Wastewater System Improvements

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-feet diameter tunnel beginning at the Nut Island shaft of the Inter-Island Tunnel and ending at the Fore River Staging Area. Two 14-inch sludge pipelines within the tunnel will convey Deer Island sludge from the Inter-Island Tunnel to the pelletizing plant. 0.4 miles of twin 12-inch pipelines within the tunnel will convey filtrate from the pelletizing plant to the Intermediate Pump Station. 2.5 miles of 42-inch force main will carry flows and filtrate to the Inter-Island Tunnel. Also includes a MOA with Quincy, Braintree, and Weymouth for tunnel rescue and fire support services.

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-feet long twin siphons beneath the Fore River from the Idlewell section of Weymouth to the southeast corner of the Exelon Energy site in North Weymouth. Constructing 1,000 linear feet of 36-inch to 54-inch new sewers in Idlewell.
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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$232,455	$227,704	$4,750	$0	$0	$208	$4,543	$0

Project Status 11/15	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.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	FY17	Chge.	FY16	FY17	Chge.	FY16	FY17	Chge.
$232,455	$232,455	$0	Aug-20	Jun-21	10 mos.	$310	$208	($102)

Explanation of Changes

- Schedule and spending changed due to project priorities.

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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$6,669	$940	$5,729	$0	$0	$0	$5,729	$0

Project Status 11/15	14.1%	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.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**
$6,635	$6,669	$34	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 (biolfilters) 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 HVAC, Odor Control, and Energy Management Systems Evaluation, Design CS/RI and Construction	Evaluation, design, and upgrades to the existing odor control, HVAC, and Building Energy Management Systems. In addition, the replacement of certain mechanical and electrical equipment will be included in this project. Systems identified through service contracts have elevated operational and maintenance needs.
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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$23,367	$3,001	$20,365	$289	$301	$909	$19,457	$0

Project Status 11/15	13.0%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	FY17	Chge.	FY16	FY17	Chge.	FY16	FY17	Chge.
$19,782	$23,367	$3,585	Dec-20	Dec-20	None	$543	$909	$366

Explanation of Changes

- Cost increase is primarily due to updated cost estimates including NI System-Wide Odor Control Design Construction Administration/Resident Inspection and Construction, updated cost based on actual award amount for NI System Wide Odor Control Evaluation, and inflation adjustments.

- Spending and schedule changed as a result of updated cost estimates listed above.

CEB Impacts

- None identified at this time.

S. 136 West Roxbury Tunnel

Project Purpose and Benefits

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

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

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

Project History and Background

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

A structural failure of the WRT would affect the tributary communities of Ashland, Brookline, Dedham, Framingham, Natick, Needham, Newton, Wellesley, and the Hyde Park and West Roxbury portions of Boston. Local failure of the tunnel could result in the discharge of 53 to 128 mgd of raw sewage into the Charles River until emergency repairs could be made, back-up of sewage into local residences and businesses, and the interruption of service to as many as 125,000 people. Section 138, 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

Sub-phase	Scope
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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$11,314	$10,314	$1,000	$0	$0	$0	$1,000	$0

Project Status 11/15	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.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	FY17	Chge.	FY16	FY17	Chge.	FY16	FY17	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	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.

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$27,482	$19,782	$7,700	$0	$0	$375	$2,910	$4,415

Project Status 11/15	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.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	FY17	Chge.	FY16	FY17	Chge.	FY16	FY17	Chge.
$27,482	$27,482	$0	Oct-31	Oct-32	12 mos.	$760	$375	($385)

Explanation of Changes

- Project schedule and spending changed primarily due to revised schedule for Wastewater SCADA/PLC Upgrade.

CEB Impacts

- None identified at this time.

S. 139 South System Relief Project

Project Purpose and Benefits

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

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

Project History and Background

Archdale Road Diversion Structure

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

High Level Sewer Repair

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

Outfall 023 Cleaning and Structural Improvements

Following the October 1996 storm, the City of Boston engaged a consultant to review the events and recommend remedial actions to prevent future flooding under similar conditions. One recommendation was to clean sediment and debris from the Stony Brook Conduit. Boston Water & Sewer Commission (BWSC) has cleaned the upstream portion of the conduit and MWRA has cleaned the outfall from the Metropolitan District Commission (MDC) gatehouse at Charlesgate to the Charles River. This part of the project also covers structural modifications to Outfall 023 to permit access points and diversion capabilities for future cleaning. This portion of the project has been moved out to fiscal year 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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$4,939	$3,439	$1,500	$0	$0	$0	$1,500	$0

Project Status 11/15	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.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	FY17	Chge.	FY16	FY17	Chge.	FY16	FY17	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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$10,389	$1,463	$8,926	$39	$0	$297	$5,168	$3,719

Project Status 5/15	14.5%	Status as % is approximation based on project budget and expenditures. The Notice-to-Proceed for the North System Hydraulic Study was completed in June 2015.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	FY17	Chge.	FY16	FY17	Chge.	FY16	FY17	Chge.
$10,383	$10,389	$6	Jun-25	Jun-27	24 mos.	$1,391	$297	($1,094)

Explanation of Changes

- Project spending changes due to updated schedule for Hydraulic Flood Engineering Design and Construction phase.

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 12th year. Plans will be developed to evaluate new wastewater metering technology for our 3rd generation of meters. Once again, the entire wastewater system will be replaced. Certain key meters will be supplied with electric power instead of battery resulting in more civil, electrical, and construction costs. Each community's unmetered areas will be tested, evaluated, and quantified in order to update current Community Flow Formulas (CFFs) as well.

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). Evaluate, quantify and update Community Flow Formulas (CFF).
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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$27,738	$5,138	$22,600	$0	$600	$1,200	$6,800	$14,600

Project Status 11/15	18.5%	Status as % is approximation on project budget and expenditures. The purchase and installation of 2nd generation of meters is complete. Planning for the next replacement is underway.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**
$27,738	$27,738	$0	Jul-29	Jul-29	None	$6,436	$1,200	($5,236)

Explanation of Changes

- Project spending decreased due to updated meter replacement plan including updated 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 12,400 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 rehabilitation of 2,280 linear feet of Metropolitan Sewer Section 46 in Stoneham.
Interceptor Renewal 3 Dorchester Interceptor Sewer Design CA/RI and Construction	Rehabilitation of Dorchester Interceptor Sewer Sections 240, 241, and 242.

Sub-phase	Scope
Study Cambridge Branch 27,26,25, 25.5, 24,23	The Cambridge Branch Sewer was completed between 1892 and 1895. The study will evaluate rehabilitation needs, feasibility, and scope.
Design/ESDC and Construction Cambridge Branch 1 Sections 27, 26	Design and construction of the Rehabilitation of Cambridge Branch Sewer Sections 27 and 26 in Charlestown, Somerville, and Cambridge.
Design/ESDC and Construction Cambridge Branch 2 Everett Sections 23 and 24	Design and Construction of the Rehabilitation of Cambridge Branch Sewer Sections 23 and 24 in Everett and Charlestown. Rehabilitation of Sections 25 and 25.5 to be determined.
Malden & Melrose Hydraulics and Structural Study/Design and Construction	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 Design CA/REI and Construction	Rehabilitation of portions of Sections 607/609/610 in Milton.
Interceptor Renewal #6 Chelsea Sections 12/14/15/62 Design CA/REI and Construction	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.

Sub-phase	Scope
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.
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.
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 Design CA/RI and Construction	The Cottage Farm CSO Facility was constructed in 1971. Cottage Farm Rehabilitation to include updating of facility equipment including pumps, sluice gates, gearboxes for 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.

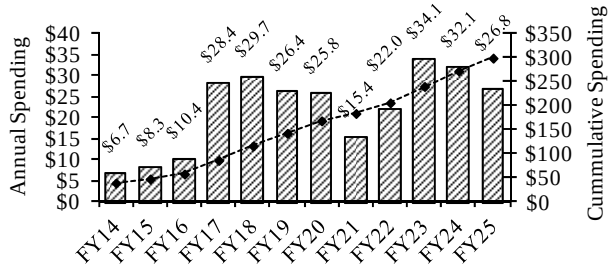
Sub-phase	Scope
Pump Station Rehab Preliminary Design/Study	Preliminary design/study for upgrades at Hayes, Hingham, Caruso, DeLauri Pump Stations, Wiggins-Castle Island Terminal, and the Somerville-Marginal CSO Facility. The project is to follow contract 7162, Pump Station and CSO Condition Assessment, 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 25 years old and is a one of a kind of this type of generator. The manufacturer is no longer making spare parts and there is only a limited quantity of available spare parts. The generator 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.
Study and Rehabilitation of Sections 186, 4, 5, and 6 Design CA/RI and Construction	Emergency removal of delaminated plastic liner from Section 186 was performed in June 2011. Rehabilitated projects in 1991 and 1997 lined sections 4, 5, and 6 with silica/shotcrete covered with epoxy. Project will include a manual inspection to identify rehabilitation needs, feasibility, and scope. Followed by design and construction of rehabilitation/repairs.
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.

Sub-phase	Scope
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.
DeLauri Pump Station Screens & Security	**This project replaces the existing catenary bar screens and installs security upgrades. Design for screens being done in-house and security portion reviewed by outside consultant. The security improvements include motion detectors, door switches, small security items in the main building and emergency generator room. This includes work associated with bringing signals underground into underground conduit to run sensor lines for SCADA.**

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$344,911	$32,446	$312,465	$10,381	$28,443	$83,764	$123,759	$120,134

I&P Asset Protection



Project Status 11/15	9.7%	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. 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. Chelsea Screenhouse Upgrades commenced in August 2015. Alewife Brook Pump Station Rehabilitation was awarded in November 2015. Prison Point/Cottage Farm Pumps, Engine, and Gearbox Rebuilds was substantially complete in December 2015.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**
$311,791	$344,911	$33,120	Dec-31	Dec-31	None	$88,585	$83,764	($4,821)

Explanation of Changes

- Budget increased primarily due to updated cost estimates for Chelsea Creek Headworks Construction; Cambridge Branch Sewer phases; Sections 186, 4, 5, and 6 phases; Interceptor Renewal Dorchester Interceptor Design Construction Administration/Resident Engineer Inspection; Interceptor Renewal 5 Milton Design Construction Administration/Resident Engineer Inspection; Interceptor Renewal 6 Design Construction Administration/Resident Engineer Inspection; Caruso Pump Station Improvements Construction; and amendment for Chelsea Creek Headworks Design. Also, higher awards for Alewife Brook Pumping Station Construction, Chelsea Screenhouse Construction and Engineering Services During Construction, as well as new project for DeLauri Pump Station Screens & Security. These increases were partially offset by NI Fire Pump Study being deleted and reallocation of funds for NI Mechanical & Electrical Replacements phase.

- Schedule and spending changes primarily due to schedule changes for Chelsea Creek Upgrades Construction, Ward Street & Columbus Park Headworks Design/Construction Administration/Resident Inspection, Cottage Farm Design and Construction 1 (PCB), updated cost estimates, and new project for DeLauri Pump Station Screens & Security.

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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$5,000	$0	$5,000	$0	$0	$0	$5,000	$0

Project Status 11/15	0.0%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	FY17	Chge.	FY16	FY17	Chge.	FY16	FY17	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 FY15	Remaining Balance	FY15	FY16	FY14-18	FY19-23	Beyond FY23
$750	$0	$750	$0	$0	$0	$750	$0

Project Status 11/15	0.0%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	FY17	Chge.	FY16	FY17	Chge.	FY16	FY17	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

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.

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

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

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

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

Scope

Sub-phase *Equipment Replacement:*	**Scope**
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.
Cathodic Protection Design & Construction	Project to evaluate the current system condition, then complete a Design and Construction phase to repair DI's cathodic protection system as needed.
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. Following a condition assessment in October 2015, the next phase is scheduled for FY20.
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. Awarded in November 2015, and expect work to be completed by July 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.
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.

Sub-phase *Equipment Replacement:*	**Scope**
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. Design was awarded in October 2015, replace in FY18-22 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; begin design in FY19, construction in FY21. Centrifuges 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 October 2014, expect completion by October 2016.
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 FY19-20.
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.

Sub-phase *Architectural:*	**Scope**
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.

Sub-phase *Architectural:*	**Scope**
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 FY19, 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.

Sub-phase *Utilities:*	**Scope**
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 (FY16-19), 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.

Sub-phase *Utilities:*	**Scope**
Power System Improvement Design & Constr. (Contracts 7061, 7061A, 7061B, 7061C, 7061D)	For modifications to DITP's electrical system as recommended in the consultant report after an FY04 power outage. Design completed in FY09-11. Completing the construction in a series of projects in FY09-14; added 7061C, dump condenser replacement and 7061D for NMPS fuel tank removal in FY11. Two awarded in FY09, two in FY11, the last – 7061A, Thermal Power Plant Fuel System Upgrade was awarded October 2015.
Thermal Power Plant Modifications – REI	Project covers REI work on 7061A above, modifications in the Thermal Power Plant fuel system. Work now expected to be done in-house.
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 two 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 FY14 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 & Sodium Bisulfite & Hypochlorite Tanks Rehabilitation 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 FY18-21. Hypochlorite Tanks rehabilitation added to scope of project in the Proposed FY17 CIP cycle 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 FY17, the tanks will have been in service for 22 years.
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.

Sub-phase *Utilities:*	**Scope**
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.
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.

Sub-phase *Support:*	**Scope**
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.

Sub-phase *Specialties:*	**Scope**
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.

Sub-phase *Specialties:*	**Scope**
Future Sodium Hypo Tank Rehabilitation or Replacement	Based on condition, expect to start replacing one tank per year beginning in FY21.
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 by September 2013.
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.
Odor Control Rehabilitation Design/ESDC , Construction and REI	Odor Control Rehabilitation work which was previously in the Ancillary Modifications Design and Construction 4 sub-phases. 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 *Plant Optimization* project in FY10. Construction currently scheduled for FY19-23.
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.

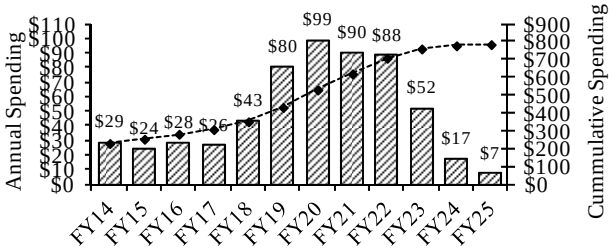
Sub-phase *Specialties:*	**Scope**
Clarifier Rehabilitation Phase 2 Design and Construction	Sub-phase pulled from the project above. This project is needed to correct deficiencies noted during the first Primary & Secondary Clarifier project. Influent gates not sealing off tanks adequately; effluent launders 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 currently scheduled for FY18-21.
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 FY20.
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. Currently scheduled to start design in FY16, construction by the end of FY18.
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.

Sub-phase *Specialties:*	**Scope**
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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$763,925	$200,290	$563,635	$28,065	$26,167	$150,358	$409,356	$56,711

DI Asset Protection



Project Status 11/15	27.6%	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, Roof Replacement Phase 3, and Centrifuge Backdrive Replacement. Contracts in process include the following: Secondary Reactor Batteries VFD Installation, NMPS VFD Replacement Construction, NMPS and WTF Valve & Piping Replacement, Electrical Upgrade Construction 4, Clarifier Phase 2 Design, Scum Skimmer Replacement, Cryo Chillers Replacement, HVAC Equipment Replacement Design, Thermal Power Plant Boiler Control Replacement, Fire Alarm System Replacement Design, Fuel System Modifications, and Digester Sludge Pump Phase 2 contracts. WTF VFD Replacement and Gravity Thickener Improvements are expected to start in FY16.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**
$720,365	$763,925	$43,560	Jun-48	Jun-48	None	$170,511	$150,358	($20,153)

Explanation of Changes

- The project cost increase is primarily due to updated cost estimate for Odor Control Rehabilitation Construction and Resident Engineer Inspection Services, Winthrop Terminal Facility Variable Frequency Drive Replacement, Gravity Thickener Replacement, HVAC Equipment Replacement, Cathodic Protection Design, Construction and Engineering Services During Construction, Sodium Bisulfite & Hypo Tanks Rehabilitation and Resident Engineer Inspection Services, and inflation adjustments. Increases are partially offset by lower award for Digester Sludge Pump Replacement Phase 2, and deleted work for Thermal Power Plant System Modifications Resident Engineer Inspection Services.

- Spending shifted primarily due to several schedule changes including Sodium Bisulfite & Hypochlorite Tanks Rehabilitation, Clarifier Rehabilitation 2 Construction, Fire Alarm Replacement Construction, Co-Digestion Design/Build, Digester & Storage Tank Rehabilitation Design/Engineering Services During Construction, DI Dystor Membrane Replacement, Future South System Pump Station VFD Replacement Construction, Odor Control Rehabilitation Design/Engineering Services During Construction, lower award for Digester Sludge Pump Replacement Phase 2, and deleted work for Thermal Power Plant System Modifications REI.

CEB Impacts

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

- Benefits of several energy-related projects have been estimated resulting in anticipated annual electrical savings. Some examples include: Electrical Equipment Upgrades 4 ($60,000 in FY18 and $60,000 in FY19), Winthrop Terminal Facility VFD Replacement ($30,000 in FY21), VFDs for Secondary Reactor Batteries ($141,000) and ($787,000) utility rebate in FY18, HVAC Equipment Replacement $200,000 in lab equipment in FY19, ($140,000 in FY21 and $50,000/yr in FY18-20), and Future SSPS VFD Replacements ($120,000 beginning in FY23). 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.

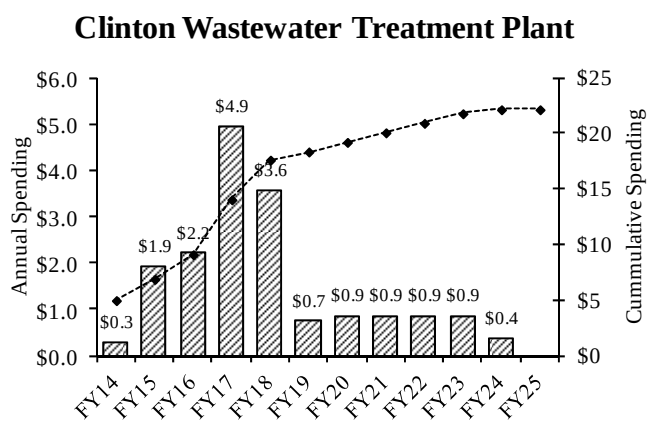
Scope

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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$19,955	$4,716	$15,239	$2,207	$4,940	$12,901	$4,171	$358



Project Status 11/15	28.2%	Status as % is approximation based on project budget and expenditures. Phosphorus Reduction Design commenced in November 2013. Digester Rehabilitation construction began in April 2014 and Phosphorus Reduction Construction is expected to commence in February 2016.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**
$20,511	$19,955	($556)	Sep-23	Sep-23	None	$13,483	$12,901	($582)

Explanation of Changes

- Project cost and spending decreased due to cost adjustment for Clinton Digester Rehabilitation partially offset by updated cost estimate for Phosphorus Reduction Construction.

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

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 some reinvestment is planned in the FY17-21 timeframe, as discussed in more detail below. For this facility, operability of mechanical equipment and maintenance of electric/standby power systems are key elements to minimizing the risk of component failure. Key decisions to minimize risk hinge on results from cost/benefit analyses, to determine when to replace equipment. The residuals pelletizing process is also currently energy-intensive; future uncertainties include long-term energy costs and supply.

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

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 negotiated a five year extension to the pellet plant operations contract with NEFCo. On March 11, 2015 the Board of Directors approved Amendment 1 to contract S345 with NEFCo, which extends the end date to December 31, 2020 and 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 has been done. See the 'scope' sections below for additional information regarding which sub-phases are funded and which are currently placeholders.

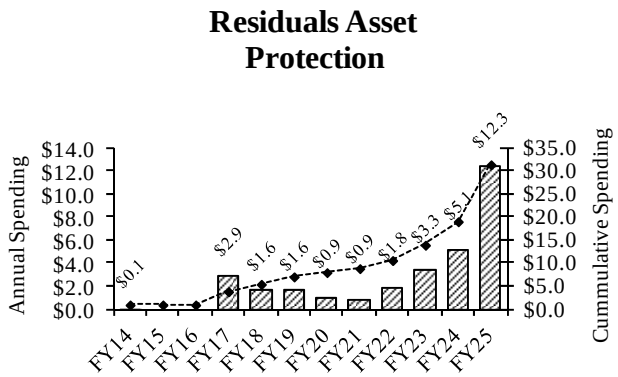
Scope

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 2nd 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 – Phase 1 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 currently scheduled to begin in FY18, for any projects requiring design by the MWRA. For FY17-21, the $10M in construction funds includes the $7M commitment to NEFCo as agreed to in the contract extension.

Sub-phase	Scope
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 the DI Asset Protection Project, and changed the name to Co-digestion Temporary Facility in FY16.
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 FY23.
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

Total Budget	Payments thru FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$103,832	$832	$103,000	$0	$2,868	$4,570	$8,470	$90,067



Project Status 11/15	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.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	FY17	Chge.	FY16	FY17	Chge.	FY16	FY17	Chge.
$103,832	$103,832	$0	Jun-48	Jun-48	None	$4,570	$4,570	$0

Explanation of Changes

- N/A

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

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

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

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

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

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

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

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

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

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

In exchange for MWRA agreeing to implement its revised long-term control plan, DEP agreed to issue a series of five (5), up to three-year extensions to the water quality variances for the Lower Charles River Basin and the Alewife Brook/Upper Mystic River through 2020. As they relate to MWRA, the terms and conditions of the variance extensions would be limited to the requirements of the Court Order (i.e. MWRA's responsibility is to implement the long-term control plan contained in the revised Schedule Seven). The most recent variance extensions were issued by DEP 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. Project schedules, which reflect compliance with Federal Court milestones, are presented in Table 2. By December 2015, MWRA and the CSO communities had completed all of the 35 projects in the plan. The completed CSO projects, together with earlier improvements to MWRA's wastewater conveyance and treatment systems, including the upgraded Deer Island Treatment Plant and associated pump stations, are predicted and intended to reduce the total annual volume of

CSO discharge in MWRA's Typical Rainfall Year from 3.3 billion gallons in 1988 to 0.44 billion gallons today, an 88% reduction, with 93% 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	• Cambridge/Alewife Sewer Separation • MWR003 Gate and Rindge Siphon Relief • Interceptor Connections/Floatables • Connection/Floatables at Outfall SOM01A • Somerville Baffle Manhole Separation • Cambridge Floatables Control (portion)	108.3
Mystic River/Chelsea Creek Confluence and Chelsea Creek	4 untreated and 39 treated @ Somerville Marginal	1.1 57.1	• Somerville Marginal CSO Facility Upgrade • Hydraulic Relief at BOS017 • Chelsea Trunk Sewer Replacement • Chelsea Branch Sewer Relief • CHE008 Outfall Repairs • East Boston Branch Sewer Relief (portion)	77.7
Charles River (including Stony Brook and Back Bay Fens)	3 untreated and 2 treated @ Cottage Farm	6.8 6.3	• Cottage Farm CSO Facility Upgrade • Stony Brook Sewer Separation • Hydraulic Relief at CAM005 • Cottage Farm Brookline Connection and Inflow Controls • Brookline Sewer Separation • Bulfinch Triangle Sewer Separation • MWRA Outfall Closings and Floatables Control • Cambridge Floatables Control (portion)	88.8
Inner Harbor	6 untreated and 17 treated @ Prison Point	9.1 243.0	• Prison Point CSO Facility Upgrade • Prison Point Optimization • BOS019 Storage Conduit • East Boston Branch Sewer Relief (portion)	61.8
Fort Point Channel	3 untreated and 17 treated @ Union Park	2.5 71.4	• Union Park Treatment Facility • BOS072-073 Sewer Separation and System Optimization • BWSC Floatables Control • Lower Dorchester Brook Sewer Modifications	62.4
Constitution Beach	Eliminate		• Constitution Beach Sewer Separation	3.7
North Dorchester Bay	Eliminate		• N. Dorchester Bay Storage Tunnel and Related Facilities • Pleasure Bay Storm Drain Improvements • Morrissey Blvd Storm Drain	253.8
Reserved Channel	3 untreated	1.5	• Reserved Channel Sewer Separation	70.6
South Dorchester Bay	Eliminate		• Fox Point CSO Facility Upgrade (interim improvement) • Commercial Pt. CSO Facility Upgrade (interim improvement) • South Dorchester Bay Sewer Separation	126.8
Neponset River	Eliminate		• Neponset River Sewer Separation	2.5
Regional			• Planning, Technical Support and Land Acquisition	50.2
TOTAL **Treated**		**410** **381**		**906.6**

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

MWRA's CSO 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 CSO projects in 2015. The court schedule requires MWRA to commence the performance assessment by January 2018 and submit a report on the assessment findings to EPA and DEP by December 2020.

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

Project	Purpose
MWR003 Gate, Rindge Ave. Siphon Relief and SOM01A	Minimize CSO discharges to Alewife Brook as part of MWRA's Alewife Brook CSO control plan and provide sewer system flood control in extreme storms with a control gate at outfall MWR003 and relief of MWRA's Rindge Ave. Siphon. Upgrade local connection capacity and provide floatables control at the City of Somerville's Outfall SOM01A.
Charles River CSO Controls	Bring the MWRA's "Brookline Connection" into service and implement Cottage Farm influent gate controls and other facility inflow controls to minimize treated discharges to Lower Charles River Basin at the Cottage Farm facility.
Community Managed	
South Dorchester Bay Sewer Separation (Fox Point)	Eliminate CSO discharges to South Dorchester Bay by separating combined sewer systems in Dorchester. This project allows MWRA to decommission the Fox Point CSO Facility.
South Dorchester Bay Sewer Separation (Commercial Point)	Eliminate CSO discharges to South Dorchester Bay by separating combined sewer systems in Dorchester. This project allows MWRA to decommission the Commercial Point CSO Facility.
Stony Brook Sewer Separation	Minimize CSO discharges to Stony Brook Conduit and the Back Bay Fens, both of which drain to the Lower Charles River Basin, by separating combined sewer systems in parts of Roxbury and Jamaica Plain. Implementation of this project is intended to reduce the number of overflows to the Stony Brook Conduit from as many as 22 to 2 in the Typical Year and reduce annual CSO discharge volume by 99.7%.
Neponset River Sewer Separation	Eliminate CSO discharges to the Neponset River and protect water quality at downstream swimming areas in South Dorchester (primarily Tenean Beach) by separating combined sewer systems in the Neponset section of Dorchester and by permanently closing CSO regulators associated with Outfalls BOS093 and BOS095.
Constitution Beach Sewer Separation	Eliminate CSO discharges at the Constitution Beach CSO Facility, allowing decommissioning of the facility, by separating combined sewer systems in parts of East Boston.
Cambridge Alewife Brook Sewer Separation	Minimize CSO discharges to Alewife Brook by separating combined sewer systems in parts of Cambridge and upgrading local system connections to MWRA's Alewife interceptors. Close certain outfalls.
BWSC Floatables Control	Limit the discharge of floatable materials from five BWSC combined sewer outfalls along Boston Inner Harbor and Fort Point Channel.
Cambridge Floatables Control	Limit the discharge of floatable materials from Cambridge CSO outfalls that will remain following completion of MWRA's CSO control plan.
Fort Point Channel Sewer Separation	Minimize CSO discharges to Fort Point Channel by separating sewer systems tributary to Outfalls BOS072 and BOS073. Implementation of the recommended sewer separation plan will reduce the number of overflows from these outfalls from as many as 23 to zero in the Typical Year. Also, relocate a CSO regulator and perform limited sewer separation to reduce CSO discharges from the Lower Dorchester Brook Sewer to Fort Point Channel with a MWRA funding cap of $2.03 million to BWSC.
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.

Project	Purpose
Brookline Sewer Separation	Separate several areas of Brookline, totaling 72 acres, where there are remaining combined sewers tributary to MWRA's Charles River Valley Sewer. The project is intended to reduce treated CSO discharges to the Lower Charles River Basin at the Cottage Farm Facility.
Bulfinch Triangle Sewer Separation	Separate the combined sewers in a 61-acre area of Boston bounded by North Station, Haymarket Station, North Washington St., and Cambridge St. The project is intended to reduce CSO discharges to the Lower Charles River Basin and Upper Inner Harbor, reduce overflows to the Prison Point CSO Facility, and close outfall BOS049.
CSO Support	
CSO Planning and Support	The goals of the CSO Program are to minimize CSO discharges, greatly reduce beach closings following wet weather events, and maximize the beneficial use of CSO receiving waters. 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 2018-2020, and acquisition of land, easements and construction permits required for CSO project implementation.

Expenditure Forecast (in $000s) and Program Status

Total Budget	Payments thru FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$906,603	$876,839	$29,765	$18,982	$5,002	$65,923	$2,973	$0

Program Status 11/15	98.3%	Status as % is approximation based on project budget and expenditures. MWRA and the CSO communities completed the remaining CSO projects in December 2015 in compliance with Schedule Seven. (See individual project status and background information).

Changes to Program Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	FY17	Chge.	FY16	FY17	Chge.	FY16	FY17	Chge.
$898,455	$906,603	$8,148	Dec-15	Dec-15	None	$57,747	$65,923	$8,176

Explanation of Changes

- **Community Managed +$8.1M**

  Project Changes: Cambridge Sewer Separation +$10.2M, Reserved Channel Sewer Separation ($2.1M).

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

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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$221,597	$221,602	$0	$0	$0	($23)	$0	$0

Project Status 11/15	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.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	FY17	Chge.	FY16	FY17	Chge.	FY16	FY17	Chge.
$221,597	$221,597	$0	May-13	May-13	None	($23)	($23)	$0

Explanation of Changes

- N/A

CEB Impacts

- Estimate of $350,000 in FY18 and FY23 for periodic cleaning of the North Dorchester Bay Tunnel (every five years per the 2004 Supplemental Environmental Impact Report).

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 Conduit and 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 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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$4,562	$4,001	$561	$555	$6	$3,914	$0	$0

Project Status 11/15	94.0%	Status as % is approximation based on project budget and expenditures. Design contract was awarded in March 2012. MWRA substantially completedInterceptor connection relief and floatables controls at outfall SOM01A in December 2013 and substantially completed MWR003/Rindge Ave in October 2015.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**
$4,562	$4,562	$0	Oct-15	Oct-15	None	$3,914	$3,914	$0

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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$64,174	$60,542	$3,631	($127)	$0	$1,650	$1,376	$0

Project Status 11/15	94.3%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**
$64,174	$ 64,174	$0	Jun-16	Dec-16	6 mos.	$1,287	$1,650	$363

Explanation of Changes

- Schedule and spending changed due to updated schedules from Boston Water & Sewer Commission.

CEB Impacts

- No impacts identified at this time.

S. 346 Cambridge Sewer Separation

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

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

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

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

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

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

On July 16, 2008, MWRA's Board of Director's approved full funding of MWRA's then-estimated cost share for the Alewife Brook (CAM002-004) Sewer Separation project and Cambridge Floatables Control at $60 million and authorized the City of Cambridge to move forward with design and construction. In October 2008, the City of Cambridge resumed design of the CAM004 stormwater basin and outfall, commenced design of CAM400 manhole separation, and commenced design of the interconnections relief and floatables control work. The City of Cambridge commenced construction of the CAM400 manhole separation project and the interconnections relief and floatables project 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 (Contract 8A) of four construction contracts (8A, 8B, 9, and Concord Lane) to complete the CAM004 sewer separation project, in compliance with Schedule Seven. Cambridge issued the notices to proceed with Contract 8B in September 2013, Contract 9 in February 2014 and Concord Lane in March 2015. By November 2015, Cambridge had attained substantial completion of contracts 8A, 8B and Concord Lane, and on December 21, 2015, in compliance with Schedule Seven, Cambridge attained substantial completion of Contract 9. Releated surface restoration work is scheduled by Cambridge to continue through June 2017.

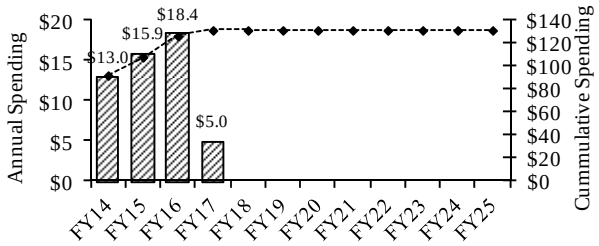
Scope

Sub-phase	Scope
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

Total Budget	Payments thru FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$102,765	$79,405	$23,360	$18,370	$4,990	$52,281	$0	$0

Cambridge CAM002-004
Sewer Separation



Project Status 11/15	90.6%	Status as % is approximation based on project budget and expenditures.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**
$92,563	$102,765	$10,202	Dec-15	Dec-15	None	$42,079	$52,281	$10,202

Explanation of Changes

- Project cost and spending increased primarily due to updated construction and engineering services during construction costs for Contracts 8B, 9, and water use charges.

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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$32,186	$32,188	($2)	($2)	$0	($161)	$0	$0

Project Status 11/15	100%	Status as % is approximation based on project budget and expenditures. Construction was substantially complete in July 2009.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	FY17	Chge.	FY16	FY17	Chge.	FY16	FY17	Chge.
$32,186	$32,186	$0	Jun-09	Jun-09	None	($161)	($161)	$0

Explanation of Changes

- N/A

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

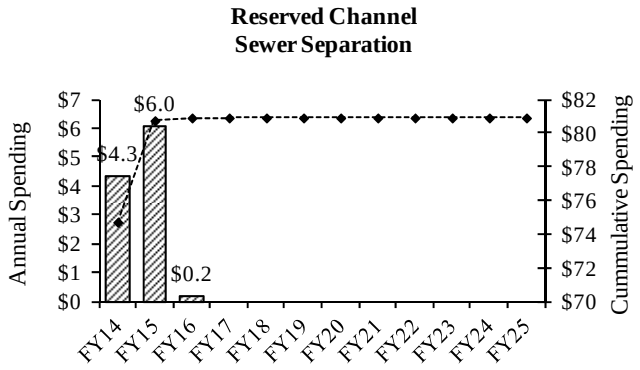
In April 2001, MWRA filed a Notice of Project Change with MEPA, recommending a reassessment of the overall CSO control approach for North Dorchester Bay and the Reserved Channel. The reassessment was completed in April 2004, when MWRA filed the Supplemental Facilities Plan and Environmental Impact Report 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 construction contracts for this project and in the period 2010-2015 issued the notices to proceed for the remaining eight construction contracts. As of December 2015, BWSC had attained substantial completion of all nine contracts, including the outfall cleaning contract (BWSC Contract 1), four sewer separation contracts (Contracts 2, 3A, 3B and 4), two consecutive paving contract (contracts 7 and 8), a sewer and cleaning contract (Contract 5 – ineligible for MWRA funding), and a downspout disconnection contract (Contract 6).

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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$70,560	$70,395	$164	$164	$0	$10,520	$0	$0



Project Status 11/15	99.8%	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, Contract 4 in May 2015 and contracts 5, 6 and 8, in December 2015.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**
$72,613	$70,560	($2,053)	Dec-15	Dec-15	None	$12,573	$10,520	($2,053)

Explanation of Changes

- Project cost and spending decreased primarily due to updated cost estimates for contracts 3B and 4, and 8.

CEB Impacts

- No impacts identified at this time.

S. 324 CSO Planning and Support

Project Purpose and Benefits

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

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

Project History and Background

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

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

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

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 renewed 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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$50,248	$48,197	$2,051	$22	$6	($714)	$1,598	$0

Project Status 11/15	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. Schedule Seven requires MWRA to complete a CSO performance assessment in the period 2018-2020.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**
$50,248	$50,248	$0	Dec-20	Dec-20	None	($378)	($714)	($336)

Explanation of Changes

- Project spending decreased due to updated expenditure projections.

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

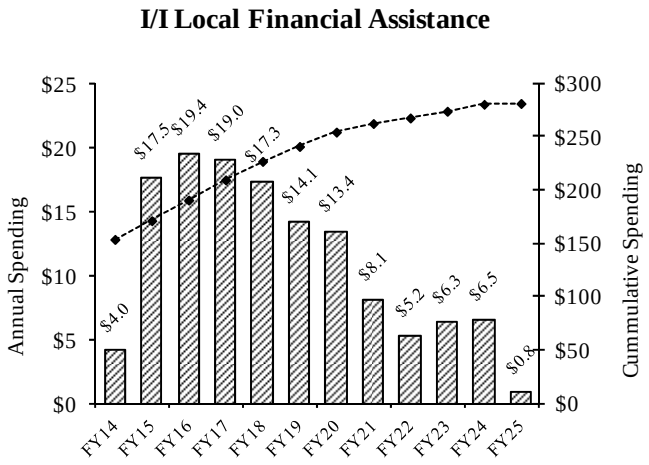
MWRA's Deer Island Wastewater Treatment Plant receives flow from 43 communities. The collection system encompasses 230 miles of MWRA interceptors and over 5,000 miles of community sewers. These sewers are of varying size, shape, age, material, depth, and conditions. All contribute some quantity of infiltration 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 Phase1 and 2 funds were distributed as 25% grants and 75% interest-free loans. The Board approved $37 million to fund a third phase of the program in June 1998, an additional $40 million for Phase 4 in June 2001, an additional $40 million for Phase 5 in June 2004, an additional $40 million for Phase 6 in June 2006, an additional $40 million for Phase 7 and an additional $40 million for Phase 8 in June 2009. The grant/loan ratio was revised for Phases 3 through 8 to 45% grants and 55% interest-free loans. During the FY15 Final CIP development in June 2014, Phases 9 and 10 were added to the CIP at $80 million each to be distributed as 75% grants and 25% interest-free loans Payback period for Phases 9 and 10 loans was also extended from 5 years to 10 years. 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 FY15	Remaining Balance	FY16	FY17	FY14-18	FY19-23	Beyond FY23
$242,585	$149,769	$92,816	$19,387	$18,952	$77,182	$47,057	($9,869)

Project Distribution Status 11/15	64.3%	Through November 2015, MWRA has distributed $126.3 million in grants and $169.8 million in interest-free loans to fund over 491 separate projects in 43 communities under the I/I Local Financial Assistance Program.



Project Repayment Status 11/15	65.7%	Through November 2015, a total of $143.1 million has been repaid by member communities receiving interest-free loans.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY14-18 Spending		
FY16	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**	**FY16**	**FY17**	**Chge.**
$242,585	$242,585	$0	Jun-35	Jun-35	None	$75,009	$77,182	$2,173

Explanation of Changes

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

CEB Impacts

- No impacts identified at this time.