

# **Capital Improvement Program**

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**Final  
FISCAL YEAR 2016**



**MASSACHUSETTS WATER RESOURCES AUTHORITY**

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## 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	\$718.0
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	\$711.5
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	(\$6.4)
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.

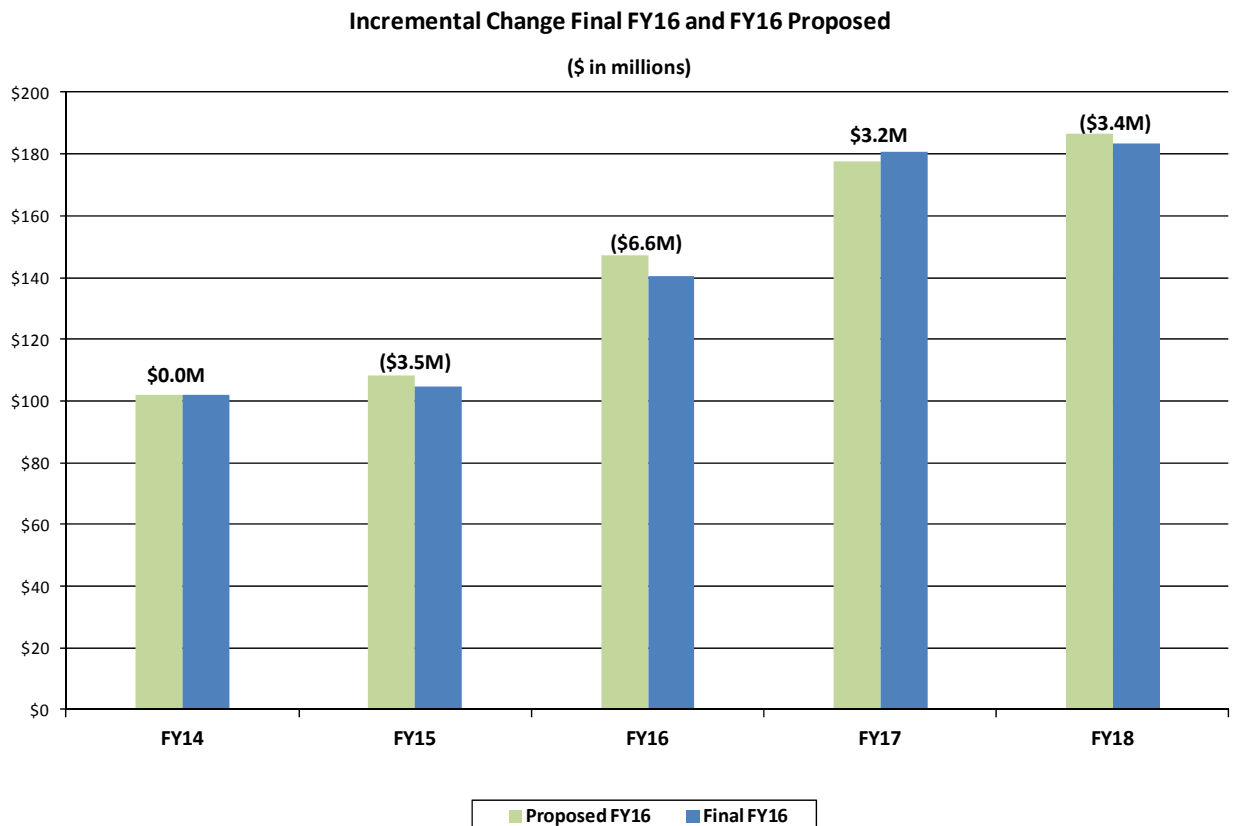
## Final FY16 CIP Compared to the FY16 Proposed CIP by Program

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

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.



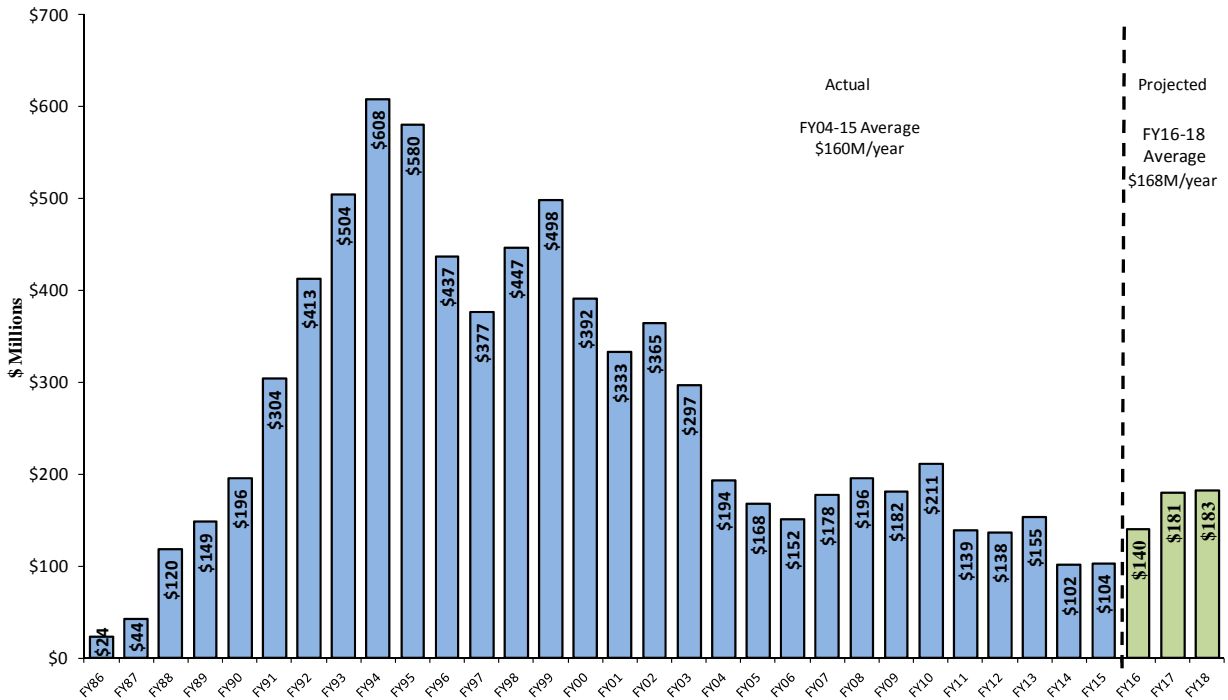
**Major Planned Contract Awards for Fiscal Year 2016:**

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.

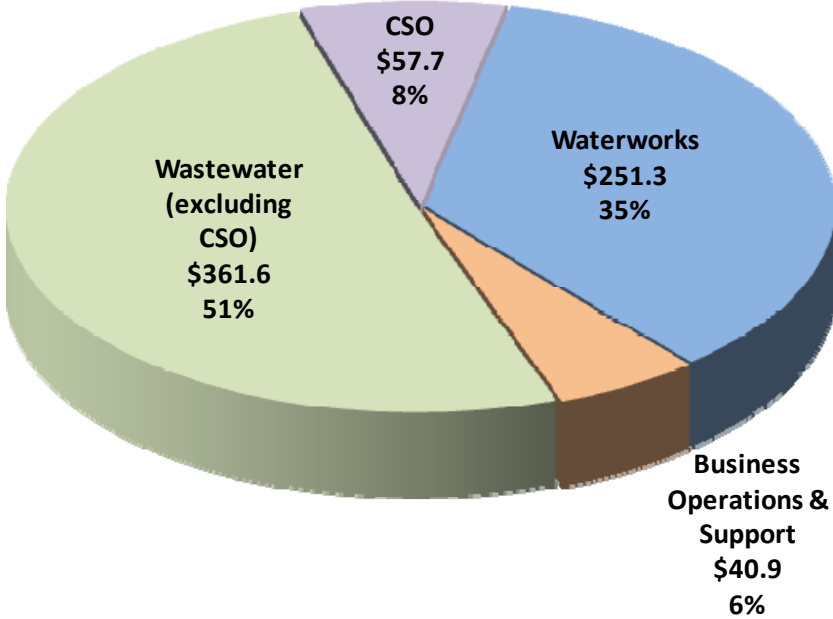
	Total Contract Amount	Payments Thru FY14	Projected Spending	Total FY14-18	Total FY19-23	Beyond 23
<b>Wastewater System Improvements</b>	<b>\$2,974.6</b>	<b>\$1,791.7</b>	<b>\$1,182.9</b>	<b>\$419.3</b>	<b>\$634.9</b>	<b>\$184.3</b>
Interception & Pumping	890.0	527.4	362.6	98.0	224.9	46.6
Treatment	775.6	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.



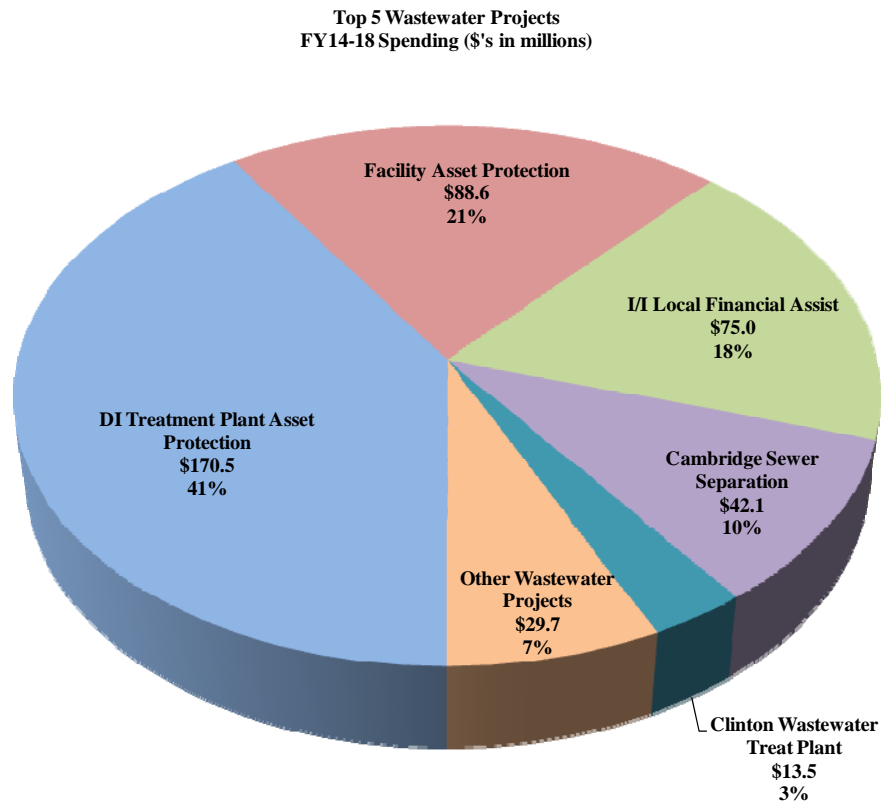
Please refer to Appendix 2 for a more detailed project listing and projected cash flows.

### 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.

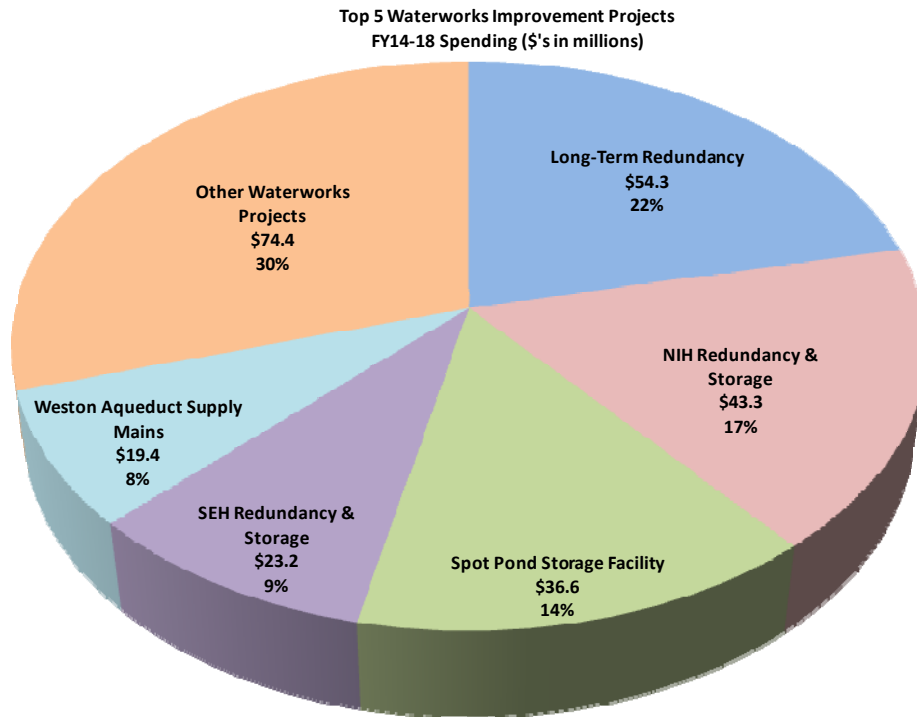
**Chelsea Headworks Construction** - \$35.7 million (\$54.8 million total construction cost). This major rehabilitation project includes replacement/upgrade to the screens, grit collection system, grit and handling systems, odor control systems, HVAC, mechanical, plumbing and instrumentation. Solids 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.

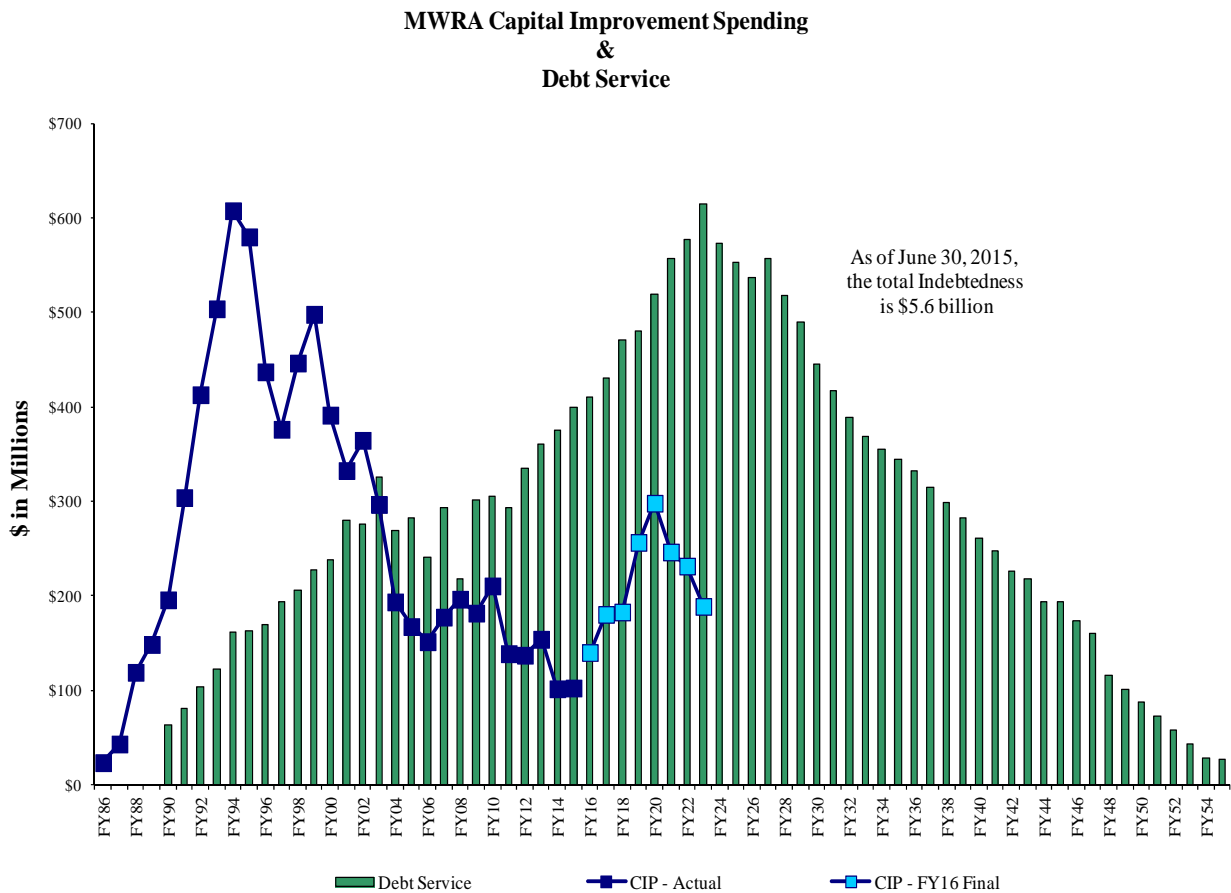
**Spot Pond Storage Facilities** - \$36.6 million (\$61.2 million in total cost) - This project is for the construction of a 20 million-gallon drinking water storage facility and redundant pump station in Stoneham. The underground, concrete tanks will provide drinking water storage for MWRA's Low Service 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**  
**Project Index**

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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.

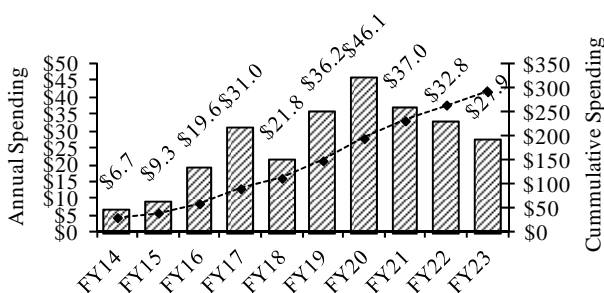
Sub-phase	Scope
Pump Station Rehab Preliminary Design/Study	Preliminary design/study for upgrades at Hayes, Hingham, Caruso, DeLauri Pump Stations, Wiggins-Castle Island Terminal, and the Somerville-Marginal CSO Facility. The project is to follow contract 7162, Pump Station and CSO Condition Assessment, 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.

