

Massachusetts Water Resources Authority



Combined Sewer Overflow Control Plan



Annual Progress Report 2008

March 2009

On the cover:

North Dorchester Bay tunnel boring machine “holes through” to the retrieval shaft, August 13, 2008.

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1. INTRODUCTION

The Massachusetts Water Resources Authority (MWRA) files this Combined Sewer Overflow Annual Report for 2008 in compliance with the Federal District Court Order in the Boston Harbor Case. Annual and quarterly reports on the progress of MWRA's plan to control combined sewer overflows to surface waters in the metropolitan Boston area (the "Long-Term Control Plan") are required by the Court. They describe the progress of work to implement the Long-Term Control Plan relative to milestones in the Court-ordered schedule. This Annual Report for 2008 reviews key accomplishments and design and construction progress in calendar year 2008 and in the quarterly period from December 16, 2008, to March 16, 2009, and discusses issues that may affect MWRA's ability to complete the CSO projects on schedule. Like previous annual CSO reports, it also presents updated information on the scope, goals, benefits and costs of the Long-Term Control Plan and its projects.

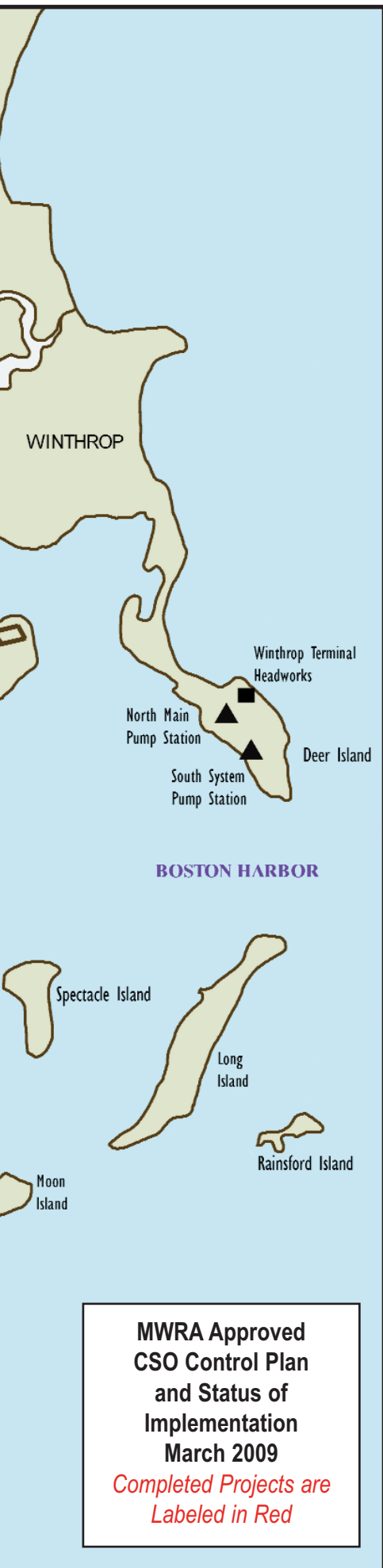
The Long-Term Control Plan was recommended in the Final CSO Facilities Plan and Environmental Impact Report (the "1997 Facilities Plan/EIR"), which MWRA filed with federal and state regulatory agencies in August 1997. The 1997 Facilities Plan/EIR contained 25 CSO projects. Together with plan modifications MWRA recommended in subsequent Notices of Project Change, Supplemental Environmental Impact Reports, and other regulatory filings, the Long-Term Control Plan comprises 35 wastewater system improvement projects to bring CSO discharges at 84 outfalls in the metropolitan Boston area into compliance with the Federal Clean Water Act and Massachusetts Water Quality Standards. Design and construction milestones for each of the 35 projects are mandated by the Federal District Court Order in the Boston Harbor Case (U.S. v. M.D.C, et al., No. 85-0489-RGS) and are set forth in Schedule Seven. Figure 1 maps the 35 projects and presents the general status of implementation for each project. Figure 2 summarizes the scope, schedule and predicted benefits of the system-wide Long-Term Control Plan.

This Annual Report includes the following information that characterizes the work performed in 2008 and the overall progress made to date to control CSO discharges, comply with the Federal District Court Order and National Pollutant Discharge Elimination System (NPDES) permits related to CSO discharges, and improve water quality in Boston Harbor and its tributaries:

- CSO control accomplishments and progress in 2008, which primarily involved the movement of several projects into construction and others into design, including projects that were previously delayed due to project reassessments or permitting hurdles.
- Substantial progress on other projects that were in design or construction prior to January 1, 2008.
- Overall progress, accomplishments and benefits of MWRA's CSO control program since 1987 when MWRA assumed responsibility for developing and implementing a long-term control plan.
- The work that is planned to complete the remaining elements of the Long-Term Control Plan.
- Activities related to the Long-Term CSO Control Plan that comply with requirements or conditions in the NPDES Permit issued to MWRA by the U.S. Environmental Protection Agency (EPA) and/or the CSO variances for the Lower Charles River and the Alewife Brook/Upper Mystic River issued to MWRA by the Massachusetts Department of Environmental Protection (DEP).



Figure 1: Approved Long-Term CSO Control Plan and Status of Implementation



Projects Completed

	Complete⁽¹⁾
Somerville Baffle Manhole Separation	1996
Chelsea Trunk Sewer Replacement	2000
Cottage Farm CSO Facility Upgrade	2000
Hydraulic Relief at CAM005 (Cambridge)	2000
Hydraulic Relief at BOS017 (Charlestown)	2000
MWRA Floatables/Outfall Closing Projects	2000
Neponset River Sewer Separation	2000
Constitution Beach Sewer Separation	2000
Chelsea Branch Sewer Relief	2001
CHE008 Floatables Control and Outfall Repair	2001
Prison Point CSO Facility Upgrade	2001
Somerville Marginal CSO Facility Upgrade	2001
Commercial Point CSO Facility Upgrade	2001
Fox Point CSO Facility Upgrade	2001
Pleasure Bay Storm Drain Improvements	2006
Stony Brook Sewer Separation	2006
Charlestown BOS019 Storage Conduit	2007
South Dorchester Bay Sewer Separation	2007
Fort Point Channel Sewer Separation & System Optimization	2007
Union Park Detention/Treatment Facility	2007
Regionwide Floatables Controls	2007
Prison Point Facility Optimization	2008

In Construction⁽²⁾

Morrissey Boulevard Storm Drain	2009
Cottage Farm Brookline Connection and Inflow Controls	2009
East Boston Branch Sewer Relief	2010
North Dorchester Bay Storage Tunnel and Related Facilities	2011
Bulfinch Triangle Sewer Separation	2013
Brookline Sewer Separation	2013
CAM004 Sewer Separation	2015

In Design

CAM400 Manhole Separation	2010
Charles River Interceptor Gate Controls	2011
CAM004 Outfall and Basin	2011
Alewife Interceptor Connection Relief and Floatables Controls	2011
Reserved Channel Sewer Separation	2015

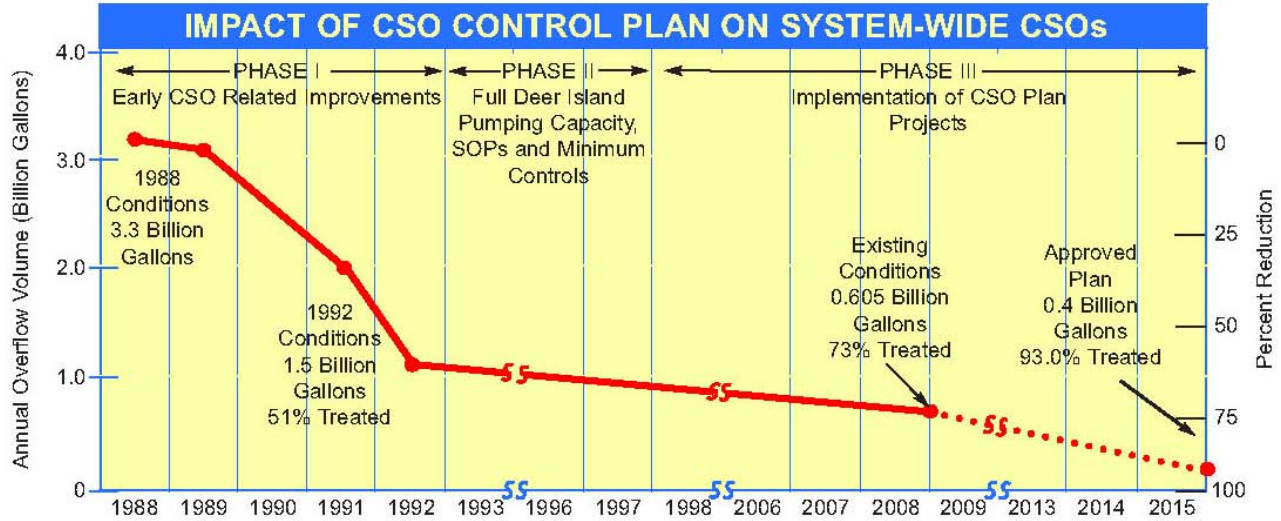
Future Start

MWR003 Gate and Rindge Ave. Siphon Relief	2014
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(1) Actual or Scheduled construction completion

(2) For each project, at least one construction contract is completed or underway

FIGURE 2: Approved Long-Term CSO Control Plan and Benefits



BENEFITS

- 84 CSO Outfalls: 36 Closed
44 Reduced to a Minimal Number of CSO Discharges per year
4 Treated
- Eliminates or Reduces CSO Activations to Achieve a Level of CSO Control Consistent with Water Quality Standards
- Treats More Frequent Discharges
- Controls Floatable Materials at All CSO Outfalls

CSO CONTROL PROJECTS

- Sewer Separation
- Existing CSO Treatment Facility Upgrades
- New CSO Treatment Facility
- CSO Consolidation /Storage Conduits
- Relief Sewers
- Localized Hydraulic Relief
- Outfall Repairs
- Region Wide Floatables Controls
- System Optimization

PROGRAM SCHEDULE

Final CSO Conceptual Plan	Dec 1994
Final Facilities Plan and EIR	Jul 1997
Final Approved Plan	Apr 2006
Design and Construction	1995 - 2015
Assessment Phase	2015 - 2020

COSTS

Planning, Design & Construction
 \$927.3 Million
 Net Annual O&M
 \$1.5 Million

2. CSO CONTROL PROGRESS AND ACCOMPLISHMENTS IN 2008

2.1 Summary of Progress and Spending in 2008

In 2008, MWRA and the CSO communities continued to implement the Long-Term Control Plan at a high level of design and construction activity to meet the Federal Court ordered obligations defined in Schedule Seven and in the March 15, 2006 Second Stipulation of the United States and the Massachusetts Water Resources Authority on Responsibility and Legal Liability for Combined Sewer Overflows, as amended by the Federal District Court on May 7, 2008¹ (the “Second CSO Stipulation”). MWRA spent \$128.1 million on CSO design and construction in calendar year 2008, \$55.2 million more than it spent in 2007, which had previously been the record spending year for CSO control. Of the \$128.1 million spent in 2008, \$123.0 million (96%) was for construction related activities, with \$90.0 million of that associated with ongoing construction of the North Dorchester Bay CSO storage tunnel in South Boston.

Capital Spending on CSO Control in 2008

Design:	\$ 5.1 million
Construction:	113.5 million
Engineering Services During Construction:	6.2 million
<u>Land/easement/permits:</u>	<u>3.3 million</u>
Total CSO capital spending in CY08:	\$128.1 million

CSO spending in 2008 brought total MWRA capital expenditures on the CSO control plan to \$575.2 million of the total \$927.3 million CSO budget in MWRA’s Proposed Fiscal Year 2010 (FY10) Capital Improvement Program (CIP). Average annual volume of CSO discharge has been reduced from 3.3 billion gallons in 1988 to 605 million gallons today, an 82% reduction, with 73% of the current discharge volume receiving treatment at MWRA’s four CSO facilities. Twenty-seven of the 84 CSO outfalls addressed in the Long-Term Control Plan have been closed; nine more are scheduled to be closed with completion of the remaining work.

MWRA completed one CSO project in 2008 (Prison Point Facility Optimization), in accordance with Schedule Seven, bringing the total number of completed projects to 22 of the 35 projects in the Long-Term Control Plan. MWRA and the CSO communities also moved many of the remaining projects into design or construction, including projects that were previously delayed due to project reassessments or permitting hurdles. Projects with construction awards in 2008 include East Boston Branch Sewer Relief, Brookline Sewer Separation, Bulfinch Triangle Sewer Separation, and Cottage Farm Brookline Connection and Inflow Controls. Projects that moved into design include MWRA’s Charles River Interceptor Optimization project and three of the Alewife Brook projects being implemented by the City of Cambridge. In addition to ongoing construction of the North Dorchester Bay CSO storage tunnel, other CSO related progress in 2008 included construction of the Morrissey Boulevard Storm Drain and design efforts associated with the North Dorchester Bay tunnel-related facilities, Reserved Channel Sewer Separation, and the third and final contract for East Boston Branch Sewer Relief.

¹ The May 7, 2008 amendment to the Second CSO Stipulation revised the level of control for the Prison Point CSO Facility in accordance with MWRA’s letter report entitled “Proposed Modification of Long-Term Level of Control for the Prison Point CSO Facility, April 2008.”

2.2 CSO Project Accomplishments in 2008

The following is a summary of accomplishments in 2008 by MWRA, with the cooperation of BWSC, the City of Cambridge and the Town of Brookline, in implementing the Long-Term Control Plan.

- MWRA and BWSC continued to make substantial progress to implement the **\$284.3 million CSO control plan for the South Boston beaches**², including MWRA’s construction of the North Dorchester Bay CSO storage tunnel and final design of tunnel related facilities that include the dewatering pumping station, force main and remote odor control facility. On August 13, 2008, MWRA’s contractor completed the 10,832-foot long, 17-foot diameter, soft-ground tunnel ahead of the contract schedule when the tunnel boring machine (TBM) “holed-through” the wall of the retrieval shaft at the upstream end of the tunnel. The contractor was able to mine and line the entire tunnel six months earlier than the contract schedule and only 10 months after commencing the mining operation at the Conley Terminal shaft in October 2007. Immediately after completing the tunnel, the contractor disassembled and removed the TBM from the retrieval shaft and has since completed the installation of five adit connections between the tunnel and the diversion system drop shafts at the existing CSO outfalls. The contractor also completed internal inspections, finish work, and clean-up in the tunnel.



In 2008, the contractor also completed the CSO and stormwater diversion chambers and most of the diversion piping at Outfalls BOS085, BOS086 and BOS087, as well as the diversion conduits to redirect CSO and stormwater flows from Outfall BOS083 to Outfall BOS084, allowing Outfall BOS083 to be permanently closed when the Outfall BOS084 diversion structures are completed. The contractor also made substantial progress with construction of the CSO and stormwater diversion chambers and related piping at Outfalls BOS081, BOS082 and BOS084.



MWRA also moved forward with final design of the 15 million-gallon per day dewatering pumping station at the downstream end of the tunnel at Conley Terminal and the 24-inch dewatering force main, as well as with the remote odor control facility at the upstream end of the tunnel that is now part of a separate contract package. MWRA completed final design of the dewatering pumping station and force main and advertised the construction

² Includes MWRA’s North Dorchester Bay project (\$234.8 M) and Pleasure Bay project (\$3.2 M), BWSC’s Morrissey Boulevard Storm Drain (\$36.9 M), and related land, easement and construction permit costs (\$9.4 M).

contract documents on December 27, 2008. MWRA expects to award the contract and issue the Notice to Proceed by April 2009. MWRA is redesigning the remote odor control facility to be a belowground facility and expects to complete design and issue a construction Notice to Proceed by December 2009.

- BWSC achieved progress as scheduled with the second and final construction contract for the **\$36.9 million Morrissey Boulevard Storm Drain** project that is part of the North Dorchester Bay CSO control plan. This contract, which BWSC commenced in September 2007, includes installation of the large storm drain along Morrissey Boulevard from Kosciuszko Circle to a new outlet at Savin Hill Cove. In 2007, BWSC completed the first construction contract for this project, which included the new diversion chamber at the upstream end of the conduit that will allow stormwater flows now discharging to Carson Beach at Outfall BOS087 to be diverted to Savin Hill Cove in storms greater than the 1-year design storm. BWSC's contractor has completed installation of the 2,800-foot-long, 12-foot by 12-foot box conduit; has commenced installation of twin 9-foot by 8-foot box conduits adjacent to Savin Hill Cove; and is continuing construction of the new outfall, dredging of the outfall area of Savin Hill Cove, and installation of riprap shoreline protection. The contract is on schedule for substantial completion by June 2009 in compliance with Schedule Seven. The Morrissey Boulevard Storm Drain and stormwater diversion structure will be placed into operation when MWRA's North Dorchester Bay CSO Storage Tunnel is brought on-line, by May 2011.



Drain Box Culvert installation along Morrissey Boulevard, Boston.

- On July 29, 2008, MWRA issued the Notice to Proceed for the second construction contract (Contract 6257) for the **\$86.8 million East Boston Branch Sewer Relief** project. MWRA completed the first construction contract in 2004 and is now completing final design of the third contract (Contract 6841). At an award amount of \$59.9 million, Contract 6257 is the largest of the East Boston contracts. It involves the installation of 2.5 miles of new sewer interceptor along Border, Condor, East Eagle and Chelsea Streets and along Marginal, Orleans and Bremen Streets primarily using micro-tunneling methods to reduce conflicts with heavily congested utilities and high traffic volumes along the East Boston streets. Nonetheless, utility conflicts continue to be a critical and difficult issue in East Boston, and MWRA is working closely with its contractor and the utility owners to resolve conflicts as they are identified. As this work progresses, relocation of utilities may impact the completion dates for this contract and the third, remaining construction contract. Meanwhile, MWRA continues to make progress with design of the third East Boston construction contract, Contract 6841, which involves replacement and upgrade of approximately one mile of interceptor sewers in upstream areas using “pipe-bursting” methods. MWRA's design consultant is finalizing the contract plans and specifications, and MWRA plans to award this last contract in April 2009.



335 million gallons to 17 activations and 243 million gallons. On April 30, 2008, MWRA filed a motion with the Court along with a proposed amendment to the Second CSO Stipulation modifying the long-term level of control for the Prison Point CSO facility (Outfall MWR203) to the updated performance predictions. On May 7, 2008, the Court allowed the motion and amendment.

- On June 30, 2008, MWRA issued the Notice to Proceed for the construction contract for the **\$3.2 million Cottage Farm Brookline Connection and Inflow Controls** project, in compliance with Schedule Seven. The project is intended to reduce treated CSO discharges from the Cottage Farm CSO Facility to the Charles River Basin by improving the conveyance of wet weather flows to MWRA's Ward Street Headworks and Deer Island Wastewater Treatment Plant. The improvements will optimize the combined conveyance capacity of the two MWRA sewers already in service that carry flows across the Charles River; augment this conveyance capacity by bringing into service a previously unutilized 54-inch diameter sewer (the "Brookline Connection") constructed nearly 40 years ago by the Metropolitan District Commission; and install flow monitoring equipment that will allow operators to control the Cottage Farm Facility gates to maximize the use of upstream storage and enhance downstream conveyance. The construction contract calls for substantial completion of all work related to system performance and CSO control by June 30, 2009, in compliance with Schedule Seven.



- On January 31, 2008, the Authority issued the Notice to Proceed for the hydraulic study and design contract for the **\$2.4 million Charles River Valley/South Charles River Relief Sewer Gate Controls** project, in compliance with Schedule Seven. The project goal is to minimize CSO discharges at the Cottage Farm Facility and at upstream, untreated CSO outfalls by optimizing the allocation of flows among four MWRA interceptors: North Charles Metropolitan Sewer, North Charles Relief Sewer, Charles River Valley Sewer, and South Charles Relief Sewer. The scope includes detailed analyses of various alternatives to optimize existing interconnections and to evaluate the potential benefits of additional interconnections. The scope also includes final design of recommended improvements to the existing gates and/or gate controls at three interconnections between the Charles River Valley Sewer and the South Charles Relief Sewer.

MWRA's design consultant completed the extensive hydraulic model evaluations and submitted the Final Hydraulic Modeling Technical Report in December 2008, and submitted the Draft Preliminary Design Report in February 2009. MWRA submitted the portions of the Technical Report evaluating the potential benefits of creating additional interceptor interconnections as a separate report to EPA and DEP on January 31, 2009, in compliance with Schedule Seven. This report concludes that additional interconnections would not provide hydraulic benefit beyond the benefits that will result from modifications to existing interconnections and the interconnection MWRA is now constructing between the interceptor overflow chambers at the Cottage Farm Facility (see page 36).

- BWSC has made substantial progress with final design of the **\$113.3 million Reserved Channel Sewer Separation** project since issuing the Preliminary Design Report in February 2008. BWSC has completed the bid documents for the first of nine planned construction contracts for this project, including four sewer separation contracts, an outfalls rehabilitation contract, a sewer rehabilitation

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contract, a downspout disconnection contract, and two final paving contracts. On January 28, 2009, BWSC advertised the first contract, which separates the combined sewers tributary to Outfall BOS080. BWSC plans to award this contract and issue a Notice to Proceed by May 2009, in compliance with Schedule Seven. BWSC plans to issue the Notices to Proceed with the remaining contracts over the period of September 2009 through April 2014 and complete all work by December 2015, in compliance with Schedule Seven.

- On November 21, 2008, the Town of Brookline issued the first of two construction contracts for the **\$24.0 million Brookline Sewer Separation** project, in compliance with Schedule Seven. This project involves sewer separation in 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 discharges to the Charles River at MWRA's Cottage Farm Facility. The first contract has a value of \$1.4 million and a substantial completion date of November 24, 2009. It includes the installation of storm drains in streets on the north and south sides of Beacon Street. Brookline is completing final design for the second construction contract and plans to advertise this contract, at an estimated eligible value of \$15.7 million, in the spring of 2009. It includes installation of sanitary sewers in Beacon, St. Mary's, and Monmouth Streets. Existing combined sewers will be converted to storm drains.
- BWSC issued the Notice to Proceed for the sole construction contract for the **\$9.6 million Bulfinch Triangle Sewer Separation** project on September 25, 2008, in advance of the November 2008 milestone in Schedule Seven. This project is located in the area between North Station and Haymarket Station and is intended to minimize CSO discharges to the Charles River and allow BWSC to eliminate CSO discharges at Outfall BOS049. Construction activities to date primarily involve relocating water and gas utilities to make room for the new storm drains that the contractor recently began to install in Causeway and Canal streets. The contract has a substantial completion date of July 8, 2010, well in advance of the November 2013 milestone in Schedule Seven.
- After years of delay due to citizens' appeals of a key wetlands permit, MWRA and the City of Cambridge were able to move the **Alewife Brook Sewer Separation** plan forward in 2008. On July 16, 2008, MWRA's Board of Directors approved an amendment to the CSO Memorandum of Understanding and Financial Assistance Agreement with the City of Cambridge that increases the financial award amount (MWRA cost share) from \$21.6 million to \$60.0 million, in addition to \$2.8 million MWRA will spend to implement its MWR003 Gate and Rindge Avenue Siphon Relief project. The total cost of the Alewife Brook Sewer Separation plan, including MWRA and Cambridge cost shares, is \$117.4 million. In October 2008, Cambridge resumed design work for three of the five projects that comprise the Alewife Brook plan: CAM004 Stormwater Outfall and Wetland Basin; CAM400 Manhole Separation; and Interceptor Connection Relief and Floatables Control at CAM002 and CAM401B and Floatables Control at CAM001. The Alewife Brook projects are delayed at least 27 months beyond their respective design and construction milestones in Schedule Seven due to the citizens' appeals.
- BWSC continues to remove stormwater flows from separated sewer systems in Dorchester after substantially completing the **\$117.1 million South Dorchester Bay Sewer Separation** project in 2007. The project eliminated CSO discharges to the Commercial Point and Fox Point CSO treatment facilities and the beaches of South Dorchester Bay, allowing MWRA to decommission the two facilities in November 2007. Since then, BWSC has conducted flow metering in the separated sewer system and performed hydraulic evaluations to verify whether the project's hydraulic performance goals have been met. BWSC issued a report in September 2008 on its evaluation of sewer system performance in the South Dorchester Bay area, concluding that remaining stormwater inflow in the separated sewer system continues to contribute to a risk for system flooding and overflows in large storms, including the 10-year

design storm that is a performance criteria for the project. The BWSC report identifies alternatives to meet the performance objectives, and BWSC has recommended and is pursuing additional inflow removal primarily by expanding its downspout disconnection program in the tributary area.

- BWSC is also designing and will construct improvements to relieve a portion of its **Lower Dorchester Brook Sewer** to reduce CSO discharges to the Dorchester Brook Conduit and Fort Point Channel. This work, which is partially funded by MWRA, includes relocating CSO regulator RE-070/11-2 and separating combined sewers in a limited area tributary to the new regulator. Relocating the regulator will allow stormwater flows in already separated drainage systems that now tie back into the sewer system to be redirected to the Dorchester Brook Conduit and Fort Point Channel. In November 2008, BWSC issued the Notice to Proceed for the contract for design and construction supervision services. Ongoing preliminary design tasks include collection and review of system record information, video inspection reports, and public and private utility plans. The contract schedule calls for submission of a preliminary design report by February 2009.

2.3 Related Compliance with MWRA's NPDES Permit and CSO Variances

In 2008, MWRA also continued to respond to the requirements and conditions in its NPDES Permit and in the CSO variances for the Lower Charles River and the Alewife Brook/Upper Mystic River.

- In April 2008, MWRA submitted to EPA and DEP its estimates of CSO discharge activations and volumes at permitted CSO outfalls for all storms in 2007. The information included updated CSO discharge activation and volume predictions at every outfall in a typical year, and compared the updated performance at each outfall with the level of control in the Long-Term Control Plan.
- MWRA continued to conduct its harbor and river water quality sampling and testing program.

3. LONG-TERM CONTROL PLAN AND BENEFITS

In 1987, through a stipulation entered in the Boston Harbor Case (U.S. v. M.D.C., et al., No. 85-0489 MA), MWRA accepted responsibility for developing a control plan to address the discharges from all CSOs hydraulically connected to the MWRA sewer system, including outfalls owned by its member communities. Under a Court-ordered schedule, MWRA recommended a CSO Conceptual Plan in 1994 that included 25 site-specific CSO projects located in Boston, Cambridge, Chelsea and Somerville. The CSO Conceptual Plan was later refined in the 1997 Facilities Plan/EIR.

In March 2006, MWRA reached an agreement with the United States and DEP on the scope and schedule for additional CSO projects, which was filed with the Court as part of a joint motion to amend the Court Schedule. In April 2006, the Court allowed the joint motion and issued an Order with a new schedule. As a result, MWRA's Long-Term Control Plan now includes 35 projects. Under the Order, MWRA has until 2020 to complete the remaining CSO work and subsequent system monitoring which will be used to verify that the Long-Term Control Plan goals are achieved.

The United States and MWRA also agreed to withdraw their February 27, 1987 Stipulation of the United States and the Massachusetts Water Resources Authority on Responsibility and Legal Liability for Combined Sewer Overflows and replace it with a “Second CSO Stipulation” that requires MWRA to implement the CSO requirements set forth in the Court Schedule and to meet the levels of control described in MWRA’s Long-Term Control Plan. The documents that recommend MWRA’s Long-Term Control Plan, including the 1997 Final CSO Facilities Plan/EIR as amended by subsequent notices of project change and supplemental plans, are identified in the March 15, 2006 Second Stipulation of the United States and the Massachusetts Water Resources Authority on Responsibility and Legal Liability For Combined Sewer Overflows, which was amended on May 7, 2008.¹

3.1 Scope, Benefits and Cost of the Approved Plan

The approved Long-Term Control Plan is described in Table 1 for each receiving water segment (also see Figure 3). The CSO control costs by receiving water segment and the total plan cost of \$927.3 million (in December 2009 dollars)³ are from MWRA’s Proposed FY10 CIP.

MWRA’s Long-Term Control Plan is predicted to reduce annual CSO discharge volume in a typical year from 3.3 billion gallons in 1988 to 0.4 billion gallons in 2015. Of the remaining discharge volume, 93% will receive treatment at MWRA’s four CSO facilities: Cottage Farm, Prison Point, Somerville Marginal and Union Park. The overall performance goals of this approved plan measured as average annual volume of CSO discharge to each receiving water segment are presented in Table 1 and in Figure 4. The Long-Term Control Plan also calls for closing 36 of the 84 CSO outfalls addressed in the plan, including the CSO treatment facilities and associated outfalls at Constitution Beach, which MWRA decommissioned in October 2000, and at Fox Point and Commercial Point (South Dorchester Bay), which MWRA decommissioned in November 2007. As mentioned in Section 2.1 of this report, 27 outfalls have been closed to date.

Following completion of the plan, MWRA is required to undertake an assessment of system-wide performance to verify that the CSO control goals have been met. A report on the results of the multi-year assessment is due in 2020. It is at that time that EPA and DEP propose to make final decisions regarding water quality standards for the Lower Charles River and Alewife Brook/Upper Mystic River. If any additional CSO control beyond the controls and discharge goals in MWRA’s Long-Term Control Plan is warranted at any outfall, it will be the individual responsibility of the respective discharge permittee: MWRA, BWSC, and the cities of Cambridge, Chelsea and Somerville.

3.2 Status of Plan Implementation and Benefits Already Achieved

CSO spending in 2008 brought total MWRA capital expenditures for the CSO control plan to \$575.2 million of the total \$927.3 million CSO budget in the Proposed FY10 CIP. With the cooperation of its CSO communities, MWRA has completed 22 of the 35 CSO projects, and 12 projects are currently in construction or design (see Figure 1 and Table 2). CSO discharges to South Dorchester Bay, the Neponset River, and Constitution Beach have been eliminated with the completion of sewer separation projects in those areas.

Since 1987, when MWRA assumed responsibility for developing and implementing a regional CSO control plan, improvements to MWRA’s wastewater transport and treatment systems have produced huge reductions in CSO discharges and dramatic improvement in water quality in many areas. These wastewater system improvements include the \$3.8 billion investment MWRA made in the new Deer Island Treatment Plant and

³ The Proposed FY10 CIP anticipates a total spending for CSO control of \$958.8 million, including escalation to the midpoint of construction and contingency, to complete the plan on schedule.

associated conveyance systems (in addition to the \$927.3 million budget for the CSO control program) and the 22 CSO projects completed to date. Together, they have reduced the average annual volume of CSO discharge in a typical rainfall year from 3.3 billion gallons in 1988 to 605 million gallons today, an 82% reduction, with 73% of the current discharge volume in a typical year receiving treatment at MWRA's four CSO treatment facilities. CSO impacts to water quality have been greatly reduced. CSO discharges to South Boston beaches were cut almost in half with the improvements to pumping capacity at Deer Island from 1989 to 2000. For Boston Harbor, a decrease in wet-weather bacteria counts harbor-wide since the late 1980s (Figure 7) shows the cumulative effect of the Boston Harbor Project and CSO control projects.

Tremendous improvement has been seen in the Charles River Basin, where average annual CSO discharge has been drastically cut from about 1.7 billion gallons in 1988 to 39 million gallons today, a 98% reduction. Approximately 88% of this remaining overflow is treated at MWRA's Cottage Farm CSO facility. These improvements are the result of major wastewater system projects MWRA has completed over the past 20 years, most notably the new Deer Island Wastewater Treatment Plant and related conveyance and pumping systems. MWRA, with the cooperation of its member communities along the Charles River, completed a set of improvements in the late 1980s that eliminated dry weather sewage overflows. They also completed a set of system optimization projects in the mid-1990s that maximized the existing system's hydraulic performance. MWRA and the communities have also completed four CSO control projects along the Charles River: Stony Brook Sewer Separation, Cottage Farm Facility Upgrade, CAM005 Hydraulic Relief, and floatables controls. The communities have undertaken other sewer separation work and have closed several CSO outfalls in the past two decades.

Figure 3: Receiving Waters



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Table 1 – Level of CSO Control and Cost by Receiving Water Segment

Receiving Water	CSO Discharge Goals (typical rainfall year)		Projects ⁽¹⁾	Capital Cost ⁽²⁾ (\$ million)
	Activations	Volume (million gallons)		
Alewife Brook/Upper Mystic River	7 untreated and 3 treated @ Somerville Marginal	7.3 3.5	<ul style="list-style-type: none"> • Cambridge/Alewife Sewer Separation • MWR003 Gate and Rindge Siphon Relief • Interceptor Connection Upgrades • Somerville Baffle Manhole Separation • Cambridge Floatables Control 	64.3
Mystic River/Chelsea Creek Confluence (including Chelsea Creek)	1 untreated and 39 treated @ Somerville Marginal	1.1 60.6	<ul style="list-style-type: none"> • Somerville Marginal CSO Facility Upgrade • Somerville Baffle Manhole Separation • Hydraulic Relief at BOS017 • Chelsea Trunk Sewer Replacement • Chelsea Branch Sewer Relief • CHE008 Outfall Repairs • East Boston Branch Sewer Relief (portion) 	78.3
Charles River (including Stony Brook and Back Bay Fens)	2 untreated and 2 treated @ Cottage Farm	6.8 6.3	<ul style="list-style-type: none"> • Cottage Farm CSO Facility Upgrade • Stony Brook Sewer Separation • Hydraulic Relief at CAM005 • Cottage Farm Brookline Connection and Inflow Controls • Charles River Interceptor Gate Controls • Brookline Sewer Separation • Bulfinch Sewer Separation • MWRA Outfall Closings and Floatables Control • Cambridge Floatables Control 	90.5
Inner Harbor	6 untreated and 17 treated @ Prison Point	9.1 243.0	<ul style="list-style-type: none"> • Prison Point CSO Facility Upgrade • Prison Point Optimization Study • BOS019 Storage Conduit • East Boston Branch Sewer Relief (portion) 	62.3
Fort Point Channel	3 untreated and 17 treated @ Union Park	2.5 71.4	<ul style="list-style-type: none"> • Union Park Treatment Facility • BOS072-073 Sewer Separation and System Optimization • BWSC Floatables Control • Lower Dorchester Brook Sewer Modifications 	62.0
Constitution Beach	Eliminate		<ul style="list-style-type: none"> • Constitution Beach Sewer Separation 	3.8
North Dorchester Bay	Eliminate		<ul style="list-style-type: none"> • N. Dorchester Bay Storage Tunnel and Related Facilities • Pleasure Bay Storm Drain Improvements • Morrissey Blvd Storm Drain 	274.8
Reserved Channel	3 untreated	1.5	<ul style="list-style-type: none"> • Reserved Channel Sewer Separation 	113.3
South Dorchester Bay	Eliminate		<ul style="list-style-type: none"> • Fox Point CSO Facility Upgrade (interim improvement) • Commercial Point CSO Facility Upgrade (interim improvement) • South Dorchester Bay Sewer Separation 	125.1
Neponset River	Eliminate		<ul style="list-style-type: none"> • Neponset River Sewer Separation 	2.7
Regional			<ul style="list-style-type: none"> • Planning, Technical Support and Land Acquisition 	50.2
TOTAL		413.1		927.3
Treated		384.8		

(1) Floatables controls are also recommended at remaining outfalls and are included in the listed projects and capital budgets.

(2) From MWRA's Proposed FY10 Capital Improvement Program.

In the same period, the communities along the Charles River have continued programs aimed at reducing pollution in separate stormwater discharges, including identifying and removing illicit sewer connections or cross connections to their storm drain systems. The CSO and stormwater related improvements, together with sanitary sewer overflow control programs in upstream communities (above the Watertown Dam), have resulted in significant and steady water quality improvement to the Charles River Basin during dry and wet weather conditions, as shown in Figure 5.

Improvement in the quality of Boston Inner Harbor waters is also seen in the changes to *Enterococcus* bacteria counts over the period 1990 to 2008, shown in Figure 6. Improvement was greatest in the Upper Inner Harbor and in Chelsea Creek, which had more serious wet weather pollution problems.

The bacteria data presented in Figure 7 show that water quality conditions improved greatly with the significant increase in wastewater transport and treatment capacity (delivery to the Deer Island Treatment Plant) in the period 1989 to 1991. This increase in delivery capacity greatly reduced CSO discharges at most outfalls. Since then, wet-weather water quality continues to improve in Boston Harbor and its tributary rivers, but at a slower pace, due in part to diminishing returns on wastewater pollution investments and the dominance of other sources of pollution, including urban stormwater. The timeperiods shown in the figure correspond to improvements in MWRA's wastewater transport and treatment systems and the implementation of CSO controls that could affect water quality in the Inner Harbor, as follows.

1989-1991: In this period, MWRA and the CSO communities were eliminating dry weather overflows and implementing other early pollution controls at CSO outfalls. MWRA was completing the "fast-track" pumping improvements at Deer Island and other major wastewater transport improvements that greatly increased the rate and reliability of wet weather flow conveyance to the Deer Island Treatment Plant. Reliable pumping capacity at MWRA's North Main Pump Station on Deer Island increased from about 450 million gallons per day (mgd) in 1988 to more than 700 mgd in 1991. MWRA also ceased the discharge of scum and sludge to Boston Harbor in 1989 and 1991, respectively.

1992-1999: MWRA and the CSO communities implemented the CSO Nine Minimum Controls, including system optimization projects (primarily raising overflow weirs) at more than 100 CSO regulators, and also improved inspection and maintenance programs.

2000-2008: MWRA completed several CSO control projects that reduced or eliminated CSO discharges at outfalls to Boston Inner Harbor and its tributaries, Charles River, Mystic River and Chelsea Creek (see Figure 1). In the same period, efforts were underway by many communities along these waters to control separate urban stormwater pollution.

Figure 4
 Predicted Typical Year CSO Discharge Volumes 1988-2015

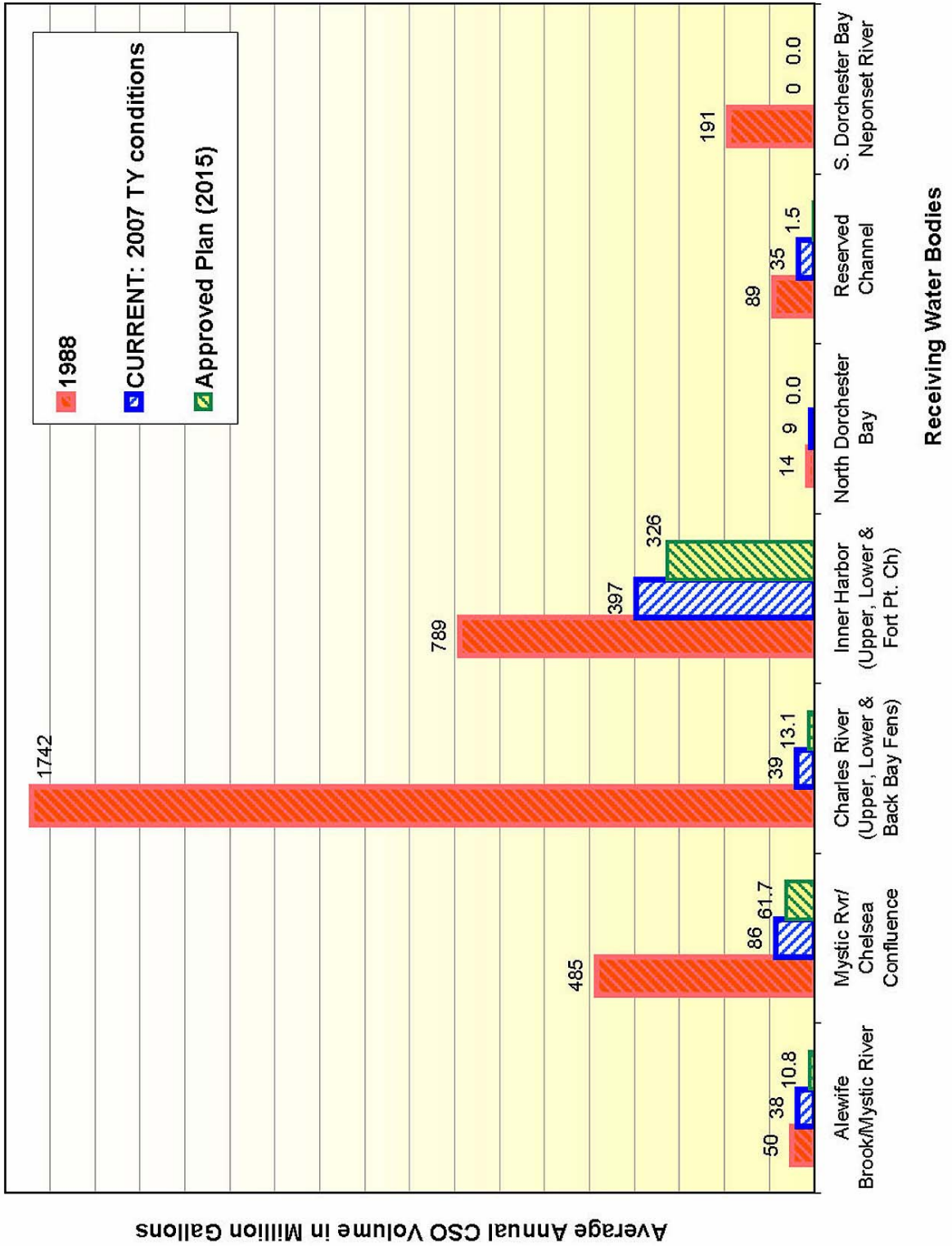
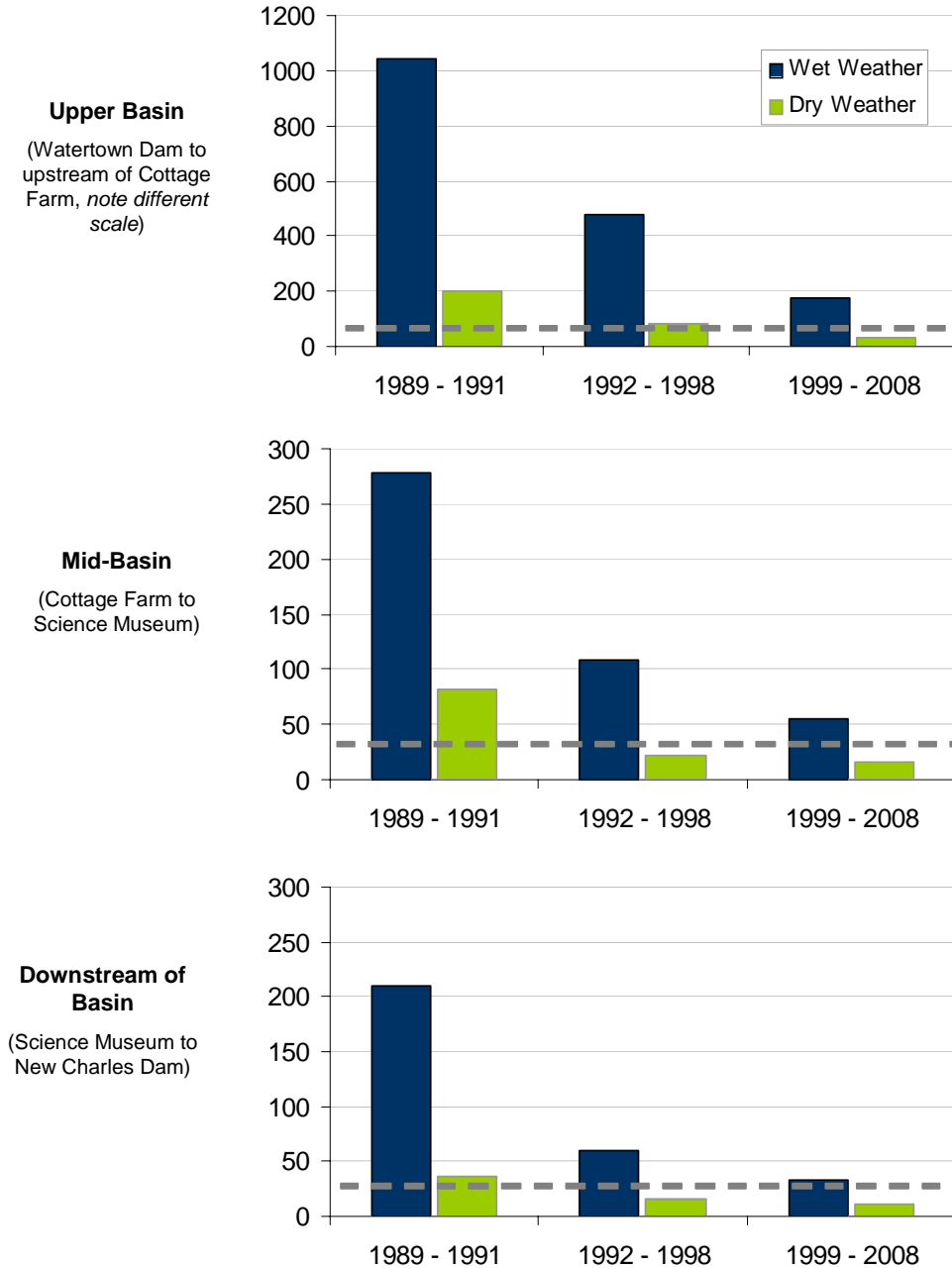


Figure 5
Change in Lower Charles River Water Quality Over Time

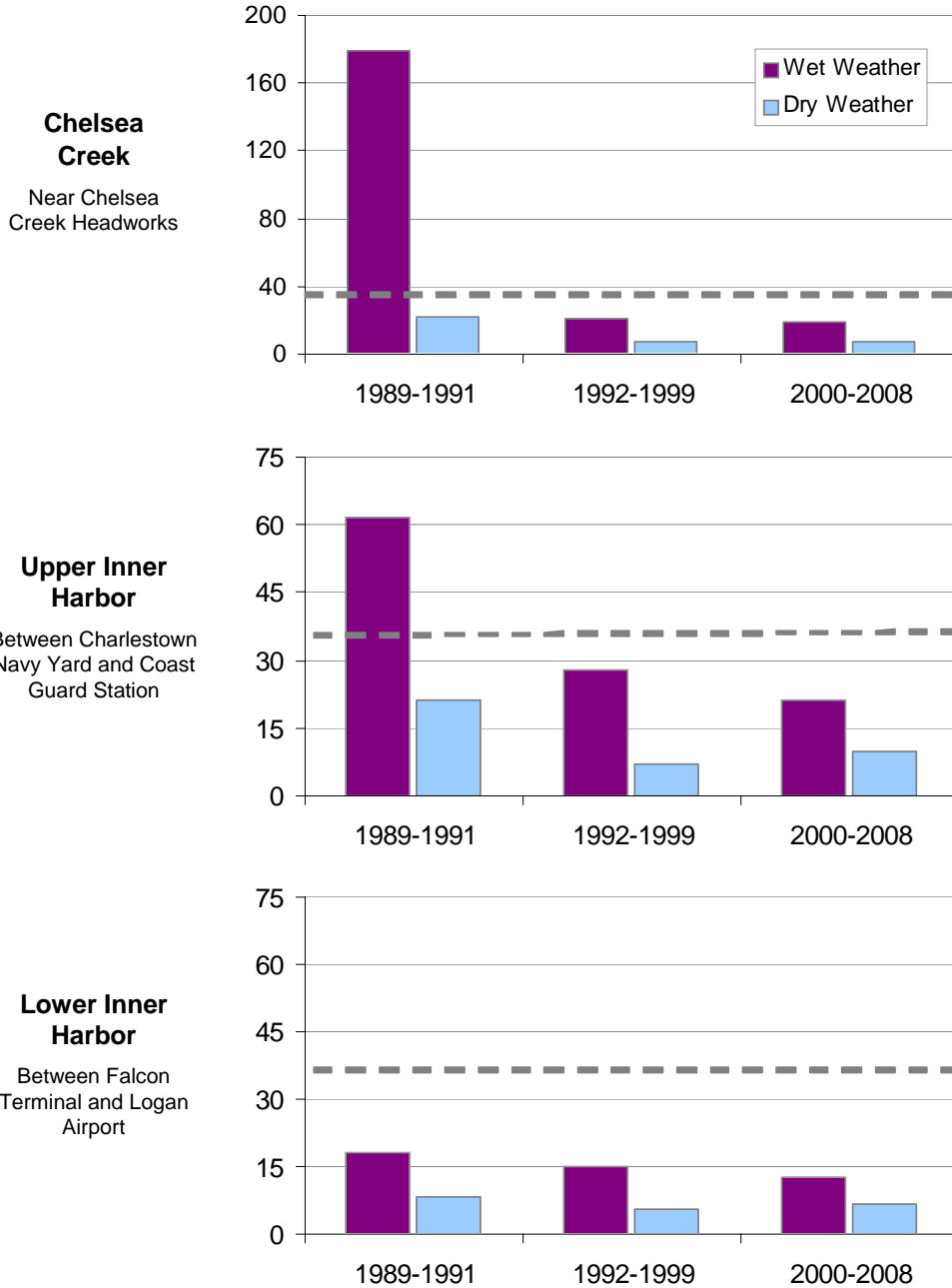
Enterococcus bacteria counts, 1990 - 2008 (note change in scale)



Dotted lines are *Enterococcus* swimming standard for freshwater, 33 counts per 100 mL. Results are *Enterococcus* counts per 100 milliliters water (geometric means). Dry weather is no rain for day of sampling and two previous days; wet weather is >0.5 inches rainfall within two previous sampling days. Other weather conditions are excluded. Results for MWRA stations 001 - 012 and 145, grouped by region.

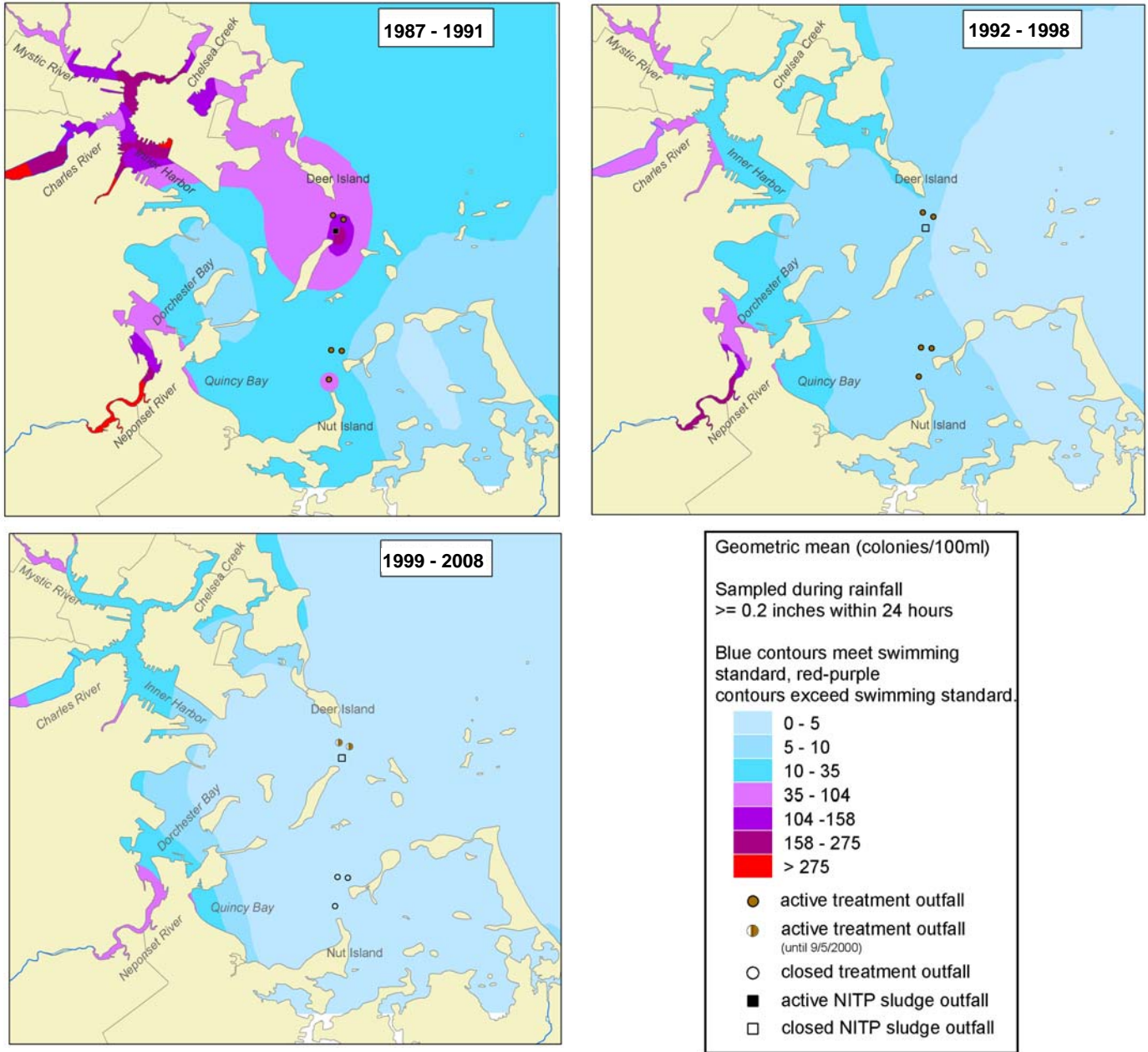
Figure 6
Change in Inner Harbor Water Quality Over Time

Enterococcus bacteria counts, 1990 - 2008 (note change in scale)



Dotted lines are *Enterococcus* swimming standard for marine water, 35 counts per 100 mL. Results are *Enterococcus* counts per 100 milliliters water (geometric mean). Dry weather is no rain for day of sampling and two previous days; wet weather is >0.5 inches rainfall within two previous sampling days. Other weather conditions are excluded. Results for MWRA monitoring stations 027, 014, and 024.

Figure 7
Changes in Boston Harbor *Enterococcus* Counts in Wet Weather



Contours show the geometric means of *Enterococcus* data collected when more than 0.2 inches of rain fell in the previous 24 hours. Blue areas meet the EPA geometric mean standard and red-purple areas exceed the standard.

- 1987 - 1991** This period shows data collected prior to when the Boston Harbor project and CSO plans began, through the last year that sludge was discharged (1991). In wet weather, areas affected by the discharge of sewage and sludge from the Deer Island Treatment Plant and Nut Island Treatment plant, and most of the Inner Harbor and tributary rivers, failed to meet the standard.
- 1992 - 1998** Data from these years reflect the effects of CSO upgrades, the ending of sludge discharge, full pumping at DITP, improved primary and beginning secondary treatment at DITP. Most of the harbor meets standards except for the tributary rivers, Fort Point Channel and along Wollaston Beach.
- 1999 - 2008** The current period shows continued improvement due to the closure of 22 CSO outfalls, upgrades of CSO facilities, ending of harbor treatment plant effluent discharges as the new outfall began operating in 2000, and local efforts to abate stormwater pollution.

4. IMPLEMENTATION SCHEDULE AND COST

4.1 CSO Project Schedules

Most of the CSO projects are complete, and the remaining projects are on schedules that are in accordance with the milestones set forth in Schedule Seven, with the exception of the five projects in the Alewife Brook CSO control plan. The CSO plan for Alewife Brook was reevaluated by MWRA and the City of Cambridge in 2000, revised in 2001, and incorporated into Schedule Seven in July 2006 with new milestones for design and construction. But continuing citizens' appeals of a key wetlands permit further delayed the five projects in MWRA's Alewife Brook CSO control plan by at least 27 months beyond the new milestones. These appeals were substantially resolved allowing MWRA and the City of Cambridge to reach agreement on new, yet still preliminary, project schedules, as well as updated costs and cost shares. In July 2008, MWRA's Board of Directors and the City of Cambridge approved the agreement, and in October 2008, the City of Cambridge was able to resume work to implement the Alewife Brook CSO projects for the first time since 2000. More information about the Alewife Brook projects and project schedules is presented in Section 5.2 of this report.

Table 2 presents the schedules for implementing the 35 projects in the Long-Term Control Plan, including updated schedules for the five Alewife Brook projects. Comparisons of the project schedules to respective milestones in Schedule Seven are included within the individual project reports in Section 5.

4.2 MWRA's CSO Related Capital Budget and Spending Projections

As shown in Figure 8, the total cost of the CSO plan (planning, design and construction) has risen from \$398 million when MWRA issued the Final CSO Conceptual Plan in 1994, to \$487 million when EPA and DEP approved the Final CSO Facilities Plan and Environmental Impact Report in 1997, to \$927.3 million today, as reflected in MWRA's Proposed FY10 CIP. The Proposed FY10 CIP estimate is in December 2009 dollars. MWRA projects to spend \$958.8 million to complete the plan on its current schedule, including escalation to the mid-point of construction and contingency.

In the Proposed FY10 CIP, projected spending on the Long-Term Control Plan in FY09 and beyond totals \$405.1 million, which is 19% of all projected capital spending by MWRA and 33% of wastewater related spending. As shown in Figure 9, annual spending on CSO control escalated greatly in the past few years and peaked in FY08 at \$110.5 million. CSO related spending will continue at high levels over the next few years as more projects move into, or further into, construction, most notably the North Dorchester Bay Facilities (pumping station, force main and remote odor control facility), the East Boston Branch Sewer Relief project, and the Bulfinch, Reserved Channel, Brookline and Cambridge sewer separation projects. CSO related spending is scheduled to continue through FY21, when MWRA will complete the sewer system performance assessment verifying attainment of the CSO levels of control, but spending is expected to drop off precipitously in FY16 when the last CSO project (Reserved Channel Sewer Separation) is scheduled to be completed.

4.3 Cost Risk

The approvals MWRA secured from EPA and DEP in 2006 on the revised Long-Term Control Plan, along with the associated changes to the Court Order, provide MWRA more certainty of the scope of its CSO obligations and related capital program supporting revenue need, borrowing calculations, and determination of future rate increases. However, the remaining projects will continue to carry cost and schedule risk until they are completed. This is in part due to the dense, urban, mostly waterfront environment in which they must be constructed.

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Table 2: CSO Project Cost and Schedules

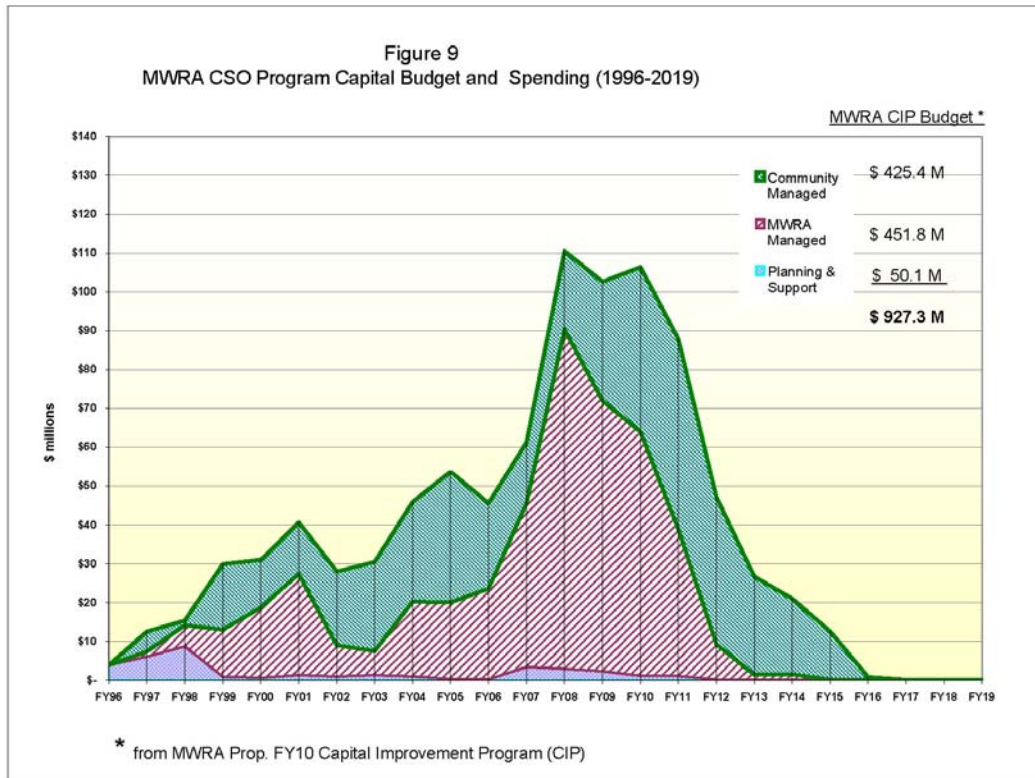
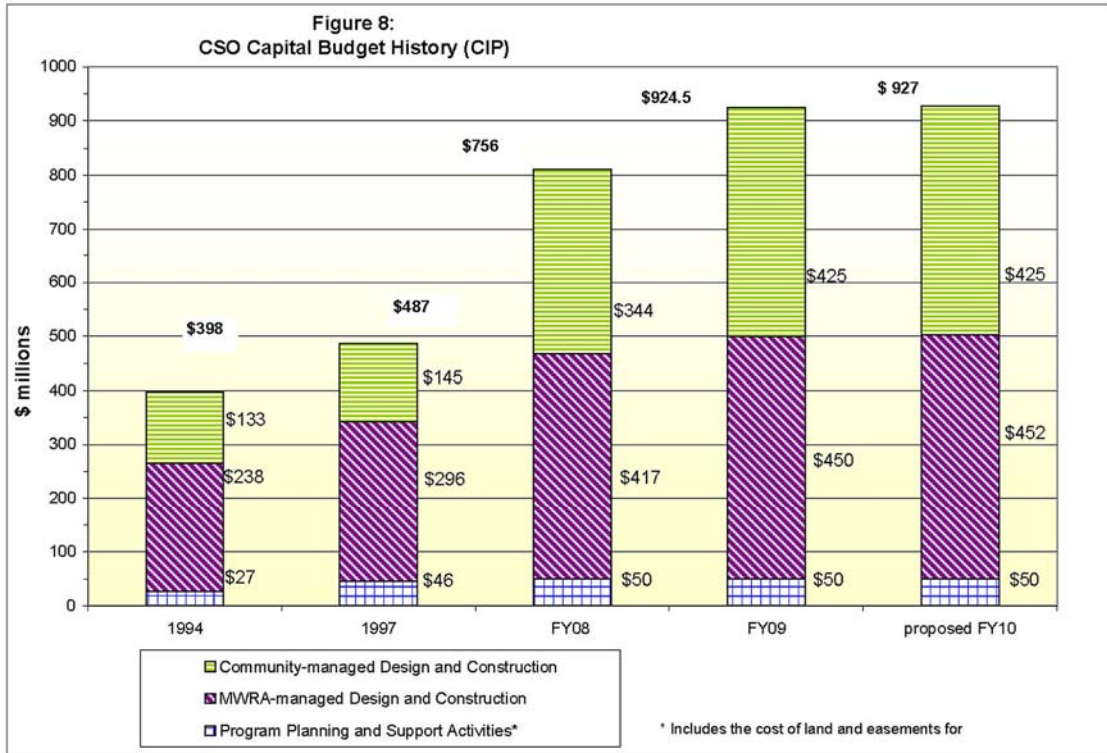
Shading indicates completed project.

Project		Cost*	Commence Design	Commence Construction	Complete Construction
North Dorchester Bay Storage Tunnel and Related Facilities		\$234.7 M	Aug-97	Aug-06	May-11
Pleasure Bay Storm Drain Improvements		3.2	Sep-04	Sep-05	Mar-06
Hydraulic Relief Projects	CAM005 Relief	2.3	Aug-97	Jul-99	May-00
	BOS017 Relief			Jul-99	Aug-00
East Boston Branch Sewer Relief		86.8	Mar-00	Mar-03	Jul-10
BOS019 CSO Storage Conduit		14.3	Jul-02	Mar-05	Mar-07
Chelsea Relief Sewers	Chelsea Trunk Sewer Relief	29.8	Jun-97	Sep-99	Aug-00
	Chelsea Branch Sewer Relief			Dec-99	Jun-01
	CHE008 Outfall Repairs			Dec-99	Jun-01
Union Park Detention and Treatment Facility		49.8	Dec-99	Mar-03	Apr-07
CSO Facility Upgrades and MWRA Floatables Control	Cottage Farm Facility Upgrade	22.4	Jun-96	Mar-98	Jan-00
	Prison Point Facility Upgrade			May-99	Sep-01
	Commercial Point Facility Upgrade			Nov-99	Sep-01
	Fox Point Facility Upgrade			Nov-99	Sep-01
	Somerville-Marginal Facility Upgrade			Nov-99	Sep-01
	MWRA Floatables and Outfall Closings			Mar-99	Mar-00
Brookline Connection and Cottage Farm Overflow Interconn. and Gate		3.2	Sep-06	Jun-08	Jun-09
Charles River Interceptor Gate Controls and Additional Connections		2.4	Jan-08	Jan-10	Jan-11
Prison Point CSO Facility Optimization		n/a	Mar-06	Mar-07	Apr-08
South Dorchester Bay Sewer Separation		117.1	Jun-96	Apr-99	Dec-06
Stony Brook Sewer Separation		44.1	Jul-98	Jul-00	Sep-06
Neponset River Sewer Separation		2.7		Apr-96	Jun-00
Constitution Beach Sewer Separation		3.8	Jan-97	Apr-99	Oct-00
Fort Point Channel Conduit Sewer Separation and System Optimization		11.3	Jul-02	Mar-05	Mar-07
Morrissey Boulevard Storm Drain		36.9	Jun-05	Dec-06	Jun-09
Reserved Channel Sewer Separation		113.3	Jul-06	May-09	Dec-15
Bulfinch Triangle Sewer Separation		9.6	Nov-06	Sep-08	Jul-10
Brookline Sewer Separation		24.0	Nov-06	Nov-08	Jul-13
Somerville Baffle Manhole Separation		\$0.4 M in Planning and Support		Apr-96	Dec-96
Cambridge/Alewife Brook Sewer Separation	CAM004 Outfall and Wetland Basin	60.0		Oct-09**	Oct-11**
	CAM004 Sewer Separation		Jan-97	Jul-98	Apr-15**
	CAM400 Manhole Separation		Oct-08	Oct-09**	Oct-10**
	Interceptor Connection Relief/Floatables		Oct-08	Apr-10**	Mar-11**
	MWR003 Gate and Rindge Ave. Siphon	2.8	Jul-11**	Feb-13**	Apr-14**
Region-wide Floatables Control and Outfall Closings		2.6	Sep-96	Mar-99	Dec-07
Planning & Support		50.2			
Total Cost		\$927.3 M			

* From MWRA Proposed FY10 Capital Improvement Program

** Preliminary schedule - see page 52.

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Some of the project costs in MWRA’s CSO capital budget are based on planning level estimates, and the completion of preliminary design investigations is typically necessary to accurately quantify the construction work and estimate the costs. Subsurface conditions and related engineering requirements are not known until detailed subsurface exploration programs have been conducted, usually during preliminary design. Utilities and utility conflicts are also determined when the layout of new facilities and pipelines is set. For sewer separation projects, the quantity and specific sources of stormwater inflow that must be removed from the existing combined sewer system and carried in a new storm drain system are determined only with intensive field investigations and hydraulic modeling evaluations.

In the past two years, several projects progressed from conceptual planning through preliminary design. These included Brookline Connection/Cottage Farm Overflow Chamber Interconnection and Gate Control; Bulfinch Triangle Sewer Separation, Brookline Sewer Separation, and Reserved Channel Sewer Separation. For all of these projects, preliminary design resulted in significant increases in construction cost estimates. A few projects continue to be at risk of cost changes during design, such as the Reserved Channel Sewer Separation and the Outfall MWR003 Control Gate/Floatables Control and Rindge Avenue Siphon Relief project. On the construction side, the North Dorchester Bay CSO Storage Tunnel was earlier identified as carrying risk for cost change, but the tunnel itself is now complete. There is, however, construction cost risk associated with the East Boston Branch Sewer Relief project with its extensive length of micro-tunneling in congested streets.

5. PROJECT IMPLEMENTATION

This section defines the scope and schedule of each of the projects in the approved Long-Term Control Plan and describes progress made in 2008 and through the first quarter of 2009. Each project section also describes any significant project changes since 2007, as well as any issues that have affected or may affect MWRA’s ability to comply with Schedule Seven. For projects that are not yet complete, each project report begins by presenting the Schedule Seven milestone and updated project schedules.

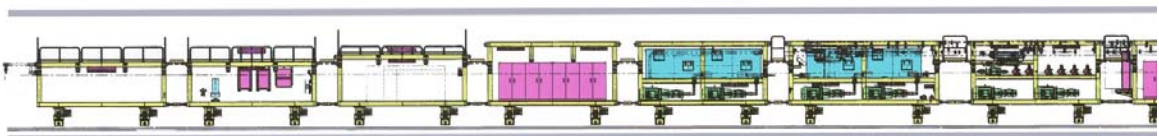
5.1 MWRA Managed Projects

NORTH DORCHESTER BAY STORAGE TUNNEL AND RELATED FACILITIES

	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Construction	August 2006	August 2006
Complete Construction	May 2011	May 2011

Approved Plan and Implementation Schedule

In April 2004, the MWRA Board of Directors voted to approve a revised recommended plan for CSO Control for North Dorchester Bay and the Reserved Channel, and MWRA filed the Supplemental Facilities Plan and Environmental Impact Report (“SFP/EIR”) presenting the revised plan. The recommended plan was subsequently approved by EPA and DEP and incorporated in Schedule Seven. It calls for eliminating CSO discharges up to a 25-year storm and providing up to a 5-year level of separate stormwater control for the North Dorchester Bay (South Boston) beaches.

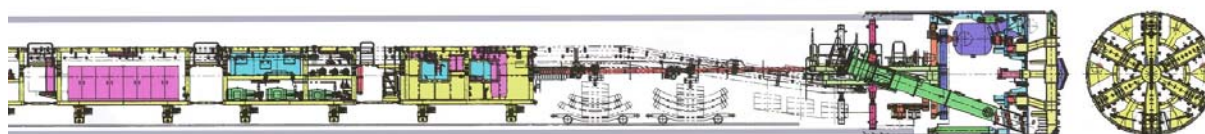


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It also calls for eliminating stormwater discharges to Pleasure Bay by redirecting them to the Reserved Channel. The long-term plan for Reserved Channel is described in Section 5.2 of this report. Components of the approved long-term plan for North Dorchester Bay and their schedules are presented in Table 3. The plan is shown in Figure 10. MWRA’s Proposed FY10 CIP includes a budget of \$284.3 million (December 2009 dollars) for the North Dorchester Bay CSO plan, including the Pleasure Bay and Morrissey Boulevard storm drains and the costs for land and easement acquisition and construction permits. MWRA estimates the total cost to complete the North Dorchester Bay plan to be \$291.8 million with inflation to the mid-point of construction. Once completed, the North Dorchester Bay CSO control plan is expected to eliminate CSO discharges except in catastrophic storms (greater than 25-year storm), compared to 16 discharges per year on average today and 21 discharges prior to the completion in 2007 of the South Dorchester Bay and Fort Point Channel sewer separation projects that greatly reduced the amount of separate stormwater entering the system upstream of the Columbus Park Headworks.

Table 3: Approved Plan for North Dorchester Bay

COMPONENT	DESCRIPTION	PROJECT SCHEDULE		
		Commence Design	Commence Construction	Complete Construction
North Dorchester Bay Storage Tunnel	<ul style="list-style-type: none"> • 10,832-ft. long, 17-ft. diameter soft-ground tunnel with mining shaft and equipment removal shaft • Drop shafts, diversion structures and associated piping at CSO Outfalls BOS081 to BOS086, including gates to control stormwater 	Sep 04	Aug 06	Dec 09
North Dorchester Bay Related Facilities	<ul style="list-style-type: none"> • 15 mgd dewatering pump station at Conley Terminal and 24-inch force main • Odor control facility at upstream end of tunnel 	Nov 06	Apr 09	May 11
Pleasure Bay Storm Drain Improvements	<ul style="list-style-type: none"> • Stormwater piping and appurtenances to relocate stormwater discharges from Pleasure Bay to Reserved Channel 	Sep 04	Sep 05	Mar 06
Morrissey Boulevard Storm Drain	<ul style="list-style-type: none"> • 2,800-foot long, 12x12 foot box conduit for stormwater conveyance to Savin Hill Cove/South Dorchester Bay • Gated connection to CSO Storage Tunnel 	Jun 05	Dec 06	Jun 09



The project includes the control of separate stormwater discharges to the South Boston beaches. It is important to note that MWRA has no statutory or regulatory responsibility for managing separate stormwater and that this project and its various stormwater elements do not set a precedent for MWRA to adopt such responsibilities.

With the project, separate stormwater discharges from drainage systems owned and operated by BWSC and the Department of Conservation and Recreation (DCR) will occur only in storms greater than the 5-year design storm (or once every five years on average), compared to current discharges with every rainstorm (100 times per year on average). Stormwater now discharging to the beaches will be redirected into the CSO tunnel in most storms. Stormwater control was added to the North Dorchester Bay CSO control plan to optimize the water quality benefits of the CSO project by taking advantage of the otherwise unused portion of storage volume in the large North Dorchester Bay tunnel in storms smaller than the 25-year design storm.

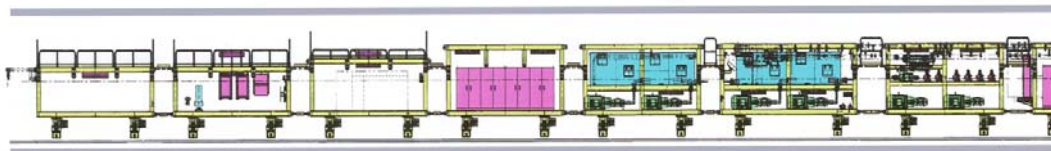
BWSC stormwater discharges from the Outfall BOS087 area to Carson Beach will be removed from the beach by directing the flows into the CSO tunnel up to the 1-year storm. In storms greater than the 1-year design storm, the BOS087 stormwater will be redirected through the proposed Morrissey Boulevard Storm Drain to a non-swimming area of South Dorchester Bay (Savin Hill Cove). Approximately one million gallons of the “first flush” of stormwater from the BOS087 tributary area will be diverted to the new tunnel up to the 5-year storm event. It is this redirection of some stormwater that allows the project to attain a 5-year level of stormwater control for the beaches.

In March 2006, MWRA completed construction of the Pleasure Bay storm drain improvements, ending wet weather discharges to Pleasure Bay Beach and physically removing a dozen outfalls. The project relocated the Pleasure Bay stormwater discharges to the less sensitive Reserved Channel, which is primarily a shipping channel. BWSC is managing implementation of the Morrissey Boulevard storm drain and Reserved Channel sewer separation projects under the CSO Memorandum of Understanding and Financial Assistance Agreement. More information about the Morrissey Boulevard storm drain and Reserved Channel sewer separation projects, including work progress, is presented in Section 5.2 of this report.

Progress in 2008 and Ongoing Work

MWRA continues to make substantial progress to implement the CSO control plan for the South Boston beaches, including construction of the North Dorchester Bay CSO storage tunnel and final design of tunnel related facilities that include the dewatering pumping station, force main and remote odor control facility.

In 2008, the contractor for the CSO Storage Tunnel accomplished major work with the tunnel, the CSO and stormwater diversion systems, and related utilities and control equipment. On August 13, 2008, MWRA’s contractor completed the 10,832-foot long, 17-foot diameter soft-ground tunnel ahead of the contract schedule when the tunnel boring machine (TBM) “holed-through” into the retrieval shaft at the upstream end of the tunnel. The contractor was able to mine and line the entire tunnel six months earlier than the contract schedule and only 10 months after commencing the mining operation at the Conley Terminal shaft in October 2007.



After completing the tunnel, the contractor immediately disassembled and removed the TBM from the retrieval shaft and installed the five horizontally drilled connections (adits) between the tunnel and the diversion system drop shafts at the existing CSO outfalls that will remain in service. The contractor then removed the rail system, electric supply lines, ventilation system and other construction staging and equipment from the tunnel.

By late December 2008, the contractor completed internal inspections, punch list items, finish work and cleaning in the tunnel. The contractor's tunneling crew demobilized and cleared out of the mining shaft work site at Conley Terminal in January 2009. The contractor is completing the concrete lining and roof



structure at the retrieval shaft at the upstream end of the tunnel and is preparing to install the concrete lining and roof structure in the mining shaft. Once the shaft work is complete, the contractor can make space at the Conley Terminal work site available for a separate contractor to mobilize for construction of the dewatering pump station and force main.

MWRA also moved forward with final design of the 15 million gallons per day dewatering pumping station at the downstream end of the tunnel at Conley Terminal and the 24-inch dewatering force main, and with the remote odor control facility at the upstream end of the tunnel

that is now part of a separate contract package. MWRA completed final design of the dewatering pumping station and force main and advertised the construction contract documents on December 27, 2008.

In 2008, the contractor also completed the CSO and stormwater diversion chambers and most of the diversion piping at Outfalls BOS085, BOS086 and BOS087. The contractor completed restoration work at Moakley Park and laid final paving to restore Babe Ruth Drive and Columbia Road in the area of the BOS085 and BOS086 construction. The contractor also completed trench excavation and cable installation for an NStar duct bank near Outfall BOS087 and completed the connection of a new storm drain to existing separate stormwater drainage at Logan Way, upstream of Outfall BOS086. Installation of the drainage system along Logan Way is delayed until May 2009 due to a redesign that is necessary to avoid subsurface utilities and related hazardous material. The new drain and connection will facilitate the separate diversion of stormwater and CSO into the tunnel at this outfall. MWRA has inspected the diversion chambers and piping at Outfalls BOS085, BOS086 and BOS087, and the contractor is now addressing punch list repairs. In addition, the contractor is making repairs to certain gate control structures, before the CSO and stormwater gates can be inspected and tested for final acceptance.



The contractor also completed the diversion conduits to redirect CSO and stormwater flows from Outfall BOS083 to Outfall BOS084, allowing Outfall BOS083 to be permanently closed when the Outfall BOS084 diversion structures are completed. The contractor is also well along with construction of the CSO and stormwater diversion chambers and related piping at Outfalls BOS081, BOS082 and BOS084, but severe winter weather conditions this year have slowed down the progress of this work. The contractor plans to complete the remaining diversion chambers and piping by the Summer of 2009 and expects to substantially complete the tunnel construction contract by December 2009.

MWRA obtained construction permits for the work, including City of Boston Public Improvement Commission Grant of Location License, Boston Conservation Commission Order of Conditions, Massachusetts Coastal Zone Management Consistency Certification and the Federal Aviation Administration. MWRA submitted construction documents to the Boston Fire Department (BFD) and plans to coordinate with BFD during construction of the pumping station and force main as an extension of the coordination that has been in place during construction of the tunnel. With the documents, permits and preparations in place, MWRA plans to award the dewatering pump station and force main contract in April 2009.

In the meantime, MWRA is redesigning and preparing construction contract documents for the belowground remote odor control facility. The facility will be constructed at the upstream end of the tunnel, adjacent to the retrieval shaft. MWRA expects to complete the bid documents and advertise and award the construction contract for this facility by December 2009.

All construction work related to the North Dorchester CSO plan, including connecting the facilities to the tunnel and bringing the tunnel into operation, is scheduled to be complete by May 2011, in compliance with Schedule Seven.

Pleasure Bay Storm Drain Improvements

On March 28, 2006, MWRA completed construction of the Pleasure Bay storm drain improvements (see figure below) ending wet weather discharges to Pleasure Bay beach. The work was completed ahead of the Schedule Seven milestone and well before the start of the 2006 swimming season.

The larger, northern leg of the storm drain system that rings Pleasure Bay from Castle Island to Marine Park now conveys storm flows to Outfall BOS080, which discharges to the Reserved Channel at Conley Terminal. Sediment controls were incorporated into the design of the new drainage system. The smaller southern leg of the new storm drain system, near Kelly's Landing and the City Point parking lot, is no longer connected to the beach outfalls, but instead connects to Outfall BOS081, which will eventually be tied into the CSO storage tunnel.



North Dorchester Bay and Reserved Channel Recommended CSO Control Plans



Figure 10

——— Tunnel
 - - - - - Dewatering Force Main
 - - - - - Storm Drain

HYDRAULIC RELIEF PROJECTS AT CAM005 AND BOS017

MWRA completed construction of these two projects in 2000, at a cost of \$2.3 million. A single construction contract combined two localized hydraulic relief projects, one in Cambridge to minimize CSO discharges at Outfall CAM005, which discharges to the Charles River Basin, and the other in Charlestown to minimize CSO discharges at Outfall BOS017, which discharges to the lower Mystic River. In Cambridge, the 24-inch diameter, 40-foot long dry weather connection between the CAM005 regulator and MWRA’s North Charles Metropolitan Sewer, adjacent to Mt. Auburn Hospital, was relieved with a new 54-inch connection. In Charlestown, 190 feet of 36-inch pipe was installed in Sullivan Square to supplement the existing connection from two BWSC combined sewers to MWRA’s Cambridge Branch Sewer, thereby relieving the original dry weather connection and reducing overflows at the BOS017 regulator. In addition, a 10-foot long restriction between the Charlestown and Cambridge Branch Sewers, adjacent to Sullivan Square, was removed, improving hydraulic performance lines in the Charlestown Branch Sewer during wet weather and relieving CSO overflow conditions upstream, at Outfall BOS019.

EAST BOSTON BRANCH SEWER RELIEF

	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	March 2000	March 2000
Commence Construction	March 2003	March 2003 (Contract 1)
Resume Design	June 2006	June 2006
Commence Construction	June 2008	July 2008 (Contract 2) April 2009 (Contract 3)
Complete Construction	June 2010	June 2004 (Contract 1) July 2010 (Contract 2) July 2010 (Contract 3)

The \$86.0 million East Boston Branch Sewer Relief project calls for relief of MWRA’s interceptor system serving most of East Boston to minimize CSO discharges to Boston Harbor and Chelsea Creek through Outfalls BOS003-014. The current plan, originally recommended in the 1997 Facilities Plan/EIR, includes replacing, relieving or rehabilitating approximately 4.5 miles of existing interceptor sewers using a combination of construction methods: micro-tunneling, pipe bursting, open-cut excavation and pipe relining.

MWRA commenced design services in March 2000, in compliance with the Court Schedule. Early design plans called for three construction contracts to implement the project. In 2002, MWRA suspended the design work on two of the contracts when it determined that the original plan would cost twice as much as estimated in the 1997 Facilities Plan/EIR and would not fully attain the recommended level of CSO control. MWRA continued design work on the first construction contract, which involved relining portions of the existing East Boston Branch Sewer to extend the useful life of the sewer and improve its hydraulic capacity. At the same time, MWRA began a reassessment of the remaining project components, to evaluate the cost effectiveness of the plan against alternatives that might provide higher benefit and/or cost less.



MWRA completed the project reassessment in early 2004. One conclusion from the reassessment was that CSO overflows in East Boston were slightly less than estimated in 1997. The number of CSO discharges at the most active outfall dropped from the previously estimated 37 per year in the 1997 Plan to 31 per year. The total annual volume of CSO discharge from all 10 outfalls in East Boston dropped from 45 million gallons to 41 million gallons. The results confirmed that the interceptor relief project (Figure 11), at a total estimated capital cost of \$73 million at that time (December 2003 dollars), would reduce CSO discharges from 31 to six in a typical year and reduce annual discharge volume from 41 million gallons to 8.6 million gallons, compared to the 1997 plan goals of five activations and 4.0 million gallons.

Based on the results of the reassessment, MWRA determined that the interceptor relief plan, even at the higher cost estimate, continued to be cost-effective and would significantly reduce CSO discharges at all of the East Boston outfalls, keeping with the intent and benefits of the 1997 plan. Ongoing work by BWSC and others to separate sewers in East Boston is expected to further reduce CSO discharges. The reassessed interceptor relief project, with its revised CSO discharge activations and volume was incorporated into Schedule Seven in 2006 with new design and construction milestones.

MWRA commenced a first construction contract to rehabilitate the main trunk of the existing interceptor in March 2003, in compliance with the Court Schedule, and completed this contract in June 2004. Construction of a second contract is underway, and a third contract is in final design, as described below.

Progress in 2008 and Ongoing Work

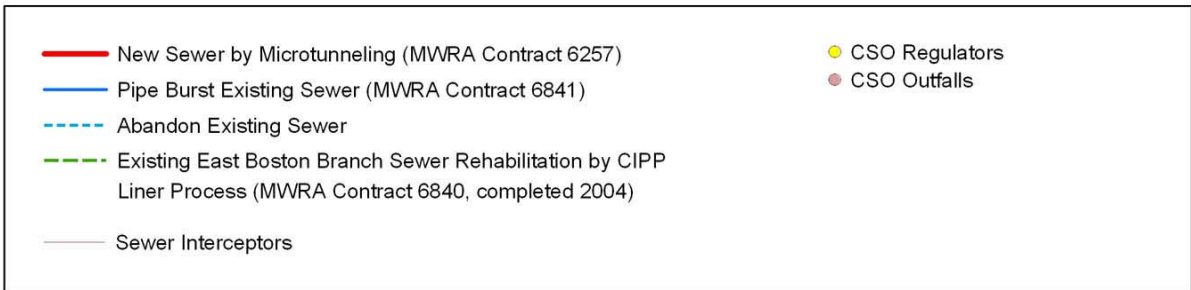
On July 29, 2008, MWRA issued the Notice to Proceed for the second, and largest, construction contract for East Boston Branch Sewer Relief, Contract 6257, at an award amount of \$59.9 million. The 24-month contract commenced one month later than planned by MWRA and required by Schedule Seven. MWRA had to extend the bid period in response to questions and requests from contractors that arose primarily from the

difficult nature of the shaft construction and tunneling in East Boston streets. Contract 6257 involves the installation of 2.5 miles of new sewer interceptor along Border, Condor, East Eagle and Chelsea Streets and along Marginal, Orleans and Bremen Streets primarily using micro-tunneling methods to reduce conflicts with heavily congested utilities and high traffic volumes along the East Boston streets. Nonetheless, utility conflicts continue to be a critical and difficult issue in East Boston, and MWRA is working closely with its contractor and the utility owners to resolve conflicts as they are identified. As this work



progresses, relocation of utilities may impact the 24-month construction schedule for this contract, and similar difficulties in addressing utility conflicts may affect the schedule for completing the third, and final, contract, Contract 6841, discussed later in this section.

Figure 11
 East Boston Branch Sewer Relief
 Hydraulic Relief Plan



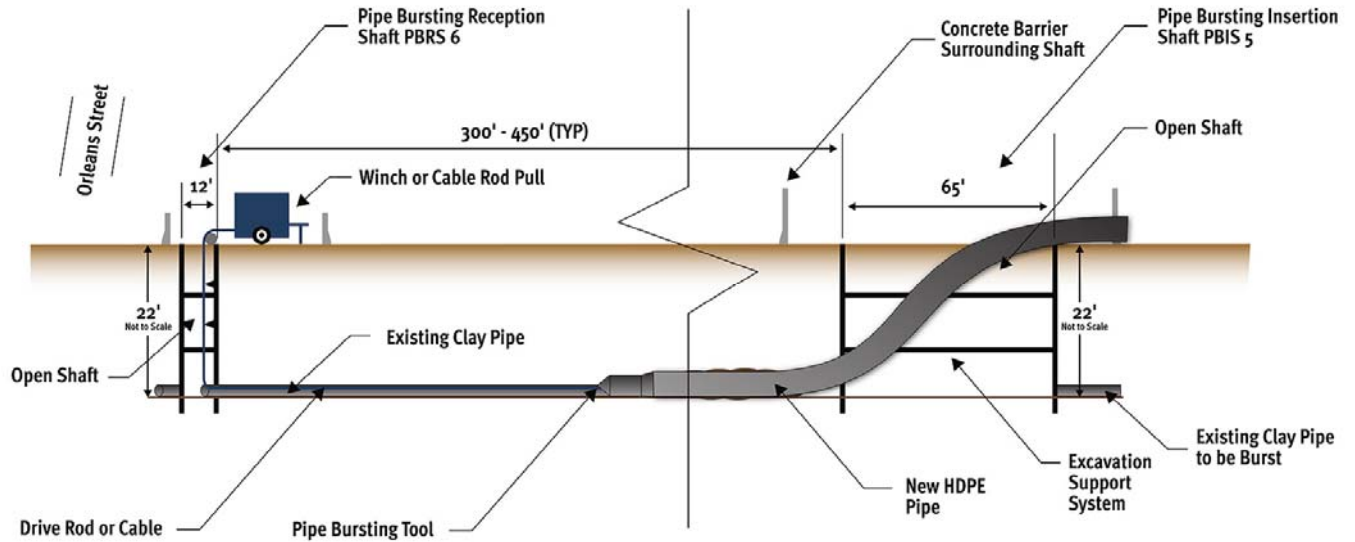
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The contractor for Contract 6257 has made progress with early construction related activities. The contractor is continuing with pre-construction surveys and the setting of control points. The contractor is also continuing with mapping utilities with Dig Safe at the various shaft locations and conducting test pit excavations to layout or revise the layout of micro-tunneling shafts along Chelsea Street, East Eagle Street, Condor Street and Border Street. Several shaft layout changes have been made to address utility conflicts. At several shaft locations, the contractor's work to install piles, support excavation, support utilities and excavate the shafts is also well underway. The contractor received a 48-inch diameter micro-tunnel boring machine (MTBM) in December 2008 and plans to receive a second 48-inch MTBM for simultaneous bores. The contractor will temporarily convert one of these machines to bore the 66-inch diameter pipe sections of the planned work.

The contractor holds biweekly utility coordination meetings with NSTAR, NationalGrid, Comcast, Verizon, Massachusetts Bay Transit Authority (MBTA), and BWSC to identify utility conflicts and plan mitigation on a case by case basis for each shaft location. The contractor and MWRA are also coordinating the work of this project with the ongoing reconstruction of the Chelsea Street bridge by the Massachusetts Highway Department ("MassHighway") and with construction by NationalGrid and ConocoPhillips in the area. At the outset of construction, the contractor and MWRA held a series of public meetings, as well as meetings with the City of Boston Public Works Department, to coordinate the construction work and gain a waiver from the City's winter moratorium on excavations (November to April).

Proposed construction changes include revised shaft locations, additional utility relocations, and recommendations from the ongoing coordination with active or proposed construction projects by others, especially NationalGrid's continuing construction of a 24-inch diameter gas main in Chelsea Street that is scheduled to be complete in June 2009 and MassHighway's reconstruction of Chelsea Street Bridge that recently commenced. The 24-month contract duration cannot be shortened and calls for substantial completion by July 2010, one month beyond the respective milestone in Schedule Seven, due to the one-month later start in July 2008 mentioned above. Any extension of the contract duration due to utility conflicts or other construction difficulties will push the current schedule for completion of the interceptor relief project beyond July 2010 day for day. In addition to utility conflicts, MWRA will continue to address any other potential work and schedule changes the contractor may propose, including changes that may arise from impacts to the CSO work by other construction projects in the area, including projects being implemented by BWSC, Boston Public Works Department, MassHighway, NationalGrid and ConocoPhillips.

Meanwhile, MWRA continues to make progress with design of the third East Boston construction contract, Contract 6841. This last contract involves replacing and upgrading approximately one mile of interceptor pipe in upstream areas using "pipe bursting" methods, whereby a new, larger pipe is installed in the same place as the smaller existing pipe by pushing through and breaking up the old pipe. Excavation is limited to setup locations from where the new pipe will be driven and locations where connections must be made and where the utilities (e.g. electric, gas) are slated to be relocated by each utility owner. MWRA's design consultant is finalizing the contract plans and specifications for advertising, and MWRA plans to award this last contract in April 2009, with a substantial completion date of July 2010.



Pipe Bursting Typical Cross Section

BOS019 CSO STORAGE CONDUIT

On March 31, 2007, MWRA completed construction of the \$14.3 million CSO storage conduit at Outfall BOS019, between the Tobin Bridge and Chelsea Street in Charlestown. The new facility includes twin, 280-foot long, 10-foot by 17-foot underground concrete conduits that provide 670,000 gallons of overflow storage capacity to capture most of the CSO flow that otherwise would be discharged to the Little Mystic Channel at Outfall BOS019. The facility also includes an aboveground pump-out facility and an underground influent gate house. Stored flows are pumped back to the interceptor system for conveyance to Deer Island after each storm passes and system capacity becomes available. The aboveground building houses the dewatering equipment, as well as the activated carbon odor control system for treating the air that is displaced when the conduit fills with combined sewage.



With the completion of this project, typical year CSO activations from Outfall BOS019 to the Little Mystic Channel have been reduced from 13 to two, and the typical year volume has been reduced from 4.4 million gallons to 0.6 million gallons, an 86% reduction. Because the outfall remains active in a typical year, MWRA installed underflow baffles within the upstream CSO regulators to provide floatables control.

CHELSEA RELIEF SEWERS

Chelsea Trunk Sewer Replacement

MWRA completed this \$4.1 million project in 2000. The 1997 Facilities Plan/EIR recommended replacing a trunk sewer in Chelsea with larger pipe to minimize CSO discharges to the Mystic River/Chelsea Creek Confluence at Outfalls CHE002, CHE003 and CHE004. The pre-existing Chelsea Trunk Sewer, which varied in diameter from 8 inches to 15 inches, was replaced with 2,300 feet of 30-inch diameter pipe. MWRA also replaced or rehabilitated sections of the CHE002 and CHE003 outfalls. MWRA managed the design and construction, but the City of Chelsea retains ownership and the responsibility for operation and maintenance of the sewer and outfalls.

Chelsea Branch Sewer Relief

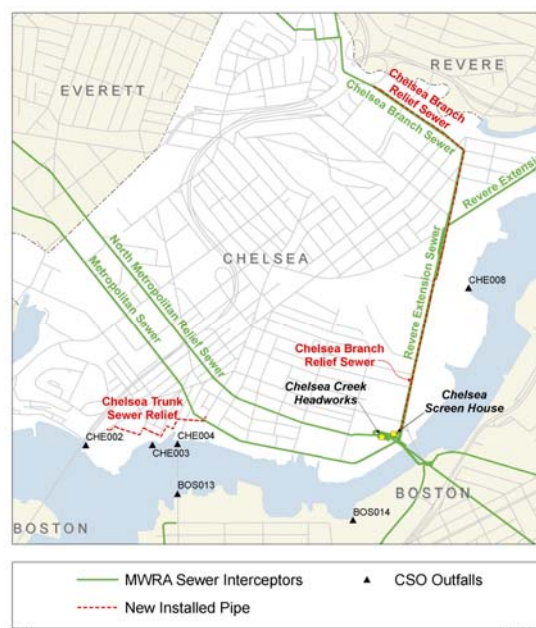
MWRA completed this \$25.7 million project in 2001. The 1997 Facilities Plan/EIR recommended relieving MWRA's Chelsea Branch Sewer to minimize CSO discharges to Chelsea Creek at Outfall CHE008 and reduce surcharging in the upstream transport system. MWRA installed 4,200 feet of 42-inch pipe and 3,500 feet of 66-inch pipe along Cabot Street and Eastern Avenue to replace or relieve MWRA's Chelsea Branch Sewer and Revere Extension Sewer, which lie parallel along Eastern Avenue. The new pipes were constructed primarily using micro-tunneling methods. The construction contract also included repairs to the existing CSO outfall at CHE008.

CHE008 Floatables Control and Outfall Repairs

This project was completed in 2001 as part of the Chelsea Branch Sewer Relief construction contract. Outfall repairs at CHE008 included relining approximately 540 feet of the existing 42-inch outfall pipe, replacing 35 feet of the pipe at its downstream end, replacing the headwall, and laying new riprap shore protection. An underflow baffle was installed in the sole regulator structure associated with this outfall, to provide floatables control.

UPGRADES TO EXISTING CSO FACILITIES

MWRA upgraded five CSO treatment facilities (Commercial Point, Cottage Farm, Fox Point, Prison Point and Somerville Marginal) to improve treatment performance and meet new residual chlorine discharge limits. All of the upgraded facilities were fully operational by early 2003. The facility upgrades generally included the replacement of the existing chlorine disinfection systems with improved systems and the addition of dechlorination systems, as well as other process control and safety improvements. The total cost of the project was \$22.4 million. Commercial Point and Fox Point were decommissioned in 2007 (see "South Dorchester Sewer Separation" in Section 5.2).



UNION PARK DETENTION AND TREATMENT FACILITY

The purpose of the \$50 million Union Park Detention and Treatment Facility is to improve water quality in the Fort Point Channel by providing storage and treatment of CSO flows that are directed to BWSC’s Union Park Pump Station. The existing pumping station, constructed in 1976, provides flood control for the South End neighborhood of Boston. On April 26, 2007, MWRA substantially completed construction of the facility, placed all storage and treatment operations on-line, and commenced the period of start-up and optimization provided for in Footnote 35 of Schedule Seven.⁴ The new facility has reduced CSO discharges from the Union Park facility from 25 activations in a typical year with an average annual untreated discharge volume of 132 million gallons to 17 activations in a typical year with an average annual treated discharge volume of 71.4 million gallons.



The facility includes coarse screens, fine screens, chlorination with sodium hypochlorite, dechlorination with sodium bisulfite and odor control equipment. A new building was constructed adjacent to the existing pumping station to house the new treatment equipment. In smaller storms that cause overflow to the facility, the underground detention basins can capture all of the overflow, thereby reducing the average annual number of pumping station discharges to the Fort Point Channel. In larger storms, when the overflow exceeds the storage capacity, the detention basins lower the velocity of flow passing through the facility, allowing solids to settle to the bottom of the basins and thereby reducing biochemical oxygen demand and total suspended solids in the flow prior to discharge.

BROOKLINE CONNECTION/COTTAGE FARM OVERFLOW CHAMBER INTERCONNECTION AND GATE CONTROL

	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	September 2006	September 2006
Commence Construction	June 2008	June 2008
Complete Construction	June 2009	June 2009

The Brookline Connection and Cottage Farm Overflow Chamber Interconnection and Gate Control project is intended to reduce treated CSO discharges from the Cottage Farm CSO Facility to the Charles River Basin by increasing the conveyance of related wet weather flows to MWRA’s Ward Street Headworks and Deer Island Wastewater Treatment Plant. The project involves modifications to existing MWRA facilities on both the Cambridge side and the Boston/Brookline side of the Charles River. These modifications will improve the conveyance capacities of the two MWRA sewers already in service that carry flows across the Charles

⁴ Footnote 35 in Schedule Seven defines the start-up period for new or upgraded CSO treatment facilities as “a period of start-up and systems optimization consisting of five activations of at least four hours duration each, which is to culminate in the consistent achievement of effective treatment of flows, as defined by NPDES permit requirements.” Since the start-up phase began on April 27, 2007, the Union Park Detention and Treatment Facility has experienced four activations of at least four hours duration.

River and will bring into service a previously unused 54-inch diameter sewer (the “Brookline Connection”) constructed nearly 40 years ago by MWRA’s predecessor, the Metropolitan District Commission.



Demolition activity within the existing Boston junction chamber to connect the 54-inch Brookline Connection pipe to the 108-inch South Charles Relief Sewer.

The specific goal of the project is to reduce treated CSO discharges from the Cottage Farm CSO Facility from a typical year average of six activations with a total volume of 28.8 million gallons, to two activations with a total volume of 6.3 million gallons. To accomplish this, the project includes the following optimization improvements (see Figure 12):

- Activation of the existing (but never utilized) 54-inch “Brookline Connection” that crosses beneath the Charles River from the influent chamber of the Cottage Farm CSO Facility in Cambridge to the South Charles Relief Sewer junction chamber in Boston, including the construction of an improved connection with the South Charles Relief Sewer along Soldier’s Field Road and replacement of a sluice gate outside the Cottage Farm CSO Facility.
- Construction of a pipe interconnection between the existing North Charles Relief Sewer overflow chamber and the South Charles Relief Sewer overflow chamber outside the Cottage Farm CSO Facility, as well as modifications to the chambers, including replacement of sluice gates.
- Installation of five remote water level monitoring devices - four upstream and one downstream of the Cottage Farm CSO Facility - to optimize the operation of the influent gates at the facility.

During design, MWRA also evaluated the feasibility and benefit of raising the weirs within the overflow chambers, but determined that higher weirs would not improve CSO control beyond the benefits provided by the other improvements.

Cottage Farm Brookline Connection and Inflow Controls



The Brookline Connection was one of three pipes constructed across the Charles River in 1970 as part of the construction of the Cottage Farm Facility. It was intended to carry excess flows from Brookline to Cottage Farm during large storms, but became unnecessary before it was brought on-line because sewer separation programs in Brookline had reduced flows to a greater extent than earlier predicted. In 2005, MWRA opened a chamber at one end, inspected the 54-inch diameter pipe for the first time since it was constructed, and found it to be in excellent condition. The current project calls for utilizing the pipe in reverse direction, carrying wet weather flows away from the Cottage Farm Facility and towards the Ward Street Headworks.

Progress in 2008 and Ongoing Work

On June 30, 2008, MWRA issued the Notice to Proceed with the \$1,976,000 construction contract for this project, in compliance with Schedule Seven. This project was the first to move into construction of four projects MWRA added to the CSO control plan for the Charles River in its 2006 agreement with EPA and DEP that supported regulatory approval of the Long-Term Control Plan.

Construction activities in 2008 included execution of subcontractor agreements and equipment purchases; submittals on the earth support system, dewatering system, and groundwater treatment; preconstruction surveys; and mobilization of equipment onto the Cottage Farm site. Work is in progress on the Cambridge side of the river to construct the piped interconnection between the two, deep overflow chambers adjacent to the Cottage Farm Facility. The contractor has completed the installation of geotechnical monitoring equipment, including groundwater wells, settlement markers and utility monitoring points. The contractor installed four deep wells and commenced dewatering to the Charles River under an EPA NPDES permit and with a temporary groundwater treatment system.



Sheet pile installation at Cambridge Cottage Farm CSO facility for new PCCP pipe interconnection between the North and South Overflow Chambers.

The sheet pile installation to support excavation for the new pipe connection between the North and South overflow chambers is in place. The contractor has completed the excavation to sub-base and commenced installation of the pipe bedding. The contractor also has completed demolition of the existing sluice gates in the North and South Charles Relief overflow chambers and in the Brookline Connection chamber, and has installed the new sluice gate in the Brookline Connection chamber.

In January 2009, the contractor commenced work at the junction chamber on the Boston side of the Charles River and at the remote flow monitoring sites concurrent with

completing the work adjacent to the Cottage Farm Facility. The contractor is performing demolition work within the existing junction chamber to allow the 54-inch Brookline Connection to be physically and hydraulically joined with the South Charles Relief Sewer. The contractor has poured a new structural beam within the junction chamber that will carry the loads required to complete structural demolition to provide the planned connection with the South Charles Relief Sewer. The contractor's ongoing work at the remote flow monitoring sites includes the installation of conduits and concrete pads for the control cabinets.

The construction contract calls for substantial completion of all work related to system performance and CSO control by June 30, 2009, in compliance with Schedule Seven, and the contractor expects to meet that date. Surface restoration to comply with conditions in wetlands permits issued by the Boston and Cambridge Conservation Commissions will continue beyond June 2009.

**CHARLES RIVER VALLEY/SOUTH CHARLES RELIEF SEWER GATE CONTROLS
AND ADDITIONAL INTERCEPTOR CONNECTIONS**

	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	January 2008	January 2008
Submit Report on Additional Connections	January 2009	January 2009
Commence Construction	January 2010	January 2010
Complete Construction	January 2011	January 2011

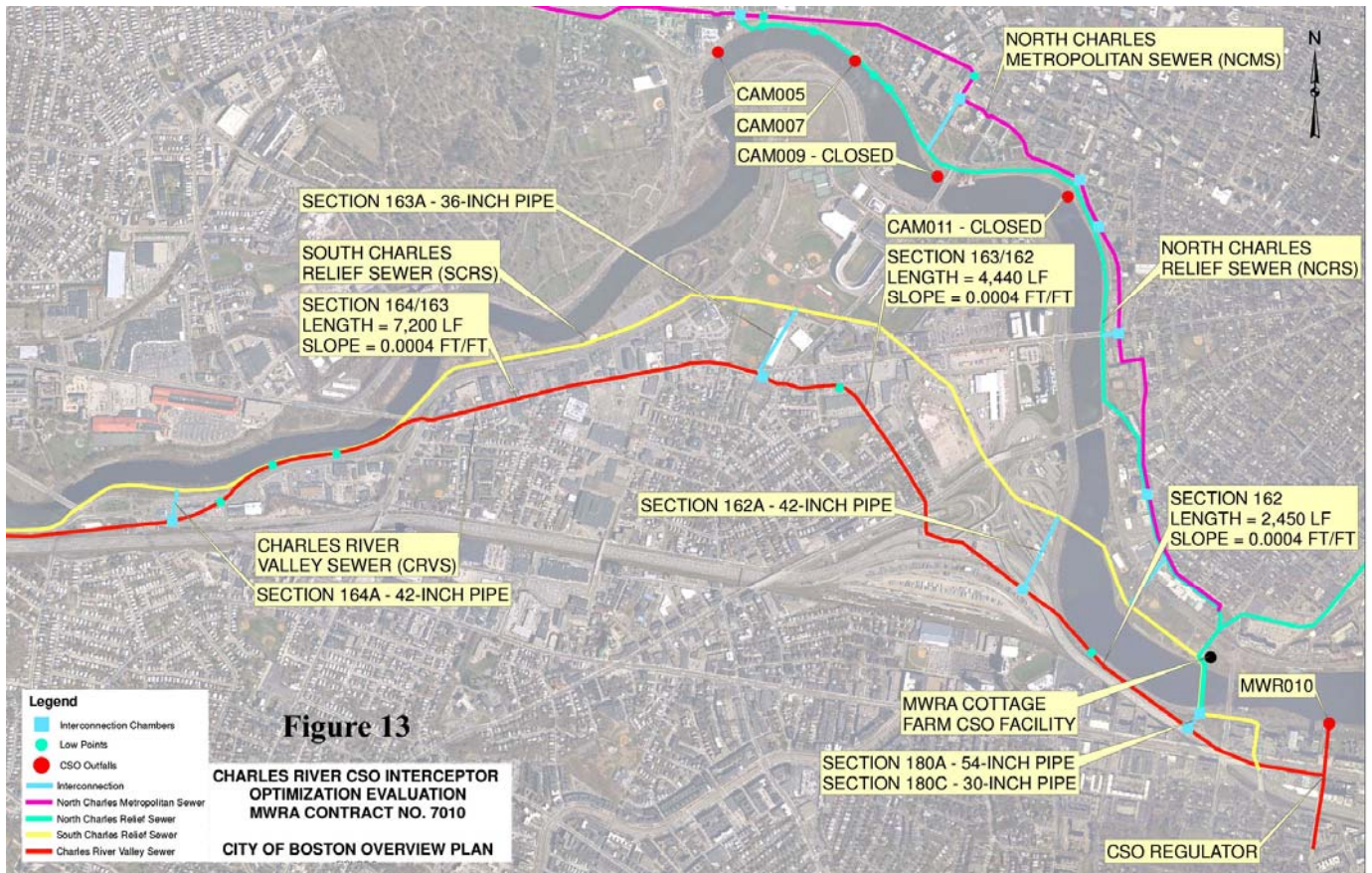
On January 31, 2008, the Authority issued the Notice to Proceed for the hydraulic study and design contract for the \$2.4 million Charles River Valley/South Charles River Relief Sewer gate controls project, in compliance with Schedule Seven. The project goal is to minimize CSO discharges at the Cottage Farm Facility and at upstream, untreated CSO outfalls by optimizing the allocation of flows among four MWRA interceptors: North Charles Metropolitan Sewer, North Charles Relief Sewer, Charles River Valley Sewer, and South Charles Relief Sewer (see Figure 13). The scope includes detailed analyses of various alternatives to optimize existing interconnections and to evaluate the potential benefits of additional interconnections. The scope also includes final design of recommended improvements to the existing gates and/or gate controls at three interconnections between the Charles River Valley Sewer and the South Charles Relief Sewer.

MWRA's design consultant completed extensive hydraulic model evaluations of alternatives and submitted the Final Hydraulic Modeling Technical Report in December 2008. MWRA submitted portions of the Technical Report evaluating the potential benefits of creating additional interceptor interconnections as a separate report to EPA and DEP on January 31, 2009, in compliance with Schedule Seven. This report concludes that additional interconnections would not provide hydraulic benefit beyond the benefits that will result from possible modifications to existing interconnections and the interconnection of the interceptor overflow chambers at the Cottage Farm Facility that MWRA is now constructing (see page 34).

Conclusions from the broader hydraulic modeling study of the interceptor system and its existing interconnections and gates include the following:

- The North Charles Metropolitan Sewer ("NCMS") and the North Charles Relief Sewer ("NCRS") on the Cambridge (north) side of the Charles River are interconnected at several locations, and an additional interconnection of these interceptors would not provide significant hydraulic benefit or a higher level of CSO control.
- The Charles River Valley Sewer ("CRVS") and the South Charles Relief Sewer ("SCRS") on the Boston (south) side of the Charles River are interconnected at three locations, and an additional interconnection of these interceptors would not provide significant hydraulic benefit or a higher level of CSO control.

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- Model predictions show that portions of the NCMS and NCRS are subject to considerable surcharging in moderate to large storms. While an interconnection of the NCRS and SCRS overflow chambers that MWRA is presently constructing at the Cottage Farm CSO Facility will provide some relief, no other interconnections or modifications to existing interconnections would provide additional benefit.
- Model predictions show that modifying the three existing interconnections of the CRVS and SCRS can improve dry-weather flow velocities and reduce sediment deposition in the SCRS and may also reduce CSO discharge at Cottage Farm in the typical year. While constructing higher fixed weirs at interconnections 162A, 163A and 164A may provide these benefits in dry weather and in moderate storms, the fixed weirs are predicted to increase hydraulic grade lines to unacceptable levels in the CRVS in large storms. MWRA is reevaluating and refining these “potential optimization measures” to attempt to preserve the potential benefits while avoiding adverse impacts.
- Model predictions show that with existing system conditions or with the potential optimization measures at the existing CRVS/SCRS interconnections, adding a new interconnection between the NCRS (north interceptor system) and the SCRS (south interceptor system) would not provide additional hydraulic benefit or a higher level of CSO control.
- Projects that MWRA, the Town of Brookline and the City of Cambridge are already implementing, including the ongoing construction at the Cottage Farm Facility, the Brookline sewer separation project that is part of MWRA’s long-term CSO control plan, and the City of Cambridge’s extensive long-term

Massachusetts Water Resources Authority
Combined Sewer Overflow Control Plan
Annual Progress Report – 2008

sewer separation program, along with any new recommendations for modifying the existing interconnections and gates or gate operations between the CRVS and SCRS, will continue to improve hydraulic grade lines and lower CSO discharges at the Cottage Farm Facility and at other CSO outfalls that discharge to the Charles River.

In February 2009, MWRA's design consultant submitted the Draft Preliminary Design Report including revised, but still preliminary, recommendations for modifying the existing interconnections and gates between the CRVS and the SCRS (Sections 162A, 163A and 164A). MWRA is reviewing the Draft Preliminary Design Report and expects to reach a decision on a final set of recommended interconnection and/or gate improvements by April 2009. MWRA plans to complete design and commence a contract for any recommended construction by January 2010, in compliance with Schedule Seven.



MWRA has reduced average annual CSO discharge volume to the Charles River Basin by 98% since 1988.

PRISON POINT CSO FACILITY OPTIMIZATION

On April 23, 2008, MWRA sent a letter report to EPA and DEP confirming implementation of the operational procedures it had recommended a year earlier to minimize treated discharges from the Prison Point CSO facility to Boston Inner Harbor. In the letter report on the Prison Point CSO Facility Optimization plan, MWRA also confirmed the hydraulic performance of the facility with the new procedures, which lower treated discharges in a typical rainfall year from 30 activations and 335 million gallons to 17 activations and 243 million gallons. On April 30, 2008, MWRA filed a motion with the Court along with a proposed amendment to the Second CSO Stipulation modifying the long-term level of control for the Prison Point CSO facility (Outfall MWR203) to the updated performance predictions. On May 7, 2008, the Court allowed the motion and amendment.



The operational changes at the Prison Point Facility include:

1. Revised standard operating procedures to open the influent gates at 16 feet depth of flow in front of the gates, instead of the 10 to 12 feet of depth previously used, to take maximum advantage of available storage in the upstream delivery pipes and to minimize both the number of times flow enters the facility and amount of flow in each event.
2. Revised standard operating procedures to close the gates and deactivate the treatment works when the facility's discharge rate falls below the new threshold of 20 million gallons per day (formerly five million gallons per day was the shut-off point), again taking advantage of storage in the upstream pipes and reducing the volume allowed to enter the facility.
3. Revised standard operating procedures for running the dry weather pump station during activations of the facility to maximize the amount of flow being conveyed by the local interceptor system to the Deer Island Treatment Plant and to further reduce the flows treated and discharged by the Prison Point facility.
4. Upgrades to the Supervisory Control and Data Acquisition (SCADA) system to provide additional real-time data that is used to improve facility operational control. The SCADA improvements include additional meters in the upstream systems to monitor water levels, as well as in the downstream interceptor sewer that receives flow from the dry weather pumps, specifically to avoid contributing to overflows at the BOS019 Storage Conduit facility. The SCADA improvements related to the Prison Point facility were completed in December 2007.

5.2 Community Managed Projects

SOUTH DORCHESTER BAY SEWER SEPARATION

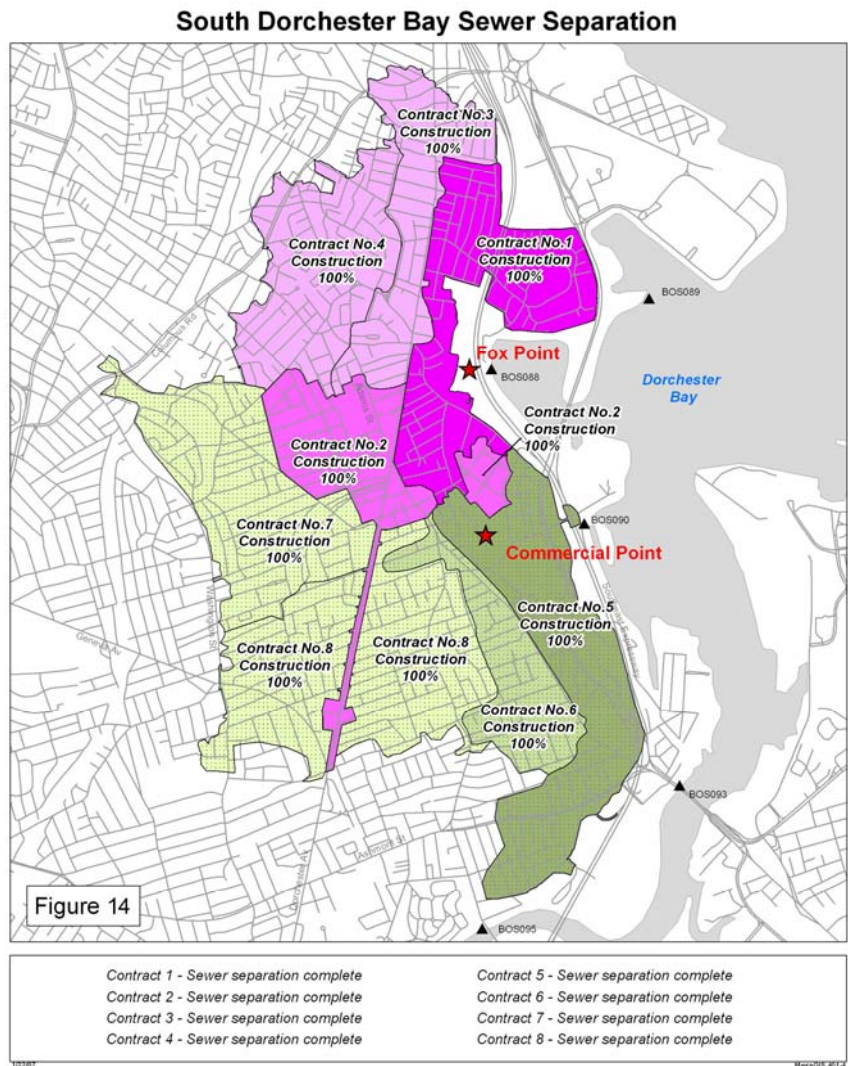
In December 2006, BWSC achieved substantial completion on the last of the sewer separation contracts for the \$117.1 million South Dorchester Bay sewer separation project, almost two years ahead of the respective milestone in Schedule Seven. The project involved 15 construction contracts, including eight major sewer separation contracts, managed by BWSC over a period of eight years beginning in April 1999. In that

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period, BWSC installed 135,700 linear feet (25.7 miles) of new storm drain, along with miles of new sewer pipe. Also, several thousand building downspout connections were removed from the sewer system. The separation work covered an area of more than 1750 acres, or 2.7 square miles. MWRA funded the cost of the separation work under its CSO Memorandum of Understanding and Financial Assistance Agreement with BWSC. Figure 14 shows the major sewer separation contract areas.

In October 2007, BWSC notified MWRA that all CSO regulators tributary to MWRA's Commercial Point and Fox Point CSO treatment facilities were closed. With the closure of the CSO regulators, CSO discharges to the beaches of South Dorchester Bay, including Malibu Beach, Savin Hill Beach and Tenean Beach, have been eliminated. Accordingly, and as recommended in the Long-Term Control Plan, MWRA decommissioned the Fox Point and Commercial Point CSO treatment facilities on November 1, 2007 and has since taken steps to surplus the properties through the Massachusetts Division of Capital Asset Management.

Prior to the implementation of this project, there were 20 treated discharges to South Dorchester Bay from the Commercial and Fox Point CSO facilities in a typical year, with an average annual CSO discharge volume of 30 million gallons. BWSC has conducted flow metering in the separated sewer system and performed hydraulic evaluations to verify that the project's hydraulic performance goals for the separated sewer system have also been met. BWSC issued a report in September 2008 on its evaluation of sewer system performance in the South Dorchester Bay area, concluding that remaining stormwater inflow in the separated sewer system continues to contribute to a risk for system flooding and overflows in large storms, including the 10-year design storm that is a performance criteria for the project. The BWSC report identifies alternatives to meet the performance objectives, and BWSC has recommended and is pursuing additional inflow removal, primarily by expanding its downspout disconnection program in the tributary area.

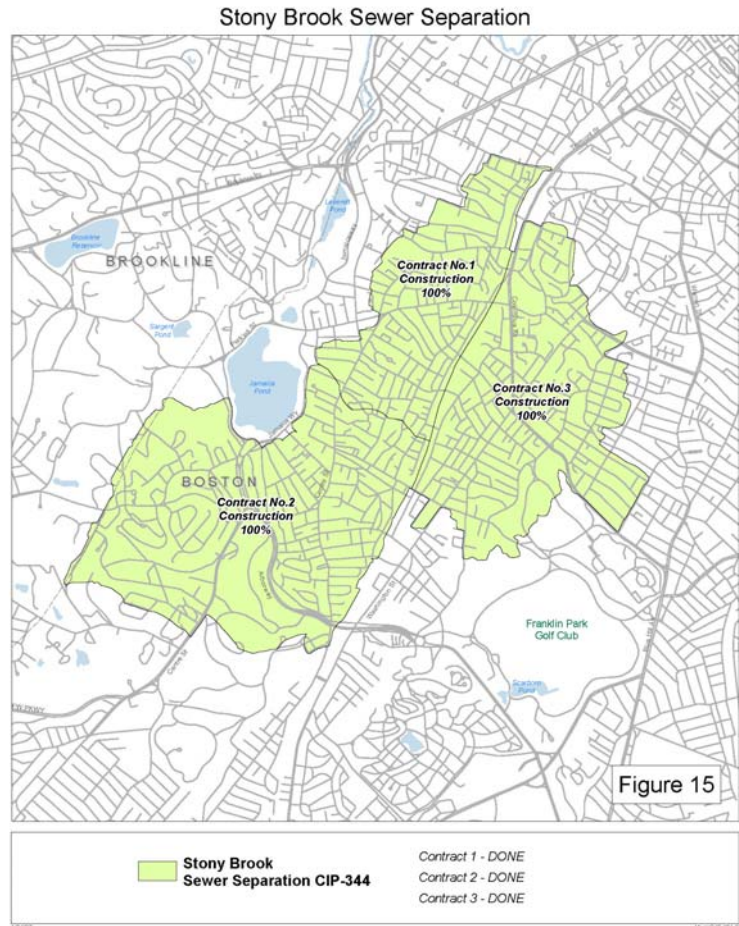


STONY BROOK SEWER SEPARATION

This project, at a cost of \$45.2 million, minimizes CSO discharges to the Stony Brook Conduit and the Back Bay Fens, both of which drain to the Charles River, by separating combined sewers in parts of Roxbury and Jamaica Plain. The separation work involved the installation of approximately 73,300 linear feet of new storm drains. BWSC managed the project’s design and construction, and MWRA funded the eligible costs pursuant to the CSO Memorandum of Understanding and Financial Assistance Agreement.

In September 2006, BWSC completed the last of the three sewer separation contracts, in compliance with Schedule Seven. Figure 15 shows the project area covered by the construction contracts. BWSC continues to conduct flow monitoring and system performance evaluations to confirm the hydraulic performance objectives.

The project reduces CSO discharges at seven CSO regulators along the Stony Brook Conduit from 22 activations and 44.5 million gallons in a typical year to two activations and 0.13 million gallons. While this represents a 99.7 % reduction in annual CSO volume, the CSO regulators must remain open to provide flood control in large storm events.



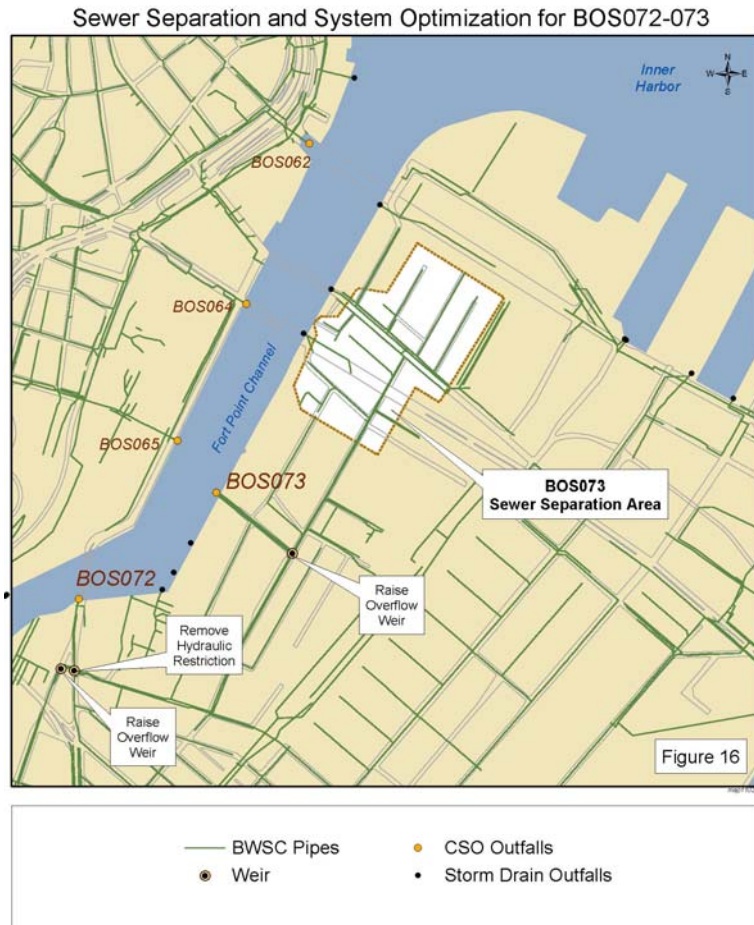
NEPONSET RIVER SEWER SEPARATION

This project involved sewer separation in the Neponset section of Dorchester to eliminate CSO discharges to the Neponset River at Outfalls BOS093 and BOS095. The separation work included construction of approximately 10,000 feet of new storm drain pipe. BWSC performed the work with MWRA funding, and MWRA’s total project cost was \$2.7 million.

BWSC completed storm drain construction and closed the last remaining CSO outfall to the Neponset River in June 2000, and it continues to perform downspout disconnection and other work to remove additional stormwater inflow from the sewer system, in order to minimize the risk of surcharging and flooding. In 2004, BWSC completed a substantial contract to remove inflow sources from sewer systems in the Neponset area. This work further reduced the amount of stormwater in the sewer system by removing non-residential, private drainage connections, such as connections from private parking lots.

FORT POINT CHANNEL BOS072-073 SEWER SEPARATION

BWSC achieved substantial completion of construction of this \$8.3 million project in March 2007, in compliance with Schedule Seven. BWSC managed the design and construction of the project, and MWRA provided funding. The sewer separation aspects of the project involved the construction of new storm drains and appurtenant structures, the relocation of storm runoff connections from the existing combined sewer to the new storm drains, and rehabilitation of the existing combined sewers for use as sanitary sewers. BWSC installed 4,550 linear feet of new storm drain pipe with this project.



and appurtenant structures, the relocation of storm runoff connections from the existing combined sewer to the new storm drains, and rehabilitation of the existing combined sewers for use as sanitary sewers. BWSC installed 4,550 linear feet of new storm drain pipe with this project.

The optimization aspect of the project involved modifications to the CSO regulator and tide gate structures associated with Outfalls BOS072 and BOS073, (Figure 16). At both locations, overflow weirs were raised, new tide gates were installed, and underflow baffles were constructed for floatables control. In addition, BWSC removed a hydraulic restriction associated with the dry weather connection at BOS072. With the completion of this project, CSO discharges from Outfalls BOS072 and BOS073 to Fort Point Channel are estimated to be reduced from nine activations in a typical year with an average annual discharge volume of three million gallons to zero discharges in a typical year.

CONSTITUTION BEACH SEWER SEPARATION

This project involved sewer separation in a section of East Boston to eliminate CSO discharges at the Constitution Beach CSO facility (Outfall BOS002/MWR207). The separation work included construction of approximately 14,000 feet of new storm drain. BWSC performed the work with MWRA funding, and MWRA's total project cost was \$3.8 million.

BWSC completed storm drain construction and closed the last remaining CSO regulator in September 2000, and MWRA decommissioned the Constitution Beach CSO Facility soon after. MWRA has transferred the site to the control of the Division of Capital Asset Management.

MORRISSEY BOULEVARD STORM DRAIN

	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	June 2005	June 2005
Commence Construction	December 2006	December 2006
Complete Construction	June 2009	June 2009

The \$36.9 million Morrissey Boulevard Storm Drain project (“MBST”), shown in Figure 17 below, is a component of the North Dorchester Bay CSO control plan. The MBST is intended to direct some of the North Dorchester Bay stormwater away from MWRA’s CSO storage tunnel in storms greater than the 1-year design storm. Redirecting these stormwater flows to Savin Hill Cove and South Dorchester Bay in large storms will reserve capacity in the MWRA tunnel to attain up to a five year level of stormwater control and up to a 25-year level of CSO control along the South Boston beaches. The MBST will enable the BOS087 outfall located near Mother's Rest in the DCR waterfront park to be eliminated. In addition to conveying the BOS087 stormwater in larger storms, the MBST will collect stormwater flows from DCR’s Morrissey Boulevard storm drain system. The pre-existing DCR drainage outfall to Savin Hill Cove is being replaced by the MBST. The project extends from Savin Hill Cove (downstream end) to Kosciuszko (upstream end).



BWSC is managing the design and construction of the project, with MWRA funding. MWRA and BWSC added the Morrissey Boulevard storm drain project to their CSO Memorandum of Understanding and Financial Assistance Agreement in May 2005, and BWSC commenced design work in June 2005, in compliance with Schedule Seven. The project includes the installation of approximately 2,800 linear feet of 12-foot by 12-foot reinforced concrete storm drain box conduit, 675 linear feet of 8-foot by 8-foot reinforced concrete storm drain box conduit; 100 linear feet of 9-foot by 8-foot reinforced concrete storm drain box conduit, and new sanitary sewers totaling 1,610 linear feet. The project also includes the relocation of approximately 3,530 linear feet of ductile iron cement-lined pipe for water main, 460 linear feet of minor drains, approximately 21 new manholes, three special manholes, six particle separators, and 23 catch basins.

In December 2006, BWSC issued the Notice to Proceed with the first of two planned construction contracts for the Morrissey Boulevard storm drain project, in compliance with Schedule Seven. This contract involved construction of a large diversion structure adjacent to Outfall BOS087, near Kosciuszko Circle. BWSC completed this first contract and commenced the second, much larger, construction contract in September 2007. This second contract involves installation of the large storm drain (a 12-foot by 12-foot box conduit) along Morrissey Boulevard from the new outlet at Savin Hill Cove to the State Police barracks, as well as lateral connections to tributary storm drain systems.



Progress in 2008 and Ongoing Work

BWSC's contractor has completed installation of the 12-foot by 12-foot box conduit and is currently installing twin 9-foot by 8-foot box conduits adjacent to Savin Hill Cove. The contractor is continuing with construction of the new outfall, dredging of the outfall area in Savin Hill Cove and installation of riprap shoreline protection. The contract is on schedule for substantial completion by June 2009 in compliance with Schedule Seven. The Morrissey Boulevard Storm Drain and stormwater diversion structure will be placed into operation when MWRA's North Dorchester Bay CSO Storage Tunnel is brought on-line.

RESERVED CHANNEL SEWER SEPARATION

	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	July 2006	July 2006
Commence Construction	May 2009	May 2009
Complete Construction	December 2015	December 2015

The primary goal of this project is to minimize CSO discharges and impacts to the Reserved Channel by separating combined sewer systems in a portion of South Boston tributary to CSO Outfalls BOS076, BOS078, BOS079 and BOS080 (see Figure 18). Implementation of the approved sewer separation plan will reduce the number of CSO activations to the Reserved Channel from 37 to three events in a typical year. The work includes the installation of approximately 35,000 feet of new storm drains. Connecting catch basins to the new storm drains will require an additional 6,500 feet of minor drain work. To remove enough stormwater inflow from the sewer system to attain the long-term level of CSO control, many building downspout connections and parking lot drains will also be disconnected from the sewer and tied into the new storm drains. The project also includes rehabilitating and/or upgrading the four CSO outfalls to ensure they have the capacity to deliver the separated stormwater flows, as well as remaining CSO flows, to the Reserved Channel for the long term.

The project area encompasses approximately 365 acres of South Boston that comprise the drainage areas tributary to the four Reserved Channel outfalls. This area is an urban mix of both residential and non-residential properties with commercial, industrial and recreational land uses. East First Street is the primary roadway through the project area. It is characterized by heavily congested utilities and truck traffic primarily associated with transportation of containers from Massport's Conley Terminal.

MWRA and BWSC added this project to their CSO Memorandum of Understanding and Financial Assistance Agreement in June 2006. BWSC is responsible for managing design and construction of the project and ensuring that CSO control goals and other project objectives are met. MWRA is funding design and construction costs pursuant to the eligibility terms of the agreement. BWSC commenced design in July 2006, in compliance with Schedule Seven. The design work and construction contracts for the Reserved Channel sewer separation project will follow an approach similar to the South Dorchester Bay and Stony Brook sewer separation projects, with multiple construction contracts sequenced over several years.

Progress in 2008 and Ongoing Work

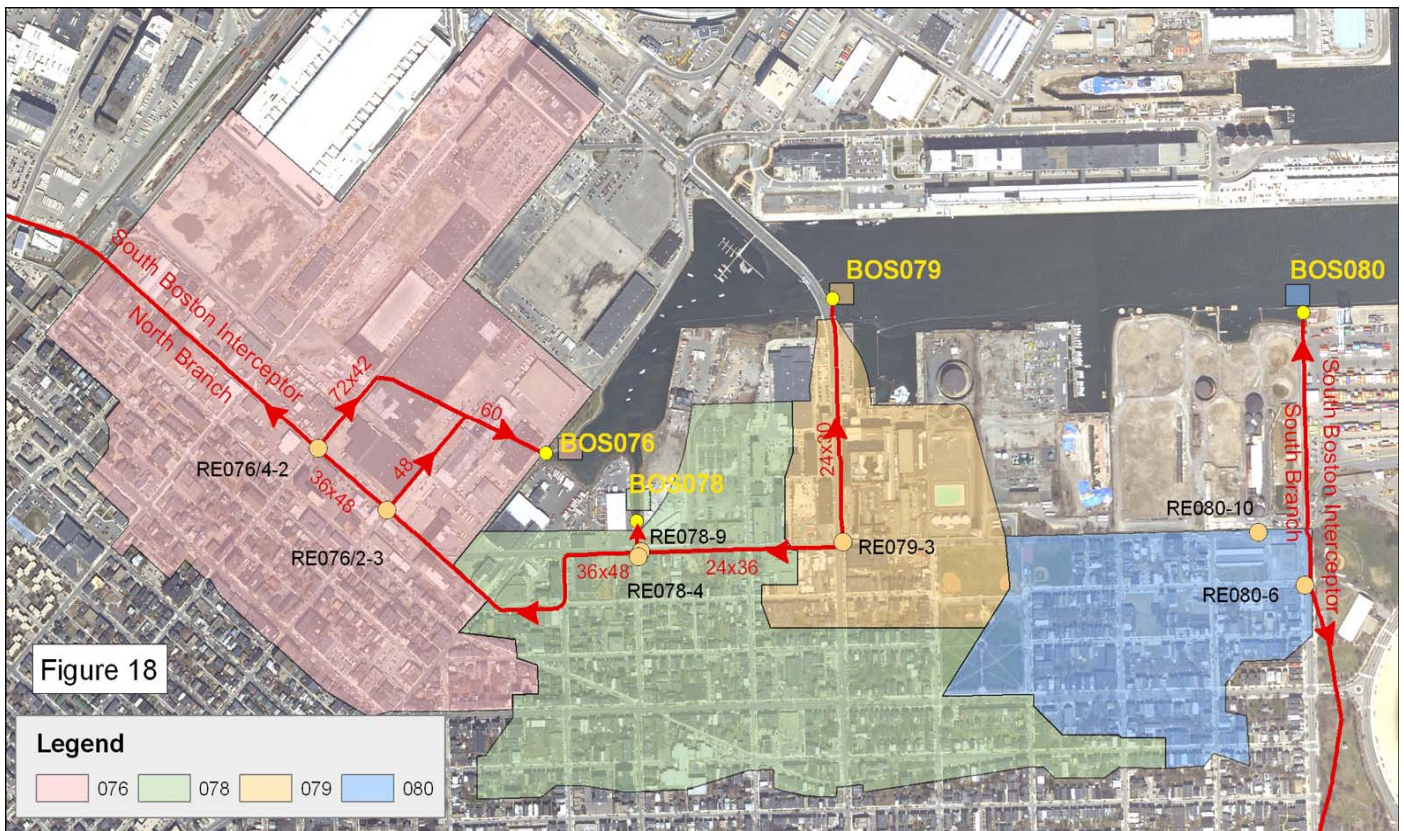
In February 2008, BWSC completed preliminary design of the Reserved Channel project, including surface and subsurface field surveys, geotechnical evaluations, stormwater inflow removal estimates, hydraulics analyses, preliminary pipe sizing, and preliminary assessment of construction requirements including utility conflicts. Based on the recommended plan in BWSC's Preliminary Design Report, the project cost estimate (design and construction) has increased from \$54.2 million when the project was added to the Long-Term Control Plan to \$113.3 million in MWRA's Proposed FY10 CIP.

Reasons for the higher cost compared with other sewer separation projects include the need to rehabilitate and upgrade the four CSO outfalls to be able to convey the additional stormwater flows; the higher incidence of hazardous material "hot spots" in the Reserved Channel area compared to typical urban conditions (increasing the cost contingency for hazardous materials handling and disposal though some of the excavated material is likely to be suitable for backfilling); the congestion of utilities within the roadway; the density of the lots and buildings; the significant pedestrian and vehicular, especially truck, traffic that must be managed and will affect the contractor's productivity. In addition, the Reserved Channel sewer separation project will

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require a significantly greater proportion of larger diameter pipe than other sewer separation projects in MWRA’s CSO plan. More than 67% of the pipes installed for the South Dorchester Bay project was 18-inch diameter or smaller, whereas over 50% of the Reserved Channel pipes are 21-inch diameter or larger, with 30% of the pipes greater than 36-inches.

BWSC has made substantial progress with design of the project since issuing the Preliminary Design Report. BWSC has completed the construction documents for the first of nine planned construction contracts for this project, including four sewer separation contracts, an outfalls rehabilitation contract, a sewer rehabilitation contract, a downspout disconnection contract, and two final paving contracts. On January 28, 2009, BWSC advertised the first contract, estimated to cost \$9.3 million, which separates the combined sewers tributary to Outfall BOS080. BWSC plans to award this contract and issue the notice to proceed by May 2009, in compliance with Schedule Seven. In the meantime, BWSC continues to move forward with design of other contracts that will commence sequentially between September 2009 and April 2014. The project schedule calls for all work to be completed by December 2015, in compliance with Schedule Seven.



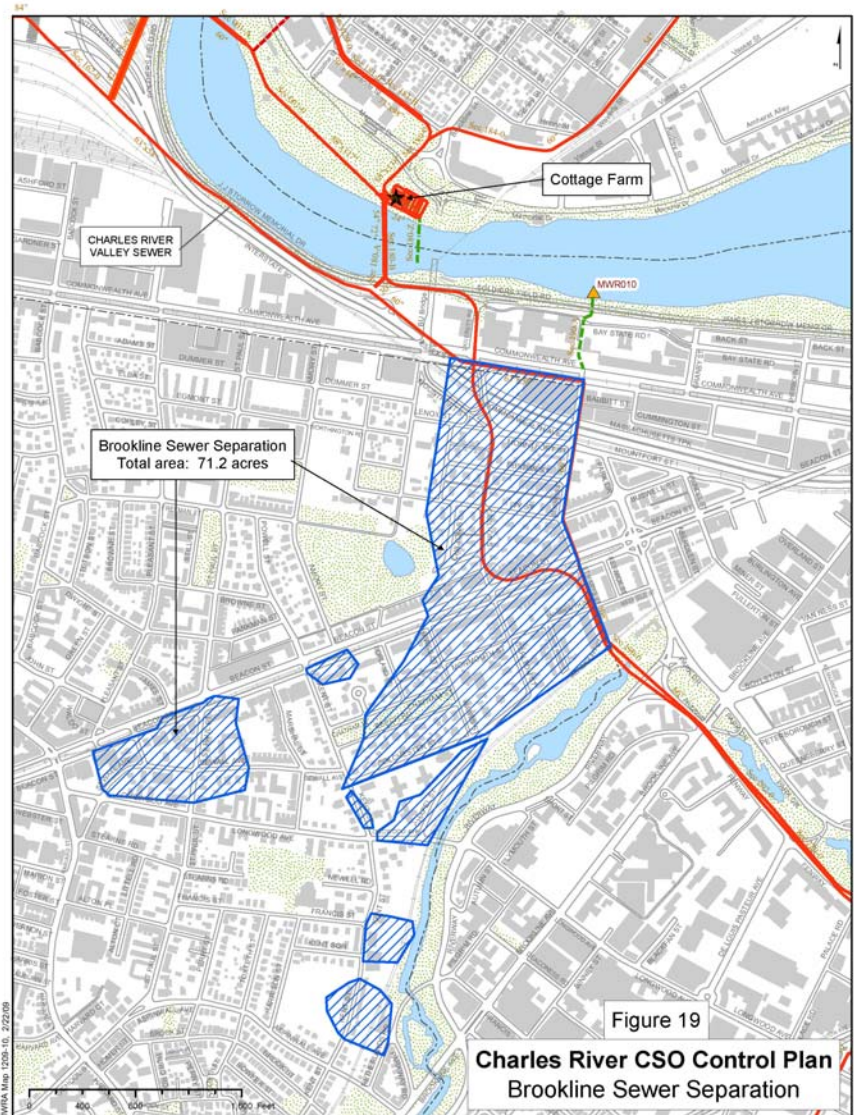
BROOKLINE SEWER SEPARATION

	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	November 2006	November 2006
Commence Construction	November 2008	November 2008
Complete Construction	July 2013	July 2013

The \$24.0 million Brookline sewer separation project is intended to separate remaining areas of Brookline, totaling about 72 acres, that have combined sewers tributary to MWRA’s Charles River Valley Sewer (see Figure 19). The project goal is to reduce treated CSO discharges to the Charles River at the Cottage Farm Facility. MWRA and the Town of Brookline executed a CSO Memorandum of Understanding and Financial Assistance Agreement in July 2006. Brookline is managing design and construction of the project and is responsible for ensuring that CSO control goals and other project objectives are met. MWRA is funding the design and construction costs pursuant to the eligibility terms of the agreement.

Progress in 2008 and Ongoing Work

On November 21, 2008, the Town of Brookline issued the Notice to Proceed for the first of two construction contracts for the project, in compliance with Schedule Seven. The first contract has a value of \$1.4 million and a substantial completion date of November 24, 2009. It includes the installation of storm drains in streets on the north and south sides of Beacon Street. Brookline is completing final design for the second construction contract and plans to advertise this contract, at an estimated eligible value of \$15.7 million, in Spring 2009. It includes installation of sanitary sewers in Beacon, St. Mary’s, and Monmouth streets. Existing combined sewers in these streets will be converted to storm drains.



BULFINCH TRIANGLE SEWER SEPARATION

	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	November 2006	November 2006
Commence Construction	November 2008	September 2008
Complete Construction	July 2013	July 2010



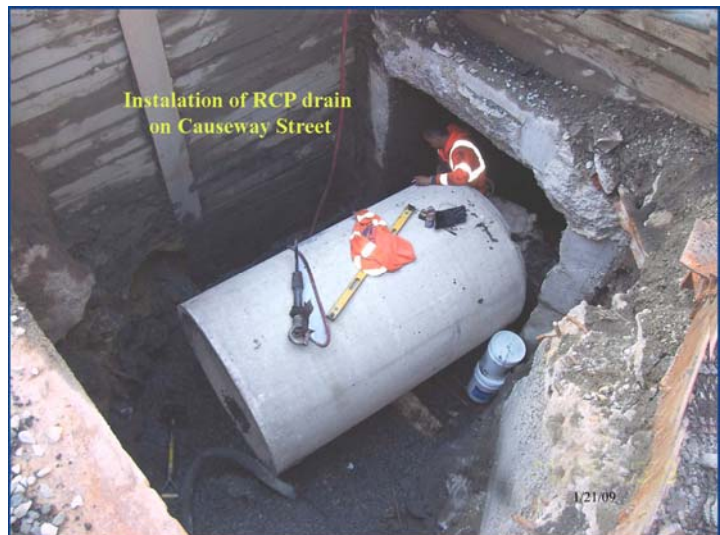
The goal of the \$9.6 million Bulfinch Triangle sewer separation project is to minimize CSO discharges to the Charles River by separating combined sewer systems in a 61-acre area bounded by Causeway, Merrimac and Canal streets (see Figure 20). Land use in the project area is characterized by multi-story mixed residential and commercial buildings. Implementation of the recommended sewer separation plan will reduce CSO discharges to the Charles River, reduce overflows to the Prison Point CSO facility, and allow BWSC to close Outfall BOS049. MWRA and BWSC added this project to their CSO Memorandum of Understanding and Financial

Assistance Agreement in October 2006. BWSC is managing design and construction of the project and is responsible for ensuring that CSO control goals and other project objectives are met. MWRA is funding the design and construction costs pursuant to the eligibility terms of the agreement.

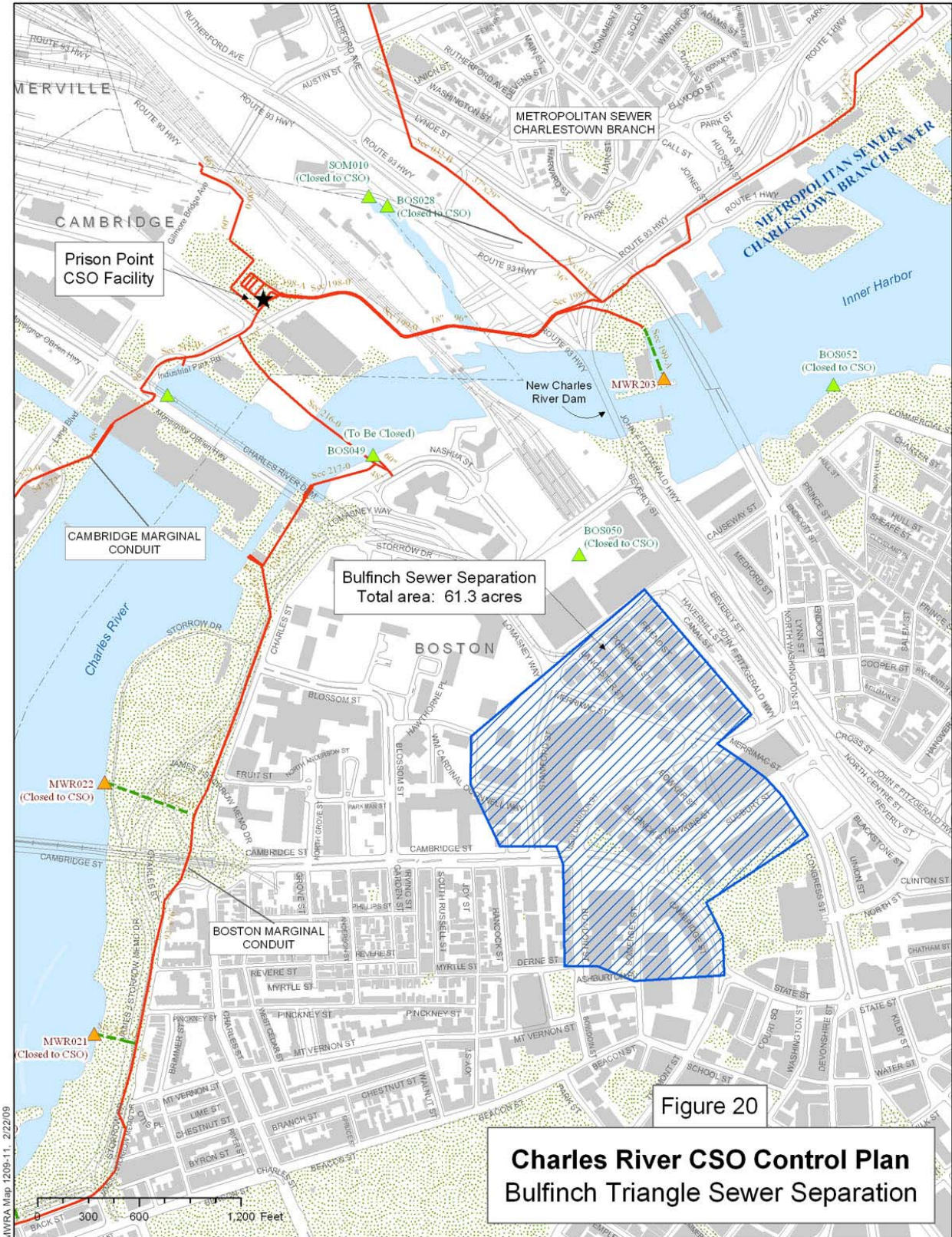
The project includes the installation of approximately 4,500 feet of new storm drains of 12- to 54-inch diameter and 1,360 feet of new sanitary sewers of 12- to 24-inch diameter. Stormwater inflow sources from as many buildings as possible and all parking areas will be disconnected from the combined sewer system and reconnected to the new drains and avoiding major internal plumbing work. The new drainage system will have sufficient capacity to convey stormwater flows from an adjacent separated storm drain system located in Congress Street that currently ties back into the combined sewer system. BWSC’s construction contract also includes extensive replacement of old water lines, with MWRA funding of this work limited to relocation of existing water lines that are in conflict with the sewer separation work.

Progress in 2008 and Ongoing Work

In 2008, BWSC completed final design and issued the Notice to Proceed for the sole construction contract on September 25, in advance of the November 2008 milestone in Schedule Seven. The contract work completed to date primarily involves the relocation of water and gas utilities to make room for the new storm drains. The contractor recently began installation of the new drains in Causeway and Canal streets. The contract has a substantial completion date of July 8, 2010, well in advance of the November 2013 milestone in Schedule Seven.



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ALEWIFE BROOK CSO CONTROL PLAN PROJECTS

Schedule Seven Milestones and Current Project Schedules*

Alewife Brook Project	Commence Design		Commence Construction		Complete Construction	
	Milestone	Schedule	Milestone	Schedule	Milestone	Schedule
CAM004 Stormwater Outfall and Wetland Basin			Jul 07	Oct 09	Jul 09	Oct 11
CAM004 Sewer Separation	Jan 97**	Jan 97	Jul 98**	Jul 98	Jan 13	Apr 15
			Jul 09	Oct 11		
CAM400 Manhole Separation	Jul 06	Oct 08	Jul 07	Oct 09	Jul 08	Oct 10
Interceptor Connection Relief and Floatables Control at CAM002, CAM401B, and SOM01A, and Floatables Control at CAM001	Jul 06	Oct 08	Jan 08	Apr 10	Dec 08	Mar 11
Control Gate/Floatables Control at Outfall MWR003 and MWRA Rindge Avenue Siphon Relief	Apr 09	Jul 11	Nov 10	Feb 13	Jan 12	Apr 14

* The project schedules are preliminary. The projects are delayed 27 months beyond the Schedule Seven milestones.

** Milestone was met by MWRA and the City of Cambridge.

Background and Description of the Alewife Brook CSO Control Plan

The Alewife Brook CSO control plan is intended to minimize CSO flows to the brook primarily by separating combined sewer systems in parts of Cambridge, but also by upgrading hydraulic capacities at local connections to the MWRA interceptors. A new stormwater outfall and wetland basin will be constructed to accommodate the separated stormwater flows, prevent any increase in flooding along Alewife Brook, and provide a level of stormwater treatment. Most of the design and construction work is managed by the City of Cambridge with MWRA funding, under a Memorandum of Understanding and Financial Assistance Agreement. Cambridge began construction of the sewer separation plan in July 1998, in accordance with the recommended plan in the 1997 Facilities Plan/EIR and in compliance with the original set of milestones for this project in the Court’s Schedule. Cambridge completed all four of the construction contracts it awarded at that time. The completed work significantly reduced CSO discharges to Alewife Brook. Hydraulic model simulations show that CSO discharges were reduced from 63 activations and 50 million gallons annual volume in a typical year to 25 activations and 33 million gallons.

In 2000, MWRA and Cambridge suspended further design work and construction contract awards related to the 1997 plan because new information showed that conditions in the Cambridge combined sewer system were markedly different from conditions assumed in 1997. MWRA and Cambridge determined that considerably more work, as well as changes to the scope of work, would be necessary to meet the 1997 CSO control goals for Alewife Brook. In April 2001, MWRA and Cambridge submitted a Notice of Project Change for public review recommending an expanded and much more costly sewer separation plan to meet those goals. The Secretary’s Certificate on the Notice of Project Change, issued in June 2001, required MWRA and Cambridge to prepare a document responding to all public comments, including comments related to the feasibility of obtaining necessary federal and state permits and other approvals to build the project. In May 2003, MWRA and the City of Cambridge submitted the response to MEPA, addressing all

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public comments. The Response to Comments was two years in the making and involved extensive interactions with regulatory agencies, community officials in Arlington, Belmont and Cambridge, DCR and the public.

The Response to Comments also presented a final project plan that incorporated adjustments made during the public review process to address the various concerns that had been raised. In particular, significant adjustments were made to Cambridge’s proposed stormwater system and wetland basin to ensure that the stormwater flows generated by the sewer separation work will have no adverse impact on Alewife Brook flood elevations and that the wetland basin will contribute to the ecological and recreational goals in DCR’s Master Plan for the Alewife Reservation. Submission of the Response to Comments document effectively marked completion of the MEPA review process for this project, allowing MWRA and Cambridge to move the project into design and construction.

The revised CSO control plan for the Alewife Brook is comprised of several component projects that were individually incorporated into the Court Schedule in April 2006. They are shown in Figure 21 and described in the Table 4 below.

Table 4: Projects in Alewife Brook CSO Control Plan

Project	Capital Cost ⁽¹⁾ (millions)	Cambridge Contract No.	Benefit
CAM004 Sewer Separation ⁽²⁾	\$76.5	8A,8B, 9	Convey stormwater flows to detention and wetlands treatment
CAM004 Stormwater Outfall and Wetland Basin	29.0	12	Remove large quantities of stormwater from the sewer system; close Outfall CAM004
CAM400 Manhole Separation	5.9	13	Remove stormwater from the sewer system; close Outfall CAM400
Interceptor Connection Relief and Floatables Control	3.3	4	Upgrade connections between Cambridge and MWRA systems to provide relief
MWR003 Control Gate and Rindge Ave. Siphon Relief	2.4	n/a	Optimize hydraulic conveyance; minimize overflows while controlling system flooding in large storms
Total Alewife Brook CSO Plan	\$117.1		

⁽¹⁾ Total plan cost to be shared by MWRA and the City of Cambridge pursuant to Memorandum of Understanding and Financial Assistance Agreement.

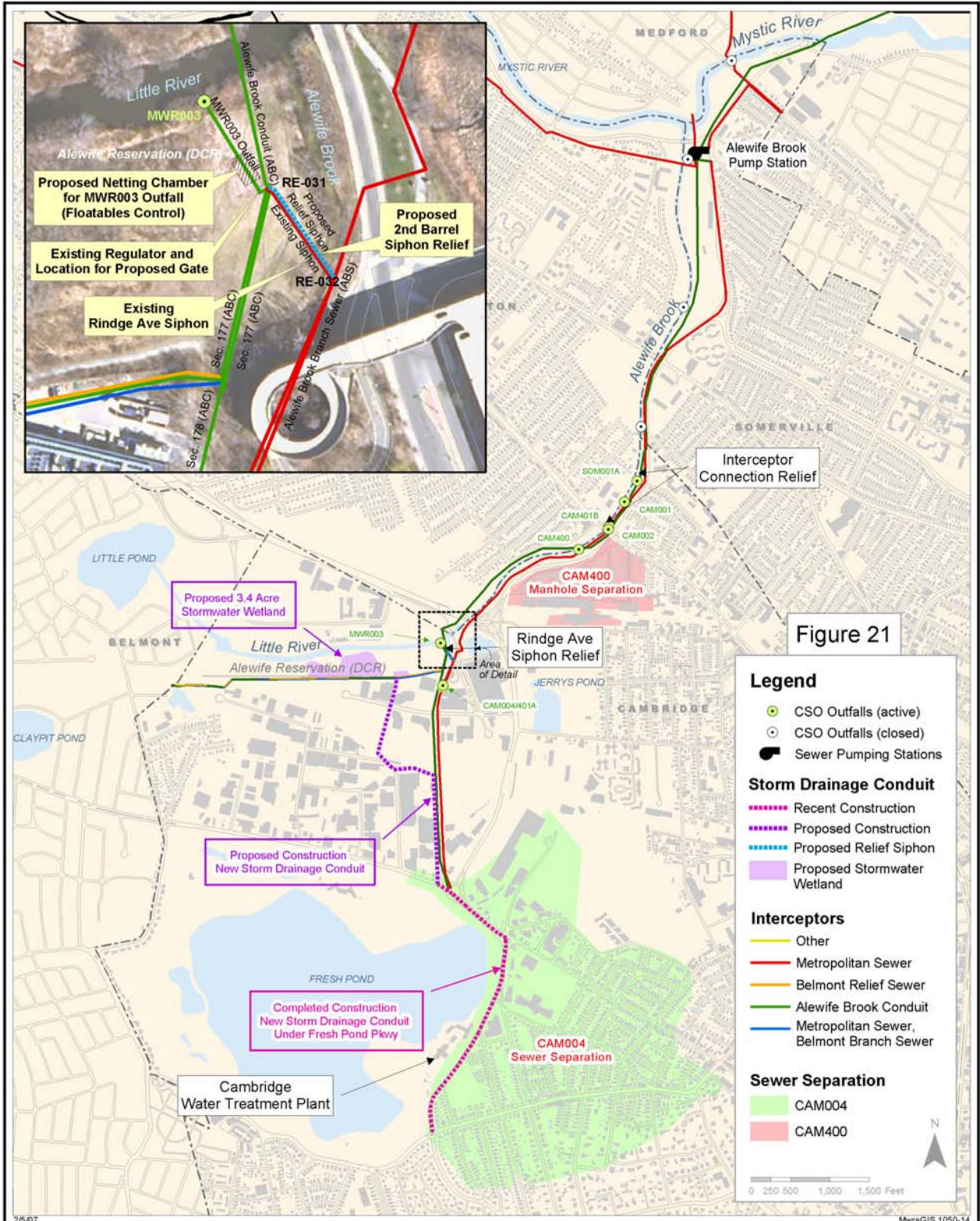
⁽²⁾ Also includes earlier contracts completed by Cambridge.

Together, these projects are predicted to reduce annual CSO volume to Alewife Brook by 85% in a typical year, from 50 million gallons in 1997 to 7.3 million gallons. CSO activations in a typical year will be reduced from 63 in 1997 to seven. The recommended control levels for CSO comply with Class B water quality (fishing and swimming) criteria 98.5 percent of the time. Other sources of pollution, primarily stormwater, will continue to cause more frequent water quality standards violations in Alewife Brook.

Delays in Implementing the Approved Plan

After completion of MEPA review in 2003, Cambridge updated its preliminary design plans to reflect several additional project modifications that resulted from MEPA review, public comments and new field information. Cambridge has also updated its design and construction schedules and cost estimates. While updating the plans, Cambridge also pursued final design of “Contract 12,” which involves construction of the wetland basin and new storm drain outfall in the Alewife Reservation that are key to the overall plan and are necessary for remaining contracts to move forward.

Alewife Brook CSO Control - Revised Plan



Cambridge's progress on Contract 12 has been delayed by a citizens' appeal of DEP's approval of the wetland basin and stormwater outfall pursuant to the Wetlands Protection Act. Cambridge received a Superseding Order of Conditions for Contract 12 from DEP on March 31, 2005. The administrative appeal was filed by a group of citizens on April 13, 2005. More than two years into the appeals process, on June 1, 2007, the Acting Commissioner of DEP issued a final decision sustaining the Superseding Order of Conditions for Contract 12. The Acting Commissioner's decision was subject to the petitioners' right to request reconsideration within 30 days. The petitioners filed a motion for reconsideration on June 12, 2007.

On October 16, 2007, DEP issued a decision denying the petitioner's motion for reconsideration and again sustaining the Superseding Order of Conditions. However, on November 14, 2007, the petitioners appealed this DEP decision in a complaint filed in Massachusetts Superior Court. The complaint in part requested the Court to enjoin the City of Cambridge from taking any action toward construction of any portion of the project until the matters of the appeal are resolved. On October 1, 2008, the Court allowed Cambridge's motion to dismiss the case. Plaintiff appealed the court's decision on December 11, 2008. Despite the recent appeal the Superseding Order of Conditions remains in effect, allowing MWRA and the City of Cambridge to move Contract 12 forward to construction.

The rest of the Alewife Brook sewer separation plan could not move forward without confidence that the new stormwater outfall and wetland would be built, and the viability of the plan continues to hinge on Contract 12. It and other plan components have been delayed by more than three years since the first citizens' appeal was filed in early 2005. The delay continued even beyond the new design and construction milestones for the Alewife Brook CSO control plan that were proposed by MWRA and Cambridge and accepted by the Federal Court in 2006. The schedules for all five Alewife Brook projects are 27 months beyond their respective design and construction milestones in Schedule Seven, but remain preliminary until Cambridge gathers additional information in the design work it has resumed.

Progress in 2008 and Ongoing Work

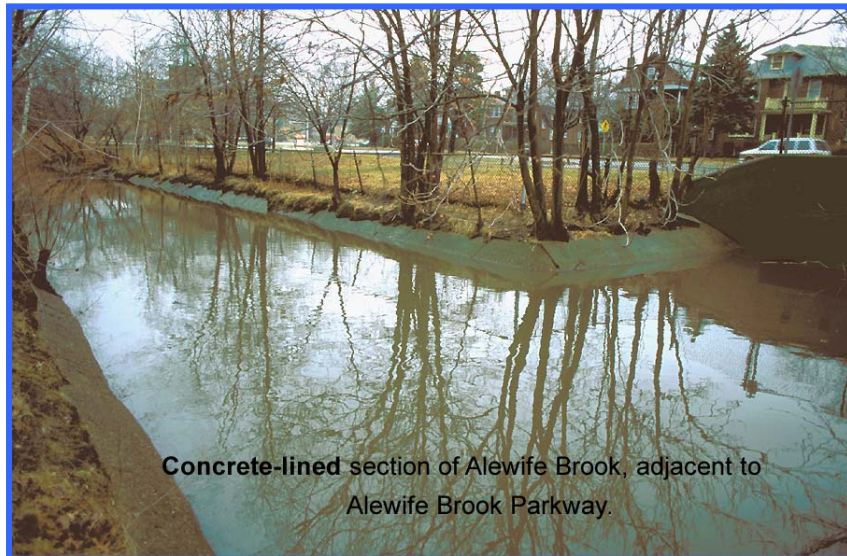
After years of delay, MWRA and the City of Cambridge were able to move the Alewife Brook Sewer Separation plan forward in 2008. On July 16, 2008, the MWRA Board of Directors approved an amendment to the CSO Memorandum of Understanding and Financial Assistance Agreement with the City of Cambridge that increases the financial award amount (MWRA cost share) from \$21.6 million to \$60.0 million, in addition to the \$2.8 million that MWRA will spend to implement its MWR003 Gate and Rindge Avenue Siphon Relief project. The total cost of the Alewife Brook Sewer Separation plan, including MWRA and Cambridge cost shares, is \$117.4 million. On November 5, 2008, MWRA and Cambridge executed amendments to their CSO Memorandum of Understanding and Financial Assistance Agreement to incorporate the full scope of the Alewife Brook plan and authorize MWRA funding for the eligible design and construction costs in accordance with the negotiated agreement.

In October 2008, Cambridge resumed design work for three of the five projects that comprise the Alewife Brook plan: CAM004 stormwater outfall and wetland basin (Contract 12); CAM400 manhole separation (Contract 13); and interceptor connection relief and floatables control at CAM002 and CAM401B and floatables control at CAM001 (Contract 4). Since then, Cambridge has conducted initial coordination of the work of the three contracts with the Cambridge Department of Public Works and MWRA and internal project coordination among the design team members to develop design work plans and schedules. For Contracts 13 and 4, Cambridge has begun to coordinate topographic surveys and other field investigations, geotechnical investigations, hazardous materials assessments, hydraulic modeling, preliminary design, and initial preparation of permit applications. The initial work for Contract 13 also includes manhole and catch basin inspections and building roof drain investigations.

Before the project delays of the last few years, Cambridge had brought Contract 12 to an advanced level of design. Over the past few months, Cambridge has been collecting information to update its Contract 12 design plans and has also updated the related hydraulic model. Cambridge has resumed its discussions with DCR regarding work in the Alewife Reservation and is also coordinating the Contract 12 work with the MBTA and commuter and freight railroad operators to discuss the status, logistics and permit considerations associated with a planned crossing of railroad tracks. For Contract 12, Cambridge has initiated preparation of a railroad crossing permit application and is updating other construction permit applications and the plan for necessary easement takings. Cambridge has also prepared and begun to implement an updated work plan for completing the final design drawings and specifications for Contract 12.

MWRA Improvements at Outfall MWR003 and Rindge Avenue Siphon

While a majority of the revised Alewife Brook CSO control plan will be implemented by the City of Cambridge with MWRA financial assistance, a portion of the plan dealing directly with MWRA sewers and an MWRA CSO outfall will be designed and constructed by MWRA. This work involves installing an automated hydraulic relief gate and associated controls at the overflow weir associated with Outfall MWR003; installing floatables control for this outfall, currently proposed as an in-line netting structure; and relieving a 30-inch MWRA siphon that interconnects the two MWRA interceptors (the Alewife Brook Sewer and the Alewife Brook Conduit) that parallel Alewife Brook and convey wastewater from parts of Belmont, Arlington, Cambridge and Somerville. The project schedule for design and construction is delayed 27 months beyond the Schedule Seven milestones, along with the other Alewife Brook projects. This project is also dependent upon Cambridge completing the other components of the Alewife Brook plan. MWRA plans to commence design of the Outfall MWR003 Control Gate/Floatables Control and Rindge Avenue Siphon Relief project by July 2011.



Concrete-lined section of Alewife Brook, adjacent to Alewife Brook Parkway.

5.3 Floatables Control and Outfall Closing Projects

The 1997 Facilities Plan/EIR called for the control of floatable materials (e.g. paper, plastics, smoking materials) in all remaining CSO discharges, in accordance with EPA's National CSO Policy. Floatables controls will be installed at all remaining CSO outfalls that are predicted to activate in a typical rainfall year. Many of the installations are part of the larger CSO control projects described above. For instance, the Chelsea Trunk Sewer Relief project included the installation of underflow baffles for floatables control at Outfalls CHE002, CHE003 and CHE004.

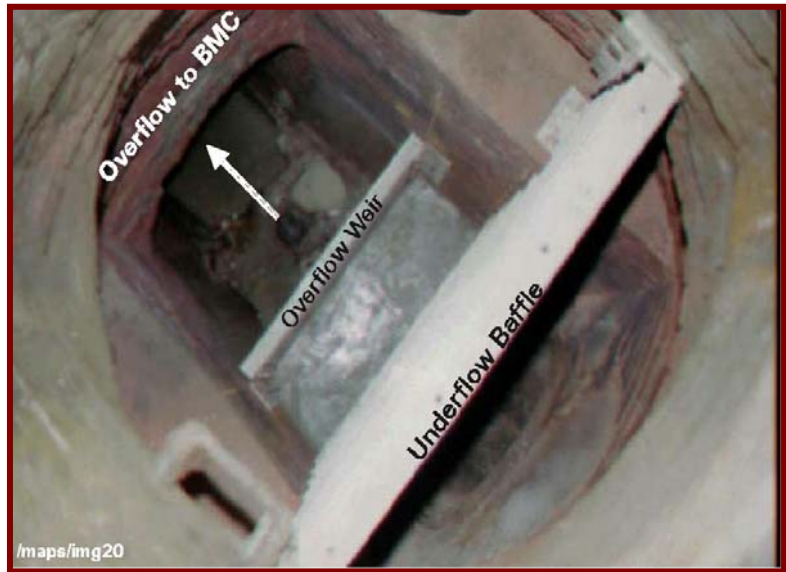
The Region-wide Floatables Control and Outfall Closing Projects described in the following sections involve floatables controls and regulator or outfall closings that are independent of the larger projects. Under mutual agreements, MWRA, BWSC, Cambridge and Somerville are responsible for implementing these controls in their respective systems. MWRA met the March 1999 milestone for commencement of construction with work at Outfalls MWR018-022. Schedule Six required the completion of all related construction work by May 2001.

MWRA Floatables Control at Outfalls MWR018-020 and Outfall Closings at MWR021-022

CSO Outfalls MWR018, 019, 020, 021 and 022 conveyed overflows from MWRA's Boston Marginal Conduit to the Lower Charles River Basin in very large storms. The project called for closing Outfalls 021 and 022 and providing floatables control at the remaining locations. The plan for floatables control involved the installation of underflow baffles at eleven CSO regulator structures upstream of Outfalls 018-020.

MWRA completed the installation of underflow baffles in four of the eleven BWSC regulators (MC-12, MC-15, MC-19, and MC-25) in late 1999. In March 2000, MWRA closed Outfalls MWR021 and MWR022 to CSO discharges.

During preliminary design of floatables control at the seven remaining CSO regulators, which were located in the Old Stony Brook Conduit System, it was determined that the installation of underflow baffles at these regulators would be difficult and potentially prohibitive due to extensive construction requirements, construction impacts and cost.



Based on new information describing the construction difficulties and showing that Outfalls MWR018, 019, and 020 will not activate in a typical rainfall year, MWRA was relieved of the requirement to install floatables control devices at these outfalls. Instead, DEP required MWRA to take certain actions to keep activations low and to confirm that activation frequencies at these outfalls were consistent with predictions. On an annual basis, MWRA reviews meter data to confirm the predicted performance, and has consistently seen that activation frequencies at these outfalls are rare, as predicted.

BWSC Floatables Control

Floatables control included in this project involved the installation of underflow baffles in 10 existing CSO regulator structures associated with outfalls along Boston Inner Harbor and the Fort Point Channel. BWSC designed and constructed the project, and MWRA funded costs. BWSC completed the last of the ten installations in 2002.

Cambridge Floatables Control

At four locations along Alewife Brook (not including Outfall CAM400, where CSO discharges will be eliminated, or Outfall CAM004, which will be closed), the floatables controls are being designed and installed in conjunction with the Alewife Brook sewer separation projects. These controls were included in the various regulatory filings on the Alewife sewer separation project and Alewife Brook/Upper Mystic River Variance and are no longer addressed with the independent Region-wide Floatables Controls.

In November 2007, the City of Cambridge substantially completed a construction contract to control the discharge of floatable materials from its Charles River CSO outfalls, in compliance with Schedule Seven. The controls included underflow baffles that were installed at Outfalls CAM007 and CAM017. Since Cambridge plans to close Outfalls CAM009 and CAM011, based on the results of hydraulic modeling, it does not intend to install floatables controls at these two outfalls. Cambridge will, however, continue to monitor system conditions near CAM009 and CAM011 to verify that these outfalls can remain permanently closed. With completion of this Cambridge work, the “Region-wide Floatables Controls” project in MWRA’s Long-Term Control Plan is fully implemented.

Somerville Floatables Control

The 1997 Facilities Plan/EIR called for the control of floatable materials in the CSO discharges at Outfall SOM001A (Tannery Brook outfall) by installing an in-line net. This work, like much of the work under Cambridge Floatables Control, is associated with the Cambridge/Alewife Brook sewer separation project and is no longer addressed as part of the Region-wide Floatables Controls. The revised Alewife Brook Plan recommends enlarging the local system connection to the MWRA interceptor at SOM001A, in addition to providing floatables control. In the meantime, the City of Somerville continues to maintain a boom as an interim floatables control measure at this outfall.

The plan for floatables control at SOM001A is also related to studies of the Tannery Brook that the City of Somerville is conducting. Any further work to implement a long term plan for floatables control should consider the results of that study. An interim report was completed in December 2005. Somerville continues to investigate the sewer and storm drain systems in this area.

6. PLANNED CSO PROGRAM ACTIVITIES IN 2009

Schedule Seven in the Federal Court Order includes nine CSO control milestones in 2009 (see Table 5). Three of the 2009 milestones and other, earlier milestones relate to the Alewife Brook CSO plan and will not be met due to a 27-month delay that resulted from citizens’ appeals of the wetlands permit for construction of the CAM004 stormwater outfall and basin. Planned work in 2009 on the Alewife Brook projects and the other projects in MWRA’s Long-Term Control Plan is described below for each water segment affected by CSOs.

6.1 Planned Progress by Receiving Water

North Dorchester Bay

The construction contract for the North Dorchester Bay CSO storage tunnel is scheduled to be substantially complete by the spring of 2009. Ongoing work includes completion of the CSO and stormwater diversion structures, piping, and related power and control systems at the five outfalls that will remain. MWRA advertised the second contract, which includes construction of the 15 mgd dewatering pumping station at Conley Terminal and related force main, in 2008 and plans to issue a notice proceed in April 2009. MWRA also plans to complete design and issue the notice to proceed with the third and final contract, which involves construction of the belowground remote odor control facility at the upstream end of the storage tunnel, by December 2009.

BWSC plans to substantially complete construction of the Morrissey Boulevard Storm Drain by June 2009, in compliance with Schedule Seven. The new storm drain will be brought on-line with completion of construction of the North Dorchester Bay CSO storage tunnel in 2011.

Reserved Channel

BWSC plans to issue a notice to proceed with the first of several planned construction contracts for the Reserved Channel sewer separation project by May 2009, in compliance with Schedule Seven. The first contract involves the construction of storm drains to separate the combined sewer system in the area tributary to Outfall BOS080. BWSC plans to commence the second Reserved Channel contract later in 2009. This contract will rehabilitate and upgrade the four existing BWSC outfalls (BOS076, BOS078, BOS079 and BOS080) prior to performing the remaining separation work upstream.

South Dorchester Bay

Since completing the South Dorchester Bay sewer separation project and closing the related CSO regulators in 2007, BWSC has monitored the performance of its Dorchester Interceptor and tributary sewers to determine whether hydraulic conditions during wet weather are acceptable. BWSC will continue to remove stormwater inflow (e.g. building downspout connections) from the sewer system to meet the system's hydraulic performance criteria. While this work and related MWRA funding continue, CSO discharges to South Dorchester Bay are eliminated, and MWRA is taking steps to surplus the Fox Point and Commercial CSO facility properties.

Inner Harbor

MWRA completed the first construction contract (trunk line rehabilitation) for the East Boston Branch Sewer Relief project in 2004. MWRA advertised the second, and largest, contract (micro-tunneling) in July 2008 and expects most of the work of this contract to occur in 2009. MWRA also plans to complete design and issue a notice to proceed with the third and last construction contract (pipe bursting) by May 2009.

Charles River Basin

MWRA plans to substantially complete the construction contract for the Cottage Farm Brookline Connection and Inflow Controls project by June 2009, in compliance with Schedule Seven. The project will provide more hydraulic conveyance capacity for the interceptor system along the north side of the Charles River in Cambridge, and it will allow MWRA to hold back the inflows to its Cottage Farm CSO facility using the

higher conveyance capacity as well as storage capacity in the upstream interceptors. The new operational conditions and procedures will significantly reduce the number of times the Cottage Farm Facility activates and the volume of treated discharges to the Charles River. MWRA also plans to complete the design work for the Charles River Interceptor Gate Controls project in 2009 and issue a Notice to Proceed with construction by January 2010, in compliance with Schedule Seven.

BWSC and the Town of Brookline will continue with the Bulfinch Triangle Sewer Separation construction contract and the first contract for the Brookline Sewer Separation project, respectively. Brookline expects to substantially complete the contract work by November 2009. Brookline also plans to issue a Notice to Proceed with the second and much larger construction contract by June 2009. In addition, MWRA is currently developing plans to inspect and clean its Outfall MWR010 to ensure it can convey the stormwater flows that will be removed from Brookline's sewer system.

Alewife Brook

Cambridge will continue with the design efforts it commenced in 2008 for three projects in the Alewife Brook CSO control plan: CAM004 Stormwater Outfall and Wetland Basin; CAM400 Manhole Separation; and Interceptor Connection Relief and Floatables Control at CAM002 and CAM401B and Floatables Control at CAM001, as well as resume design efforts related to CAM004 Sewer Separation. Cambridge is moving forward with these design efforts despite the latest appeal of the Massachusetts Superior Court decision on the DEP wetlands permit for the CAM004 stormwater outfall and basin. Cambridge expects to complete design of the CAM004 outfall and basin and CAM400 manhole separation projects in late 2009.

6.2 Annual CSO Discharge Reporting and Performance Tracking

In compliance with its NPDES permit and CSO variances for the Charles River and Alewife Brook/Upper Mystic River, MWRA reviews facility records, meter data and other system performance indicators and performs hydraulic modeling to estimate CSO discharges for all storms that occur each calendar year. MWRA plans to submit the CSO discharge estimates for 2008 to EPA and DEP in April 2009. MWRA will share the results with its CSO communities to validate the estimates and coordinate with their own submissions to EPA and DEP, in compliance with similar reporting requirements in their NPDES permits and CSO variances. MWRA uses the annual CSO discharge estimates to verify progress in controlling CSO discharges toward realizing the goals of the Long-Term Control Plan and meeting corresponding NPDES permit limits that are the basis for compliance with water quality standards.

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Table 5: Work in 2009 Related to Schedule Seven Milestones

Note: Shading indicates Alewife Brook related milestones that will not be met.

Milestone Date	Milestone Description	Project Schedule
Jul 2006	<i>MWRA, in cooperation with Cambridge, to commence design of CAM400 manhole separation; and to commence design of interceptor connection relief and floatables control at CAM002, CAM401B, and SOM01A and floatables control at CAM001.</i>	All of the Alewife Brook CSO projects are delayed by 27-months as a result of the citizens' appeal of the wetlands Superseding Order of Conditions for Cambridge's Control 12 (CAM004 stormwater outfall and wetland basin). While certain appeals continue, Cambridge commenced design of three projects in 2008 and plans to move the three projects into construction in 2009 and 2010. Design and construction of two other Alewife Brook CSO projects will follow accordingly.
Jul 2007	<i>MWRA, in cooperation with Cambridge, to commence construction of CAM400 manhole separation; and to commence construction of CAM004 stormwater outfall and detention basin.</i>	
Jan 2008	<i>MWRA, in cooperation with Cambridge, to commence construction of interceptor connection relief and floatables control at CAM002, CAM401B, and SOM01A, and floatables control at CAM001.</i>	
Jul 2008	<i>MWRA, in cooperation with Cambridge, to complete construction of CAM400 manhole separation.</i>	
Dec 2008	<i>MWRA, in cooperation with Cambridge, to ensure completion of construction for interceptor connection relief and floatables control at CAM002, CAM401B, and SOM01A, and floatables control at CAM001.</i>	
Apr 2009	<i>MWRA to commence design of control gate/floatables control at Outfall MWR003 and MWRA Rindge Avenue siphon relief.</i>	
Jul 2009	<i>MWRA, in cooperation with Cambridge, to complete construction of CAM004 stormwater outfall and detention basin.</i>	
	<i>MWRA, in cooperation with Cambridge, to commence construction of CAM004 sewer separation.</i>	

(continued on next page)

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Table 5: Work in 2009 Related to Schedule Seven Milestones (continued)

Note: **Shading** indicates Alewife Brook related milestones that will not be met.

Milestone Date	Milestone Description	Project Schedule
Jan 2009	<i>MWRA to complete evaluation of additional Charles River interceptor interconnection alternatives and submit related report to EPA and DEP. Such report shall include reasonably expeditious schedules for completing projects that can be completed for low cost, that do not have unexpected construction impacts, and that result in a meaningful reduction in overflow volume or frequency.</i>	MWRA submitted its report on the evaluation of additional Charles River interceptor interconnection alternatives to EPA and DEP on January 30, 2009. The evaluations showed that additional interconnections would not provide a significant reduction in CSO overflow volume or frequency and would not provide any other hydraulic benefits. Accordingly, MWRA does not recommend constructing additional interconnections beyond the interconnection of the North Charles and South Charles overflow chambers at Cottage Farm now in construction.
Mar 2009	<i>MWRA to submit (annual report on CSO control progress).</i>	MWRA submitted this Annual Report for 2008 on March 13, 2009.
Apr 2009	<i>MWRA to commence implementation of additional Charles River interceptor interconnections projects in compliance with the schedules submitted pursuant to the related January 2009 milestone.</i>	As discussed at the related January 2009 milestone above, MWRA determined that additional interconnections would not provide hydraulic or CSO control benefit.
May 2009	<i>MWRA, in cooperation with BWSC, to commence construction of Reserved Channel sewer separation.</i>	BWSC plans to issue the notice to proceed with the first of several construction contracts for the Reserved Channel sewer separation project by May 2009.
Jun 2009	<i>MWRA to complete construction of the Brookline Connection, Cottage Farm overflow chamber interconnection, and Cottage Farm gate control.</i> <i>MWRA, in cooperation with BWSC, to complete construction of Morrissey Boulevard storm drain.</i>	Ongoing construction is scheduled to be substantially complete by June 2009. Ongoing construction is scheduled to be substantially complete by June 2009.

The End

