect 36/WS/Waltham Conn. - Design/CA/RI	3,048	1,399	45.9%	45.9%		Dec-22
68170_6543 WASM 3 Waltham - CP2	109,449	0	Future	0.0%	Jul-18	
68171_6544 WASM 3 Belmont - CP3	44,704	0	Future	0.0%	Oct-21	
68172_6545 WASM 3 Arlington - CP4	17,505	0	Future	0.0%	Jan-23	
68173_6546 Section 28, Arlington - CP1	2,304	2,304	Complete	100.0%		
68245_6870 Survey	210	89	42.4%	42.4%		Oct-25
68269_6996 Arlington Pipe Work	401	401	Complete	100.0%		
68272_7000 WASM3 Section 12 Replacement - Constr.	2,114	2,114	Complete	100.0%		
68273_7001 WASM3 Section 12 Replacement - Design	265	265	Complete	100.0%		
68285_7083 Section 28 - Design/CA/RI	867	867	Complete	100.0%		
68301_7222 Watertown Sect Rehab	2,668	2,618	98.1%	98.1%		Dec-13
68332_7448 Sect 36/W11/S 9-All Valve	11,251	0	Future	0.0%	Nov-14	
68333_7457 Section 101 Const	12,291	0	Future	0.0%	Jul-20	
<b>731 Lynnfield Pipeline</b>	<b>\$5,626</b>	<b>\$5,626</b>	<b>Complete</b>	<b>100.0%</b>		
68187_6584 Construction Phase 2	4,792	4,792	Complete	100.0%		
68196_6619 Easement, Legal, License & Permits	8	8	Complete	100.0%		
68251_6905 Design/CA/RI	553	553	Complete	100.0%		
68289_7096 Temporary Interconnect - Phase 1 Constr	272	272	Complete	100.0%		
<b>735 Section 80 Rehabilitation</b>	<b>\$9,836</b>	<b>\$0</b>	<b>Future</b>	<b>0.0%</b>		
68249_6891 Section 80 - Construction	7,869	0	Future	0.0%	Jan-19	
68250_6892 Section 80 - Design/CS/RI	1,967	0	Future	0.0%	Jan-17	

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<b>753 Central Monitoring System</b>	<b>\$39,006</b>	<b>\$15,804</b>	<b>40.5%</b>	<b>40.5%</b>		
75300_5025 Study	190	190	Complete	100.0%		
75301_5026 Design	2,651	2,651	Complete	100.0%		
75302_5027 Equipment Prepurchase	2,162	2,162	Complete	100.0%		
75303_5028 SCADA Implementation	2,101	1,912	91.0%	91.0%		Mar-15
75304_5160 Communications Structures	161	161	Complete	100.0%		
75305_5173 Construction & Start-up Services	352	352	Complete	100.0%		
75306_5171 Construction 1	209	209	Complete	100.0%		
75308_5849 Operations Center - Construction	1,499	1,499	Complete	100.0%		
75309_5987 Technical Assistance	386	386	Complete	100.0%		
75310_5218 Waterworks SCADA/PLC Upg	18,500	0	Future	0.0%	Oct-16	
75474_6125 Microwave Equipment	782	782	Complete	100.0%		
75488_6653 Microwave Comm System-Wide Backbone	1,694	1,694	Complete	100.0%		
75489_6654 Monitoring & Control - Study & Design	1,808	1,808	Complete	100.0%		
75494_6816 Microwave Communic for Waterworks Fac.	1,957	1,957	Complete	100.0%		
75495_6825 Ludlow Communications	41	41	Complete	100.0%		
75512_7338 Quabbin Power Comm & Secur	3,400	0	Future	0.0%	Oct-15	
75540_7461 Quabbin Power Design	814	0	Future	0.0%	Jul-14	
75541_7475 Utility Fees and Permits	300	0	Future	0.0%	Jul-14	
<b>763 Distribution Systems Facilities Mapping</b>	<b>\$2,299</b>	<b>\$1,036</b>	<b>45.1%</b>	<b>45.1%</b>		
75458_5162 Planning and Design	936	936	Complete	100.0%		
75476_6152 Data Purchase	100	100	Complete	100.0%		
75484_6525 Records Development	763	0	Future	0.0%	Jan-17	
<b>765 Local Water Pipeline Improvement Loan Program</b>	<b>\$0</b>	<b>\$128,313</b>	<b>NA</b>	<b>NA</b>		
75485_6608 Community Loans	222,318	222,318	Complete	100.0%		
75493_6759 Community Repayment	-222,318	-150,535	67.7%	67.7%		Jun-23
75513_7339 Local Water System Assistance Loans	200,000	61,286	30.6%	30.6%		Jun-20
75514_7340 Local Water System Assistance Repayment	-200,000	-6,538	3.3%	3.3%		Jun-30
75515_7350 CVA Loans	10,000	2,085	20.9%	20.9%		Jun-20
75516_7351 CVA Repayments	-10,000	-302	3.0%	3.0%		Jun-30

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<b>766 Waterworks Facility Asset Protection</b>	<b>\$21,043</b>	<b>\$546</b>	<b>2.6%</b>	<b>2.6%</b>		
75490_6689 Meter Vault Manhole Retrofits Design	406	0	Future	0.0%	Sep-18	
75497_6832 Walnut Hill Tank - Design	300	0	Future	0.0%	Jul-16	
75498_6833 Walnut Hill Tank - Construction	1,000	0	Future	0.0%	Jul-17	
75501_6910 Waltham Bridge Pipe Replacement	238	238	Complete	100.0%		
75502_6920 Permits and Legal Fees	16	9	56.3%	56.3%		Jun-18
75505_7022 Cosgrove Flat Roof Repl	300	0	Future	0.0%	Sep-16	
75509_7064 Cosgrove Valve Replacement - Constr	1,819	0	Future	0.0%	Jul-19	
75510_7065 Cosgrove Valve Replacement - Design	214	0	Future	0.0%	Jul-18	
75511_7228 Transformer at Cosgrove Intake Building	299	299	Complete	100.0%		
75520_7381 Shaft 9 Rehab Des CA/RI	400	0	Future	0.0%	Jul-25	
75523_7384 Elevated Water Sto Tank Repaint Design	500	0	Future	0.0%	Jul-16	
75524_7385 Covered Stor Tank Rehab Des CA/RI	1,000	0	Future	0.0%	Jul-19	
75535_7425 Electrical Distr Upgr Southboro	400	0	Future	0.0%	Jul-17	
75536_7453 Water Meter Upgrade Repl	1,000	0	Future	0.0%	Sep-18	
75537_7458 Beacon ST Line Repair	1,000	0	Future	0.0%	Jan-16	
75538_7474 Beacon St Repair Design CA/RI	425	0	Future	0.0%	Nov-14	
75550_7479 Meter Vault Retrofits Const	1,625	0	Future	0.0%	Sep-19	
75551_7492 Shaft 9 Rehab Const	1,600	0	Future	0.0%	Mar-27	
75553_7482 Covered Stor Tank Rehab Const	4,000	0	Future	0.0%	Jul-21	
77552_7493 Elevated Water Stor Tank Repaint Const	4,500	0	Future	0.0%	Jul-17	
<b>881 Equipment Purchase</b>	<b>\$23,168</b>	<b>\$13,348</b>	<b>57.6%</b>	<b>57.6%</b>		
92374_6760 Security Equipment & Installation	9,840	6,927	70.4%	70.4%		Jun-17
92379_6808 ICP-MS Lab Testing Equipment	117	117	Complete	100.0%		
92411_7239 High Lift Fork Loader (Lull)	121	121	Complete	100.0%		
92416_7246 Ford Ramp Truck	122	122	Complete	100.0%		
92417_7247 Street Sweeper	182	182	Complete	100.0%		
98454_7306 Prior Vehicle Purchases	2,415	2,415	Complete	100.0%		
98455_7307 FY11-13 Vehicle Purchases	2,361	2,361	Complete	100.0%		
98456_7308 FY14-18 Vehicle Purchases	6,888	982	14.3%	14.3%		Jun-18
98458_7310 FY14-18 Major lab Instrumentation	1,000	0	Future	0.0%	Mar-17	
98467_7325 Front-End Loader	121	121	Complete	100.0%		
<b>925 Technical Assistance</b>	<b>\$1,125</b>	<b>\$0</b>	<b>Future</b>	<b>0.0%</b>		
77000_LAND Land Appraisal	150	0	Future	0.0%		
80000_SURV Surveying	75	0	Future	0.0%		
90000_HAZM Hazardous Material	900	0	Future	0.0%		

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<b>933 Capital Maintenance Planning</b>	<b>\$16,721</b>	<b>\$11,058</b>	<b>66.1%</b>	<b>66.1%</b>		
19175_6421	Inventory & Evaluation - 1 & 2	2,579	2,579	Complete	100.0%	
92387_6976	As-Needed Design Contract 1	313	313	Complete	100.0%	
92393_6988	As-Needed Design Contract 2	318	318	Complete	100.0%	
92399_7070	As-Needed Design Contract 5	558	558	Complete	100.0%	
92402_7101	As-Needed Design Contract 3	579	579	Complete	100.0%	
92403_7102	As-Needed Design Contract 4	247	247	Complete	100.0%	
92413_7242	As-Needed Design Contract 6	704	704	Complete	100.0%	
92414_7243	As-Needed Design Contract 7	980	980	Complete	100.0%	
92415_7244	As-Needed Design Contract 8	1,044	1,044	Complete	100.0%	
98470_7390	As-Needed Design Contract 9	1,769	1,610	91.0%	91.0%	Jan-14
98471_7391	As-Needed Design Contract 10	1,880	1,862	Complete	99.0%	
98473_7436	As-Needed Design Contract 11	550	79	14.4%	14.4%	Aug-15
98474_7437	As-Needed Design Contract 12	1,100	186	16.9%	16.9%	Jan-16
98485_7456	As-Needed Design Contract 13	1,100	0	Future	0.0%	Feb-14
98487_7496	As-Needed Design Contract 14	1,000	0	Future	0.0%	Jan-16
98488_7497	As-Needed Design Contract 15	1,000	0	Future	0.0%	Jan-16
98489_7498	As-Needed Design Contract 16	1,000	0	Future	0.0%	Jan-16
<b>934 MWRA Facilities Management</b>	<b>\$2,151</b>	<b>\$371</b>	<b>17.2%</b>	<b>17.2%</b>		
92389_6983	Design/Engineering Services	150	0	Future	0.0%	Jul-18
92390_6984	Facilities Construction	2,001	371	18.5%	18.5%	Sep-20
<b>935 Alternative Energy Initiatives</b>	<b>\$25,630</b>	<b>\$17,388</b>	<b>67.8%</b>	<b>67.8%</b>		
19285_6974	Deer Island Solar	904	904	Complete	100.0%	
92428_6974C	DI Wind	4,063	4,063	Complete	100.0%	
92430_7270	Future DI Wind Constr (Battery D Locat)	4,679	0	Future	0.0%	Oct-18
92432_6974E	Loring Road Hydro - Design	2	2	Complete	100.0%	
92439_7274	Technical Assistance - Solar	124	124	Complete	100.0%	
92440_6974B	Energy Advisory Consultant Services	46	46	Complete	100.0%	
92441_OP67	Wind Power Feasibility Study	346	346	Complete	100.0%	
92442_7292	DI Photovoltaic System Phase 1 - Const.	1,119	1,119	Complete	100.0%	
92443_7274A	Technical Assistance-Energy Efficiency	463	463	Complete	100.0%	
92444_7274B	Technical Assistance - Solar II	348	348	Complete	100.0%	
92445_7274C	Tech Assistance - Emerging Technology	101	101	Complete	100.0%	
92446_7274D	Technical Assistance - Wind	460	460	Complete	100.0%	
98450_7302	Charlestown Wind - Construction	5,125	5,125	Complete	100.0%	
98452_7304	John J. Carroll WTP Solar-Construction	2,367	2,367	Complete	100.0%	
98453_7305	Rew Energy TA-Wind-Solar	650	0	Future	0.0%	Jan-16
98459_6974F	Loring Road Hydro - Construction	1,882	1,882	Complete	100.0%	
98463_7321	DI Wind Phase II Construction	2,500	37	1.5%	1.5%	Mar-18
98465_7323	Fish Hatch Pipeline Hydro	450	0	Future	0.0%	Feb-16

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<b>940 Application Improvement Program</b>	<b>\$10,176</b>	<b>\$366</b>	<b>3.6%</b>	<b>3.6%</b>		
92420_7251 GIS Applications & Integration	350	17	4.9%	4.9%		Jun-17
92435_7286 Lawson Enhancements	1,750	0	Future	0.0%	Oct-15	
92436_7287 Maximo Upgrade	2,626	0	Future	0.0%	Jul-15	
92437_7288 PIMS Enhancements	400	0	Future	0.0%	Jun-16	
92469_7386 Enterprise Performance mgmt Enhancements	200	81	40.5%	40.5%		Jun-17
98475_7438 Enterprise Content Mgmt	4,000	0	Future	0.0%	Aug-16	
98476_7439 Mobile Integrations	300	22	7.3%	7.3%		Jul-16
98484_7447 LIMS Enhancement	550	246	44.7%	44.7%		Jun-17
<b>942 Information Security Program ISP</b>	<b>\$2,385</b>	<b>\$820</b>	<b>34.4%</b>	<b>34.4%</b>		
92434_7285 IT Security Infrastructure/Equipment	647	501	77.4%	77.4%		Jun-14
92500_7499 Info Sec Prot Infrastructure Upg	1,020	0	Future	0.0%	Jan-16	
98477_7440 Electronic Sec Impl	400	0	Future	0.0%	Jun-14	
98483_7446 IT Security Program (ISP) Development	318	318	Complete	100.0%		
<b>944 Information Technology Management Program</b>	<b>\$923</b>	<b>\$0</b>	<b>Future</b>	<b>0.0%</b>		
92412_7240 Implement IT Task Force	100	0	Future	0.0%	Jun-16	
92421_7252 Service Delivery & Best Practices	111	0	Future	0.0%	Jul-15	
92422_7253 Reorganize MIS Department	150	0	Future	0.0%	Jul-16	
98472_7408 IT Project Management Methodology	200	0	Future	0.0%	Jun-16	
98478_7441 Software Devel Life Cycle (SDLC)	362	0	Future	0.0%	Jun-16	
<b>946 IT Infrastructure Program</b>	<b>\$10,271</b>	<b>\$3,791</b>	<b>36.9%</b>	<b>36.9%</b>		
92404_7200 IT System Architecture	750	692	92.3%	92.3%		Jun-17
92405_7201 Net 2020/Net 2020 DITP/Southborough	2,811	916	32.6%	32.6%		Jun-17
92406_7203 Storage Upgrades	1,575	697	44.3%	44.3%		Jun-18
92407_7204 Backup Upgrades	894	526	58.8%	58.8%		Sep-18
92408_7205 Server Management	500	243	48.6%	48.6%		Jun-18
98480_7443 Enterprise Applic Integr	2,091	56	2.7%	2.7%		Dec-18
98481_7444 E-Mail Upgrades	150	8	5.3%	5.3%		Jun-17
98482_7445 Enterprise Data Mgmt	1,500	653	43.5%	43.5%		Jun-17



# APPENDIX 7

## Municipality and Project Reference by Municipality

**APPENDIX 7**  
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 Rehabilitation	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, Needham, 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	Walnut Hill 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, Somerville
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	Northern High NW Trans Section 70-71	Stoneham, Wakefield, Melrose, Lynnfield, Saugus, Lynn, Peabody, Marblehead, Swampscott, Nahant
621	Watershed Land	All Water Communities
623	Dam Projects	All Water Communities
625	Long Term Redundancy	All Water Customers (except Chicopee, Wilbraham, South Hadley Fire District #1, Worcester, Clinton, and Leominster)
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
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 7**  
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 8

## Municipality and Project Reference by Project

**APPENDIX 8**  
**MUNICIPALITY/PROJECT(s)**

Municipality Project Number/Project	Municipality Project Number/Project
<p><b>All MWRA COMMUNITIES</b></p> <p>211 Laboratory Services            881 Equipment Purchase            925 Technical Assistance            931 Business Systems Plan            932 Environmental Remediation            933 Capital Maintenance Planning/Development            934 MWRA Facilities Management            935 Alternative Energy Initiatives            940 Application Improvement Program            942 Information Security Program ISP            944 Information Technology Management Program            946 IT Infrastructure Program</p>	<p><b>Ashland</b></p> <p>136 West Roxbury Tunnel</p> <p><b>Bedford</b></p> <p>702 New Connecting Mains - Shaft 7 to WASM 3            704 Rehabilitation of Other Pump Stations            708 Northern Extra High Service - New Pipelines</p> <p><b>Belmont</b></p> <p>702 New Connecting Mains - Shaft 7 to WASM 3            704 Rehabilitation of Other Pump Stations            730 Weston Aqueduct Supply Mains</p>
<p><b>ALL WASTEWATER COMMUNITIES</b></p> <p>128 Infiltration/Inflow Local Financial Assistance Program            130 Siphon Structure Rehabilitation            132 Corrosion &amp; Odor Control Study            137 Wastewater Central Monitoring            141 Wastewater Process Optimization            142 Wastewater Metering System Equipment Replacement            145 Interception &amp; Pumping Facilities Asset Protection            146 D.I. Cross Harbor Tunnel            147 Randolph Trunk Sewer Relief            206 Deer Island Treatment Plant Asset Protection            271 Residuals Asset Protection</p>	<p><b>Boston</b></p> <p>131 Upper Neponset Valley Sewer System            136 West Roxbury Tunnel            139 South System Relief Project            324 CSO Support            339 North Dorchester Bay &amp; Reserve Channel Conduits/CSO            340 South Dorchester Bay Sewer Separation (Fox Point)            341 South Dorchester Bay Sewer Separation (Commercial Pt.)            347 East Boston Branch Sewer Relief            355 MWR003 Gate and Siphon            356 Fort Point Channel Sewer Separation            357 Charles River CSO Controls            358 Morrissey Boulevard Drain            359 Reserved Channel Sewer Separation            361 Bulfinch Triangle Sewer Separation            545 Blue Hills Covered Storage            693 Northern High Service Pipe Improvements - Revere/Malden            702 New Connecting Mains - Shaft 7 to WASM 3            704 Rehabilitation of Other Pump Stations            713 Spot Pond Supply Mains Rehabilitation            719 Chestnut Hill Connecting Mains            721 Southern Spine Distribution Mains            723 Northern Low Service Rehab. - Sections 8 &amp; 57            727 SEH Redundancy &amp; Storage            730 Weston Aqueduct Supply Mains</p>
<p><b>ALL WATER COMMUNITIES</b></p> <p>597 Winsor Dam Hydroelectric            621 Watershed Land            623 Dam Projects            625 Long-Term Redundancy            677 Valve Replacement            712 Cathodic Protection of Distribution Mains            753 Central Monitoring System            763 Distribution Systems Facilities Mapping            765 Local Water Pipeline Improvement Loan Program            766 Watertown Facility Asset Protection</p>	<p><b>Braintree</b></p> <p>104 Braintree-Weymouth Relief Facilities            147 Randolph Trunk Sewer Relief</p>
<p><b>ALL WATER COMMUNITIES (except South Hadley, Chicopee, Wbraham, Worcester, Clinton, and Leominster)</b></p> <p>542 Walnut Hill Treatment Plant            544 Norumbega Covered Storage            604 MetroWest Tunnel</p> <p><b>Arlington</b></p> <p>702 New Connecting Mains - Shaft 7 to WASM 3            704 Rehabilitation of Other Pump Stations            708 Northern Extra High Service - New Pipelines            713 Spot Pond Supply Mains Rehabilitation            730 Weston Aqueduct Supply Mains</p>	

**APPENDIX 8**  
**MUNICIPALITY/PROJECT(s)**

<b>Municipality</b> <b>Project Number/Project</b>	<b>Municipality</b> <b>Project Number/Project</b>
<p><b>Brookline</b></p> <p>131 Upper Neponset Valley Sewer System</p> <p>136 West Roxbury Tunnel</p> <p>357 Charles River CSO Controls</p> <p>360 Brookline Sewer Separation</p> <p>704 Rehabilitation of Other Pump Stations</p> <p>719 Chestnut Hill Connecting Mains</p> <p>721 Southern Spine Distribution Mains</p> <p>727 SEH Redundancy &amp; Storage</p> <p><b>Burlington</b></p> <p>127 Cummingsville Replacement Sewer</p> <p><b>Cambridge</b></p> <p>324 CSO Support</p> <p>346 Cambridge CAM002-004 Sewer Separation</p> <p>355 MWR003 Gate and Siphon</p> <p>357 Charles River CSO Controls</p> <p>713 Spot Pond Supply Mains Rehabilitation</p> <p>730 Weston Aqueduct Supply Mains</p> <p><b>Canton</b></p> <p>545 Blue Hills Covered Storage</p> <p>704 Rehabilitation of Other Pump Stations</p> <p>714 Southern Extra High - Sections 41, 42, and 74</p> <p>721 Southern Spine Distribution Mains</p> <p>727 SEH Redundancy &amp; Storage</p> <p><b>Chelsea</b></p> <p>324 CSO Support</p> <p>347 East Boston Branch Sewer Relief</p> <p>713 Spot Pond Supply Mains Rehabilitation</p> <p>723 Northern Low Service Rehab. - Sections 8 &amp; 57</p> <p><b>Lynn</b></p> <p>618 Northern High NW Trans Section 70-71</p> <p>692 Northern High Service Section 27 Improvements</p> <p>693 Northern High Service Pipe Improvements - Revere/Malden</p> <p><b>Lynnfield</b></p> <p>618 Northern High NW Trans Section 70-71</p> <p>731 Lynnfield Pipeline</p> <p><b>Malden</b></p> <p>693 Northern High Service Pipe Improvements - Revere/Malden</p> <p>713 Spot Pond Supply Mains Rehabilitation</p>	<p><b>Chicopee</b></p> <p>543 Quabbin Water Treatment Plant</p> <p>615 Chicopee Valley Aqueduct Redundancy</p> <p>616 Quabbin Transmission System</p> <p>753 Central Monitoring System</p> <p><b>Clinton</b></p> <p>210 Clinton Wastewater Treatment Plant</p> <p><b>Dedham</b></p> <p>131 Upper Neponset Valley Sewer System</p> <p>136 West Roxbury Tunnel</p> <p>727 SEH Redundancy &amp; Storage</p> <p><b>Dover</b></p> <p>136 West Roxbury Tunnel</p> <p><b>Everett</b></p> <p>347 East Boston Branch Sewer Relief</p> <p>713 Spot Pond Supply Mains Rehabilitation</p> <p>723 Northern Low Service Rehab. - Sections 8 &amp; 57</p> <p><b>Framingham</b></p> <p>136 West Roxbury Tunnel</p> <p>617 Sudbury/Weston Aqueduct</p> <p><b>Hingham</b></p> <p>104 Braintree-Weymouth Relief Facilities</p> <p><b>Holbrook</b></p> <p>104 Braintree-Weymouth Relief Facilities</p> <p>617 Sudbury/Weston Aqueduct</p> <p><b>Lexington</b></p> <p>702 New Connecting Mains - Shaft 7 to WASM 3</p> <p>704 Rehabilitation of Other Pump Stations</p> <p>708 Northern Extra High Service - New Pipelines</p> <p><b>Nahant</b></p> <p>618 Northern High NW Trans Section 70-71</p> <p>692 Northern High Service Section 27</p> <p>693 Northern High Service Pipe Improvements - Revere/Malden</p> <p><b>Natick</b></p> <p>136 West Roxbury Tunnel</p> <p>617 Sudbury/Weston Aqueduct Repairs</p> <p><b>Needham</b></p> <p>136 West Roxbury Tunnel</p> <p>735 Section 80 Rehabilitation</p>

**APPENDIX 8**  
**MUNICIPALITY/PROJECT(s)**

<b>Municipality</b>	<b>Municipality</b>
<b>Project Number/Project</b>	<b>Project Number/Project</b>
<b>Marblehead</b>	<b>Newton</b>
618 Northern High NW Trans Section 70-71	131 Upper Neponset Valley Relief Sewer
692 Northern High Service Section 27	136 West Roxbury Tunnel
693 Northern High Service Pipe Improvements - Revere/Malden	702 New Connecting Mains - Shaft 7 to WASM 3
<b>Medford</b>	719 Chestnut Hill Connecting Mains
547 Fells Covered Storage	730 Weston Aqueduct Supply Mains
702 New Connecting Mains - Shaft 7 to WASM 3	<b>Norwood</b>
713 Spot Pond Supply Mains Rehabilitation	545 Blue Hills Covered Storage
<b>Melrose</b>	704 Rehabilitation of Other Pump Stations
618 Northern High NW Trans Section 70-71	714 Southern Extra High - Sections 41 and 42
<b>Milton</b>	721 Southern Spine Distribution Mains
545 Blue Hills Covered Storage	727 SEH Redundancy & Storage
704 Rehabilitation of Other Pump Stations	<b>Peabody</b>
714 Southern Extra High - Sections 41, 42, and 74	618 Northern High NW Trans Section 70-71
721 Southern Spine Distribution Mains	693 Northern High Service Pipe Improvements - Revere/Malden
727 SEH Redundancy & Storage	721 Southern Spine Distribution Mains
<b>Quincy</b>	722 NIH Redundancy & Storage
104 Braintree-Weymouth Relief Facilities	<b>Wilbraham</b>
545 Blue Hills Covered Storage	543 Quabbin Water Treatment Plant
721 Southern Spine Distribution Mains	616 Quabbin Transmission System
<b>Randolph</b>	753 Central Monitoring System
104 Braintree-Weymouth Relief Facilities	<b>Wakefield</b>
147 Randolph Trunk Sewer Relief	618 Northern High NW Trans Section 70-71
<b>Reading</b>	722 NIH Redundancy & Covered Storage
722 NIH Redundancy & Covered Storage	<b>Waltham</b>
<b>Revere</b>	702 New Connecting Mains - Shaft 7 to WASM 3
349 Chelsea Trunk Sewer	704 Rehabilitation of Other Pump Stations
693 Northern High Service Pipe Improvements - Revere/Malden	708 Northern Extra High Service - New Pipelines
<b>Saugus</b>	730 Weston Aqueduct Supply Mains
618 Northern High NW Trans Section 70-71	<b>Watertown</b>
693 Northern High Service Pipe Improvements - Revere/Malden	702 New Connecting Mains - Shaft 7 to WASM 3
731 Lynnfield Pipeline	704 Rehabilitation of Other Pump Stations
	730 Weston Aqueduct Supply Mains
	<b>Wellesley</b>
	136 West Roxbury Tunnel
	617 Sudbury/Weston Aqueduct Repairs
	735 Section 80 Rehabilitation

**APPENDIX 8**  
**MUNICIPALITY/PROJECT(s)**

<b>Municipality</b>	<b>Municipality</b>
<b>Project Number/Project</b>	<b>Project Number/Project</b>
<b>Somerville</b>	<b>West Roxbury</b>
702 New Connecting Mains - Shaft 7 to WASM 3	131 Upper Neponset Valley Relief Sewer
713 Spot Pond Supply Mains Rehabilitation	<b>Weston</b>
730 Weston Aqueduct Supply Mains	617 Sudbury/Weston Aqueduct Repairs
<b>South Hadley</b>	730 Weston Aqueduct Supply Mains
543 Quabbin Water Treatment Plant	<b>Westwood</b>
616 Quabbin Transmission System	721 Southern Spine Distribution Mains
753 Central Monitoring System	727 SEH Redundancy & Storage
<b>Stoneham</b>	<b>Weymouth</b>
618 Northern High NW Trans Section 70-71	104 Braintree-Weymouth Relief Facilities
722 NIH Redundancy & Covered Storage	<b>Winchester</b>
<b>Stoughton</b>	702 New Connecting Mains - Shaft 7 to WASM 3
714 Southern Extra High - Sections 41, 42, and 74	704 Rehabilitation of Other Pump Stations
721 Southern Spine Distribution Mains	722 NIH Redundancy & Covered Storage
727 SEH Redundancy & Storage	<b>Winthrop</b>
<b>Sudbury</b>	693 Northern High Service Pipe Improvements - Revere/Malden
617 Sudbury/Weston Aqueduct Repairs	<b>Woburn</b>
<b>Swampscott</b>	722 NIH Redundancy & Covered Storage
618 Northern High NW Trans Section 70-71	
692 Northern High Service Section 27	



# APPENDIX 9

## MWRA Completed Projects

## Appendix 9

### MWRA Completed Projects (as of June 30, 2015)

Project	Total Cost (\$000)	Completion Date	Summary
<b>Wastewater</b>	\$5,024,201		
<b>Waterworks</b>	\$1,554,541		
<b>Business and Operations Support</b>	\$67,069		
<b>MWRA Total</b>	\$6,645,811		

**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.

<b>Wastewater System Improvements</b>			
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.

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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.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.

### Appendix 9

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	\$2,228	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.

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S.339 North Dorchester Bay	\$221,600	May-11	Eliminate CSO discharges and provide a high level of storm water control.
S.340 South Dorchester Bay Sewer Separation (Fox Pt.)	\$54,626	Nov-06	Eliminate CSO discharges to South Dorchester Bay
S.342 Neponset River Sewer Separation	\$2,549	Aug-02	Elimination of CSO discharges to the Neponset River.
S.343 Constitution Beach Sewer Separation	\$3,769	Apr-02	Elimination of CSO discharges at the Constitution Beach CSO Facility.
S.344 Stony Brook Sewer Separation	\$44,247	Sep-06	Minimize CSO discharges to the Stony Brook conduit and the Back Bay Fens.
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	\$933	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.356 Fort Point Channel Sewer Separation	\$11,917	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	\$32,188	Jun-09	Reroute storm water from BOS087 area
S.360 Brookline Sewer Separation	\$24,788	Jul-13	Minimize discharges to Charles River by separating combined sewer systems in several areas.
S.361 Bulfinch Triangle Sewer Separation	\$9,054	Jul-10	Minimize discharges to Charles River by separating combined sewer systems in several areas.
S.402 Comprehensive Safety Action Project	\$891	Nov-90	Correction of safety hazards at MWRA facilities and establishment ongoing safety management program.

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S.403 Sewerage Division Management Services	\$1,930	Dec-86	Provision of engineering design and construction advice.
S.924 Harbor Environmental Studies	\$1,666	Jun-92	Collection and study of harbor water quality data.
<b>Sub-Total Wastewater System Improvements</b>	<b>\$5,024,201</b>		

## Appendix 9

<b>Waterworks System Improvements</b>			
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	\$415,378	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.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.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.

**Appendix 9**

S.603 Transmission Maintenance Facility	\$5,025	May-93	Construction of new waterworks maintenance facility in Southborough.
S.604 MetroWest Tunnel	\$696,814	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.



**Appendix 9**

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.

**Appendix 9**

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.
<b>S.731 Lynnfield Pipeline</b>	<b>\$5,626</b>	<b>Dec-12</b>	<b>Replace undersized water main to meet Lynnfield's high water demand</b>
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.
<b>Sub-Total Water System Improvements</b>	<b>\$1,554,541</b>		

**Appendix 9**

<b>Business &amp; Operations Support</b>			
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	\$9,815	Mar-08	To improve MWRA operations by consolidating facilities.
S.931 Business System Planning	\$24,456	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.
<b>Sub-Total Business &amp; Operations Support</b>	<b>\$67,069</b>		

# APPENDIX 10

## Expected Useful Life of Capital Projects

**APPENDIX 10**

**EXPECTED USEFUL LIFE OF CAPITAL PROJECTS**

The estimated useful life of the MWRA's capital projects are summarized below:

<b>Type of Capital Improvement</b>	<b>Estimated Useful Life (in years)</b>
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