

# Massachusetts Water Resources Authority



## Combined Sewer Overflow Control Plan



## Annual Progress Report 2007

March 2008

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On the cover:

Cutting head for North Dorchester Bay tunnel boring machine is lowered into the mining shaft, October 2007.”

## 1. Introduction

The Massachusetts Water Resources Authority (MWRA) files this Combined Sewer Overflow Annual Report for 2007 in compliance with the Federal District Court Order in the Boston Harbor Case. Annual and quarterly reports on MWRA's plan for the control of combined sewer overflows in the metropolitan Boston area in the long-term (the "Long-Term Control Plan") are required by the Court. They describe the progress of work to complete the Long-Term Control Plan relative to milestones in the Court-ordered schedule. This annual report reviews key accomplishments, regulatory and court actions, and design and construction progress in calendar year 2007 and in the quarterly period from December 15, 2007, to March 15, 2008. Like previous annual reports, it also discusses issues that may affect MWRA's ability to complete the CSO projects on schedule.

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 a decade ago, in August 1997. 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 status of implementation for each project. Figure 2 summarizes the scope, schedule and predicted benefits of the Long-Term Control Plan.

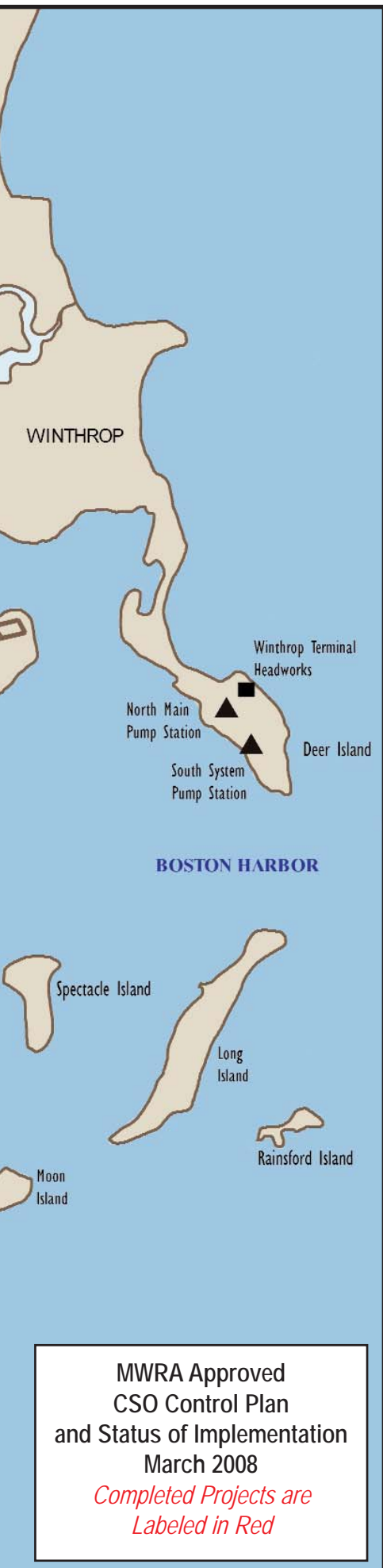
This Annual Report includes the following information that characterizes the work performed in 2007 and the overall progress made to date to control CSO discharges, comply with the Federal District Court Order and National Pollutant Discharge Elimination System (NPDES) permits related to CSO discharges, and improve water quality in Boston Harbor and its tributaries:

- Key CSO control accomplishments in 2007, which included the completion of several CSO projects and significant design and construction progress on many others;
- Overall progress, accomplishments and benefits of MWRA's CSO control program in the two decades since MWRA assumed responsibility for the Long-Term Control Plan in 1987;
- The work that is ongoing or planned to complete the remaining elements of the Long-Term Control Plan; and
- A project-by-project review of implementation status, progress in the past year, and issues affecting schedule compliance.

## 2. Highlights of Accomplishments and Progress in 2007

In 2007, MWRA continued to implement the Long-Term Control Plan at high levels of design and construction activity and related spending to meet the Federal Court-ordered obligations in Schedule Seven. MWRA, with the cooperation of the Boston Water and Sewer Commission (BWSC) and the City of Cambridge, completed construction of five of the 35 CSO projects, bringing the total number of completed projects to 21. The five completed projects, together with implementation of improved operational procedures at the Prison Point CSO treatment facility in 2007, further reduce the average annual volume of CSO discharge by 182 million gallons, a 22% reduction, from the previous year's level.





**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

**In Construction (2)**

Prison Point Facility Optimization	2008
Morrissey Boulevard Storm Drain	2009
East Boston Branch Sewer Relief	2010
North Dorchester Bay Storage Tunnel and Related Facilities	2011
CAM004 Sewer Separation	TBD

**In Design**

Cottage Farm Brookline Connection and Inflow Controls	2009
Charles River Interceptor Gate Controls	2011
Bulfinch Triangle Sewer Separation	2013
Brookline Sewer Separation	2013
Reserved Channel Sewer Separation	2015
CAM004 Outfall and Basin	TBD

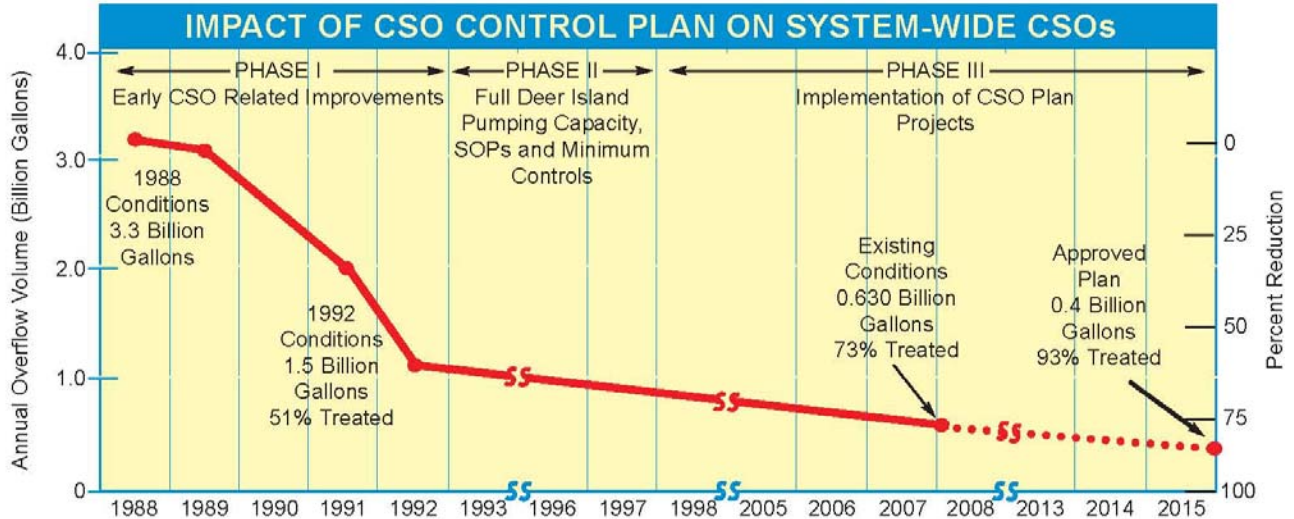
**Future Start**

CAM400 Manhole Separation	TBD
Alewife Interceptor Connection Relief and Floatables Controls	TBD
MWR003 Gate and Rindge Ave. Siphon Relief	TBD

(1) Actual or Scheduled construction completion

(2) 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  
 \$840.3 Million  
 Net Annual O&M  
 \$1.5 Million

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System-wide, average annual CSO discharge has been reduced by 2.7 billion gallons since 1988, an 81% reduction. In addition, the recently completed projects resulted in the closing of five more CSO outfalls, (BOS088, BOS089, BOS090 South Dorchester Bay, and CAM009, CAM011 Charles River) bringing the total number of closed outfalls to 27 of the 84 outfalls addressed in the Long-Term Control Plan.

In 2007, MWRA and the communities also made substantial progress on 11 projects that are currently in design or construction. MWRA spent \$72.9 million on the Long-Term Control Plan in 2007, its highest annual spending on CSO control to date. Of this cost, \$65.6 million (90%) was construction related, including construction contracts, engineering services during construction, acquisition of land and easements, and construction permit fees.

MWRA Spending on CSO Control in 2007

Design:	\$ 7.3 million
Construction contracts:	59.4 million
Construction related services:	4.2 million
<u>Land/easement/permits:</u>	<u>2.0 million</u>
<b>Total CSO capital spending in CY07:</b>	<b>\$ 72.9 million</b>

The following lists the key accomplishments and progress made in 2007.

***CSO Project Implementation***

- MWRA continued to make substantial progress to implement the \$264 million CSO control plan for the South Boston beaches, including construction of the North Dorchester Bay storage tunnel and final design of tunnel related facilities. In September 2007, MWRA received the tunnel boring machine (TBM) from the manufacturer. MWRA’s tunnel contractor assembled the TBM on-site and commenced mining operations from the finished mining shaft at Massport’s Conley Terminal on October 17, 2007. As of March 10, 2008, the contractor had mined 3,200 feet (30%) of the proposed 10,832-foot (2.1-mile) tunnel (see map below). Full circumferential lining of the tunnel with 10-inch thick, pre-cast concrete sections occurs continuously with the mining operation. In addition, the contractor has completed most of the work to construct the equipment retrieval shaft at the upstream end of the tunnel near the State Police Building.

The contractor has also made substantial progress constructing the CSO and stormwater diversion structures and tunnel drop shafts at existing CSO outfalls, restoring and improving the surface of Moakley Park where much of the construction to date has taken place, and cleaning and rehabilitating existing sewers and outfall pipes to prepare them for tunnel mining below them and for connecting them to the tunnel eventually. At the same time,



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BWSC has moved the \$34 million Morrissey Boulevard Storm Drain project entirely into construction. The storm drain is intended to augment the level of stormwater control provided by the storage tunnel along the South Boston beaches.

- BWSC completed construction of the South Dorchester Bay Sewer Separation project in December 2006 and closed all related CSO regulators in 2007, well ahead of the November 2008 milestone in Schedule Seven. The project cost was \$119 million, funded by MWRA. Completion of this project brings to an end the discharge of CSOs to South Dorchester Bay and removes the impacts of CSO discharges on its beaches and shellfish beds. On November 1, 2007, with confirmation from BWSC that it had closed all CSO regulators tributary to the Fox Point and Commercial Point CSO treatment facilities, MWRA decommissioned the two facilities as planned. Prior to the project, these facilities discharged a total of 30 million gallons of treated CSO in typical rainfall year.
- In April 2007, MWRA completed construction of the \$51.1 million Union Park Detention and Treatment Facility. The construction contract also included \$5.7 million of improvements by BWSC to its 32-year old Union Park pumping station that provides flood control to the South End neighborhood. The detention and treatment facility includes screening, chlorine disinfection, dechlorination and a level of solids removal upstream of the pumping station, which discharges the treated flows to the Fort Point Channel. The new, below-grade detention basins also provide complete capture of flows up to the 2 million-gallon storage volume of the basins. The basins reduce the average annual number of pumping station discharges to Fort Point Channel from 25 to 17 and reduce average annual CSO discharge volume from 132.0 million gallons untreated to 71.4 million gallons treated. This facility is currently operating in startup phase.
- In March 2007, MWRA completed construction of the \$14.3 million BOS019 CSO Storage Conduit in Charlestown. The storage conduit captures up to 670,000 gallons of CSO, reducing the average annual number of discharges at outfall BOS019, which outlets to the Little Mystic Channel, from 13 to 2 and reducing total annual discharge volume at this outfall by 86%, from 4.4 million gallons to 0.6 million gallons. Since March 31, 2007, flow has entered the facility during 21 storms, and 5.2 million gallons of overflow that previously would have been discharged to Little Mystic Channel was captured during these events and pumped back to the collection system after the storms for transport to the Deer Island treatment plant. Only during two of these storms, on April 16, 2007 and February 13, 2008, did the overflow exceed the storage capacity of the conduit and cause a discharge of the net flow to the Little Mystic Channel.
- BWSC also completed construction of the Fort Point Channel Sewer Separation project in March 2007, in compliance with Schedule Seven, at a total project cost of \$8.3 million funded by MWRA. The project eliminates CSO discharges at BWSC outfalls BOS072 and BOS073 in a typical rainfall year. Previously, these outfalls activated nine times and discharged a total of 3.0 million gallons of CSO in typical rainfall year.
- On March 30, 2007, MWRA submitted its report on the optimization study of the Prison Point CSO Facility to EPA and DEP, in compliance with Schedule Seven. In the report, MWRA recommended a set of wet weather operational improvements predicted to reduce the number of treated discharges to the Inner Harbor from 30 to 17 in a typical rainfall year and reduce the facility's average annual discharge volume from 335 million gallons to 250 million gallons. In accordance with the report, MWRA has implemented the recommended operational changes and continues to monitor them and measure the improved performance of the facility. MWRA plans to complete the testing program this spring and recommend new CSO discharge goals for the facility (activation frequency and volume in a typical year) in a report to EPA and DEP in April 2008.



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- MWRA also made substantial progress to complete design of the \$80 million East Boston Branch Sewer Relief project. In September 2007, MWRA received from its design consultant the 100% design plans and specifications for Contract 6257, which involves installing approximately 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 and with limited open cut sections. MWRA plans to complete design and advertise the contract in March 2008 and issue a Notice to Proceed by June 2008, in compliance with Schedule Seven. MWRA also recently received the 50% design plans and specifications for Contract 6841, which involves replacing and upgrading approximately one mile of interceptor pipe in upstream areas using “pipebursting” methods. MWRA completed a first construction contract, involving relining the main trunk of the East Boston Branch Sewer, in 2004.
- In 2007, MWRA, BWSC and the Town of Brookline continued to make substantial progress to implement the set of new projects that were added to the Long-Term Control Plan by the agreement with EPA and DEP of March 2006, to further reduce CSO discharges to the Charles River. MWRA received the 100% design plans and specifications for the \$3.8 million Cottage Farm Brookline Connection and Inflow Controls project and plans to advertise the construction contract in March 2008. MWRA also procured design services for the \$2.0 million Charles River Interceptor Gate Controls/Additional Interceptor Connections project and issued the Notice to Proceed for the design contract on January 31, 2008, in compliance with Schedule Seven. The Town of Brookline and BWSC recently completed field investigations, preliminary design plans and related reports for the Brookline Sewer Separation project and the Bulfinch Triangle Sewer Separation project, respectively. The cost estimates for these two projects have increased significantly. MWRA is reviewing the estimates and the preliminary design plans and is obtaining more information about the costs from Brookline and BWSC. These projects are intended to improve upon the substantial reduction in pollutant loadings to the Charles River already achieved through major CSO related investments by MWRA, BWSC, Brookline and Cambridge.
- BWSC also continued to make substantial progress in 2007 with the Reserved Channel Sewer Separation project. BWSC completed the field investigations and expects to submit a preliminary design report and detailed cost estimate to MWRA this spring. BWSC has informed MWRA that the project cost estimate will be as much as \$57 million more than the \$63.1 million in MWRA’s Proposed Fiscal Year (FY) 2009 Capital Improvement Program (CIP) budget, to lay new storm drains through the congested residential and commercial streets and tight utility corridors that characterize the Reserved Channel area. MWRA will review the design plans and detailed cost estimate when they are received from BWSC with the Preliminary Design Report and will determine how to proceed with this project.
- In November 2007, the City of Cambridge installed floatables control at CSO outfalls CAM007 and CAM017 on the Charles River, in compliance with Schedule Seven, and closed CSO outfalls CAM009 and CAM011 on the Charles River by installing temporary brick and mortar bulkheads at the regulators, thereby completing the region-wide floatables control project.
- On October 16, 2007, DEP issued a decision rejecting a final administrative appeal request related to the Alewife Brook CSO control plan and sustaining the wetlands Superseding Order of Conditions it had issued to the City of Cambridge for Contract 12, which includes the CAM004 stormwater outfall and wetland basin. On November 14, 2007, citizen petitioners filed an appeal of this DEP decision in Massachusetts Superior Court, in part requesting 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 court appeal are resolved. Despite this appeal and motion, MWRA and the City of Cambridge expect to finalize their negotiations soon on changes to their CSO Memorandum of Understanding and Financial Assistance Agreement to incorporate the full scope of the revised sewer separation plan as presented in the July 2003 Final Variance Report, along with updated costs, a cost share, and new project schedules. Upon

approval by MWRA's Board of Directors, MWRA and the City of Cambridge plan to move forward with implementation of the Alewife Brook CSO projects.

### ***Regulatory Decisions***

In 2007, DEP extended the CSO Variances for the Charles River issued to MWRA, BWSC and the City of Cambridge by three years, to October 1, 2010. DEP also extended the CSO Variances for the Alewife Brook/Upper Mystic River issued to MWRA, the City of Cambridge and the City of Somerville by three years, to September 1, 2010. Under the agreement on the Long-Term Control Plan reached by EPA, DEP and MWRA in March 2006, DEP agreed to issue a series of three-year variance extensions until 2020, and MWRA agreed to implement the revised Long-Term Control Plan by 2015 and verify the predicted performance of the plan at all CSO outfalls by 2020. At that time, DEP will consider issuing long-term water quality standards determinations, based on the verified performance of the Long-Term Control Plan and other conditions affecting the water quality and uses of these water bodies.

Conditions in the recent variance extensions require MWRA to implement the Long-Term Control Plan and require MWRA and the municipalities to continue to implement the Nine Minimum Controls of EPA's National CSO Control Policy. MWRA is also required to continue its water quality sampling program, and all of the CSO permittees are required to report estimated CSO discharge frequency and volume from their respective outfalls to these receiving waters on an annual basis. In April 2007, MWRA and the municipalities submitted their estimates of CSO discharges for the storms in calendar year 2006. MWRA's submission included discharge estimates for all of the currently active CSO outfalls addressed in the Long-Term Control Plan, regardless of ownership.

### **3. Long-Term Control Plan – Two Decades of Progress and Water Quality Improvement**

It has been a decade since MWRA recommended a long-term plan to bring CSO discharges in Boston Harbor and other area waters into compliance with the Federal Clean Water Act and Massachusetts Water Quality Standards. It also has been two decades since MWRA assumed responsibility for developing and implementing a long-term control plan. 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, including more than 25 site-specific CSO projects located in Boston, Cambridge, Somerville and Chelsea. The CSO Conceptual Plan was later refined in the 1997 Facilities Plan/EIR.

In March 2006, MWRA reached agreement with EPA 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 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 monitoring which will be used to verify that the Long-Term Control Plan goals are achieved. The United States and MWRA agreed to withdraw the 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 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 comprise MWRA's Long-Term Control Plan, which cover a nearly 10-year period, 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.

### ***Scope, Benefits and Cost of the Current Plan***

The approved Long-Term Control Plan is presented in Table 1, by receiving water segment (see Figure 3). The costs shown in Table 1, including the total plan cost of \$840.3 million (in December 2008 dollars)<sup>1</sup>, are from MWRA's Proposed FY09 CIP. These costs, especially for the Charles River and the Reserved Channel, may increase significantly with the new cost estimates MWRA recently received from BWSC and the Town of Brookline for the Bulfinch Triangle and Reserved Channel Sewer Separation projects and the Brookline Sewer Separation project, respectively (see "MWRA's Concern with Potential CSO Program Cost Increases," in Section 4).

With the anticipated benefits of the Prison Point CSO facility operational improvements that MWRA recently implemented and is now testing, 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 when the plan is fully implemented in 2015. Of the remaining discharge volume, 93% will receive treatment at MWRA's CSO facilities at Cottage Farm, Prison Point, Somerville Marginal and Union Park. The overall performance goals of this approved plan, measured as the average annual volume of CSO discharge to each receiving water segment, are shown 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 earlier 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, consistent with the plan and in compliance with water quality standards. 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 Charles River and Alewife Brook. 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, including MWRA, BWSC, and the cities of Cambridge and Somerville.

### ***Status of Plan Implementation and Benefits Already Achieved***

CSO spending in 2007 brought total MWRA capital expenditures for the CSO control plan to \$446.4 million of the total \$840.3 million CSO budget in the Proposed FY09 CIP. With the cooperation of its CSO communities, MWRA has completed 21 of the 35 CSO projects, and 11 additional projects are now into 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 in the Boston Harbor Case, improvements to MWRA's wastewater transport and treatment systems have produced huge reductions in CSO discharges (see Figure 4) and dramatic improvement in water quality in many areas. These wastewater system improvements include the \$3.8 billion investment MWRA has made in the new Deer Island Treatment Plant and associated conveyance systems (in addition to the \$840 million budget for the CSO control program) and the 21 CSO projects completed to date. Together, they have

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<sup>1</sup> The Proposed FY09 CIP anticipates a total spending for CSO control of \$893.4 million, including escalation to the midpoint of construction and contingency, to complete the plan on schedule.

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**Table 1: Long-Term Control Plan by Receiving Water**

Receiving Water	CSO Discharge Goals (typical rainfall year)		Projects <sup>(1)</sup> (Completed projects in <i>italics</i> )	Capital Cost <sup>(2)</sup>
	Activations	Volume (million gallons)		
Alewife Brook/Upper Mystic River	7 untreated and 3 treated @ Somerville Marginal	7.3 3.5	<ul style="list-style-type: none"> <li>• <i>Somerville Baffle Manhole Separation</i></li> <li>• CAM004 Sewer Separation</li> <li>• CAM004 Stormwater Outfall and Detention Basin</li> <li>• CAM400 Manhole Separation</li> <li>• Interceptor Connection Upgrades/Floatables Control</li> <li>• MWR003 Gate and Rindge Siphon Relief</li> </ul>	\$ 61.1 M
Mystic River/Chelsea Creek Confluence (includes Chelsea Creek)	1 untreated and 39 treated @ Somerville Marginal	1.1 60.6	<ul style="list-style-type: none"> <li>• <i>Hydraulic Relief at BOS017</i></li> <li>• <i>Chelsea Trunk Sewer Replacement</i></li> <li>• <i>Somerville Marginal CSO Facility Upgrade</i></li> <li>• E. Boston Branch Sewer Relief (2 of 10 outfalls)</li> </ul>	10.5 M
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"> <li>• <i>Cottage Farm CSO Facility Upgrade</i></li> <li>• <i>Stony Brook Sewer Separation</i></li> <li>• <i>Hydraulic Relief at CAM005</i></li> <li>• Cottage Farm Brookline Connection and Inflow Controls</li> <li>• Charles River Interceptor Gate Controls</li> <li>• Brookline Sewer Separation</li> <li>• Bulfinch Sewer Separation</li> <li>• <i>MWRA Outfall Closings and Floatables Control</i></li> </ul>	72.4 M
Inner Harbor	6 untreated and 30/17 <sup>(3)</sup> treated @ Prison Point	9.0 335.0/250.4 <sup>(3)</sup>	<ul style="list-style-type: none"> <li>• <i>Prison Point CSO Facility Upgrade</i></li> <li>• <i>Chelsea Branch Sewer Relief</i></li> <li>• <i>CHE008 Outfall Repairs</i></li> <li>• <i>BOS019 Storage Conduit</i></li> <li>• (8 of 10 outfalls)</li> </ul>	123.3 M
Fort Point Channel	3 untreated and 17 treated @ Union Park	2.5 71.4	<ul style="list-style-type: none"> <li>• <i>Union Park Treatment Facility</i></li> <li>• <i>BOS072-073 Sewer Separation and System Optimization</i></li> </ul>	59.4 M
Constitution Beach	Eliminate		• <i>Constitution Beach Sewer Separation</i>	3.8 M
North Dorchester Bay	Eliminate		<ul style="list-style-type: none"> <li>• N. Dorchester Bay Storage Tunnel and Related Facilities</li> <li>• <i>Pleasure Bay Storm Drain Improvements</i></li> <li>• Morrissey Blvd Storm Drain</li> </ul>	264.2 M
Reserved Channel	3 untreated	1.5	• Reserved Channel Sewer Separation	63.1 M
South Dorchester Bay	Eliminate		<ul style="list-style-type: none"> <li>• <i>Fox Point CSO Facility Upgrade (interim)</i></li> <li>• <i>Commercial Point CSO Facility Upgrade (interim)</i></li> <li>• <i>South Dorchester Bay Sewer Separation</i></li> </ul>	126.9 M
Neponset River	Eliminate		• <i>Neponset River Sewer Separation</i>	2.7 M
Regional			<ul style="list-style-type: none"> <li>• <i>Region-wide Floatables Controls</i></li> <li>• Planning, Technical Support and Land Acquisition</li> </ul>	2.7 M 50.2 M
<b>TOTAL</b>		<b>505.1/420.5<sup>(3)</sup></b>		
<b>Treated</b>		<b>476.8/392.2<sup>(3)</sup></b>		<b>\$ 840.3 M</b>

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

(2) Current estimated cost, as contained in MWRA Proposed FY09 Capital Improvement Program

(3) The two levels of control are with and without the predicted performance of operational improvements at the Prison Point CSO Facility, currently in performance testing.

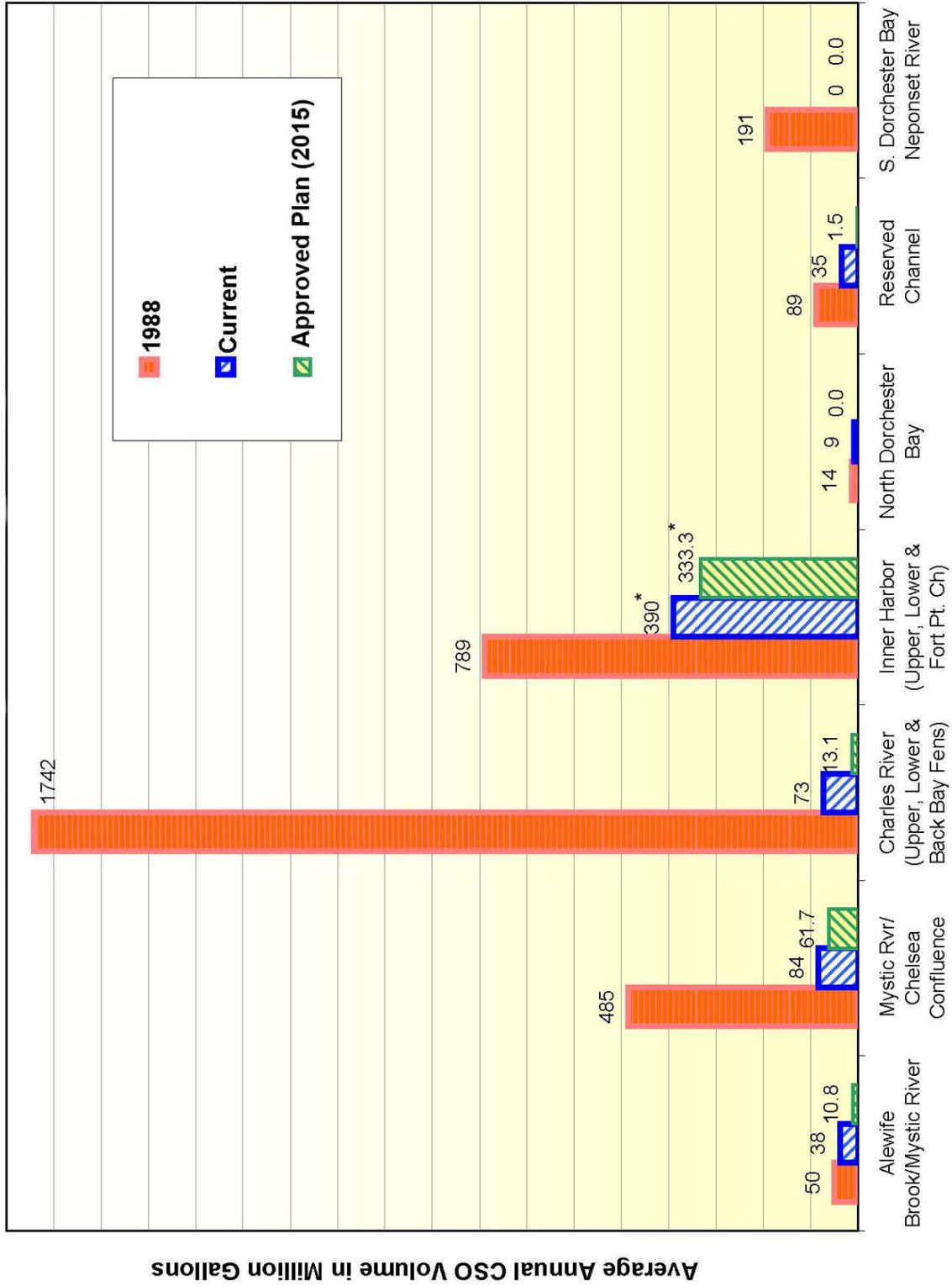
**Figure 3: Receiving Waters**



reduced average annual volume of CSO discharge in a typical rainfall year from 3.3 billion gallons in 1988 to 630 million gallons today, an 81% reduction. In addition, 73% of the remaining overflow now receives 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 5) 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 discharges have been drastically cut from about 1.7 billion gallons in 1988 to 73 million gallons today, a 96% reduction. Approximately 85% 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 \$3.8 billion investment in 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 and 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.

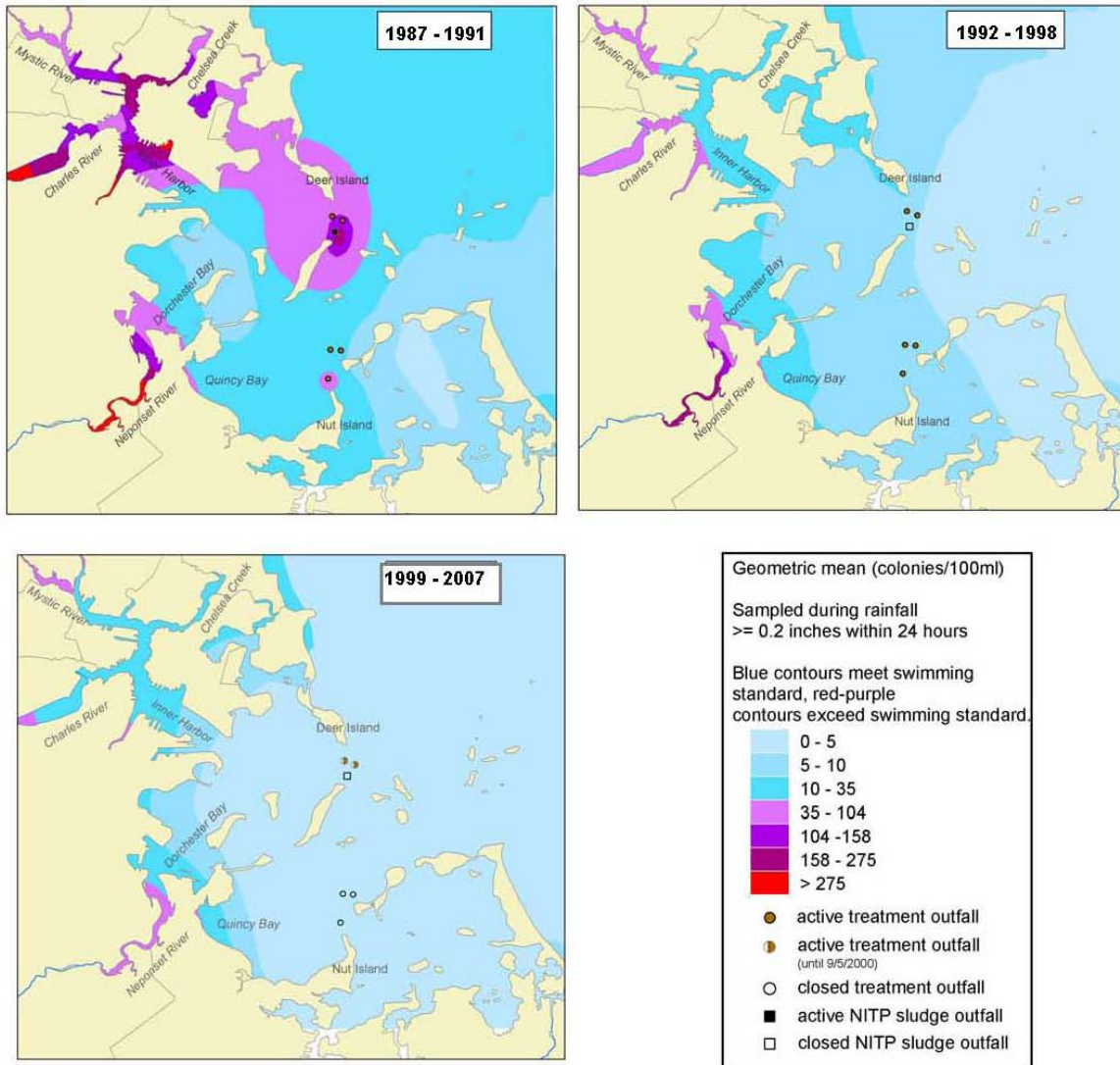
Figure 4  
 CSO Typical Year Discharge Volumes are Diminishing



Receiving Water Bodies

\* Includes predicted reduction of treated discharges at Prison Point CSO Facility due to operational changes currently in start-up and testing

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**Figure 5. 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 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 reflects the affects 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 - 2007** The current period shows continued improvement due to the closure of 27 CSO outfalls, upgrades of CSO facilities, ending of harbor treatment plant effluent discharges as the new out fall began operating in 2000, and local efforts to abate stormwater pollution.

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. Figure 6 shows marked differences in the results of water quality sampling for *Enterococcus*<sup>2</sup> conducted in three sequential periods beginning in 1989 that generally coincide with the timeframes of specific pollution control achievements:

- 1989-1991: the elimination of dry weather overflows and other early pollution controls at CSO outfalls; the “fast-track” pumping improvements at Deer Island and other major transport improvements that greatly increased the rate and reliability of wet weather flow conveyance to the Deer Island Treatment Plant.
- 1992-1998: implementation of CSO system optimization plans; improved MWRA and community system inspection and maintenance programs; sewer separation projects by BWSC and Cambridge in the Charles River watershed.
- 1999-2007: completion of CAM005 hydraulic relief, Cottage Farm CSO facility upgrades and Stony Brook sewer separation projects in the Long-Term Control Plan; major sewer separation work by Cambridge from Central Square to Harvard Square; intensive stormwater pollution reduction programs by communities along the Charles River in compliance with DEP administrative orders pursuant to Section 308 of the Clean Water Act.

#### **4. Implementation Schedule and Cost**

##### ***CSO Project Schedules***

All of the projects are progressing on schedules that comply with the milestones set forth in Schedule Seven, with the exception of the projects in the Alewife Brook CSO project. The approved CSO plan for Alewife Brook was revised by MWRA and the City of Cambridge, approved by the Court Parties, and incorporated into the Court Schedule a few years ago, but has since suffered delays due to a citizen’s appeal of the wetlands Superseding Order of Conditions issued by DEP for Cambridge’s Contract 12. Contract 12 includes construction of a stormwater basin and outfall in and near the Department of Conservation and Recreation’s (“DCR”) Alewife Brook Reservation that are necessary to accommodate new stormwater flows generated by the sewer separation work that is the core of the revised CSO plan.

On October 16, 2007, the Acting Commissioner of DEP issued a decision denying the appellants' motion for reconsideration of DEP's June 1, 2007 final decision sustaining the superseding order of conditions for the City of Cambridge Department of Public Works for its Cambridge Park Drive Drainage project, which includes the CAM004 stormwater outfall and detention basin (Contract 12). This action effectively closed

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<sup>2</sup> In 2007, DEP changed the bacteria indicator for measuring water quality standards compliance in the Charles River fecal coliform to *E. coli*. *Enterococcus*, another indicator of the presence of human and animal waste, is presented here because of the complete volume of data that exists across the full time period. Historical fecal coliform counts and current *E. coli* counts in the Charles River show a trend similar to *Enterococcus*, with progressive improvement since the mid-1990s.

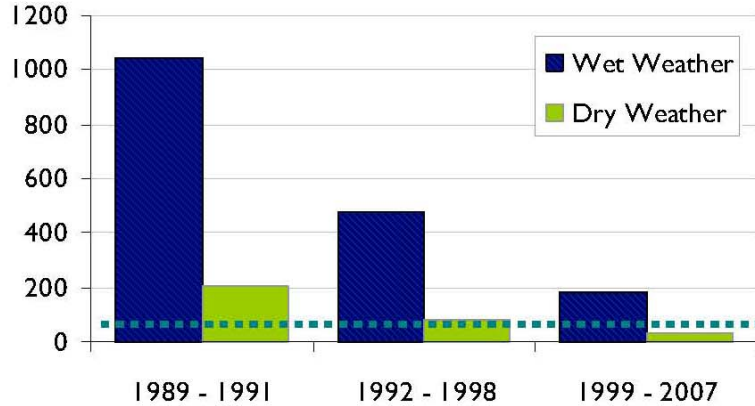


**Figure 6**  
**Change in Lower Charles River Water Quality Over Time**

*Enterococcus* bacteria counts, 1989 - 2007

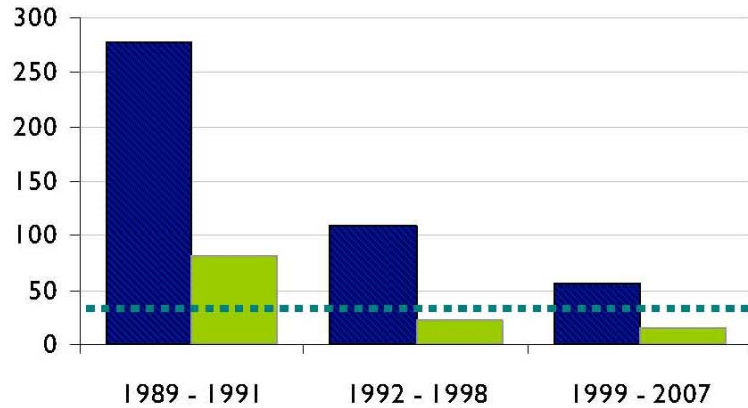
**Upper Basin**

(Watertown Dam to upstream of Cottage Farm, note different scale)



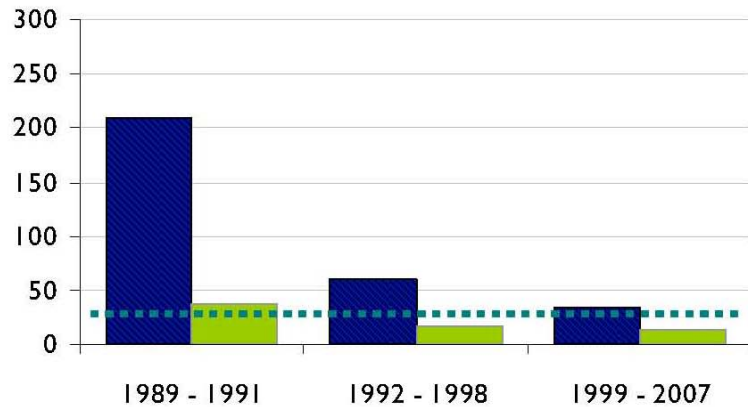
**Mid-Basin**

(Cottage Farm to Science Museum)



**Downstream of Basin**

(Science Museum to New Charles Dam)



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.

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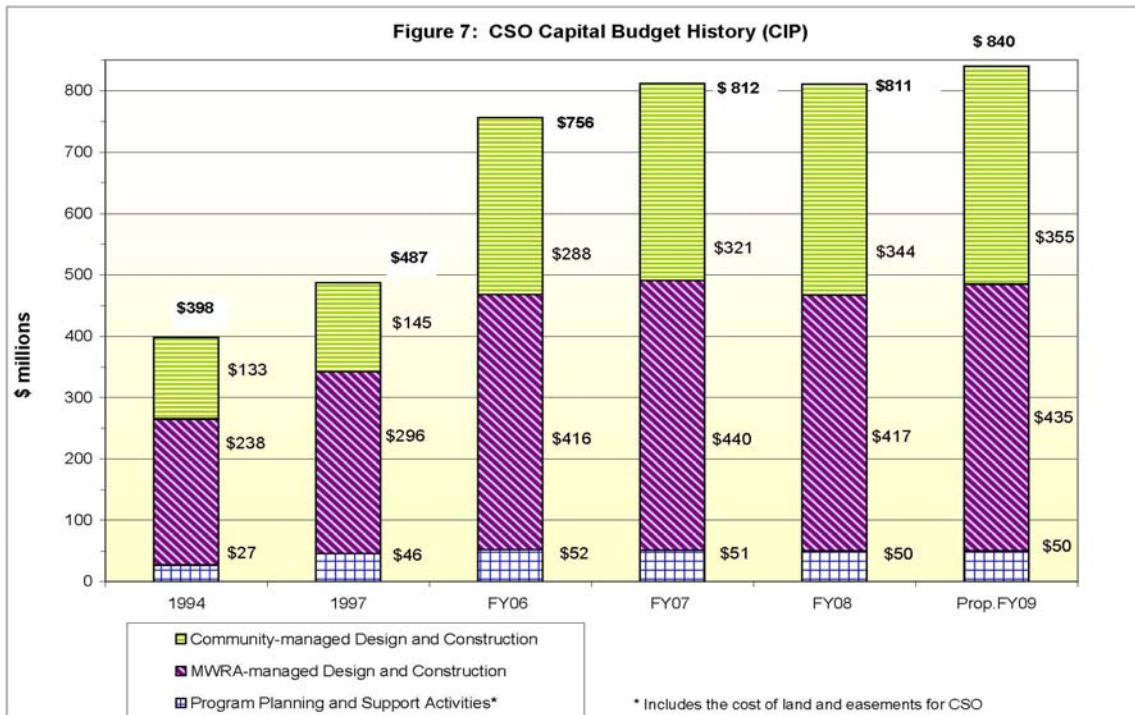
the DEP Administrative Appeal process. On November 14, 2007, the petitioners appealed the Acting Commissioner's October 16<sup>th</sup> decision to Superior Court. DEP and the City of Cambridge are providing historical information from the DEP administrative appeals process in response to the Court filing. Cambridge and MWRA have been meeting to discuss how best to proceed with the Alewife Brook CSO projects, taking any remaining risks into account, and expect to propose a plan and schedule soon.

To date, the five projects constituting the Long-Term Control Plan for Alewife Brook, including CAM004 stormwater outfall and detention basin (Contract 12), have experienced a delay of at least 21 months beyond their Schedule Seven milestones.

***MWRA's Capital Budget and Spending Projections for CSO Control***

As shown in Figure 7, 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 \$840.3 million in MWRA's Proposed FY09 CIP. The Proposed FY09 CIP estimate is in December 2008 dollars. MWRA projects to spend \$893.4 million to complete the plan on schedule, including escalation to the mid-point of construction and contingency.

In the Proposed FY09 CIP, the projected spending for the CSO Program in FY08 (see Figure 8) and beyond totals \$428.6 million, which is 21% of total projected capital spending and 35% of wastewater related capital spending. Annual spending on CSO control has escalated greatly over the last several years and will continue to increase over the next year or two as more projects move 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. In the Proposed FY09 CIP, annual CSO spending is estimated to peak at \$125.4 million in FY09, then trail off through FY21. Most of the spending will occur by FY16, when construction of the last CSO project (Reserved Channel Sewer Separation) is scheduled to be completed (see Figure 8).



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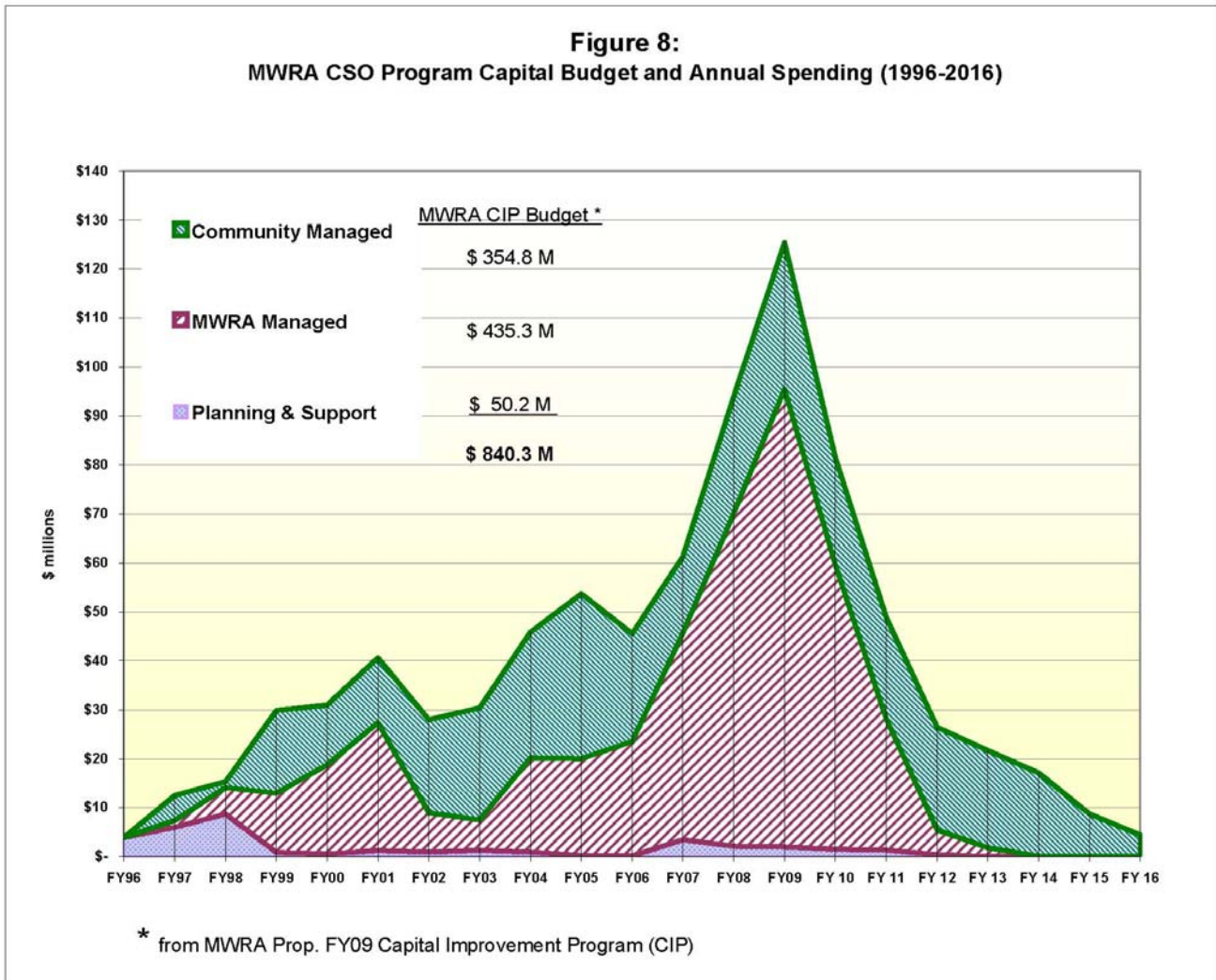
**Table 2: CSO Project Cost and Schedules**  
 (Shading indicates completed project.)

Project		Project Costs Prop. FY09 CIP	Commence Design	Commence Construction	Complete Construction
North Dorchester Bay Storage Tunnel and Related Facilities		\$224.1	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		\$80.0	Mar-00	Mar-03	Jun-10
BOS019 CSO Storage Conduit		\$14.3	Jul-02	Mar-05	Mar-07
Chelsea Relief Sewers	Chelsea Trunk Sewer Relief	\$29.8	Jun-97	Aug-99	Aug-00
	Chelsea Branch Sewer Relief			Dec-99	Jun-01
	CHE008 Outfall Repairs			Dec-99	Jun-01
Union Park Detention/Treatment Facility		\$51.1	Dec-99	Mar-03	Apr-07
CSO Facility Upgrades and MWRA Floatables	Cottage Farm Upgrade	\$22.4	Jun-96	Mar-98	Jan-00
	Prison Point Upgrade			May-99	Sep-01
	Commercial Point Upgrade			Nov-99	Sep-01
	Fox Point Upgrade			Nov-99	Sep-01
	Somerville-Marginal Upgrade			Nov-99	Sep-01
	MWRA Floatables and Outfall Closings			Mar-99	Mar-00
Brookline Connection and Cottage Farm Overflow Interconn. and Gate		\$3.8	Sep-06	Jun-08	Jun-09
Charles River Interceptor Gate Controls and Additional Connections		\$2.0	Jan-08	Jan-10	Jan-11
Prison Point CSO Facility Optimization		\$0.0	Mar-06	Mar-07	Apr-08
South Dorchester Bay Sewer Separation		\$118.9	Jun-96	Apr-99	Dec-06
Stony Brook Sewer Separation		\$45.2	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 Pt Channel Conduit Sewer Separation and System Optimization		\$8.3	Jul-02	Mar-05	Mar-07
Morrissey Boulevard Storm Drain		\$36.9	Jun-05	Dec-06	Jun-09
Reserved Channel Consolidation Conduit Sewer Separation		\$63.1	Jul-06	May-09	Dec-15
Bulfinch Triangle Sewer Separation		\$4.7	Nov-06	Nov-08	Jul-13
Brookline Sewer Separation		\$9.7	Nov-06	Nov-08	Jul-13
Somerville Baffle Manhole Separation (including Planning and Support)				Apr-96	Dec-96
Cambridge/Alewife Brook Sewer Separation	CAM004 Outfall and Detention Basin	\$58.7		TBD	TBD
	CAM004 Sewer Separation		Jan-97	Jul-98	TBD
	CAM400 Manhole Separation		TBD	TBD	TBD
	Interceptor Connection Relief/Floatables		TBD	TBD	TBD
	MWR003 Gate and Rindge Ave. Siphon	\$2.4	TBD	TBD	TBD
Region-wide Floatables Control and Outfall Closings		\$2.7	Sep-96	Mar-99	Dec-07
Planning & Support		\$50.2			
<b>Total Budget</b>		<b>\$840.3</b>			

**NOTE:**

Cambridge/Alewife Brook Sewer Separation projects, are delayed due to the citizen's wetlands appeal. MWRA and Cambridge are now developing schedules for moving the project forward.

**Figure 8:**  
**MWRA CSO Program Capital Budget and Annual Spending (1996-2016)**



***MWRA’s Concern with Potential CSO Program Cost Increases***

The approvals MWRA secured from EPA and DEP in 2006 on the updated Long-Term Control Plan and the associated changes to the Court Order provide MWRA more certainty of the scope of its CSO obligations and related capital program and support revenue need and borrowing calculations and determination of rate increases. However, the remaining projects will continue to carry significant 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 and a continuing, significant escalation in the cost of certain construction work and materials.

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 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.

MWRA's CSO control program budget may increase significantly due to updated cost information recently received from Brookline and from BWSC for sewer separation projects they are implementing. The Town of Brookline recently completed design investigations and preliminary design plans for its portion of the approved Long-Term Control Plan. Brookline's revised cost estimates for sewer separation totals approximately \$21.6 million, an increase of \$11.9 million above MWRA's Proposed FY09 CIP budget of \$9.7 million. Based upon initial meetings between MWRA and Brookline, the potential MWRA increase may be reduced by \$3.4 million (for ineligible costs) to a net increase of \$8.5 million. MWRA and Brookline will continue to meet to discuss the scope, schedule and budget for this project. In addition, the Brookline sewer separation plan calls for the discharge of separated stormwater through an existing MWRA CSO outfall (MWR010), which will require cleaning and possible repairs. Cost estimates for this component have not been developed, but may be in the range of \$3 million to \$5 million.

BWSC has submitted preliminary design reports and detailed cost estimates for the Bulfinch Triangle Sewer Separation project. BWSC's revised estimate for this project is approximately \$6.7 million, \$2 million more than MWRA's proposed FY09 budget of \$4.7 million.

MWRA expects to receive the preliminary design report and detailed cost estimate from BWSC for the Reserved Channel Sewer Separation project soon. BWSC recently submitted to MWRA a total estimated cost for the project, which is now \$57 million more than MWRA's Proposed FY09 CIP budget of \$63.1 million.

In addition, based on ongoing negotiations with the City of Cambridge of final cost and cost share for the Cambridge Sewer Separation project, MWRA's share of the cost of the Alewife Brook Sewer Separation project may increase by an additional \$2 million.

These revised cost estimates, particularly the estimate for the Reserved Channel Sewer Separation project, are significantly higher than the concept planning estimates that are the basis for the respective project budgets in MWRA's Proposed FY09 CIP and for MWRA's cost/benefit decisions in selecting these projects for the Long-Term Control Plan. MWRA will continue to review the preliminary design reports and meet with BWSC and Brookline to discuss the new cost estimates, with the objectives of evaluating the reasonableness of the costs and assessing their eligibility for MWRA funding pursuant to the memorandum of understanding and financial assistance agreement with each municipality. The higher costs may also warrant a reevaluation of the projects' costs and benefits to determine whether they remain cost effective and should continue to be recommended by MWRA.

## **5. Project Implementation**

This section defines the scope and schedule of each of the projects recommended in the Long-Term Control Plan and describes progress made in 2007 and the first quarter of 2008, any significant project changes since 2006, and key issues that have affected or may affect MWRA's ability comply with Schedule Seven.

**5.1 MWRA Managed Projects**

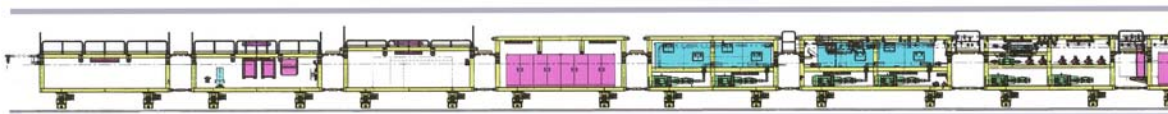
**NORTH DORCHESTER BAY STORAGE TUNNEL AND RELATED FACILITIES**

*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 a 5-year level of separate stormwater control for the North Dorchester Bay beaches. It also calls for eliminating stormwater discharges to Pleasure Bay by redirecting them to the Reserved Channel. The Plan for Reserved Channel is described later on this report, in Section 5.2. Components of the approved plan and MWRA’s project schedule are presented in Table 3. The plan is shown in Figure 9.

**Table 3: Approved Plan for North Dorchester Bay (from 2004 SEIR)**

COMPONENT	DESCRIPTION	PROJECT SCHEDULE		
		Commence Design	Commence Construction	Complete Construction
North Dorchester Bay Storage Tunnel	<ul style="list-style-type: none"> <li>• 10,832-ft. long, 17-ft. diameter soft-ground tunnel with mining shaft and equipment removal shaft</li> <li>• Drop shafts, diversion structures and associated piping at CSO outfalls BOS081 to BOS086, including gates to control stormwater</li> </ul>	Sep 04	Aug 06	Dec 09
North Dorchester Bay Related Facilities	<ul style="list-style-type: none"> <li>• 15 mgd dewatering pump station at Conley Terminal and 24-inch force main</li> <li>• Odor control facility at upstream end of tunnel, near State Police building</li> </ul>	Nov 06	Apr 09	May 11
Pleasure Bay Storm Drain Improvements	<ul style="list-style-type: none"> <li>• Stormwater piping and appurtenances to relocate stormwater discharges from Pleasure Bay to the Reserved Channel</li> </ul>	Sep 04	Sep 05	Mar 06
Morrissey Boulevard Storm Drain	<ul style="list-style-type: none"> <li>• 2,900-foot long, 12x12 foot box conduit for stormwater conveyance to Savin Hill Cove/South Dorchester Bay</li> <li>• Gated connection to CSO Storage Tunnel</li> </ul>	Jun 05	Dec 06	Jun 09



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Once completed, the North Dorchester Bay CSO control plan is expected to virtually eliminate beach closings resulting from pollution sources associated with the North Dorchester Bay outfalls. These sources are CSO, separate stormwater, and illegal sanitary connections to drainage pipes. The project will 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.

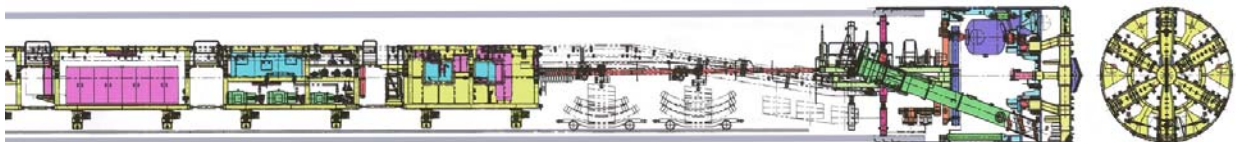
The project includes improvements to minimize separate stormwater discharges to the South Boston beaches. Separate stormwater from the BWSC's and the Department of Conservation and Recreation's (DCR) drainage systems will be discharged to the beach areas only in storms greater than the 5-year design storm, compared to current discharges during every rainstorm (100 times per year on average). Most of the stormwater now discharging to the beaches will be redirected into the CSO tunnel. 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.

Stormwater improvements were included in the North Dorchester Bay CSO control plan to optimize the water quality benefits of the CSO facilities, in part by taking advantage of the excess capacity of the large facilities, especially the North Dorchester Bay storage tunnel, in storms smaller than the 25-year design storm.

With the Morrissey Boulevard storm drain, BWSC stormwater discharges from the 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 and redirecting the flows to a non-swimming area of South Dorchester Bay (Savin Hill Cove) in larger storms. By directing much of the stormwater flows from outfall BOS087 to the new CSO storage tunnel, the plan minimizes the frequency and volume of new stormwater discharges to Savin Hill Cove, compared to an earlier BWSC/DCR Morrissey Boulevard drainage proposal that did not call for a tunnel connection. Under MWRA's plan, stormwater from the BOS087 outfall area will be captured in the tunnel up to the 1-year design storm, resulting in one discharge per year to Savin Hill Cove, on average, rather than every time it rains, as in the previous BWSC/DCR proposal. In addition, 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.

In March 2006, MWRA completed construction of the Pleasure Bay storm drain improvements, ending wet weather discharges to Pleasure Bay Beach. The project relocated the Pleasure Bay stormwater discharges to the less sensitive Reserved Channel.

MWRA's Proposed FY09 CIP includes a budget of \$264.2 million (December 2008 dollars) for the North Dorchester Bay CSO plan, including the Pleasure Bay and Morrissey Boulevard storm drains. An additional \$10 million in land, easement and permit costs is included in the CIP. MWRA estimates the total cost to complete the North Dorchester Bay plan to be \$290 million, with land, easement, permit costs and inflation to the mid-point of construction.



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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, can be found in Section 5.2 of this report.

***Progress in 2007 and Ongoing Work***

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

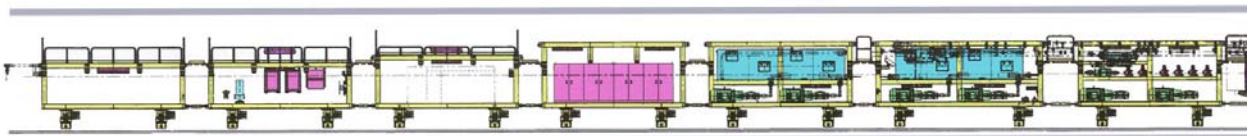
In 2007, MWRA continued to make substantial progress to implement the CSO control plan for the South Boston beaches, including construction of the North Dorchester Bay CSO storage tunnel and final design of tunnel related facilities. MWRA had issued the Notice to Proceed with the tunnel construction contract in August 2006.

This \$148.6 million contract is the single largest construction contract in MWRA’s Long-Term Control Plan. As tunnel construction ramped up in the fall of 2006, MWRA issued the Notice to Proceed with the design contract for the tunnel-related facilities, including the 15 million gallons per day (mgd) dewatering pumping station at Conley Terminal, the 24-inch force main from the pumping station to the BWSC local wastewater collection system, and the remote odor control facility that will be constructed at the upstream end of the tunnel adjacent to the State Police Building on Day Boulevard.

After MWRA commenced the tunnel construction contract in August 2006, the contractor’s initial efforts were focused on preparing the tunnel mining shaft at Conley Terminal and the equipment retrieval shaft at the upstream end of the proposed tunnel and receiving the tunnel boring machine (TBM) from the Japanese manufacturer. The contractor also made substantial progress in the first 18 months of the contract to lay or relocate utilities and construct tunnel drop shafts and CSO and stormwater diversion structures and piping at the seven existing outfalls (BOS081-087) that will eventually be connected to the tunnel.

By early September 2007, the contractor had substantially completed the mining shaft at Conley Terminal, and received the TBM. This event was celebrated on September 12, 2007 at the mining shaft site by MWRA, with more than 100 other participants, including Federal District Court Judge Richard G. Stearns, court parties, elected officials, representatives of public agencies and environmental advocacy organizations, including BWSC, DCR, Save the Harbor/Save the Bay, and The Boston Harbor Association, and members of the South Boston community.

In late September and early October, 2007, the contractor assembled the TBM on-site, lowered it into the mining shaft, and commenced mining operations by breaking through the mining shaft wall on October 17, 2007. After mining the first 300 feet, the contractor stopped mining on November 26, 2007, so that it could move the 270-foot long TBM trailing gear from the ground surface to the back of the TBM in the tunnel.





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The contractor completed attaching the trailing gear to the TBM and resumed mining on December 10, 2007. The contractor then mined for another 300 feet and again stopped mining on December 24, 2007, to be able to install a rail car switch and turntable. The contractor then commenced full mining operations on January 15, 2008, with two shifts that have since progressed with no substantial interruption. As of March 10, 2008, the contractor had mined 3,200 feet (30%) of the proposed 10,832-foot (2.1-mile) tunnel.

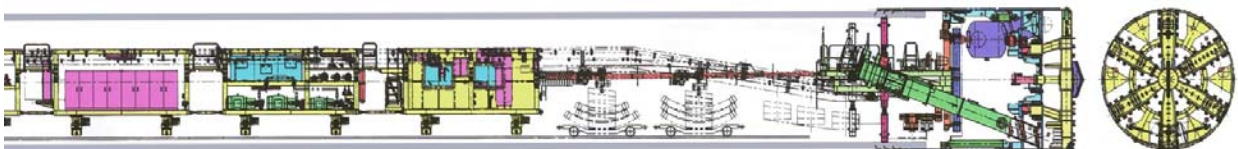


As the mining proceeds, the contractor simultaneously installs a full circumferential tunnel liner using 10-inch thick, bolted and gasketed pre-cast concrete segments. The lining system is designed to provide long-term structural strength and water-tightness. The contractor continuously removes tunnel muck produced from the mining operation to various disposal sites that were arranged by the contractor pursuant to the contract provisions.

The contractor has also made substantial progress constructing the CSO and stormwater diversion

structures and tunnel drop shafts at existing CSO outfalls, restoring and improving the surface of Moakley Park where much of the construction to date has taken place, and cleaning and rehabilitating existing sewers and outfall pipes to prepare them for tunnel mining below them and for connections to the tunnel. The contractor has completed all of the drainage work at outfall BOS087, where BWSC eliminated CSO discharges a few years ago. BOS087 now serves as a storm drain outfall but will be closed as part of the North Dorchester Bay CSO plan. Some of the new drainage facilities at BOS087 will enable MWRA to direct stormwater flows from this outfall to the CSO storage tunnel up to the 1-year storm and during the first flush of all storms, and convey these flows to MWRA's Deer Island Wastewater Treatment Plant, after each storm. Work at construction drop shafts and CSO and stormwater diversion structures at outfalls BOS086 and BOS085 is well underway and is scheduled to be complete by the spring of 2008. The contractor has also commenced work at outfalls BOS084 and BOS083 and plans to complete the work in these areas by the summer of 2008. Work at outfalls BOS082 and BOS081 is scheduled to commence in the fall of 2008 and be complete by the spring of 2009.

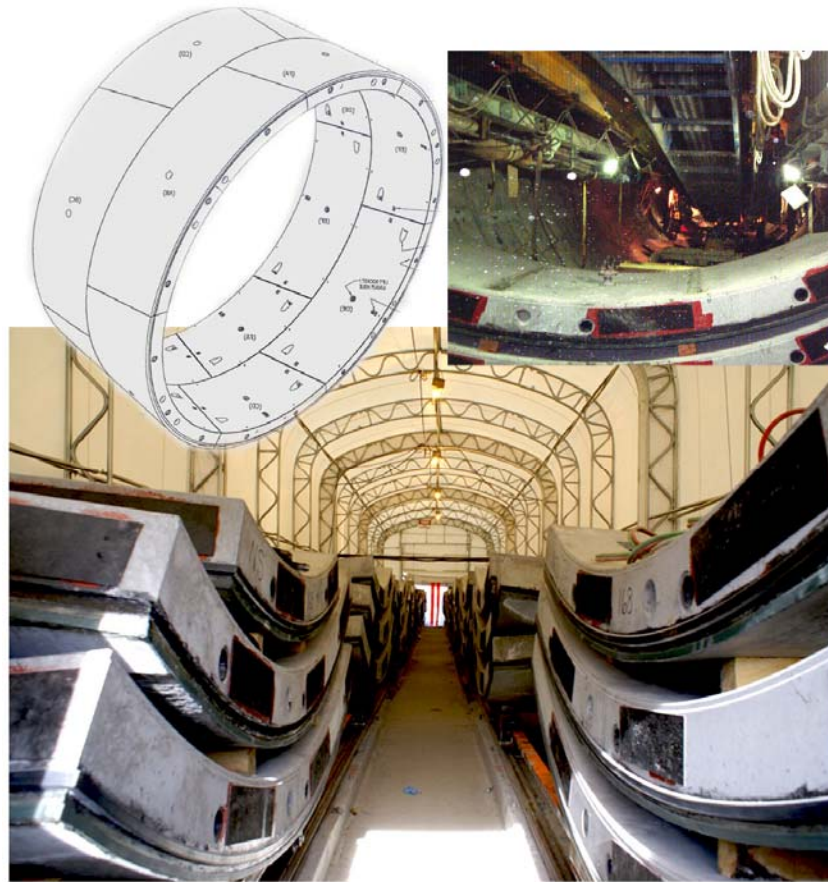
In November 2006, MWRA issued the Notice to Proceed with the design contract for the tunnel related facilities. The facilities include the 15 mgd pumping station at Massport's Conley Terminal and 24-inch force main that will be used to dewater the tunnel after storms, as well as the remote odor control facility at the upstream end of the tunnel near the State Police Building on Day Boulevard. In 2007, MWRA's design



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consultant completed the field investigations, the Design Report, and the 60% design stage contract documents. MWRA recently completed its review of the 90% design plans and contract specifications submitted by its design consultant in January 2007. In addition, the consultant has commenced bathymetric surveys in North Dorchester Bay and internal inspections and core samplings of the CSO outfalls as part of the CSO Outfall sedimentation study. The study is intended to develop recommendations for ensuring that the outfalls will remain operationally reliable after the CSO storage tunnel is brought on-line and discharges through the outfalls become infrequent.

The design of the tunnel related facilities is on schedule, and MWRA plans to award the related construction contract by March 2009. At that time, the tunnel mining operations will be winding down and work space around the mining shaft at Conley Terminal will begin to become available for the facilities contractor. 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.



Full circumferential tunnel lining  
10-inch thick, pre-cast concrete segments

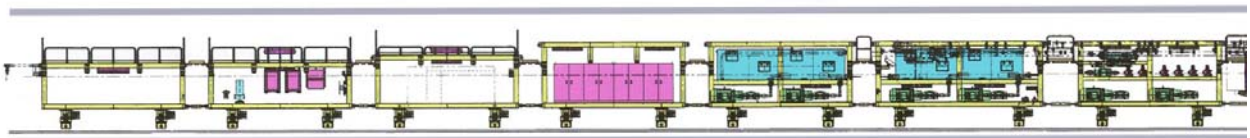
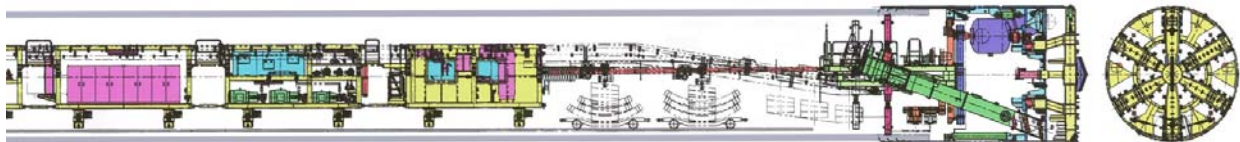


Figure 9  
 North Dorchester Bay and Reserved Channel  
 Recommended CSO Control Plans



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



***Pleasure Bay Storm Drain Improvements***

Complete Construction	<u>Court Milestone</u> May 2006	<u>Project Schedule</u> March 2006
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On March 28, 2006, MWRA completed construction of the Pleasure Bay storm drain improvements (see Figure 10), 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.



**Figure 10**  
**Pleasure Bay Storm Drain Improvements**  
**Completed March 2006**

**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	June 2008 (Contract 2) December 2008 (Contract 3)
Complete Construction	June 2010	June 2004 (Contract 1) June 2010 (Contract 2) March 2010 (Contract 3)

This \$80 million 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, consists of replacing, relieving or rehabilitating approximately 4.5 miles of existing interceptor sewers using a combination of construction methods including micro-tunneling, pipe bursting, open-cut excavation and pipe relining. MWRA commenced design services in March 2000, in compliance with the Court Schedule.



Typical set up for pipebursting operation.

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 third 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 reevaluation also considered the potential for improving the performance of the facilities that carry East Boston flows to the Deer Island Treatment Plant. The facilities include the Caruso Pump Station in East Boston, the Winthrop Terminal Facility, and the Chelsea Creek Headworks. The evaluations did not find new opportunities for improving the performance of

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these facilities beyond the benefits of improvements that were already planned. Although planned improvements to the Winthrop Terminal Facility will increase transport capacity and allow the Caruso Pump Station to pump at a slightly greater rate, this increase in capacity was found to have little effect on overflows in East Boston, where ability to convey wet weather flows is limited not by the pumping station but by the conveyance capacities of the East Boston pipes delivering flow to the station.

In addition, the reassessment compared the cost and benefit of a total of 20 CSO control alternatives involving hydraulic relief, sewer separation and flow diversion. Other CSO control technologies that were evaluated and rejected in the 1997 Plan, such as storage or treatment, were not deemed cost-effective primarily because the outfalls are dispersed throughout East Boston and would have to be consolidated.

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 6 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 5 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 will 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 the contract in June 2004. The second construction contract (Contract 6257) involves installation of approximately 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 and with limited open cut sections. The third contract (Contract 6841) replaces and upgrades approximately one mile of interceptor pipe in upstream areas using “pipebursting” 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.

### ***Progress in 2007 and Ongoing Work***

MWRA has made substantial progress on a new design contract for the remaining elements of the project since it issued the Notice to Proceed in June 2006, in compliance with Schedule Seven. In 2007, MWRA’s design consultant completed the field investigations and preliminary design work and submitted the Draft Design Report to MWRA in March and the Final Design Report in September. The design consultant also submitted the 100% design documents for construction Contract 6257 to MWRA in September 2007. MWRA has used the 100% design documents to solicit comments on the design from other parties, including BWSC; to present project plans to potentially affected land owners; to support permit applications, such as the Notice of Intent to the Boston Conservation Commission; and to coordinate the MWRA CSO work with the proposed or ongoing construction work of other parties, including BWSC, Boston Public Works Department, Massachusetts Highway Department and utility owners. MWRA plans to complete final design of Contract 6257 and advertise the construction contract for bids in March 2008. MWRA expects to issue the Notice to Proceed with Contract 6257 by June 30, 2008, in compliance with Schedule Seven.



Also in 2007, the design consultant completed the 50% documents for construction Contract 6841, which MWRA received in March 2008. MWRA plans to complete final design and advertise this construction contract by August 2008. MWRA has scheduled all construction contracts to be complete by June 2010, in compliance with Schedule Seven.

In parallel with the final design efforts for the microtunneling contract (Contract 6257), MWRA has continued to meet with outside agencies to coordinate the work and to obtain necessary construction permits. In October 2007, MWRA met with the Boston Transportation Department to discuss traffic management and attended a hearing before the Boston Conservation Commission to secure a wetlands Order of Conditions, which was issued by the Commission on November 2, 2007.

### ***Potential Conflicts with Other Construction Projects***

MWRA has held several meetings with representatives of KeySpan over the past year to coordinate MWRA's jacking shaft and pipe installation on ConocoPhillips' land along Chelsea Street with the planned KeySpan installation of a 24-inch gas distribution main on the same parcel. KeySpan's construction is scheduled to occur from March 2008 to August 2008.

At a meeting held on November 15, 2007, ConocoPhillips informed MWRA that once KeySpan has completed its gas main installation in August 2008, ConocoPhillips itself must use the parcel through December 2008 for parking equipment and materials to support construction of a new petroleum tank on the other side of Chelsea Street. MWRA's contractor will not be able to access the ConocoPhillips parcel until January 2009 and will have to schedule the variously located relief sewer activities around this restriction to avoid construction schedule delay.

MWRA has also been meeting with BWSC during final design. BWSC awarded its contract for water, sewer and drain construction on Border and Condor Streets on July 19, 2007, and BWSC's contractor began physical construction in August 2007. In late November 2007, BWSC sent MWRA a letter stating that BWSC construction will be completed in the fall of 2008. MWRA's microtunneling contract shares much of the same alignment. Contract 6257 is scheduled to start in June 2008 and be completed by June 2010. MWRA will continue to pay close attention to the overlap of these schedules in the summer and fall of 2008, to avoid delay.

Finally, the City of Boston advertised its contract for replacement of the Chelsea Street Bridge in September 2007, with a projected bid opening in May 2008. MWRA has been tracking this long-delayed project for many years relative to construction of the East Boston Branch Sewer Relief project. The City of Boston estimates that the existing Chelsea Street Bridge will be taken out of service for a 3 to 6 month period starting 21 months after issuance of the construction Notice to Proceed. Assuming Boston's notice to proceed is issued in the summer of 2008, the existing Chelsea Street Bridge could be taken out of service in early 2010, concurrent with MWRA's construction timeframe. When the existing Chelsea Street Bridge is taken out of service, additional traffic will cross the Meridian Street bridge between Chelsea and East Boston, resulting in increased traffic volume on Condor and East Eagle Streets in East Boston. As MWRA's contractor may be working in these same streets during this time period, coordination with the City of Boston is critical.

MWRA continues to address the potential conflicts with these projects by others as it finalizes the CSO construction documents.

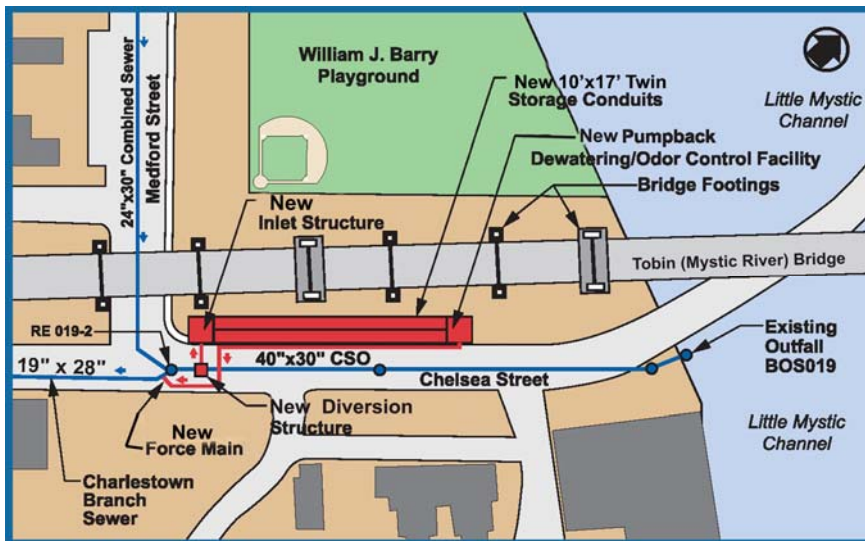


**BOS019 CSO STORAGE CONDUIT**

	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	January 2003	July 2002
Commence Construction	March 2005	March 2005
Complete Construction	September 2006	March 2007*

\* The 6-month extended construction period was due to a substantial increase in project size and complexity, which MWRA reported to the Court prior to commencement of construction.

On March 31, 2007, MWRA completed construction of the \$14.3 million CSO storage conduit at outfall BOS019. The new facility includes two, 280-foot long, 10-foot by 17-foot underground concrete conduits that provide 670,000 gallons of overflow storage capacity, as well as an aboveground pump-out facility and



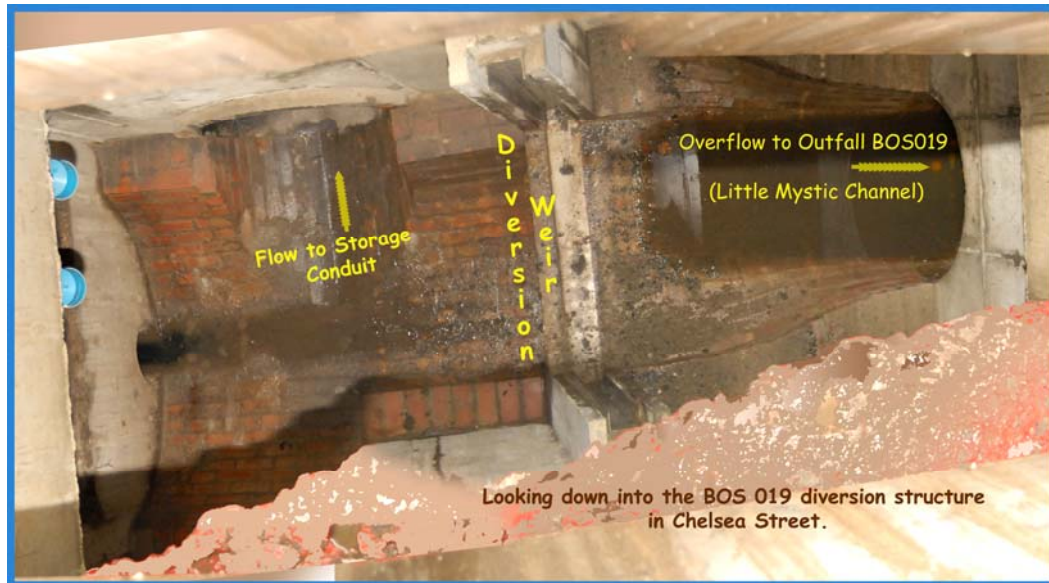
an underground influent gate house. The project is predicted to reduce the average annual number CSO discharges from outfall BOS019 to the Little Mystic Channel from 13 to 2 and reduce total annual discharge volume at this outfall by 86%, from 4.4 million gallons to 0.6 million gallons.

The 1997 Facilities Plan/EIR recommended constructing a 380-foot long, 12'x12' box conduit adjacent to the Tobin Bridge and Chelsea Street in Charlestown to store most of

the CSO flows that discharge through outfall BOS019. The stored flows will be pumped back to the interceptor system for conveyance to Deer Island after each storm passes and system capacity becomes available. An aboveground building would house the dewatering equipment, as well as the activated carbon odor control systems for treating the air that is displaced when the conduit fills with combined sewage. During larger storms that cause overflows that exceed the storage volume of the conduit, system relief will continue to be provided through the existing outfall (see Figure 12). For this reason, underflow baffles were recommended to be installed within the existing and proposed regulator as part of this project to provide floatables control.

In the course of design, several significant changes were made to the project from what was assumed in the 1997 Facilities Plan/EIR. MWRA reexamined system hydraulic conditions using flow meter data it collected in the fall of 2003. With the new data, MWRA concluded that a storage volume of 670,000 gallons would be necessary to meet the 1997 CSO control goals, a significant increase in size, as well as cost, over the 410,000- gallon storage conduit recommended in the 1997 plan. At the same time, to protect the Tobin Bridge foundations during construction, the storage conduit was shortened in length by making it a double-barreled conduit, and moved further away from the bridge. MWRA added an automatic flushing-gate system for cleaning the two storage barrels after storms. The revised plan included twin 10-foot wide by 17-foot high barrels, in lieu of the single 12'x12' box conduit that was originally proposed.

**Figure 12: BOS019 Storage Conduit Diversion Structure and Existing Outfall**



Since completing construction and bringing the facility on-line on March 31, 2007, overflows have entered the storage conduit during 21 storms. A total of 5.2 million gallons of overflow that previously would have been discharged to Little Mystic Channel was captured during these events and pumped back to the collection system after the storms for transport to the Deer Island Treatment Plant. Only during two of these storms, on April 16, 2007 and February 13, 2008, did the overflow exceed the storage capacity of the conduit and cause a discharge of the net flow to the Little Mystic Channel.

**Completed Pump-Out/Odor Control Facility Above CSO Storage Tunnel**



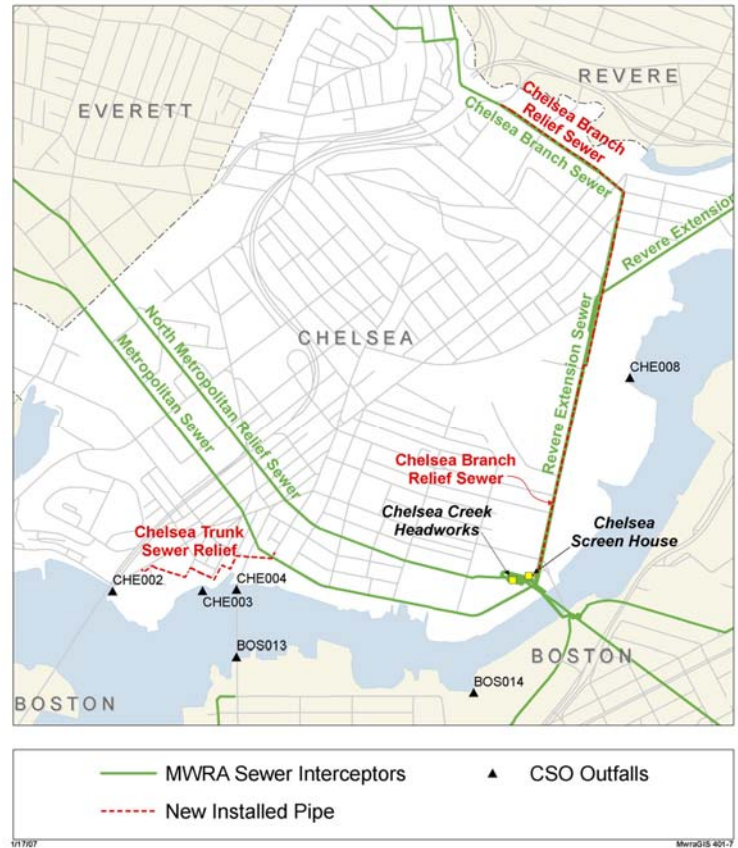
**CHELSEA RELIEF SEWERS**

***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 existing Chelsea Trunk Sewer, which varied in diameter from 8 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 construction, but the City of Chelsea retains ownership and 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 microtunneling 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 Relief Sewer 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.

**UNION PARK DETENTION AND TREATMENT FACILITY**

	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	December 1999	December 1999
Commence Construction	March 2003	March 2003
Complete Construction	September 2005	April 2007*

\* MWRA commenced partial beneficial use of the new detention basins on December 31, 2006.

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The \$50 million Union Park Detention and Treatment Facility is intended 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.



**Union Park Detention and Treatment Facility, South End, Boston**

On December 31, 2006, MWRA brought the storage portion of the new facility on-line and began capturing overflows up to the 2-million gallon storage capacity of the new below-grade detention basins. Dewatering pumps discharge the captured flows to the BWSC collection system for conveyance to the Deer Island treatment plant, after storms pass. 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.<sup>3</sup>

The new facility is predicted to reduce 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

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<sup>3</sup> 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 one activation of at least four hours duration.

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.

From April 27, 2007, to March 1, 2008, overflows entered the Union Park facility during 18 storms. In these 18 events, the facility prevented a total of 26 million gallons of CSO flow from being discharged to the Fort Point Channel. In eight of the 18 events, the detention basins were completely filled, flows exceeded the storage capacity of the basins, and the excess CSO flow was treated and discharged to Fort Point Channel. The total volume of treated flow discharged in this period was 71 million gallons. MWRA continues to work with the contract operator and BWSC to optimize the operation and performance of the facility. With the completion of this facility and the sewer separation and system optimization project for CSO outfalls BOS072 and BOS073 (see “Fort Point Channel BOS072-073 Sewer Separation” in Section 5.2), MWRA has greatly decreased CSO impacts to the Fort Point Channel.

### **UPGRADES TO EXISTING CSO FACILITIES**

MWRA upgraded five existing 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. The upgraded facilities were all fully operational by early 2003. The facility upgrades generally included replacement of the existing chlorine disinfection systems with improved systems, construction of dechlorination systems, and 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).

### **CHARLES RIVER CSO CONTROL PLAN PROJECTS**

In response to the CSO control plan MWRA recommended in the 1997 Final Facilities Plan/EIR, DEP issued a three-year variance to water quality standards for CSOs in the Charles River Basin in October 1998. This short-term water quality standards determination was made in lieu of issuing a Long-Term water quality standards revision. With the variance, DEP approved MWRA’s plan for the Charles River Basin, but also required MWRA to identify and evaluate additional measures that could further reduce CSO discharges, especially at the Cottage Farm CSO treatment facility. Since 1998, DEP has issued several three-year extensions to the variance.

In August 2005, MWRA recommended adding a set of optimization measures and targeted sewer separation projects to its plan to increase the level of CSO control at Cottage Farm and at other Charles River outfalls. The projects include:

- Brookline Connection/Cottage Farm Overflow Chamber Interconnection and Gate Control
- Charles River Valley/South Charles Relief Sewer Gates Controls and Additional Interceptor Connection
- Bulfinch Triangle Sewer Separation
- Brookline Sewer Separation

These projects were included in the revised Long-Term Control Plan approved by EPA and DEP in March 2006 and were incorporated into Schedule Seven by the Court in April 2006. Together with projects in the original plan, they are predicted to reduce treated CSO discharges at the Cottage Farm facility to 2 activations and 6.3 million gallons in a typical year, compared to the 1997 goals of 7 activations and 23 million gallons. Most of the benefit comes from optimization improvements that direct more wet weather

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flow to MWRA's Ward Street Headworks and reduce overflows into the treatment facility. The targeted sewer separation projects will lower wet weather flows to the system, offsetting any hydraulic impacts of directing more flow to the headworks. The Bulfinch Triangle and Brookline sewer separation projects are discussed in Section 5.2.

***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

Further reduction of CSO discharges to the Charles River, especially treated discharges at the Cottage Farm CSO facility, will be accomplished by controlling overflows into the facility by both increasing flow conveyance to the Ward Street Headworks and taking advantage of upstream storage capacity in the MWRA North Charles Metropolitan and Metropolitan Relief Sewers in Cambridge. Recommended measures, shown in Figure 13, include: bringing into operation the historically unutilized 54-inch "Brookline Connection" that crosses beneath the Charles River from the Cottage Farm influent chamber (on the Cambridge side of the Charles River) to an improved connection with the South Charles Relief Sewer (on the Boston side of the river); developing gate controls and a control system to optimize and potentially automate the operation of the existing Cottage Farm influent gates; providing a piped interconnection between the two overflow chambers outside the Cottage Farm facility; replacement of old gates in the overflow chambers with automated, modulating gates that hydraulic modeling showed would provide greater operational flexibility and more hydraulic benefit in further reducing CSO flows into the Cottage Farm facility.

The Brookline Connection was one of three pipes constructed across the Charles River by the early 1970's 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, toward Brookline and the Ward Street Headworks.

MWRA issued the Notice to Proceed for a \$1.3 million design contract on September 30, 2006, in compliance with Schedule Seven. MWRA's design consultant completed the field investigations, hydraulic model assessments and preliminary design investigations in 2007. MWRA received the Final Preliminary Design Report and Hydraulic Modeling Report and the Final Geotechnical and Hazardous Materials Assessment Report in September and October 2007, respectively. The Preliminary Design Report and Hydraulic Modeling Report recommended replacing the plan to raise weirs in the Cottage Farm overflow structures with a plan to install modulating gates, to provide more efficient hydraulic control. The design consultant also submitted the draft 100% design documents in October 2007.

MWRA submitted Notices of Intent to the Boston and Cambridge Conservation Commissions in January 2008 for approval of work subject to the Wetlands Protection Act. MWRA submitted copies of the draft 100% design documents to the Department of Conservation and Recreation (DCR) for its review of the work proposed on DCR land at Magazine Park in Cambridge and at Soldier's Field Road in Boston. MWRA submitted a construction permit application to DCR in February and plans to complete the final design and advertise the construction contract by March 2008. Schedule Seven requires MWRA to commence construction by June 2008.

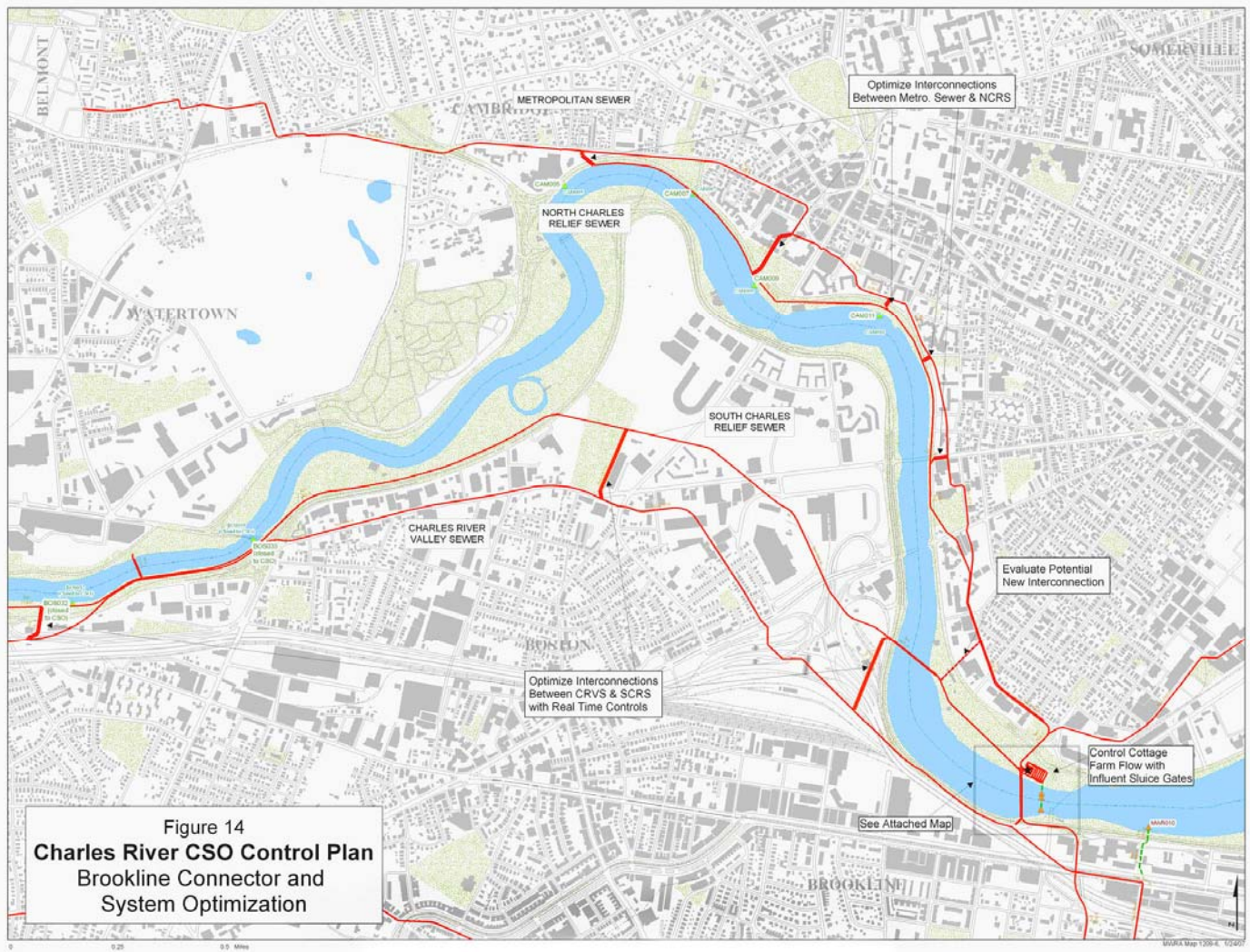
Figure 13  
 Cottage Farm Brookline Connection and Inflow Controls



***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

This set of improvements to further reduce Charles River CSOs includes measures to optimize hydraulic conditions within the four interceptors that convey flow to the Ward Street Headworks and can overflow to the Cottage Farm facility. The measures include developing an operational strategy for optimizing the transfer and allocation of flows between the Charles River Valley Sewer and the South Charles Relief Sewer using existing gates located at three connections between these interceptors (see Figure 14). MWRA will also evaluate the feasibility of improving hydraulic performance along the North Charles Metropolitan Sewer and the North Charles Relief Sewer with new connections or modified existing connections between these interceptors and by adjusting overflow regulators along the interceptors.



**Figure 14**  
**Charles River CSO Control Plan**  
**Brookline Connector and**  
**System Optimization**



On January 31, 2008, MWRA issued the Notice to Proceed with the design contract, in compliance with Schedule Seven. The contract includes the hydraulic model evaluations, design of the gate controls, and the evaluation of additional interceptor connections. The design contract schedule calls for the consultant to submit the report on the evaluation of additional connections by January 2009, commence construction of the interceptor gate controls by January 2010, and complete construction of the gate controls by January 2011, all in compliance with Schedule Seven.

### **PRISON POINT CSO FACILITY OPTIMIZATION**

On March 30, 2007, MWRA submitted its report on the optimization study of the Prison Point CSO facility (the "Report") to EPA and DEP, in compliance with Schedule Seven. The Report recommended a set of operating strategies at the Prison Point CSO facility (see Figure 15) and related structures to minimize the treated discharges from this facility to the Inner Harbor. MWRA's hydraulic model predicted that this set of operational changes could reduce treated discharges from the facility from 30 activations in a typical year with an average annual treated discharge volume of 335 million gallons (which is the level of control in the Long- Term Control Plan incorporated into the Court Order in April 2006) to 17 activations in a typical year with an average annual treated discharge volume of 250 million gallons, without increasing untreated overflows at other locations.



The study recommended new protocols for opening and closing the facility's wet weather gates to maximize the use of available storage in the upstream system.

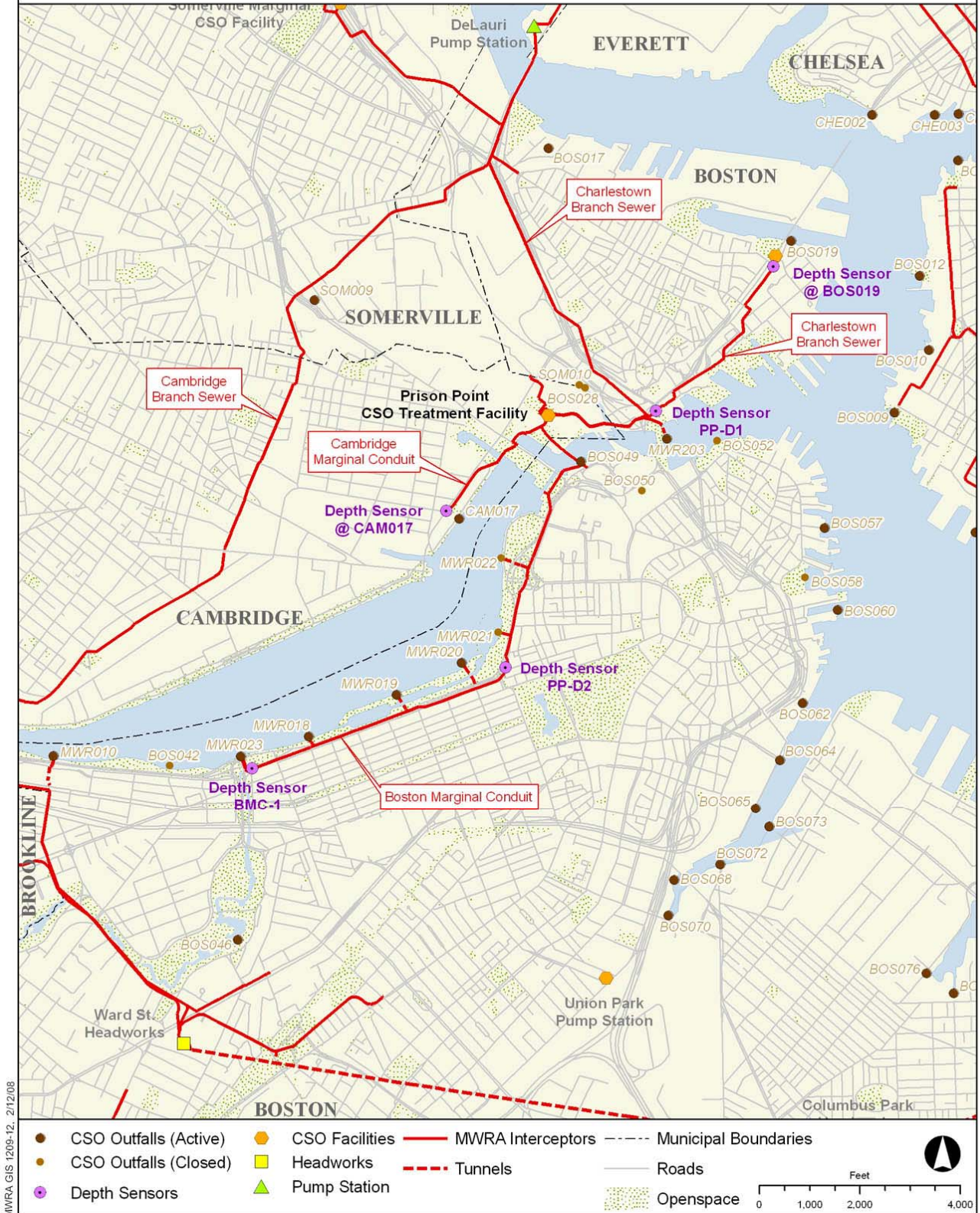
The study also recommended operating the facility's dry weather pumps whenever there is available capacity in the Charlestown Branch Sewer, which receives the flows from the dry weather pumps. These recommended operational strategies carried the potential for contributing to discharges at other system locations if not carefully implemented.

In order to minimize the potential for increased discharges at other locations, MWRA recommended close monitoring of water surface elevations at critical points in the upstream overflow conduits and sewer interceptors and frequent monitoring of weather forecasts. In a June 12, 2007 letter, EPA acknowledged that the recommended operational strategies may increase the risk of untreated overflows. Notwithstanding the risk, EPA supported the implementation of these strategies as an acceptable approach to further reduce CSO discharges overall.

Since April 2007, MWRA has implemented the following measures to reduce treated discharges and improve treatment performance at the Prison Point CSO facility:

1. Revised standard operating procedures to open the influent gates at 16 feet depth of flow in front of the gates, instead of the 10-12 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 flows enter the facility and amount of flow in each event.

**Figure 15 Prison Point CSO Facility Sub System**



MWRA GIS 1209-12\_2/12/08

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 mgd (formerly 5 mgd was used), again taking advantage of storage in the upstream pipes and reducing the volume allowed to enter the facility.
3. The testing of various dry weather pump operation strategies 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. The implementation of Supervisory Control and Data Acquisition (SCADA) systems to provide additional real-time data and 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. The SCADA improvements related to the Prison Point facility were completed in December 2007.

MWRA continues to implement the operational strategies and track the improved performance of the facility. MWRA plans to use the collected performance data and rainfall records to adjust the system hydraulic model and update the model's predictions of facility performance over a range of storms and for the typical rainfall year. With these improved model predictions and a field-verified assurance of the improved performance of the facility, MWRA expects to be in a position to propose new discharge limits (i.e. frequency of facility activation and total annual discharge volume in a typical year) for the Prison Point CSO facility in a report MWRA plans to submit to EPA and DEP in April 2008.



Below Ground Detention Tanks at Prison Point CSO Facility

**5.2 Community Managed Projects**

**SOUTH DORCHESTER BAY SEWER SEPARATION**

	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	June 1996	June 1996
Commence Construction	April 1999	April 1999
Complete Construction	November 2008	December 2006

In December 2006, BWSC achieved substantial completion on the last of the sewer separation contracts for the 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 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. Total eligible cost for design and construction is estimated to be \$119 million. Figure 16 shows the major sewer separation contract areas, all now complete.

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 plans to surplus the properties through the Massachusetts Division of Capital Asset Management.

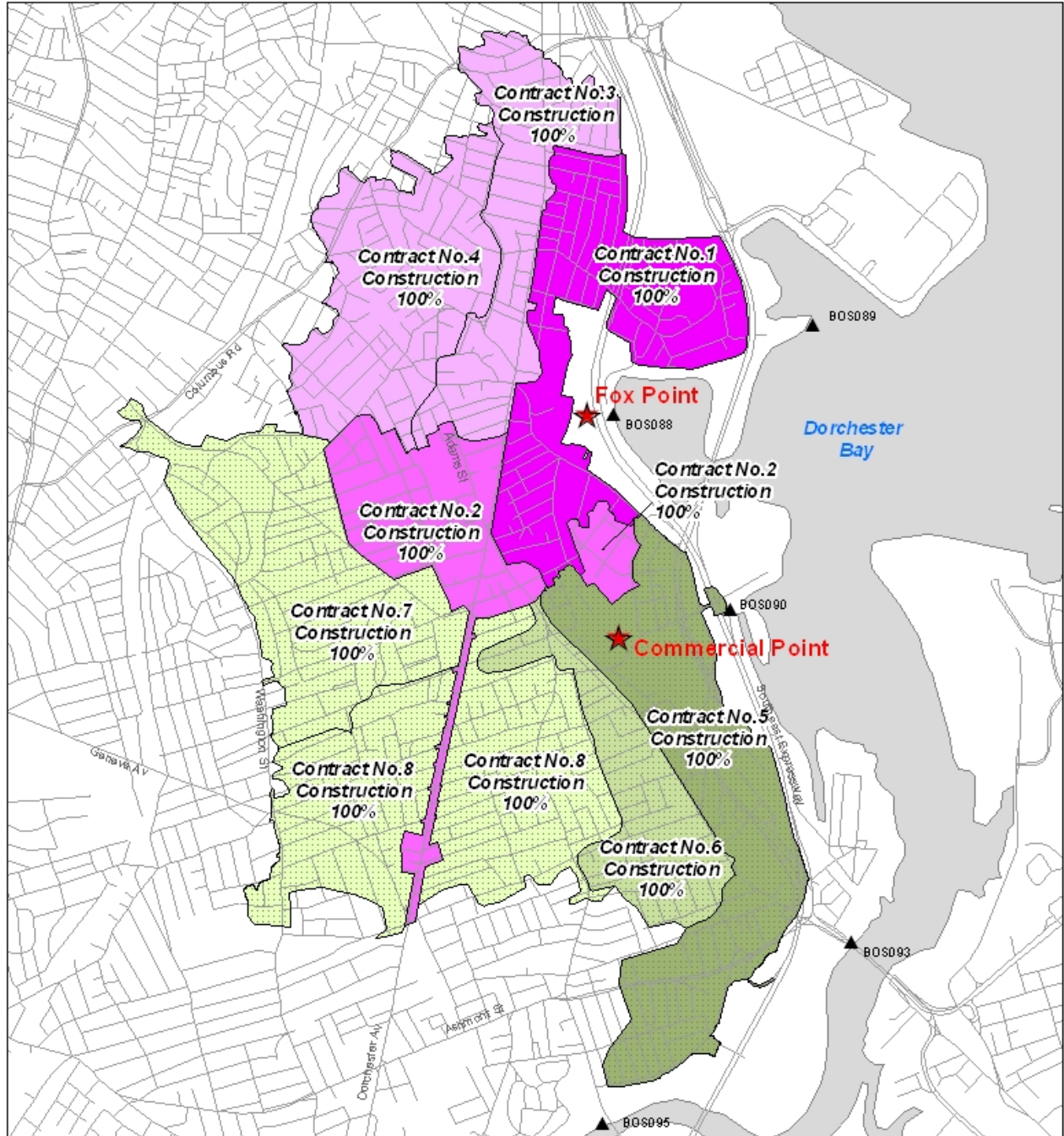
Prior to the implementation of this project, there were 20 treated discharges to South Dorchester Bay from the Commercial and Fox Point CSO facilities in a typical year, with an average annual CSO discharge volume of 30 million gallons. BWSC continues to monitor hydraulic conditions in the separated sewer system and is evaluating the system's performance during wet weather to make certain that there are no flooding impacts due to remaining stormwater in the system. If hydraulic problems are identified, BWSC may have to perform additional work to provide further hydraulic relief to the system in certain areas.

Sewer separation typically removes 70% to 90% of the stormwater inflow in combined sewers. Higher removals are difficult and expensive to achieve. BWSC's goal for the South Dorchester Bay project was a minimum of 90% inflow removal. BWSC is continuing its downspout disconnection program in this area and is completing final paving of disturbed streets. Disconnection of downspouts from the combined sewer system is necessary to remove enough stormwater from the sewers to meet CSO control goals, in this case elimination. BWSC expects the downspout removal and paving work will be completed in the spring of 2008.



**MWRA decommissioned the Commercial Point and Fox Point CSO facilities on November 1, 2007.**

**Figure 16**  
**South Dorchester Bay Sewer Separation**



Contract 1 - Sewer separation complete  
 Contract 2 - Sewer separation complete  
 Contract 3 - Sewer separation complete  
 Contract 4 - Sewer separation complete

Contract 5 - Sewer separation complete  
 Contract 6 - Sewer separation complete  
 Contract 7 - Sewer separation complete  
 Contract 8 - Sewer separation complete

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**STONY BROOK SEWER SEPARATION**

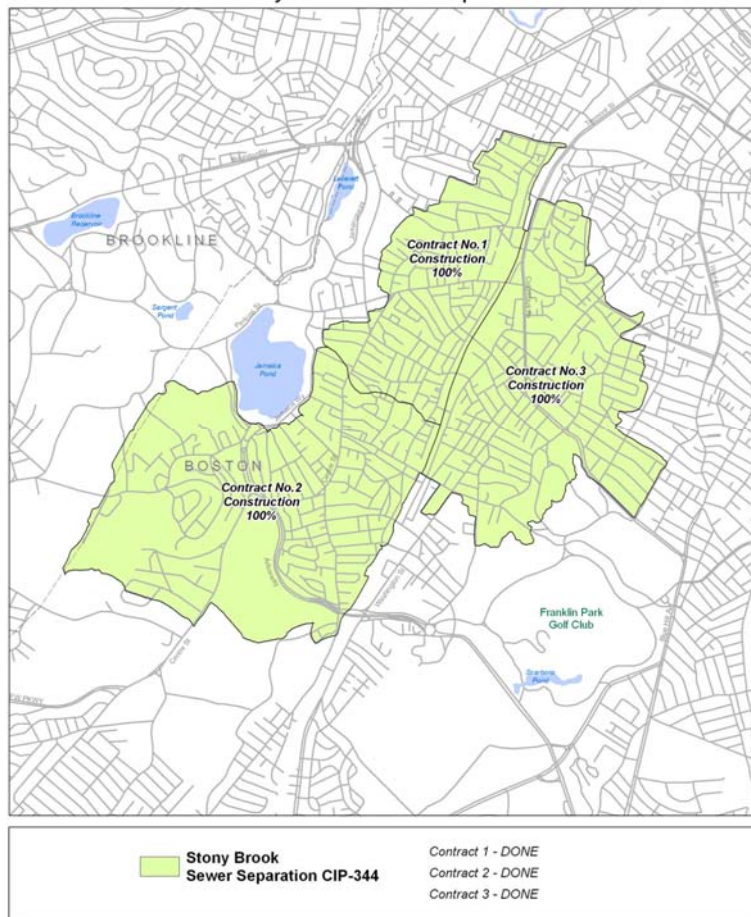
	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	July 1998	July 1998
Commence Construction	July 2000	July 2000
Complete Construction	September 2006	September 2006

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 17 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 2 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.

Figure 17  
 Stony Brook Sewer Separation



**FORT POINT CHANNEL BOS072-073 SEWER SEPARATION**

	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	July 2002	July 2002
Commence Construction	March 2005	March 2005
Complete Construction	March 2007	March 2007

On March 30, 2007, BWSC achieved substantial completion of construction of this \$8.3 million project, 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. BWSSC 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 18). 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 expected 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.

**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.

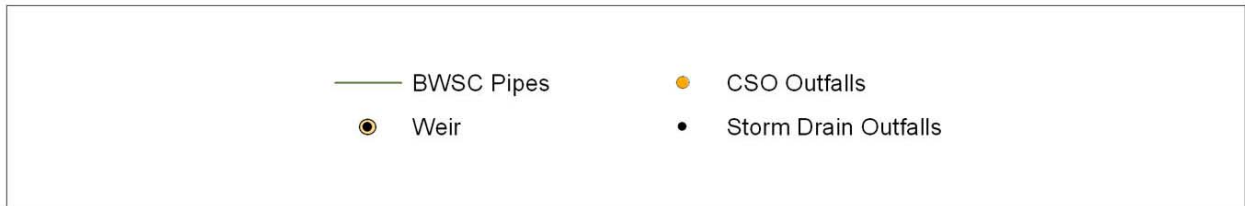
BWSC completed storm drain construction and closed the last remaining CSO outfall to the Neponset River in June 2000, and it continues to perform downspout disconnection and other work to remove additional stormwater inflow from the sewer system, in order to minimize the risk of surcharging and flooding. 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.

**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.

Figure 18  
 Sewer Separation and System Optimization for BOS072-073





**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 Morrissey Boulevard Storm Drain project (“MBST”), shown in Figure 19 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 a 5-year level of stormwater control along the South Boston beaches in addition to a 25-year level of CSO control. The MBST will enable the BOS087 outfall located near Mother's Rest to be eliminated. In addition to conveying the BOS087 stormwater in larger storms, the MBST will collect all stormwater flows from DCR’s Morrissey Boulevard storm drain system. The existing DCR outfall in Savin Hill Cove will be replaced by the MBST. The project extends from Savin Hill Cove (downstream end) to the State Police barracks on William Day Boulevard (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



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and Financial Assistance Agreement in May 2005, and BWSC commenced design work in June 2005, in compliance with Schedule Seven.

On December 26, 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 the BOS087 outfall, behind the State Police barracks. BWSC completed this first contract in 2007 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. The contract is on schedule for substantial completion by June 2009, in compliance with Schedule Seven.

The second construction contract began with many utility relocations to install the new 12-foot by 12-foot reinforced concrete box culvert. Installation of the culvert started in early February 2008 near the access road to the University of Massachusetts Boston, John F. Kennedy Presidential Library and Museum and Massachusetts Archives/Commonwealth Museum and is proceeding northward in the service road past Boston College High School and the Sovereign Bank complex to Mt. Vernon Street. Work will also take place in Mt. Vernon Street, near the JFK/UMass Red Line Station, and in the Bayside Exposition Center parking lot.

The MBST includes the installation of approximately 2,810 linear feet of 12-foot by 12-foot reinforced concrete storm drain box conduit, 660 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, approximately 410 linear feet of reinforced concrete pipe, ductile iron pipe and PVC pipe for storm drain, and approximately 1,600 linear feet of PVC pipe for sanitary sewer pipes. 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 drain, approximately 21 new manholes, three special manholes, six particle separators, and 23 catch basins.

**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

This project is intended to minimize CSO discharges to the Reserved Channel by separating combined sewer systems in a portion of South Boston (see Figure 20 below). Implementation of the recommended sewer separation plan will reduce the number of overflows to Reserved Channel from 37 to 3 in a typical year.

In April 2001, MWRA filed a Notice of Project Change with MEPA, recommending a reassessment of the overall CSO control approach for North Dorchester Bay and Reserved Channel. The Secretary's Certificate, issued in June 2004, approved the reassessment as scoped by MWRA. MWRA began the reassessment in September 2001, which included updating planning assumptions and water quality information and evaluating a full range of CSO control goals and technologies. MWRA completed the reassessment and filed the Supplemental Facilities Plan and Environmental Impact Report for North Dorchester Bay and the Reserved Channel in April 2004. In the report, MWRA recommended a new plan calling for sewer separation in the drainage areas tributary to the Reserved Channel outfalls.

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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 will fund 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 likely follow an approach similar to the South Dorchester Bay and Stony Brook sewer separation projects, with multiple construction contracts sequenced over several years.

BWSC has substantially completed the data collection phase of this project, including field investigations, internal pipeline inspections, building inspections, geotechnical investigations and flow metering. BWSC expects to receive the preliminary design report from its design consultant this spring. The report will define the size, extent and location of new storm drains and sewers necessary to separate the sewers tributary to the four existing CSO outfalls along the Reserved Channel. It will also define the level of stormwater inflow that BWSC must remove from the sewer system to effect the required levels of control at the outfalls.

BWSC plans to submit the preliminary design report and detailed cost estimate to MWRA when they are available. BWSC has informed MWRA that the project cost estimate to lay the new storm drains through the congested residential and commercial streets and tight utility corridors that characterize the Reserved Channel area may be as much as \$57 million more than the \$63.1 million in MWRA’s Proposed FY09 CIP budget. MWRA will review the design plans and detailed cost estimate when they are received from BWSC with the Preliminary Design Report to determine how to proceed with this project.



Figure 20

1/16/07

MwraGIS 1102-16

**BULFINCH TRIANGLE 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 goal of the Bulfinch Triangle sewer separation project is to minimize CSO discharges to the Charles River by separating combined sewer systems in the area of Boston roughly bounded by North Station, Haymarket Station, North Washington Street, and Cambridge Street (see Figure 21). Implementation of the recommended sewer separation plan will reduce the number of overflows to the Charles River, reduce overflows to the Prison Point CSO facility and close outfall BOS049.

MWRA and BWSC added this project to their CSO Memorandum of Understanding and Financial Assistance Agreement in October 2006. BWSC will be responsible for managing design and construction of the project and ensuring that CSO control goals and other project objectives are met. MWRA will fund the design and construction costs, pursuant to the eligibility terms of the agreement.

Field investigations, building inspections and survey work are substantially complete. BWSC received the final Preliminary Design Report from its design consultant in September 2007 and has authorized final design activities, which are now underway. MWRA continues to review the Preliminary Design Report, the preliminary design plans, and the updated cost estimate it received from BWSC. The cost estimate has increased significantly, approximately \$2 million above the \$4.7 million budget in MWRA's Proposed FY09 CIP budget. MWRA is reviewing the estimates and the preliminary design plans.

**BROOKLINE SEWER SEPARATION**

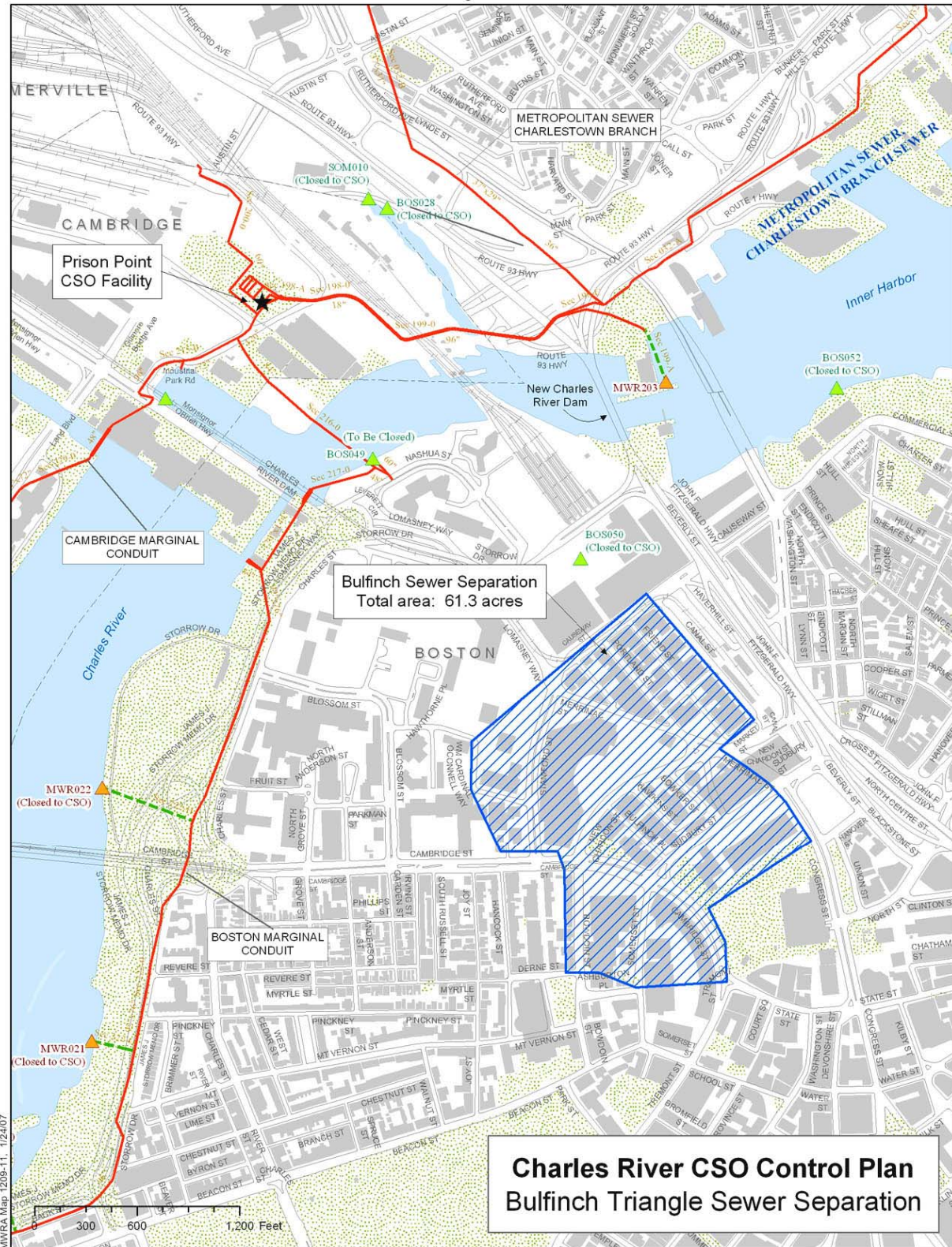
	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	November 2006	November 2006
Commence Construction	November 2008	November 2008
Complete Construction	July 2013	July 2013

The \$9.0 million Brookline sewer separation project is intended to separate remaining areas of Brookline, totaling 71.2 acres, that have combined sewers tributary to MWRA's Charles River Valley Sewer (see Figure 22). The project is intended to reduce 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 will be responsible for managing design and construction of the project and ensuring that CSO control goals and other project objectives are met. MWRA will fund the design and construction costs, pursuant to the eligibility terms of the agreement.

Field investigations, building inspections and survey work are substantially complete. Brookline received the final Preliminary Design Report from its design consultant in December 2007 and has authorized final design services. MWRA is reviewing the Preliminary Design Report, the preliminary design plans, and the updated cost estimate it received from Brookline. The cost estimate has increased significantly, approximately \$11.9 million above the \$9.7 million budget in MWRA's Proposed FY09 CIP.

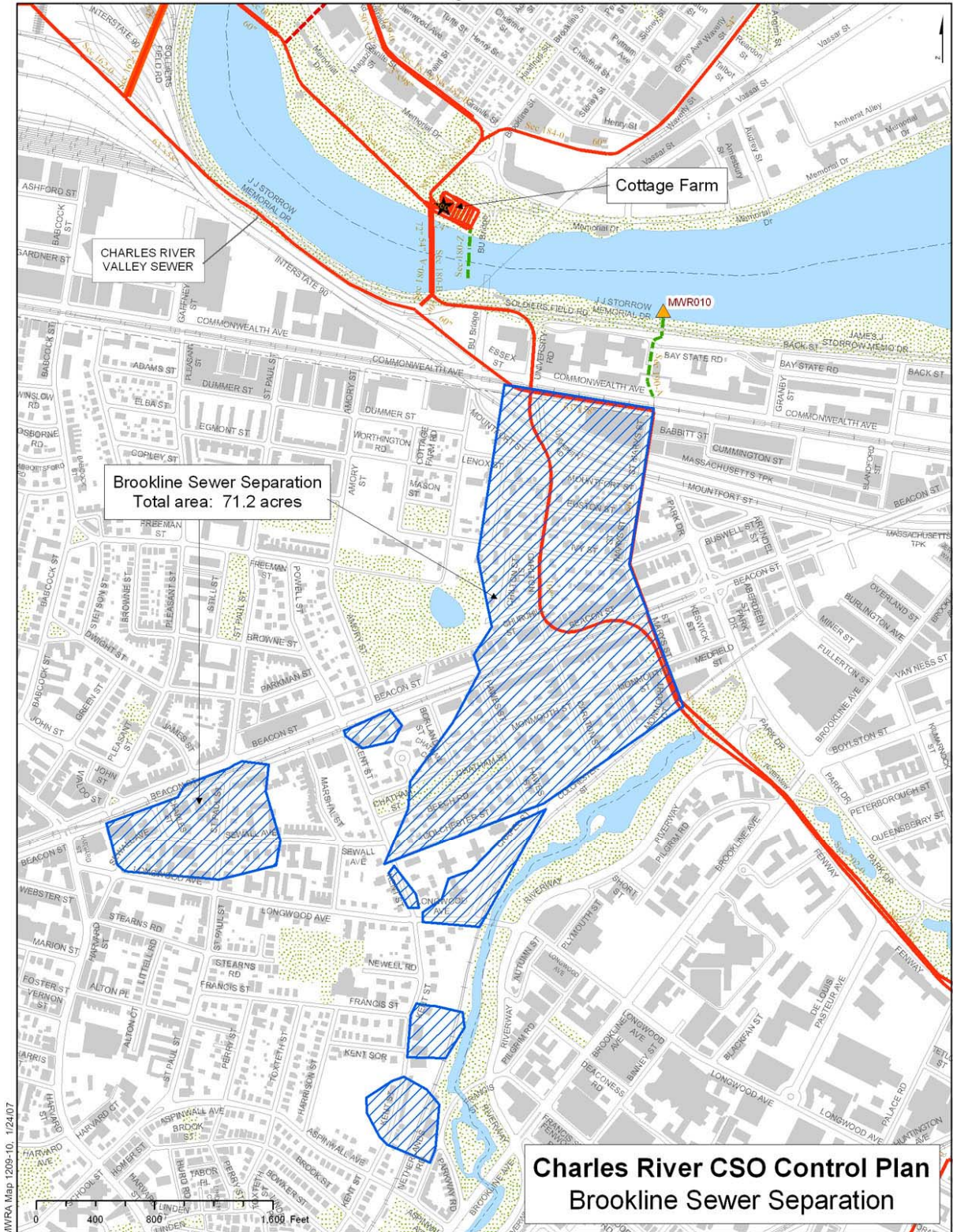
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Figure 21



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Figure 22



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**ALEWIFE BROOK CSO CONTROL PLAN PROJECTS**

	<u>Court Milestones</u>		
	<u>Commence Design</u>	<u>Commence Construction</u>	<u>Complete Construction</u>
CAM004 Stormwater Outfall and Detention Basin		July 2007	July 2009
CAM004 Sewer Separation	January 1997*	July 1998*/July 2009	January 2013
CAM400 Manhole Separation	July 2006	July 2007	July 2008
Interceptor Connection Relief and Floatables Control at CAM002, CAM401B, and SOM01A, and Floatables Control at CAM001	July 2006	January 2008	December 2008
Control Gate/Floatables Control at Outfall MWR003 Gate and MWRA Rindge Avenue Siphon Relief	April 2009	November 2010	January 2012

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

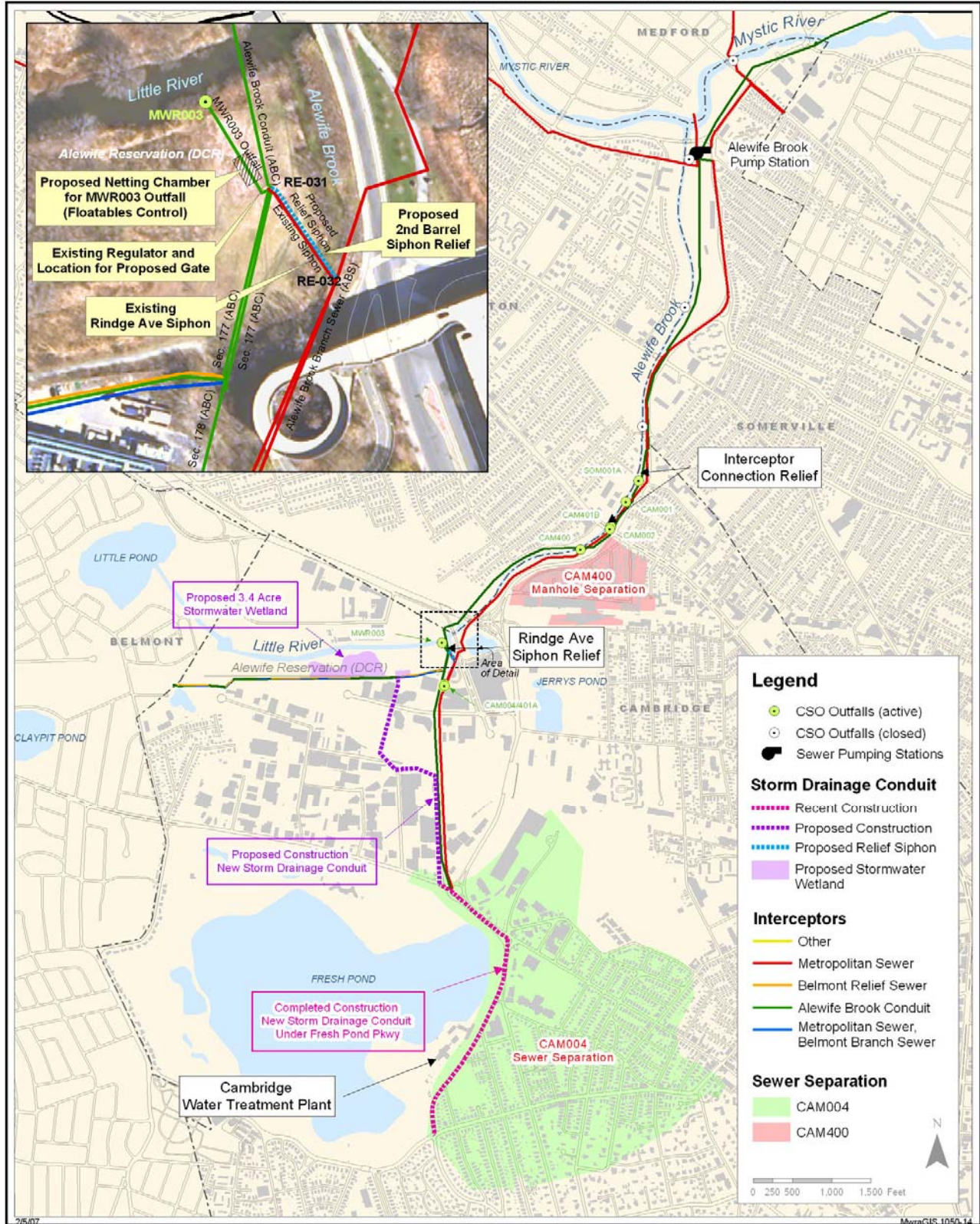
***Background and Description of the Alewife Brook CSO Control Plan***

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 stormwater basin and new stormwater outfall 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 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 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

**Figure 23**  
**Alewife Brook CSO Control - Revised Plan**





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 comprises several component projects that were individually incorporated into the Court Schedule in April 2006. Shown in Figure 23, they include:

- CAM004 Stormwater Outfall and Detention Basin (Cambridge Contract 12)
- CAM004 Sewer Separation (Cambridge Contracts 8 and 9)
- CAM400 Manhole Separation (Cambridge Contract 13)
- Interceptor Connection Relief and Floatables Control at CAM002, CAM401B, and SOM01A, and Floatables Control at CAM001 (Cambridge Contract 4)
- Control Gate/Floatables Control at MWR003 and Rindge Avenue Siphon Relief (an MWRA contract)

Together, these projects are intended to reduce CSO discharges to the Alewife Brook to seven activations in a typical year.

### ***Schedule and Cost Concerns***

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.

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 requests 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. The City of Cambridge and DEP have since filed responses to the complaint.

The rest of the Alewife Brook sewer separation plan cannot move forward without the new stormwater outfall and basin in place, and the viability of the plan hinges on Contract 12. Contract 12 and other plan components have been delayed by more than three years since the first citizens' appeal was filed in early 2005. The delay has 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 and added to Schedule Seven. To date, all plan components have suffered a 21 month delay beyond the new milestones in Schedule Seven. These components include Contract 12; CAM400 manhole separation; interceptor connection relief and floatables control at CAM002, CAM401B, SOM01A and CAM001;

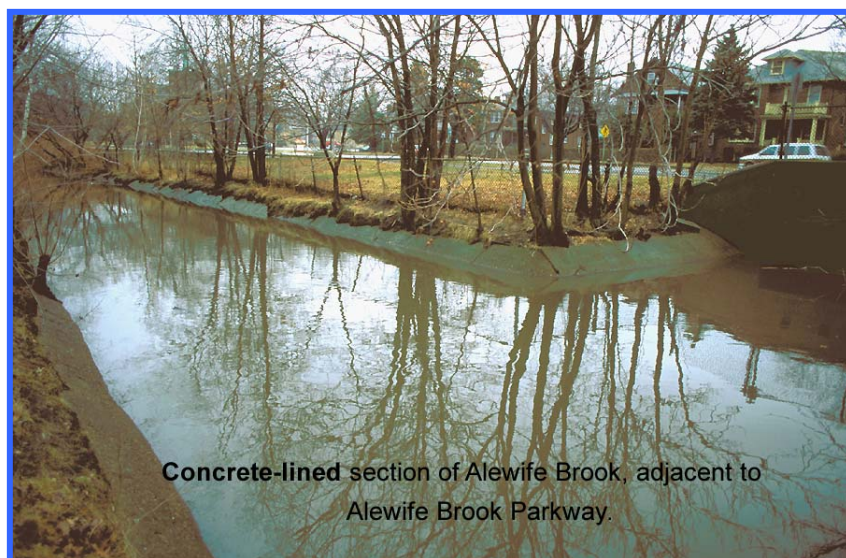
CAM004 sewer separation; and the control gate and floatables control at outfall MWR003 and MWRA Rindge Avenue siphon relief.

MWRA and Cambridge are reviewing project schedules and budgets and are developing a plan for moving the Alewife Brook projects forward, while controlling any remaining risk associated with the appeal.

The cost of the Alewife Brook CSO control plan was last updated in December 2004, in Cambridge's Draft Second Supplemental Preliminary Design Report ("SSPDR"), which provided an update on the work plans, design and construction contract requirements, schedules and costs for the Alewife projects. The SSPDR showed that the total project cost for the Alewife plan and for Cambridge floatables control would be at least \$94 million, compared to the estimate of \$74 million in the 2001 Notice of Project Change, though the general scope of work and level of CSO control had not changed. With delays caused by the wetlands appeal, the cost is now estimated to be nearly \$110 million. The \$74 million estimate, developed with the 2001 Notice of Project Change, was itself a substantial cost increase from the original 1997 CSO plan estimate of \$13.8 million. MWRA is presently negotiating a revised agreement with Cambridge concerning the higher total cost and its effect on cost sharing by MWRA and Cambridge.

#### ***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 at least 21 months beyond the Schedule Seven milestones, because this work is dependent upon Cambridge completing Contract 12 and has been delayed along with the other Alewife Brook projects.



**5.3 Floatables Control and Outfall Closing Projects**

	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	September 1996	September 1996
Commence Construction	March 1999	March 1999
Complete Construction		
Most outfall locations	May 2001	May 2001
Cambridge Charles River	December 2007	December 2007

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 most of the remaining active CSO outfalls as 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.

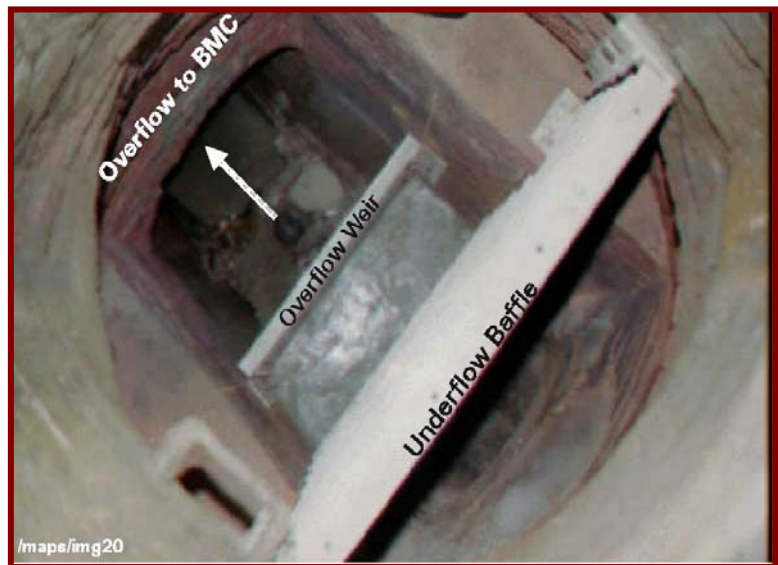
The Region-wide Floatables Control and Outfall Closing Projects described in the following sections involve floatables controls and regulator or outfall closings that are independent of the larger projects. Under mutual agreements, MWRA, BWSC, Cambridge and Somerville are responsible for implementing 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 only rarely activate, 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 ten 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 (CAM400 is no longer included, as this outfall will instead 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. In lieu of installing controls at outfalls CAM009 and CAM011, Cambridge chose to close these two outfalls as part of the same construction contract, based on the results of hydraulic model evaluations it conducted. Cambridge intends to monitor system conditions near CAM009 and CAM011 to verify no adverse hydraulic effect. With completion of this Cambridge work, the “Region-wide Floatables Controls” project in MWRA’s Long-Term Control Plan is now 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 2008**

Schedule Seven in the Federal Court Order includes nine CSO control milestones in 2008 (see Table 4). Three of these milestones relate to the Alewife Brook plan and will not be met due to delay already caused by the wetlands appeal. Planned work in 2008 for 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.

### ***North Dorchester Bay***

MWRA's construction schedule calls for more than 90% of the 10,832-foot North Dorchester Bay CSO storage tunnel to be mined by December 31, 2008. It also calls for completion of the CSO and stormwater diversion structures and related tunnel drop shafts at outfalls BOS083/BOS084 (consolidation to one drop shaft), BOS085 and BOS086 by the fall of 2008. Similar work at outfall BOS082 will occur in the fall of 2008 and be completed in early 2009. Work at outfall BOS081 is scheduled in 2009. MWRA plans to complete all work in the tunnel construction contract by the spring of 2009.

By the fall of 2008, MWRA also plans to complete the ongoing final design services for the tunnel related facilities, including the dewatering pumping station at Conley Terminal, the force main, and the remote odor control facility near the State Police Building. MWRA plans to advertise the construction contract for these facilities by December 2008. The construction contract is scheduled to commence in the spring of 2009 and be substantially complete by May 2011, in compliance with Schedule Seven.

The bulk of BWSC's construction work for the Morrissey Boulevard Storm Drain will occur during 2008. Utility work and other site preparation is ongoing, and BWSC commenced installation of the 12-foot by 12-foot conduit along Morrissey Boulevard in February 2008. BWSC's schedule calls for substantial completion of the project by June 2009, in compliance with Schedule Seven.

### ***South Dorchester Bay***

Since completing the South Dorchester Bay sewer separation project and closing the related CSO regulators in 2007, BWSC has been monitoring the performance of its Dorchester Interceptor and tributary sewers to determine whether hydraulic conditions during wet weather are acceptable. BWSC plans to complete the hydraulic evaluations and submit a related report this spring. The report will confirm that the system performance objectives of the project have been met or recommend additional work to achieve the planned performance.

### ***Inner Harbor***

MWRA completed the first construction contract (trunk line rehabilitation) for the East Boston Branch Sewer Relief project in 2004. MWRA plans to advertise the second, and largest, contract (microtunneling) by March 2008 and issue the Notice to Proceed by June 2008, in compliance with Schedule Seven. MWRA also plans to advertise the third and last construction contract (pipebursting) by August 2008 and issue the Notice to Proceed by December 2008.

MWRA plans to submit a report to EPA and DEP in April 2008 on the implementation of wet weather operational changes at the Prison Point CSO treatment facility and the expected long-term performance of the facility with these changes. MWRA expects to propose new long-term discharge goals (i.e. average annual activation frequency and treated discharge volume) for the Prison Point facility in the report.

### ***Charles River Basin***

BWSC has been monitoring flows at the CSO regulators affected by the Stony Brook sewer separation project since completing the project in September 2006. BWSC plans to conduct additional flow metering in the spring of 2008 and will use the monitoring program data to assess system performance and estimate remaining CSO discharges to the Stony Brook Conduit.

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**Table 4: Planned Efforts in 2008 Related to Schedule Seven Milestones**

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>	The Alewife Brook CSO projects have been delayed pending the citizens' appeal of the wetlands Superseding Order of Conditions for Cambridge's Control 12 (CAM004 stormwater outfall and detention basin). MWRA and Cambridge are developing a revised financial assistance agreement and project schedule for completing the Alewife Brook projects.
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>	
Mar 2008	<i>MWRA to submit (annual report on CSO control progress).</i>	MWRA submitted this Annual Report for 2007 on March 14, 2008.
Jun 2008	<i>MWRA to commence construction of the Brookline Connection, Cottage Farm overflow chamber interconnection, and Cottage Farm gate control.</i>	MWRA plans to issue the Notice to Proceed with the construction contract by June 30, 2008.
	<i>MWRA to commence construction of interceptor relief for BOS003-014.</i>	MWRA plans to issue the Notice to Proceed with the construction contract by June 30, 2008.
Nov 2008	<i>MWRA, in cooperation with BWSC, to assure completion of construction of South Dorchester Bay sewer separation.</i>	BWSC completed the South Dorchester Bay Sewer Separation project and closed all related CSO regulators in 2007. Accordingly, MWRA decommissioned the Commercial Point and Fox Point CSO treatment facilities on November 1, 2007.
	<i>MWRA, in cooperation with BWSC, to commence construction of Bulfinch Triangle Sewer Separation.</i>	BWSC plans to issue the Notice to Proceed for a first construction contract by November 2008.
	<i>MWRA, in cooperation with Brookline, to commence construction of Brookline sewer separation.</i>	The Town of Brookline and MWRA plan to issue the Notice to Proceed for a first construction contract by November 2008.

BWSC also plans to issue the Notice to Proceed with the first construction contract for the Bulfinch Triangle Sewer Separation project by November 2008, in compliance with Schedule Seven.

The Town of Brookline and MWRA plan to issue a first construction contract for the Brookline Sewer Separation contract by November 2008, in compliance with Schedule Seven. The work will involve separating the town's combined sewers in the Charles River drainage area and rehabilitating the MWRA's CSO outfall at MWR010 for use as a storm drain outfall in the long-term.

MWRA recently advertised the construction contract for the Cottage Farm Brookline Connection and Inflow Controls project and plans to issue the Notice to Proceed by June 2008, in compliance with Schedule Seven. MWRA also plans to complete preliminary design investigations for the Charles River Interceptor Gate Controls and Evaluation of Additional Interceptor Connections project by the end of the year.

### ***Alewife Brook***

Despite the latest appeal to Massachusetts Superior Court on the DEP wetlands permit, MWRA and the City of Cambridge expect to finalize their negotiations soon on changes to their CSO Memorandum of Understanding and Financial Assistance Agreement to incorporate the full scope of the revised sewer separation plan as presented in the July 2003 Final Variance Report, along with updated costs, a cost share, and new project schedules. Upon approval by the MWRA's Board of Directors, MWRA and the City of Cambridge plan to move forward with implementation of this project. At this time, MWRA and Cambridge expect that the design of Contract 12 and the design of other elements of the Alewife plan will commence in 2008. Accordingly, the construction of Contract 12 and certain other Alewife Brook projects would commence in 2009. MWRA and Cambridge will also monitor the progress of the ongoing court appeal of DEP's wetlands decision.

### ***Annual CSO Discharge Reporting***

In compliance with its NPDES permit and CSO variances for the Charles River and Alewife Brook/Upper Mystic River, MWRA is reviewing facility records, meter data and other system performance indicators and is conducting hydraulic modeling to estimate CSO discharges for all storms that occurred in calendar year 2007. MWRA plans to submit the estimates to EPA and DEP in April 2008. MWRA will share the results with its CSO communities to validate the estimates and coordinate their submissions to EPA and DEP, because the communities have 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, which are the basis for compliance with water quality standards.

***The End***