

Massachusetts Water Resources Authority



Combined Sewer Overflow Control Plan



Annual Progress Report 2004

March 2005

TABLE OF CONTENTS

	<u>Page</u>
1. Introduction	1
2. Status of CSO Control	1
3. Progress in 2004	4
3.1 Key CSO Efforts and Accomplishments in 2004	4
3.2 Efforts to Gain Plan Approval and Move Projects Forward	8
<i>Charles River CSO Variance</i>	
<i>Alewife Brook /Upper Mystic River CSO Variance</i>	
3.3 Efforts to Track CSO Benefits	11
3.4 Efforts to Safeguard Long-Term Benefits	11
4. CSO Control Plan Cost and Spending	12
5. Gaining Regulatory Approvals on a Final Plan for CSO Control	16
6. Project Implementation	17
6.1 MWRA Managed Projects	17
North Dorchester Bay and Reserved Channel	
Hydraulic Relief Projects at CAM005 and BOS017	
East Boston Branch Sewer Relief	
BOS019 CSO Storage Conduit	
Chelsea Relief Sewers	
Union Park Detention/Treatment Facility	
Upgrades to Existing CSO Facilities	
6.2 Community Managed Projects	33
South Dorchester Bay Sewer Separation	
Stony Brook Sewer Separation	
Fort Point Channel BOS072-073 Sewer Separation	
Neponset River Sewer Separation	
Constitution Beach Sewer Separation	
Cambridge/Alewife Brook Sewer Separation	
6.3 Region-wide Floatables Controls and Outfall Closing Projects	44
MWRA Floatables Control and Outfall Closing	
CSO Control at outfall MWRA 010	
BWSC Floatables Control	
Cambridge Floatables Control	
Somerville Floatables Control	
7. Planned CSO Program Activities in 2005	47

1. Introduction

The Massachusetts Water Resources Authority (MWRA) files this CSO Annual Report for 2004 in accordance with the Federal District Court Order in the Boston Harbor Case. Annual and quarterly CSO reports describe the progress of work to complete MWRA's long-term CSO control plan relative to milestones in the Court-ordered schedule.

MWRA's long-term CSO control plan was recommended in the *Final CSO Facilities Plan and Environmental Impact Report* (the "1997 Facilities Plan/EIR"), which MWRA filed with federal and state regulatory agencies in August 1997. Together with plan modifications MWRA proposed in subsequent Notices of Project Change and Supplemental EIRs, it recommends 25 wastewater system improvement projects (see Figure 1) to bring CSO discharges at 84 outfalls in the metropolitan Boston area into compliance with the federal Clean Water Act and state Water Quality Standards.

Figure 2 summarizes the scope, schedule and benefits of the plan. The 1997 Facilities Plan/EIR received state and federal regulatory approvals in late 1997 and early 1998, respectively, allowing MWRA to move the projects into design and construction.

Design and construction milestones for all of the projects are mandated by the Federal District Court in the Boston Harbor Case (CA No. 85-0489-MA) and are set forth in Schedule Six. Schedule Six calls for all projects to be fully implemented by November 2008, although MWRA has reported to the Court that it will seek to amend Schedule Six by replacing the existing milestones for those projects that were reassessed, bringing the overall completion date to 2017. Most of the project reassessments that were underway in 2003 (as reported last year: North Dorchester Bay, Reserved Channel, Fort Point Channel, Alewife Brook and East Boston) were completed that year or in 2004, and resulted in revised recommended plans for CSO control, with the exception of East Boston, for which selection of a final plan is yet to be determined. For these revised plans, MWRA expects to propose changes to Schedule Six following ongoing discussions with EPA and DEP to gain regulatory acceptance of the project changes and overall CSO plan requirements.

This annual report reviews planning, design and construction progress and accomplishments in 2004 and through the quarterly period from December 15, 2004 to March 15, 2005. Like previous annual reports, it also discusses issues that may affect MWRA's ability to complete the CSO projects on schedule and describes the efforts taken to move CSO control forward. In addition, this report looks ahead at the regulatory decisions, including water quality standards determinations, that must be made to finalize the CSO plan and allow MWRA to complete its CSO control obligations under the Court Order.

2. Status of CSO Control

MWRA has spent nearly \$300 million on planning, design and construction of the CSO control. With the cooperation of its CSO communities, MWRA has completed 14 of the 25 projects the plan recommends (see Figure 1 and Table 1). Seven additional projects are in construction. Of the 84 CSO outfalls addressed in the plan, 21 have been closed to CSO discharges (of the total 34 outfalls recommended to be closed). CSO discharges to Constitution Beach and the Neponset River have been eliminated.

FIGURE 1

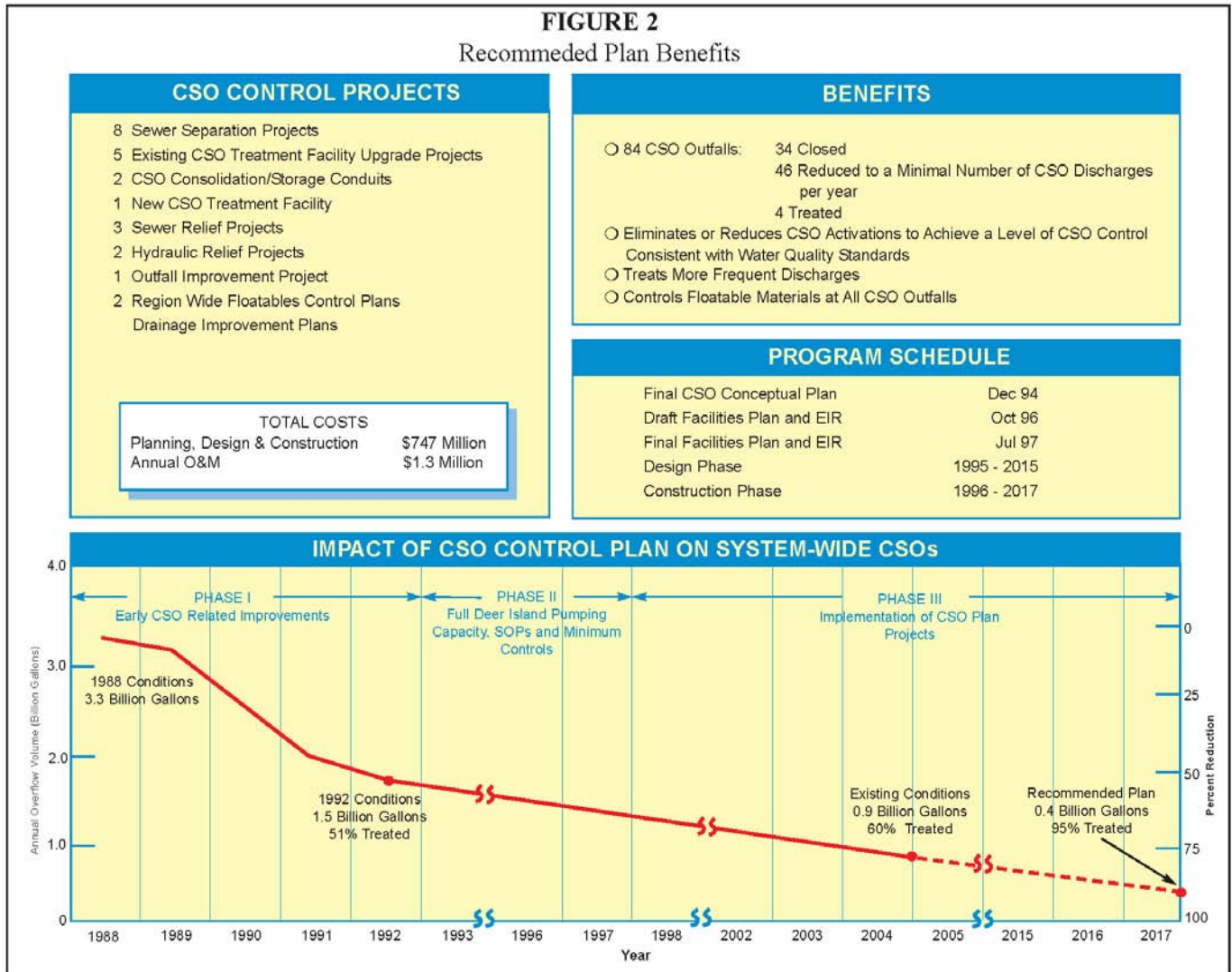
MWRA Recommended CSO Control Plan and Status of Implementation



(1) East Boston Project reassessment completed; final plan pending.

Massachusetts Water Resources Authority
 Combined Sewer Overflow Control Plan
 Annual Progress Report – 2004

FIGURE 2
 Recommended Plan Benefits



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 with dramatic improvement in water quality in many areas (see Figure 3). The wastewater system improvements, which include the upgraded Deer Island Treatment Plant and associated pumping stations, as well as completed CSO projects, have reduced average annual volume of CSO discharge (in a typical rainfall year) from 3.3 billion gallons in 1988 to 0.9 billion gallons today, with 60% of the remaining overflow receiving treatment at MWRA’s five CSO 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 4) shows the cumulative effect of the Boston Harbor Project and CSO control projects.

Massachusetts Water Resources Authority
 Combined Sewer Overflow Control Plan
 Annual Progress Report – 2004

Table 1: CSO Project Implementation Status

Completed			
<i>Hydraulic Relief at CAM005</i>			
<i>Hydraulic Relief at BOS017</i>			
<i>Chelsea Trunk Sewer Replacement</i>			
<i>Chelsea Branch Sewer Relief</i>			
<i>CHE008 Floatables Control and Outfall Repair</i>			
<i>Cottage Farm CSO Facility Upgrade</i>			
<i>Prison Point CSO Facility Upgrade</i>	In Construction		
<i>Somerville Marginal CSO Facility Upgrade</i>	<i>Cambridge/Alewife Brook Sewer Separation (25%)</i>		
<i>Commercial Point CSO Facility Upgrade</i>	<i>South Dorchester Bay Sewer Separation (70% complete)</i>		
<i>Fox Point CSO Facility Upgrade</i>	<i>Stony Brook Sewer Separation (68 % complete)</i>		
<i>MWRA Floatables/Outfall Closing Projects</i>	<i>Regionwide Floatables Control (75% complete)</i>	In Design	
<i>Neponset River Sewer Separation</i>	<i>Union Park Treatment Facility (55% complete)</i>	<i>North Dorchester Bay Tunnel and Facilities</i>	In Planning
<i>Constitution Beach Sewer Separation</i>	<i>East Boston Branch Sewer Relief (10% complete incl. Contract 1)</i>	<i>Morrissey Blvd and Pleasure Bay Drains</i>	<i>Reserved Channel Sewer Separation</i>
<i>Somerville Baffle Manhole Separation</i>	<i>Fort Point Channel Sewer Separation & Optimization</i>	<i>Charlestown BOS019 Storage Conduit</i>	<i>E. Boston Branch Sewer Relief (except Contract 1)</i>

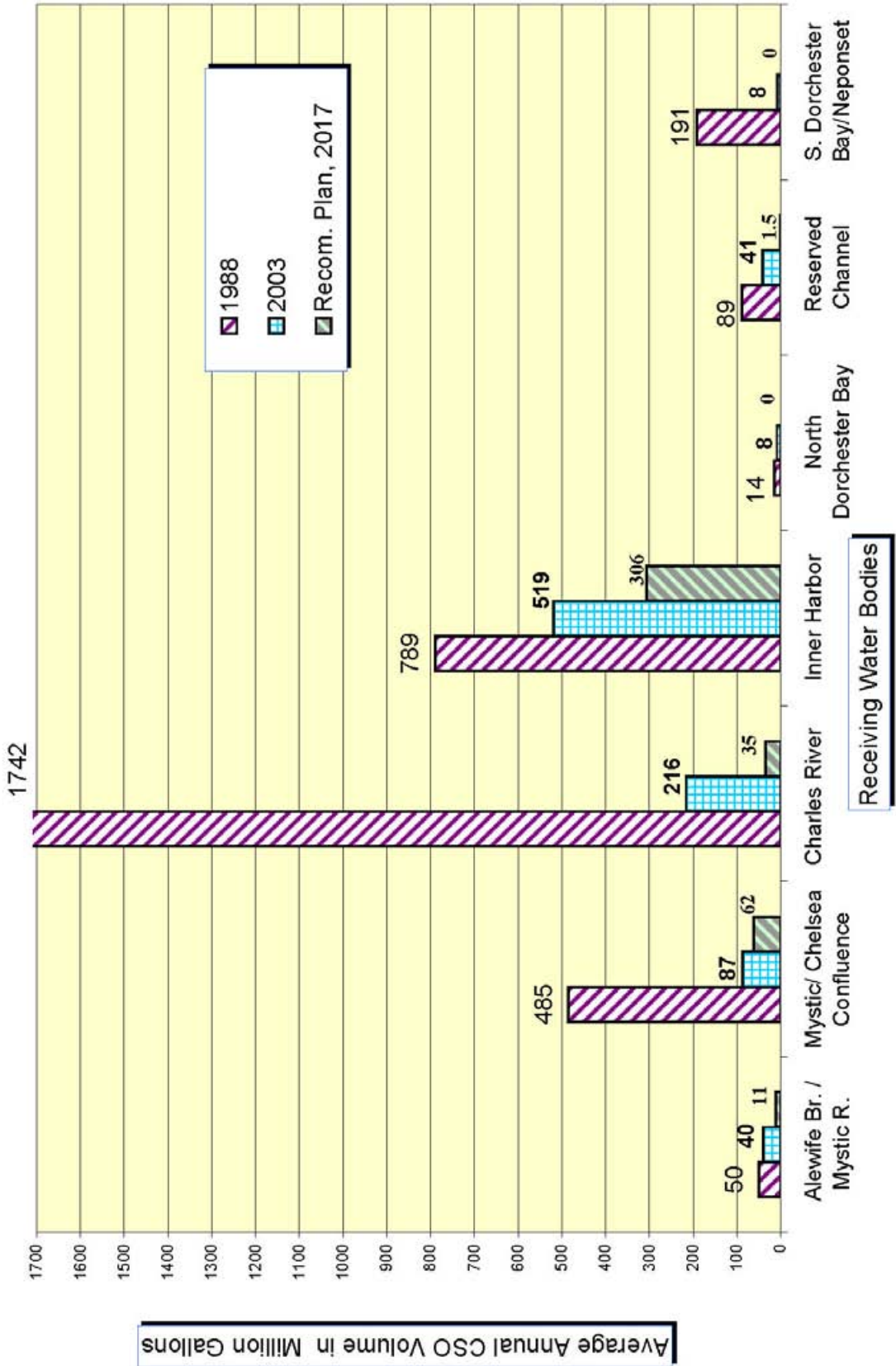
3. Progress in 2004

3.1 Key CSO Efforts and Accomplishments in 2004

The following summarizes key accomplishments in 2004. More information on each of these items is presented later in this report.

- Progress on CSO design and construction in 2004 exceeded any previous year. MWRA spent \$46 million in 2004 alone, its highest annual spending for CSO control to date.
- MWRA achieved 55% completion of the \$40 million construction contract for the Union Park Detention/Treatment Facility. The contractor has excavated the entire site to depths exceeding 40 feet, removed over 60,000 tons of soil from the site (90% of the project total) to construct the massive underground storage basins, and placed over 10,000 cubic yards of concrete (80% of the project total). Much of the work to modify and upgrade the existing pumping station was also completed.

Figure 3
 CSO Discharge Volumes are Diminishing



Massachusetts Water Resources Authority
 Combined Sewer Overflow Control Plan
 Annual Progress Report – 2004

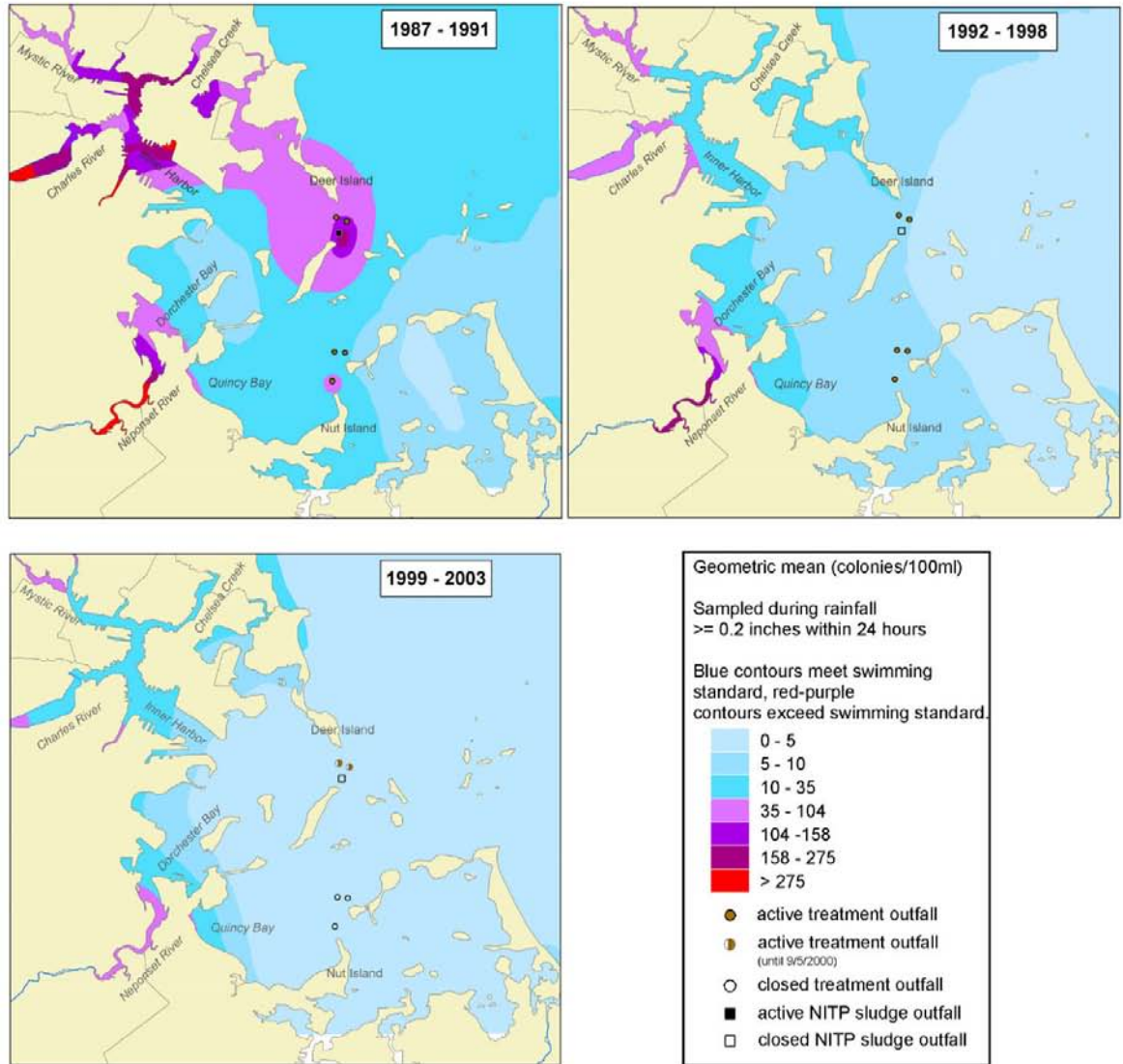


Figure 4. Changes in Boston Harbor Average *Enterococcus* Counts in Wet Weather

Changes in wet weather bacterial water quality in Boston Harbor 1987 to 2003, monitoring data collected by MWRA’s Central Lab and Environmental Quality monitoring program in Boston Harbor and tributary rivers, and from Metropolitan District Commission (now Department of Conservation and Recreation) beach monitoring. *Enterococcus* is the sewage indicator bacteria recommended by EPA for monitoring marine waters. Contours show the geometric means of *Enterococcus* data collected when more than 0.2 inches of rain had fallen in the previous 24 hours; blue areas meet the EPA standard and red-purple areas exceeded the standard.

- 1987-1991** shows data from before the Boston Harbor project and CSO plans began up through the last year that sludge was discharged (1991). In wet weather most of the Inner Harbor, the tributary rivers, and areas affected by discharges of sewage and sludge from the Deer Island Treatment Plan (DITP) and Nut Island Treatment Plant failed the standard, some with extremely high counts.
- 1992-1998** reflects impacts of CSO upgrades, the end of sludge discharges, full pumping at DITP, improved primary and beginning secondary treatment at DITP. Most of the harbor meets standards, except tributary rivers, Fort Point Channel, and along Wollaston Beach.
- 1999-2003** shows continued improvement due to closure of 22 CSO outfalls, upgrades of CSO facilities, ending of harbor treatment plant effluent discharges as the new outfall began operating, and local efforts to abate stormwater pollution.

Massachusetts Water Resources Authority
Combined Sewer Overflow Control Plan
Annual Progress Report – 2004

- Construction activity on the South Dorchester Bay sewer separation project reached its highest level in 2004, with the installation of 24,074 feet (4.6 miles) of new storm drain. All major construction contracts are either underway or completed. Boston Water and Sewer Commission (BWSC) has installed more than 95,000 feet of new storm drain in total, completing 70% of the construction work and surpassing the Court mandated progress requirement.
- Construction activity on the Stony Brook sewer separation project remained high in 2004, with the installation of 12,093 feet (2.3 miles) of new storm drain. All major construction contracts are either underway or completed. BWSC has installed 50,000 feet of new storm drain in total, completing 68% of the construction work and surpassing the Court mandated progress requirement.
- MWRA completed the \$5.5 million first construction contract for the East Boston Branch Sewer Relief project (outfalls BOS003-014) in June. The work involved rehabilitating MWRA's existing interceptor, constructed in 1894, including installing 5,430 feet of 40-inch diameter cured-in-place resin liner for long-term structural integrity and improved hydraulic performance. The work involved the largest sewer bypass pumping operation in New England, with a flow capacity of 42 million gallons a day, to ensure uninterrupted service during the relining operation, even in wet weather.
- On February 27, 2004, the Federal District Court allowed MWRA's motion seeking to incorporate the new CSO plan for Fort Point Channel – sewer separation and system optimization – into related milestones in Schedule Six. BWSC has since commenced the first construction contract in compliance of the milestone in Schedule Six. Design of the remaining work is 75% complete.
- MWRA completed final design of the BOS019 CSO Storage Conduit in Charlestown, and advertised the construction contract in November, with the intent of awarding the contract by March 31, 2005, in compliance with Schedule Six.
- Cambridge completed 100% plans and specifications for Contract 12 on the Alewife Sewer Separation project. Contract 12 involves the construction of a stormwater basin and storm drain outfall necessary to accommodate stormwater from the planned sewer separation work. Cambridge plans to award the contract by the end of 2005.
- MWRA developed a scope of services for design of the components of the Alewife Brook plan that it will implement, which include installing floatables control and an overflow control gate at outfall MWR003 and relieving the MWRA Rindge Avenue siphon with a second siphon barrel. Design is scheduled to commence in 2005.
- MWRA worked with DEP and the public during review of the Final Variance Report for the Alewife Brook and Upper Mystic River, which MWRA completed in July 2003. On September 1, 2004, after review of the report and public comments, and with other information about water quality conditions, DEP issued an additional three-year extension to the Alewife Brook/Upper Mystic River Variance, to September 1, 2007.
- In early 2004, MWRA submitted the Cottage Farm CSO Facility Assessment Report to MEPA, EPA and DEP, demonstrating that the facility operates as designed in accordance with NPDES permit¹ limits. On October 1, 2004, based on review of the Cottage Farm report, public comments and other

1. The National Pollutant Discharge Elimination System (NPDES) permit was last issued to MWRA by DEP and EPA in May, 2000. It sets limits on the amount of discharges and pollutants.

information about Charles River water quality conditions, DEP issued an additional three-year extension to the Charles River Variance, to October 1, 2007.

- All five of MWRA's upgraded CSO facilities are meeting NPDES permit limits.
- MWRA reached consensus with the regulatory agencies on a revised CSO control plan for the South Boston beaches (North Dorchester Bay) and the Reserved Channel. In April, MWRA filed a Supplemental Facilities Plan and Environmental Impact Report that recommended revised CSO control plans for these receiving waters, to eliminate CSO discharges to the beaches, eliminate most of the separate stormwater discharges to the beaches (5-year storm level of control), and greatly reduce CSO discharges to the Reserved Channel. The Secretary of Environmental Affairs issued a certificate on the plan in July allowing detailed design to proceed.
- With an aggressive schedule for implementing the North Dorchester Bay project, MWRA commenced final design of the storage tunnel in September and completed 60% plans and specifications in February 2005. MWRA also completed 100% plans and specifications for Pleasure Bay stormwater diversion in December, with the intent of commencing construction in 2005.
- MWRA held discussions with EPA and DEP toward gaining regulatory acceptance of the long-term plan for CSO control, including recommended plan changes from recent project reassessments and related implementation schedules. To support regulatory review, MWRA submitted additional economic analyses showing that the cost of its CSO program is contributing to significant economic impact on its ratepayers. MWRA continued to emphasize that higher levels of CSO control would provide negligible water quality benefit.

3.2 Efforts to Gain Plan Approval and Move Projects Forward

Since late 1997 and early 1998, when EPA and DEP issued water quality standards determinations and CSO plan approvals, MWRA has conducted additional planning level investigations to support continuing regulatory review and remaining regulatory decisions. Final regulatory decisions on water quality standards and appropriate level of CSO control are yet to be issued for the Charles River and Alewife Brook, though MWRA has provided the regulatory agencies with several years of additional water quality data collection, CSO impact evaluations and CSO control planning.

In addition, MWRA has conducted project reassessments in areas where it faced obstacles to project implementation and/or where new information questioned the cost-effectiveness of a project. For some of these areas, MWRA has been able to recommend revised plans (North Dorchester Bay, Reserved Channel, Fort Point Channel and Alewife Brook), and these plans have gained state and federal regulatory support. However, a decision on a recommended plan for East Boston, following MWRA's reassessment of the East Boston Branch Sewer Relief project, has not yet been made, pending further discussions with EPA and DEP. Information on the results of the East Boston reassessment is presented in Section 6.

At this time, MWRA and the City of Cambridge continue to carry considerable risk in moving forward with the revised Alewife Brook sewer separation plan. There is uncertainty under the Alewife Brook Variance that future water quality standards determinations will be consistent with the CSO control goals of the plan. Furthermore, new information from Cambridge on the cost of implementing the recommended plan raises concern about the cost impacts and questions whether the cost and benefit evaluations that led MWRA and Cambridge to select the plan warrant reconsideration. Section 6 includes a detailed discussion of the Alewife Plan, efforts to implement the plan, and the cost concerns.

Charles River CSO Variance

In 1998, DEP issued regulatory variances to MWRA, BWSC and the City of Cambridge allowing CSO discharges to the Charles River Basin pending the development of additional water quality and CSO related information on which to base a long-term decision on water quality standards. MWRA's variance required it to implement the 1997 CSO plan, collect additional water quality data and evaluate the cost and benefits of higher levels of CSO control at the Cottage Farm CSO Treatment Facility, particularly looking at the construction of additional storage capacity. MWRA submitted the Cottage Farm CSO Facility Assessment Report in January 2004. The report demonstrated that Cottage Farm is providing significant treatment in compliance with the NPDES permit, and that additional storage would have great cost and significant impact to the recreational facilities at Magazine Park, with negligible water quality benefit. The report instead recommended specific system optimization measures at Cottage Farm to improve CSO performance and supported ongoing sewer separation work by Cambridge and Brookline that would also reduce CSO discharges to the Charles River.



On the Charles River, MWRA has eliminated or greatly reduced CSO discharges at several outfalls along the Esplanade and has upgraded the Cottage Farm CSO Treatment Facility to improve disinfection and provide dechlorination, while BWSC continues construction of a sewer separation project that will minimize CSO discharges to Stony Brook.

On October 1, 2004, after review of the Cottage Farm report and public comments, DEP issued an additional three-year extension to the Charles River variance, to October 1, 2007. Conditions in the variance extension require MWRA, the City of Cambridge and BWSC to implement all elements of the recommended CSO control plan for the Charles River, including the additional controls recommended by MWRA in the Cottage Farm report, and to continue to implement the Nine Minimum Controls, CSO discharge monitoring, public notice of CSO discharges and Charles River water quality monitoring. In addition, the new conditions require MWRA, Cambridge and BWSC to report on improvements to their sewer systems and storm drain systems that may affect sanitary sewer overflows (SSOs) and combined sewer overflows to the Charles River; report on the operational performance of facilities related to the collection and transport of combined sewage flows; and evaluate the feasibility of additional infiltration/inflow (I/I) removal and stormwater recharge to further control SSO and CSO discharges.

Water quality in the Lower Charles River Basin has improved tremendously over the last decade, in part as due to significant reductions in CSO discharges at the Cottage Farm facility and several other outfalls. Greatly improved pumping capacity at the Deer Island Treatment Plant, improved sewer system operation and maintenance, and the implementation of projects under the long-term CSO control plan have contributed to the CSO reductions. The completed CSO work includes hydraulic relief at outfall CAM005; upgrade of the Cottage Farm facility; the closing of several outfalls by MWRA and BWSC;

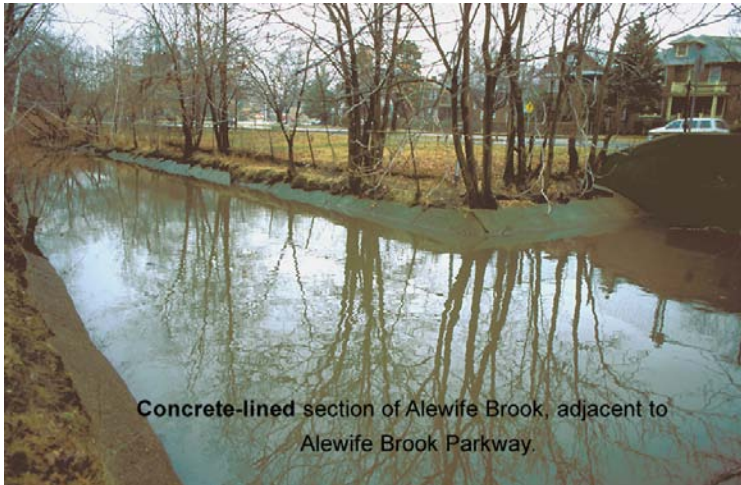
and the ongoing sewer separation work in areas along the Stony Brook Conduit, which is nearly 70% complete. In addition, MWRA has proposed a new project in its Proposed Fiscal Year 2006 Capital Improvement Program (FY06 CIP) for implementation of the system optimization recommendations in the Cottage Farm report.

In 2004, MWRA completed a report on its investigations of anthropogenic (human-source) viruses in Boston Harbor, Charles River, Cottage Farm CSO treatment facility and Deer Island treatment plant for the years 1995 to 2003. MWRA began this study several years ago, because there was and continues to be interest among regulatory agencies and wastewater utilities to know more about the prevalence of pathogens in the environment and in treated and untreated wastewater discharges, as well as the effect of treatment in reducing pathogens.

The study found viruses in about 30 percent of samples from Boston Harbor and the Charles River. Virus levels were low, similar to other water bodies in Europe and the United States (including beaches). There are no standards for virus concentrations in Massachusetts waters, but the samples collected in the Charles River and in Boston Harbor had virus counts well below Arizona's standard for reclaimed water for partial contact, and the average counts in the Charles River and Boston Harbor were well below Arizona's full-body contact standard for reclaimed water. The data are consistent with multiple sources of pathogens (e.g. stream flow, CSO, and stormwater), and CSO facility discharges did not significantly increase the prevalence of viruses during wet weather. Viruses in wastewater were significantly reduced by treatment at the Cottage Farm CSO treatment facility and at the Deer Island treatment plant. On average, treated CSO and final secondary effluent had equivalent levels of viruses.

Alewife Brook/Upper Mystic River CSO Variance

In 1999, DEP issued regulatory variances to MWRA and the cities of Cambridge and Somerville allowing CSO discharges to the Alewife Brook and Upper Mystic River pending the development of additional



the results of MWRA's updated evaluation of the cost and performance of CSO control alternatives offering higher levels of CSO reduction and an affordability analysis. The report concluded that higher levels of CSO control would not be cost-effective, would not reduce violations of water quality standards in Alewife Brook, and could cause widespread social and economic hardship in parts of MWRA's service area.

In 2004, MWRA worked with DEP and the public during review of the Final Variance report. On September 1, 2004, after review of the report and public comments, DEP issued an additional three-

year extension to the Alewife Brook/Upper Mystic River Variance, to September 2007. Conditions in the variance extension require MWRA and the cities of Cambridge and Somerville to implement the revised recommended CSO control plan for the Alewife Brook/Upper Mystic River Basin. The conditions also require MWRA to continue to perform its water quality monitoring program and the cities of Cambridge and Somerville to perform infrastructure investigations to determine if they can further reduce CSO discharges through hydraulic relief, sewer separation, or other collection system controls. In addition, MWRA is required to review the assessment reports performed by the cities of Cambridge and Somerville to determine if there are any feasible, cost effective system optimization measures that benefit water quality in the Alewife Brook/Upper Mystic River watershed which can supplement the current recommended plan.



3.3 Efforts to Track CSO Benefits

In 2004, MWRA continued to perform hydraulic modeling and water quality sampling to measure improved sewer system performance, remaining CSO discharges and their impacts, and improvements in water quality conditions as CSO control projects are implemented. A considerable amount of hydraulic modeling and water quality sampling was conducted to comply with the requirements of MWRA's NPDES permit and the conditions of regulatory variances. The permit and variances require MWRA to estimate the quantity of CSO discharge from active outfalls in every storm event occurring in the previous year. The efficacy of CSO controls is assessed by comparing discharges from year to year and relating them to what would be expected to occur in "typical year" rainfall conditions, which were the basis for the CSO control goals in the 1997 Facilities Plan/EIR. The modeling results over the last few years confirm that MWRA is on track in achieving the predicted benefits of its CSO plan. MWRA has submitted reports presenting the modeling results for 2001, 2002 and 2003 to EPA and DEP, and plans to submit the report for 2004 in April 2005.

In 2003, MWRA completed calibration and verification of its new wastewater system model that is already beginning to replace the hydraulic model MWRA has been using since 1993. MWRA has begun to use the new model, built with InfoWorks software, in place of its older sewer system model, which used Stormwater Management Model (SWMM) software. For instance, the ongoing modeling work to estimate CSO discharges during 2004 is being performed with the new model. MWRA is careful to continually compare the results from the new model with results from the old model, to ensure that there is reasonable consistency. The results tend to be slightly different, more in some areas than in others, but not inconsistent. Some difference was expected and is reasonable, because the new model simulates the system with much greater detail and with much less model instability. These differences must be recognized as MWRA uses the InfoWorks model to assess the attainment of goals that were established with the SWMM model.

3.4 Efforts to Safeguard Long-term Benefits

Another important activity in MWRA's CSO control program is the review of proposed projects

involving changes to the MWRA or community sewer systems or land use development in the service area. Careful consideration must be given to the impacts of sewer system improvements and development projects to ensure that these projects will not compromise sewer system performance, the attainment of CSO control goals or the benefits of CSO control long into the future.

Through coordinated efforts with its CSO communities (Boston, Cambridge, Chelsea and Somerville) and with DEP, MWRA has reviewed large development plans (e.g. Environmental Notification Forms, Draft and Final Environmental Impact Reports) and worked with developers to ensure that project plans include mitigation of potential negative impacts to the sewer system. Development projects typically increase the amount of wastewater flow to the community and MWRA combined sewer systems, which could increase the burden on the systems during wet weather and exacerbate system flooding and overflows.

Communities typically require development projects to remove on-site stormwater flows from the combined sewer system where possible, or to prevent any increase in stormwater flows that must continue to drain to a combined sewer. To offset the impacts of the additional sanitary flow that typically accompanies large-scale development, DEP, MWRA and the communities urge developers to remove, at an appropriate ratio (e.g. 2:1, 3:1 or 4:1), an amount of stormwater or infiltration (groundwater entering the pipes). The developer may accomplish this on the project site, by separating sewers and storm drains that were previously combined, or the developer may perform work off-site to remove wet weather flows from a hydraulically related sewer system. The result in either case is no net increase in wet weather overflows, at a minimum, or a net reduction in wet weather flows and overflows.

In 2003, major development projects reviewed by MWRA included, among many others, several mixed-use developments on the East Boston waterfront, with sewer and storm drain improvements that have an advantage for CSO control in East Boston.

4. CSO Control Plan Cost and Spending

The CSO Program is the largest single capital spending commitment in MWRA's proposed CIP (encompassing drinking water and wastewater projects), and it continues to grow. MWRA's Proposed FY06 capital budget includes \$747 million for the CSO Program, which is \$46 million or 6.5% more than the amount in the FY05 capital budget, primarily due to inflation adjustments on unawarded contracts and revised cost estimates based on updated design reports and expanded scope. In the Proposed FY06 CIP, the CSO Program accounts for one-third of the \$1.8 billion of planned spending in FY05 and beyond. In particular, CSO spending represents almost 40% of estimated spending between fiscal years 2004 to 2008, during which period MWRA is projecting a cumulative rate increase of nearly 30%.

In its new budget proposal, MWRA made difficult decisions to defer many non-CSO projects to meet its CSO control obligations under the Federal District Court Order and control the financial burdens on its ratepayers by limiting future increases in water and sewer rates. Proposed spending on non-CSO projects over the next eight years was reduced by \$425 million from the projections in the current capital budget, by deferring \$150 million in high priority water and wastewater capital improvements.

The budget for MWRA's CSO Program has grown considerably since the long-term CSO control plan was first proposed in the 1994 *CSO Conceptual Plan and System Master Plan* and approved in 1997-8. A breakdown of project costs and cost changes is shown in Table 2. Total cost of the CSO plan (planning, design and construction) has risen from \$406 million when MWRA issued the Final CSO Conceptual Plan in 1994, to \$481 million when EPA and DEP approved the Final CSO Facilities Plan and Environmental Impact Report in 1997, to \$747 million in MWRA's Proposed FY06 CIP, respectively (see Figure 5). An increase in cost of \$100 million, or 38% of the \$294 million cost increase since the

Massachusetts Water Resources Authority
 Combined Sewer Overflow Control Plan
 Annual Progress Report – 2004

Table 2. Cost Estimates for CSO Projects

Project	Conceptual Plan (Dec 1994)	Fac. Plan/EIR (Aug 1997)	Current Budget (1)	Proposed Budget (2)	Status
North Dorchester Bay CSO Plan	\$ 122.7	\$ 164.4	\$ 204	\$ 220	In design
Pleasure Bay, Morrissey Boulevard Storm Drains	N / A	N / A	18.8	24.6	In design
Reserved Channel Sewer Separation	N / A	N / A	48	54.4	Design start 2007
Hydraulic Relief Projects at CAM005 and BOS017	6.1	1.3	2.3	2.3	Complete
East Boston Branch Sewer Relief	38.4	30.8	63	68	Phased design and construction
Fort Pt. Channel Sewer Separation	5.2	11.9	5	5.3	In construction
BOS019 Storage Conduit	2.6	5.7	10	10.7	In design
Chelsea Trunk Sewer and Chelsea Branch Sewer Relief	7.8	31.1	29.8	29.8	Complete
Union Park Detention Treatment	16.9	36.3	43.4	45	In construction
Upgrades to Existing CSO Facilities and MWRA Floatables Control	13.3	14.6	22.4	22.4	Complete
S. Dorchester Bay Sewer Separation	94.0	69.2	112	117	Phased design and construction underway
Stony Brook Sewer Separation	24.4	45.0	42.6	43.7	Phased design and construction underway
Neponset River Sewer Separation	10.9	9.0	2.7	2.7	Complete
Constitution Beach Sewer Separation	8.9	5.6	3.8	3.8	Complete
Somerville Baffle Manhole Separation	0.7	0.4	0.4	0.4	Complete
Cambridge/Alewife Brook Sewer Separation	12.1	13.8	37.8	39.5	Phased design and construction underway
MWR003 Gate & Siphon	N / A	N / A	1.4	2	Design start 2005
Charles River CSO Controls	N / A	N / A	N/A	0.8	Design start 2005
Region-wide Floatables Control	1.6	1.6	3.5	3.5	Phased design and construction underway
BOS032 Interceptor Connection Relief	1.1	0	0	0	Project deleted
Dorchester Brook Conduit In-Line Storage	4.1	0	0	0	Project deleted
Sub Total CSO PROJECTS	\$ 371.0 M	\$ 441.0 M	\$ 651 M	\$ 696 M	
Planning and Land / Easements	\$ 27.0	\$ 46.3	\$ 50	\$51	Ongoing
Total CSO PROGRAM	\$ 398 M	\$ 487 M	\$701 M	\$ 747 M	

- (1) From MWRA Approved FY 05-07 Capital Improvement Program.
 (2) From MWRA Proposed FY 06-08 Capital Improvement Program.

**Massachusetts Water Resources Authority
Combined Sewer Overflow Control Plan
Annual Progress Report – 2004**

long-term plan was approved in 1997, has occurred just in the past three years. The latest cost increases have been due to plan and scope changes to meet the 1997 goals or to overcome siting problems, as well as inflation and site-specific construction requirements.

Future regulatory decisions leave MWRA exposed to serious cost risk. EPA and DEP may seek to require MWRA to pursue higher levels of control in some areas, at great cost, despite years of information showing that little if any additional water quality improvement would be achieved over the predicted benefits of MWRA’s recommended plan. The key outstanding regulatory decisions are related to the Charles River Variance, the Alewife Brook/Upper Mystic River Variance and the East Boston plan. There is a risk that the cost could climb substantially, especially to the extent regulatory decisions are made based on EPA and DEP’s estimates of how much MWRA’s ratepayers can afford, irrespective of cost-benefit.

The Proposed FY06 budget shown in Table 3 includes the cost estimates for the revised plans for Fort Point Channel, Alewife Brook, Reserved Channel and North Dorchester Bay, including the Morrissey Boulevard and Pleasure Bay storm drains. It carries an updated cost estimate for the 1997 recommendation for hydraulic relief of the East Boston Branch Sewer. MWRA’s budget for the CSO Program has costs assigned to three major program areas: MWRA-managed projects; community-managed projects; and planning and support. The new Fort Point Channel sewer separation project, the new Reserved Channel sewer separation project and the Morrissey Blvd. storm drain have been added to the community-managed category, as these projects will be implemented by BWSC with MWRA funding.

The costs for siting MWRA-managed projects, and most significantly the \$9 million cost to build parts of the revised North Dorchester Bay CSO tunnel project on Massport’s Conley Terminal, are included in the planning and support category.

Of this total budget amount, MWRA spent nearly \$300 million from 1987 through calendar year 2004. In 2004 alone, MWRA spent \$45 million on CSO control, with the bulk of spending going to project construction, including the South Dorchester Bay and Stony Brook sewer separation work and the Union Park Detention/Treatment Facility. Annual spending has increased over the last few years and will greatly increase further over the next few years, as more CSO projects, including some of the most expensive projects (e.g. North Dorchester Bay tunnel), move into construction. Spending is expected to peak in FY08, at \$124.3 million, and the program calls for continued spending into FY18, when the last project, Reserved Channel sewer separation, is scheduled to be completed.

Table 3: CSO Program Budget History

	Conceptual Plan 1994	Facilities Plan 1997	Recent MWRA Budgets		
			FY04 CIP	FY05 CIP	Prop. FY06 CIP
Program Planning and Support Activities	\$ 27 M	\$ 46 M	\$ 41 M	\$ 50 M	\$ 51 M
MWRA-managed Design and Construction	238 M	296 M	400 M	443 M	405 M
Community-managed Design and Construction	133 M	145 M	204 M	208 M	291 M
TOTAL CSO PROGRAM	\$ 398 M	\$ 487 M	\$ 645 M	\$ 701 M	\$ 747 M

Massachusetts Water Resources Authority
 Combined Sewer Overflow Control Plan
 Annual Progress Report – 2004

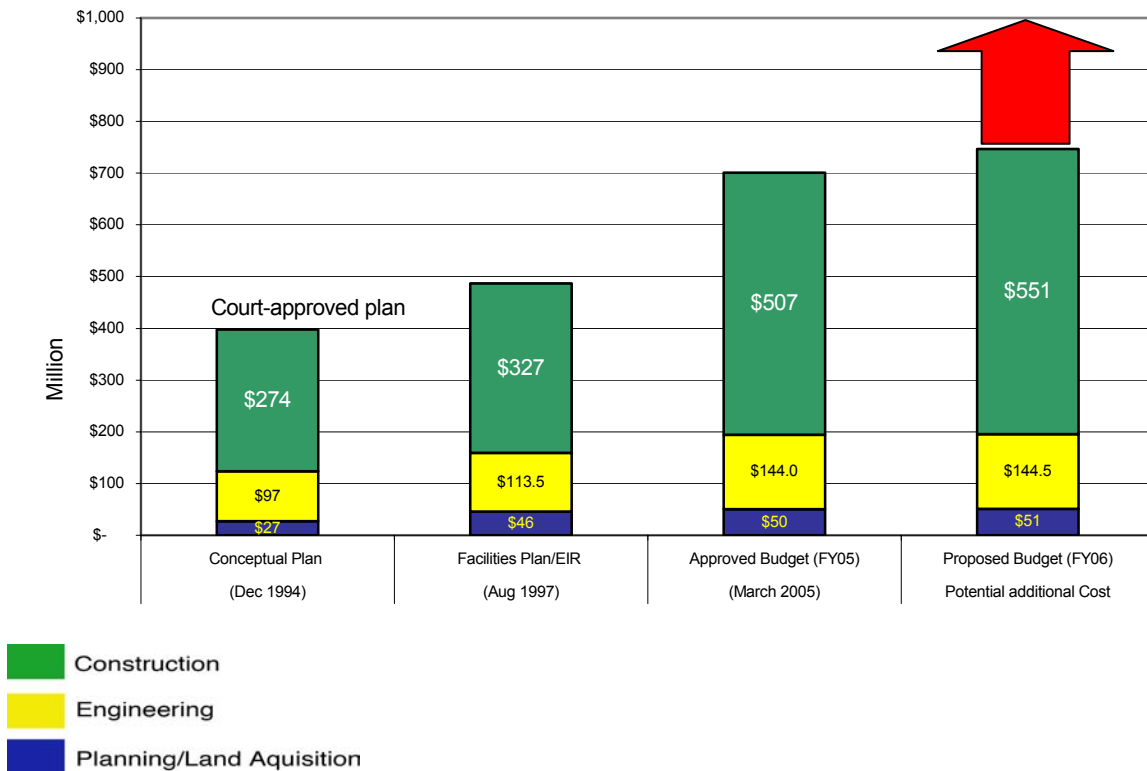
Schedule Six of the Boston Harbor Case includes numerous milestones for commencement and completion of planning, design and construction of the 25 CSO projects. Since 1994, when MWRA first proposed a new CSO control plan and implementation schedule, many CSO project scope and schedule changes have been proposed by MWRA and accepted by the Court Parties and the Court. As regulatory decisions are soon made on the new recommended plans that have resulted from recent project reassessments, MWRA plans to propose additional schedule changes.

Table 4: CSO Program Spending

	Thru FY05	FY06	FY07	FY08	FY 09	Beyond
MWRA-managed Design and Construction	\$121.1 M	\$30.7 M	\$68.4 M	\$104.6 M	\$62.7 M	\$16.9 M
Community-managed Design and Construction	151.0	26.5	20.6	17.2	13.2	62.8
Program Planning and Support Activities	38.9	8.5	1.1	2.5	0.1	0.2
TOTAL CSO PROGRAM	\$311.0 M	\$65.7 M	\$90.1 M	\$124.3 M	\$76.0 M	\$79.9 M

Note: From MWRA’s Proposed FY 06-08 CIP. MWRA’s fiscal year (FY) ends on June 30.

Figure 5: Risks of Cost Increases



5. *Gaining Regulatory Approvals on a Final Plan for CSO Control*

EPA interprets the Clean Water Act to require either the elimination of combined sewer overflows or a demonstration that water quality standards should be changed to permit overflows. One of the permissible bases for a change in water quality standards is a showing that the cost of eliminating CSOs would produce sewer rates so high as to cause widespread social and economic impacts. In 1997, EPA determined that the ratio of MWRA's projected rates to median household income in certain communities within the service area showed that the further increase in rates that would result from CSO controls in addition to those proposed in the 1997 Plan would have such impacts. This determination, in part, formed the basis for EPA's acceptance of MWRA's 1997 recommended plan based on its finding that the plan would meet state water quality standards, as revised by the state. EPA did not accept long-term changes to the water quality standards for the Alewife Brook/Upper Mystic River and the Charles River. Variances issued for these receiving waters remain in effect.

A year ago, EPA, DEP and MWRA agreed to hold discussions on the scope, cost and schedule of the entire CSO plan. In these discussions, MWRA stressed that it cannot and should not agree to specific project goals and schedules in the absence of an agreement on the overall plan. MWRA believes that this approach is necessary so that it can continue to allocate its CSO investment among the various impacted receiving water segments based on prioritization of uses, water quality goals and receiving water benefits. Moreover, MWRA believes that it has demonstrated with more than twelve years of data that higher levels of CSO control will not provide significant water quality benefits over the benefits achieved by its recommended plan. In addition, in December 2004, MWRA submitted to EPA and DEP a report supplementing the economic impact analyses that MWRA had earlier submitted to the regulatory agencies as part of the Final Variance Report for the Alewife Brook/Upper Mystic River and the Cottage Farm CSO Facility Assessment Report. The recent report concludes that, compared to the 1997 prediction, MWRA's rates are having a greater impact on its ratepayers and increases in spending on CSO control would exacerbate this burden. Accordingly, it supports the position that water quality standards in the Charles River and Alewife Brook/Upper Mystic River, the two areas where there is not final agreement as to the required level of CSO control, should be changed to allow the permitting of the remaining, minor CSO discharges following implementation of MWRA's recommended plan.

MWRA believes that it has met all federal and state requirements for a long-term plan to bring CSO discharges into compliance with water quality standards:

- MWRA has demonstrated that it is technically infeasible to eliminate CSO discharges system-wide.
- The recommended CSO plan will eliminate CSO discharges to sensitive use areas, with a high level of stormwater control further provided at the South Boston beaches.
- In less sensitive use areas, the plan will bring CSO discharges into compliance with Class B or SB standards for fishing and swimming greater than 98% of the time (95% compliance is required for Class B_(CSO) or SB_(CSO) designation).
- The plan's cost, \$747 million in 2005 dollars, contributes to a significant economic impact to MWRA's ratepayers.
- Higher levels of CSO control, at great additional cost, will not provide additional water quality improvement or additional protection of uses.

6. Project Implementation

This section defines the scope and schedule of each of the projects recommended in the long-term CSO control plan and describes progress made in 2004, project changes, if any, and key issues that have affected or may affect MWRA's ability to implement the projects in compliance with Schedule Six.

6.1 MWRA Managed Projects

NORTH DORCHESTER BAY AND RESERVED CHANNEL

Recommended Plan and Proposed Implementation Schedule

On April 14, 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 on April 27, 2004, MWRA filed the Supplemental Facilities Plan and Environmental Impact Report ("SFP/EIR") presenting the revised plan.

The recommended plan calls for a 25-year-storm level of CSO control (essentially elimination) and a 5-year-storm level of separate stormwater control for the North Dorchester Bay beaches; elimination of stormwater discharges to Pleasure Bay by redirecting them to the Reserved Channel; and a large reduction in CSO discharges to the Reserved Channel, in line with the B(cso) water quality standards designation for the Channel. Components of the recommended plan and MWRA's latest proposed schedule are described in the table below and shown in Figure 6.

The Secretary issued a certificate on July 16, 2004, stating that the SFP/EIR "adequately and properly complies with" MEPA requirements and that "the project may now proceed to the final design and permitting stage." The certificate also indicated that additional information should be developed during the permitting process, especially information related to the Morrissey Boulevard drain project, and required that a monitoring program be developed for water and sediment quality in Savin Hill Cove/South Dorchester Bay to identify project-specific impacts or changes to these water bodies.

Once completed, the project is expected to virtually do away with beach closings resulting from 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 (25-year storm or greater), compared to 21 discharges per year on average today.

With the participation of BWSC and the Department of Conservation and Recreation (DCR), the project includes components to minimize those agencies' separate stormwater discharges to the South Boston beaches. Overall, separate stormwater from BWSC and DCR drainage systems will be discharged only in storms greater than the 5-year design storm, compared to current discharges during every rainstorm (108 times per year on average). Stormwater now discharging to the beaches will be tied into the CSO tunnel, and stormwater tributary to Pleasure Bay will be relocated to the less sensitive Reserved Channel. BWSC stormwater discharges from the BOS087 area to Carson Beach will be minimized by redirecting stormwater from larger storms, via a new Morrissey Boulevard drainage conduit, to a non-swimming area of South Dorchester Bay (Savin Hill Cove).

Massachusetts Water Resources Authority
 Combined Sewer Overflow Control Plan
 Annual Progress Report – 2004

COMPONENT	DESCRIPTION	PROPOSED SCHEDULE		
		Commence Design	Commence Construction	Complete Construction
North Dorchester Bay Storage Tunnel	<ul style="list-style-type: none"> • 11,250-foot long, 17-foot diameter soft-ground tunnel with mining shaft and equipment removal shaft • Drop shafts, diversion structures and associated piping at CSO outfalls BOS081 to BOS086, including gates to control stormwater • Dry weather flow connection relief associated with outfall BOS086 	Sep 04	Apr 06	Sep 10
North Dorchester Bay Facilities	<ul style="list-style-type: none"> • 15 mgd dewatering pump station at Conley Terminal and 24-inch force main • Odor control facility at upstream end of tunnel, near State Police building 	May 07	Oct 08	Sep 10
Pleasure Bay Storm Drains	<ul style="list-style-type: none"> • Stormwater piping and appurtenances to relocate stormwater discharges from Pleasure Bay to the Reserved Channel 	Sep 04	Aug 05	May 06
Morrissey Boulevard Storm Drain	<ul style="list-style-type: none"> • 2,900-foot long, 12x12 foot box conduit for stormwater conveyance to Savin Hill Cove/South Dorchester Bay 	Jun 05	Dec 06	Jun 09
Reserved Channel Sewer Separation	<ul style="list-style-type: none"> • Separation of combined sewer systems in areas tributary to CSO outfalls BOS076, BOS078, BOS079 and BOS080 	Jan 07	May 09	Dec 17

Compared to previous BWSC/DCR Morrissey Boulevard drainage proposals, this plan minimizes the frequency and volume of stormwater discharges to Savin Hill Cove. Under the current plan, stormwater (up to the 1-year storm) will be captured in the tunnel resulting in 1 discharge per year, on average, rather than every time it rains, as in the previous proposals.

In addition, the project will minimize CSO discharges to the Reserved Channel, reducing them from about 37 per year currently to 3 per year, on average. It is important to note that MWRA has no statutory or regulatory responsibility for managing separate stormwater and that this project does not set any precedent for MWRA to adopt such responsibilities.

The estimated capital cost of the recommended plan, not including land and easement acquisition costs, is \$299 million, in 2005 dollars. This is approximately \$42 million more than the cost estimate in the April 2004 SFP/EIR, primarily due to inflation. Total cost to complete the projects for North Dorchester Bay and the Reserved Channel will be significantly more, with inflation to the mid-point of construction and land and easement costs.

Figure 6
 North Dorchester Bay and Reserved Channel
 Recommended CSO Control Plans



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

In response to concerns raised by the Secretary, the Court, certain court parties and others, MWRA identified an approach to shorten the implementation schedule of the projects comprising the recommended plan. The approach included expediting design of the storage tunnel and Pleasure Bay stormwater diversion to move these components into construction at the earliest possible time. The approach also calls for having BWSC implement the Morrissey Boulevard storm drain and Reserved



Channel sewer separation projects, under proposed amendments to the existing CSO Memorandum of Understanding and Financial Assistance Agreement between MWRA and BWSC.

On August 11, 2004, the MWRA Board of Directors approved an amendment to MWRA's original (1997) design contract for the North Dorchester Bay project, and design services for the storage tunnel and Pleasure Bay components of the plan revised plan commenced in September, 2004. The contract schedule has the objective of awarding the tunnel construction contract in the spring of

2006. The same schedule calls for an even earlier commencement of construction of the Pleasure Bay stormwater relocation improvements, with completion of construction as early as May 2006, before the 2006 swimming season. Through continuing discussions with court parties, MWRA intends to expedite achieving the benefits of the plan, while controlling design and construction risks and accommodating numerous approval processes, including approval from the state legislature pursuant to Article 97.

Necessary Environmental and Land Approvals

The Secretary's Certificate on the SFP/EIR required MWRA to prepare a Section 61 Finding, in accordance with M.G.L. c.30, s.61, to identify the environmental impacts and mitigation measures for components of the project requiring a state permit, action or approval. The Secretary specifically directed that the Section 61 Finding address certain key issues raised in public comments on the diversion of some separate stormwater from North Dorchester Bay to Savin Hill Cove in South Dorchester Bay.

MWRA has coordinated development of the Section 61 Finding with BWSC and DCR. The document will present the respective responsibilities among MWRA, BWSC and DCR for design, construction and operations/maintenance of the facilities and structures recommended in the plans for North Dorchester Bay and the Reserved Channel, and generally describes how issues raised by the Secretary will be addressed. For example, regarding a monitoring program for Savin Hill Cove/South Dorchester Bay, MWRA will continue monitoring water quality in that area as part of its Boston Harbor monitoring program, perhaps with certain enhancements. BWSC will develop and implement, in consultation with MWRA, DCR and other agencies, a monitoring program to assess the impacts of its new stormwater outfall.

The Section 61 document finds that all feasible measures have been taken to avoid, minimize or mitigate environmental impacts. MWRA plans to submit the document to MEPA and relevant permitting agencies in Spring 2005, in advance of submitting permit applications to state regulatory agencies and prior to BWSC commencing design of the Morrissey Boulevard storm drain in June. Permitting agencies will refer to this document to assist them in carrying out their own obligations under Section 61.

As part of early design efforts, MWRA has carefully developed work plans and schedules for seeking all permits and approvals necessary to construct the North Dorchester Bay tunnel and facilities and for the Pleasure Bay stormwater improvements. Similar work plans and schedules will be developed by BWSC when it begins design of the Morrissey Boulevard and Reserved Channel projects. For North Dorchester Bay and Pleasure Bay, environmental permits are required from the Boston Conservation Commission (Wetlands Order of Conditions), the Department of Environmental Protection (Waterways Chapter 91 License), and the Army Corps of Engineers. Construction access permits are required from BWSC for work affecting its facilities and from DCR for work within land under its control, which includes most of the work. MWRA is also working with elected officials to coordinate the filing of Article 97 legislation for construction in parklands, which involves most of the planned work and is on the critical path for a Spring 2006 construction start.

MWRA must obtain permission to access during design, and eventually construct on, Conley Terminal. MWRA is working with Massport to effect these permissions through short-term occupancy permits and long-term easement agreements. MWRA recently made considerable progress toward reaching agreement with Massport on the language and requirements for a right of entry permit. The effects of the delayed field investigation programs are still being evaluated. MWRA continues to work closely with Massport to attempt to preserve the aggressive design schedule.

Progress on North Dorchester Bay Storage Tunnel and Facilities

Since commencing final design in September, MWRA has made significant progress with the technical aspects of the tunnel design. MWRA has completed most of the field surveys and soil borings necessary to supplement data collected during the original project design efforts. Remaining survey and soil boring work is limited to work on Conley Terminal, delayed until MWRA obtains right-of-entry from Massport, and a few additional borings along the tunnel alignment. MWRA has also completed development of a hydraulic model it will use to evaluate hydraulic needs, simulate design conditions and verify project performance. Work also involved investigations into operational strategies and controls, sediment deposition in the tunnel and maintenance needs, long-term tunnel access requirements, and tunnel construction risk assessment.

In addition, MWRA is performing preliminary design investigations on the dewatering pump station recommended at Conley Terminal. The work includes establishing design criteria and equipment requirements, evaluating station configuration and alternative layouts within the Terminal in coordination with Massport staff, and determining construction sequencing. MWRA has determined that the pumping capacity of the station can be increased from 10 mgd proposed in the SFP/EIR to 15 mgd without increasing the facilities footprint, but with a corresponding increase in the diameter of the discharge force main from 20 inches to 24 inches. The higher capacity will enable MWRA to dewater the tunnel in less time (reducing dewatering of the full tunnel from 24 hours to about 16 hours). MWRA is also optimizing the automated operation of the dewatering pumps to be able to dewater the tunnel whenever capacity in the sewer system is available to accept flows, even during storms. The intent is to enhance the capture of stormwater while not compromising the ability to fully capture CSO flows up to the 25-year storm.

Progress on Pleasure Bay Storm Drain Improvements

In the fall of 2004, MWRA updated its plans for the Pleasure Bay storm drain improvements based on a reexamination of the project area and on discussions with DCR and the Boston Conservation Commission. With new information, MWRA revised its earlier plans for the Pleasure Bay drainage work,



which were included in the 100% design plans for the original North Dorchester Bay project prepared in 2000. The revisions included adding catch basins in the area of Kelly's Landing, in part to correct chronic flooding problems on a portion of Day Boulevard; increasing some pipe sizes and adding a sediment control chamber. MWRA plans to tie the currently inoperable catch basins in the Kelly's Landing area into outfall BOS081, which eventually will be connected into the North Dorchester Bay tunnel. In

addition, the plans now call for replacing all of the DCR catch basins, which are either in disrepair or obsolete. These revisions, together with inflation, have increased the cost estimate for the Pleasure Bay drainage improvements from \$2.3 million to \$3.9 million.

In December 2004, MWRA received 100% design plans for the Pleasure Bay drainage improvements, which it forwarded to DCR, Massport and BWSC for review. MWRA is also preparing permit applications for the Pleasure Bay work. MWRA plans to finalize bid documents and advertise the construction contract this summer, for commencement of construction in September.

Progress on Morrissey Boulevard Storm Drain and Reserved Channel Sewer Separation

Since filing the SFP/EIR, MWRA and BWSC have held discussions to confirm the implementation plans and schedules for the Morrissey Boulevard storm and Reserved Channel sewer separation projects. The two agencies have agreed to amend their CSO Memorandum of Understanding (MOU) and Financial Assistance Agreement (FAA), under which BWSC is currently designing and constructing several other CSO projects with MWRA funding. With amendments adding these projects and their eligible costs to the MOU and FAA, BWSC plans to commence design of the Morrissey Boulevard and Reserved Channel projects by June 2005 and January 2007, respectively.

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. A preliminary design report early in the design phase will define the work in much more detail and lay out construction contracts and contract schedules.

HYDRAULIC RELIEF PROJECTS AT CAM005 AND BOS017

MWRA completed construction of these two projects in 2000. 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, 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 divert two BWSC combined sewers to a more direct connection with MWRA’s Cambridge Branch Sewer, thereby relieving the original dry weather connection from the BOS017 regulator. In addition, a 10-foot long restriction between the Charlestown and Cambridge Branch Sewers, adjacent to Sullivan Square, was removed, with the intent of lowering hydraulic grade lines in the Charlestown Branch Sewer during wet weather and possibly 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
Complete Construction	September 2005	Pending final plan selection

This project calls for relief of the MWRA interceptor system serving most of East Boston, to minimize CSO discharges to Boston Harbor and Chelsea Creek through outfalls BOS003-014.

The current plan, recommended in the 1997 Facilities Plan/EIR, calls for replacing, relieving or rehabilitating a total of 24,750 feet of existing interceptor sewers using a combination of construction methods, including open cut, pipe bursting, microtunneling, and pipe repair or relining. MWRA issued a Notice to Proceed for design services in March 2000, in compliance with Schedule Six. Design plans call for three construction contracts to complete the project. MWRA has completed one of the construction contracts, but suspended design work on the other two, when it determined that the original plan would cost twice as much as estimated in the 1997 Facilities Plan/FEIR and would not fully attain the recommended level of CSO control. The reassessment, conducted in 2003 and 2004, involved reevaluating the cost effectiveness of the plan against alternatives that might provide higher benefit and/or cost less.

MWRA commenced the first construction contract in March 2003 in accordance with Schedule Six and completed the contract in June 2004. It involved rehabilitation of portions of the existing East Boston Branch Sewer with cured-in-place pipe liner, to extend the useful life of the sewer and improve its hydraulic capacity. The second construction contract involves installation of a new sewer interceptor along Condor, East Eagle and Border Streets using microtunneling methods, and the third contract replaces and upgrades interceptors in upstream areas using “pipe bursting” methods. Design work on these contracts will resume once MWRA reaches agreement with EPA and DEP on a final plan for CSO control in East Boston.

MWRA substantially completed the reassessment at the end of 2003, and has been refining the evaluations as new information becomes available. One conclusion of the reassessment was that CSO overflows in East Boston are slightly less than originally estimated. 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 and pipelines that carry East Boston flows to the Deer Island Treatment Plant. These facilities include the Caruso Pump Station in East Boston, the Winthrop Terminal facility and the Chelsea Creek Headworks. This review did not find new opportunities for improving the performance of these facilities beyond the benefits of currently planned work. Although planned improvements to the Winthrop Terminal facility will increase transport capacity and allow Caruso Pump Station to pump at a slightly greater rate, this increase in capacity has little effect on flows and overflows in East Boston, where ability to convey wet weather flows is currently limited not by the pump 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, such as storage or treatment, that were evaluated and rejected in the 1997 Plan were not deemed cost-effective, primarily because the outfalls are dispersed throughout East Boston.

The results confirm that the **current interceptor relief project (Figure 7)**, at a total estimated capital cost of \$68 million, more than twice the cost estimate in the 1997 Facilities Plan/EIR, 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. It is important to note that while the current hydraulic relief plan does not meet the 1997 goals, which were the basis for regulatory approvals of the plan and for new CSO discharge limits in the BWSC and MWRA NPDES permits, the current plan's performance is consistent with the predicted performance in the 1994 CSO Conceptual Plan and System Master Plan, which was the original basis for the milestones in Schedule Six.

The reevaluation report also shows that the **current interceptor relief project with the addition of sewer separation in the Jeffries Point and Maverick Square areas (Figure 8)**, at a total capital cost of \$81 million (\$13 million more than the current plan and about \$51 million more than the 1997 cost estimate), is the lowest cost alternative to attain the higher CSO control goals in the 1997 plan. Adding more areas of sewer separation beyond the Jeffries Point and Maverick Square areas to the plan would not result in significantly higher levels of control and would add considerable cost. Full sewer separation, in lieu of the interceptor relief project, while yielding the highest level of control (4 activations and 1.0 million gallons annual volume), would cost about \$117 million and would not come close to eliminating CSO discharges. This is primarily due to the configuration of the downspouts and drains in much of East Boston, which makes it difficult to separate the storm flows from the sewer system.

MWRA also evaluated constructing a **new siphon across the Chelsea Creek (see Figure 9)**, to relieve the East Boston system by transferring some of its flows to MWRA's North Metropolitan Sewer and Chelsea Creek Headworks, thereby bypassing the Caruso Pump Station and the main trunk sewer in East Boston and eliminating the need for the proposed hydraulic relief tunnel along Condor Street. The results showed this alternative not to be cost-effective, since flow diversion would not increase the level of control or reduce project cost compared to options that build on the current interceptor relief project, i.e. sewer separation. This finding and the predicted performance of area-wide sewer separation mentioned above essentially confirm the cost-effectiveness of the current hydraulic relief plan.

Figure 7
 East Boston Branch Sewer Relief
 Recommended Hydraulic Relief Plan



Contract 6256: Alternative 24

- New Sewer
- Abandon Existing Sewer
- EBBS Rehab by CIPP Liner Process (MWRA Contract 6840, completed 5/04)
- Pipe Burst Existing Sewer
- Sewer Interceptors

- CSO Regulators
- CSO Outfalls

map1102-1

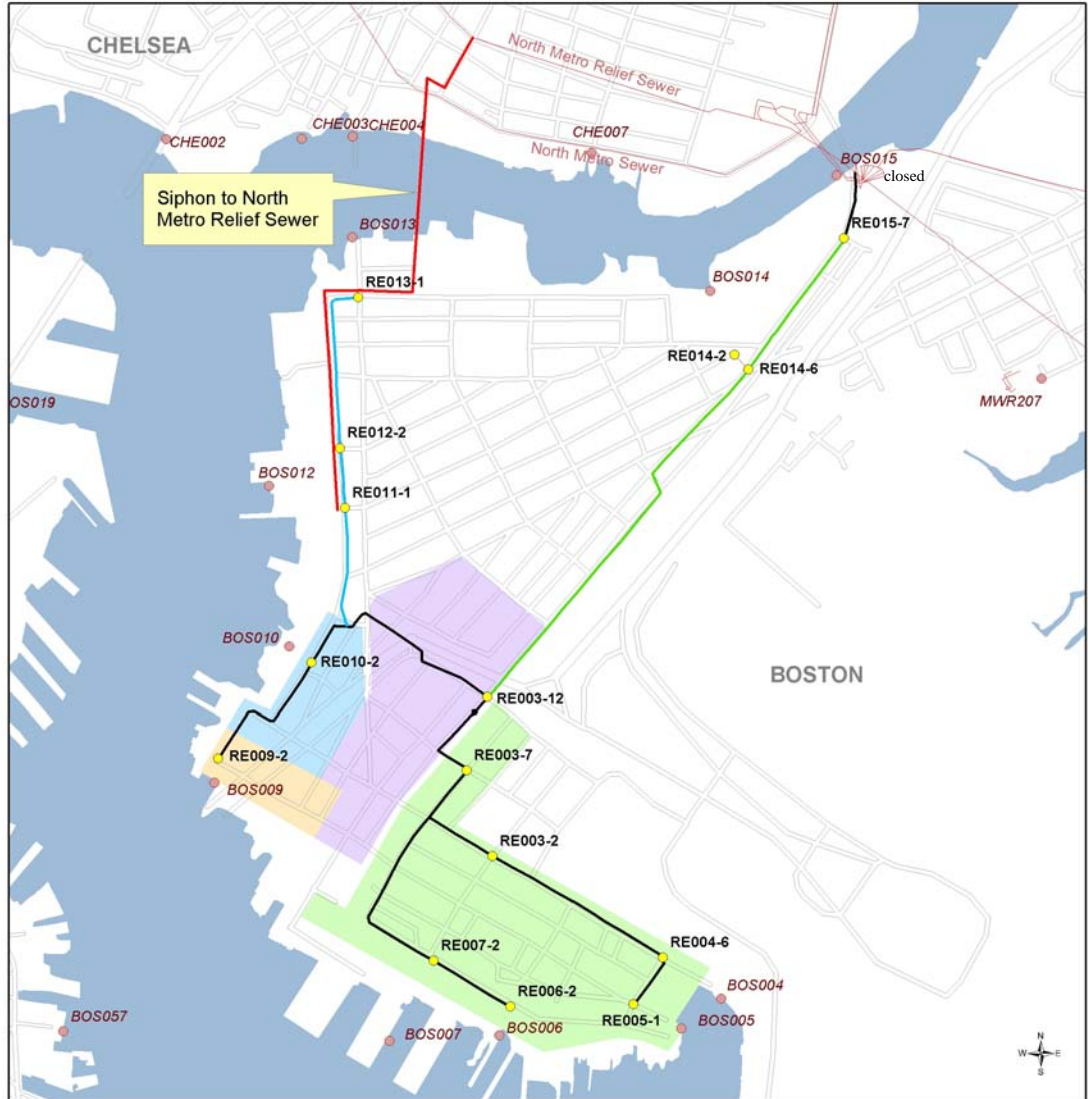
Figure 8
 East Boston Branch Sewer Relief
 Hydraulic Relief with Sewer Separation Jeffries Point and Maverick Square (South)



map1102-2

Figure 9

East Boston Branch Sewer Relief with
 Siphon to North Metropolitan Relief Sewer with Jeffries Point
 and Maverick Square (South, North and East) Sewer Separation



map1102-3

Massachusetts Water Resources Authority
 Combined Sewer Overflow Control Plan
 Annual Progress Report – 2004

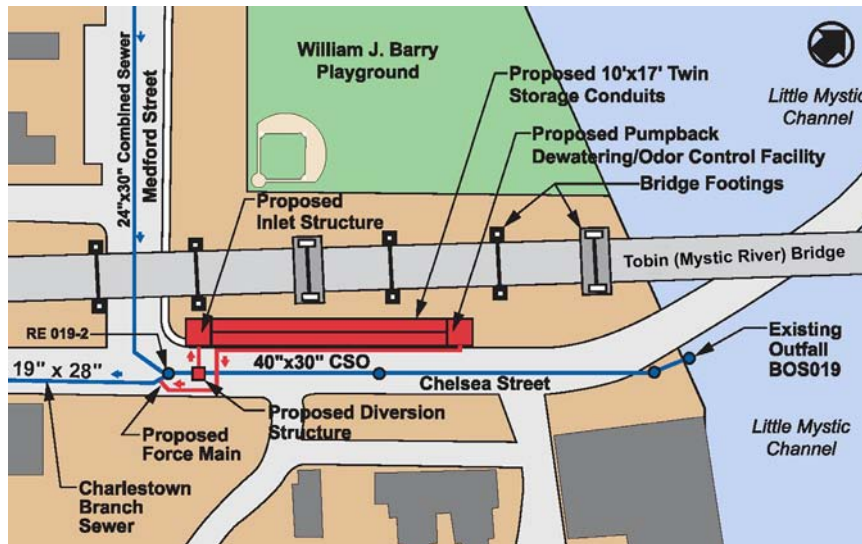
Following initial discussions held late in 2003, MWRA met with EPA and DEP in September and December 2004 on the East Boston plan, as part of broader CSO discussions. MWRA has also tracked plans and progress by BWSC, Massachusetts Bay Transportation Authority (MBTA) and land developers that include separation of sewers within the same areas of East Boston – Jeffries Point and Maverick Square - evaluated by MWRA. MWRA plans to incorporate this information into a final reassessment report.

Based on the results of the reassessment, MWRA believes that the current interceptor relief plan, even at the updated, higher cost estimate of \$68 million, is cost-effective and will significantly reduce CSO discharges at all of the East Boston outfalls (to greater than 95% compliance with water quality standards), in 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. Through ongoing discussions with EPA and DEP, MWRA expects to be able to reach agreement on a final CSO plan for East Boston soon. MWRA will then develop a schedule for completing design and construction.

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 1997 Facilities Plan/EIR recommended constructing a 380-foot long, 12’x12’ box conduit adjacent to the Tobin Bridge and Chelsea St. in Charlestown to store most of the CSO flows that discharge at outfall BOS019. The stored flows will be pumped back to the Deer Island transport system after each storm passes and system capacity becomes available. An above ground building will be constructed to house the dewatering equipment, as well as the activated carbon odor control systems which will treat the air that is displaced when the conduit fills with combined sewage. During larger storms that cause overflows that exceed the storage volume of each conduit, system relief will continue to be provided through



the existing outfalls. For this reason, underflow baffles were recommended to be installed within the existing and proposed regulators as part of these projects to provide floatables control.

the existing outfalls. For this reason, underflow baffles were recommended to be installed within the existing and proposed regulators as part of these projects to provide floatables control.

MWRA commenced the design contract for the BOS019 storage conduit in July 2002, in advance of the milestone in Schedule Six. As an initial design effort, MWRA completed a reassessment of the BOS019 storage conduit project in June 2003. The reassessment verified that a storage conduit to reduce overflows at BOS019 was cost-effective to meet the CSO control goals of 2 overflows per year and a total annual discharge volume of 0.4 million gallons. With this affirmation MWRA commenced preliminary design work.

Massachusetts Water Resources Authority
Combined Sewer Overflow Control Plan
Annual Progress Report – 2004

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. At the same time, to protect the Mystic River 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 plans call for twin 10-foot wide by 17-foot high barrels, 280 feet long each.

MWRA held informational meetings on the project with local community members and their elected officials the last week of September 2004, at which the project was met with much support for the environmental benefit it will provide the Little Mystic Channel. DEP's Waterways Regulation Program has drafted a Waterways License for the new facilities, pursuant to M.G.L. Chapter 91, but cannot issue the license until MWRA has secured easements from Massport.

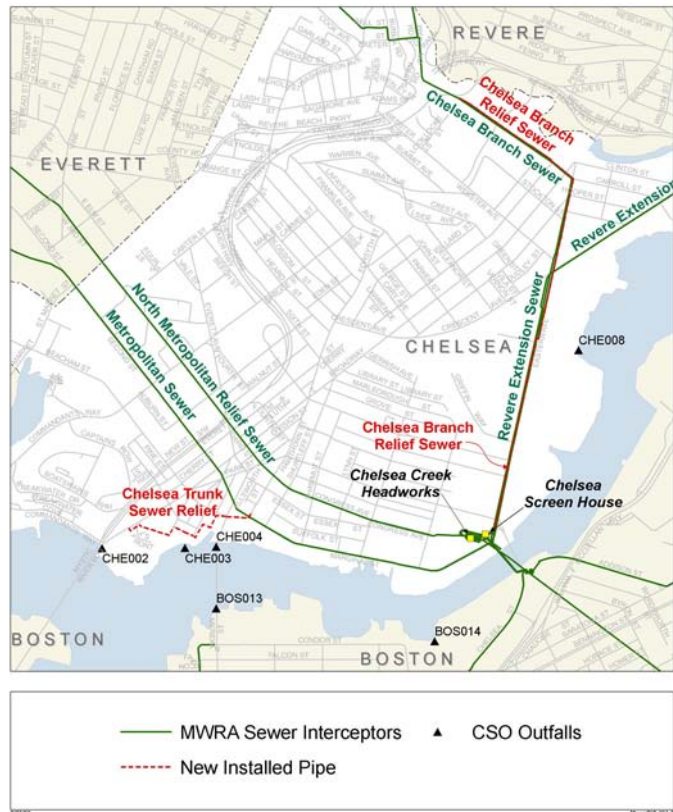
MWRA advertised the project for construction bids on November 13, 2004. MWRA opened general bids on March 3, 2005, and the MWRA Board of Directors awarded the contract to the low bidder in the amount of \$10,474,000. MWRA expects to execute an easement agreement with Massport and obtain the Chapter 91 Waterways License by the end of March and be able to commence construction no later than March 31, in compliance with Schedule Six.

Based on the final plans and specifications, MWRA has increased the estimated project construction duration by six months, from 18 months to 24 months. If MWRA is able to commence construction by the end of March, 2005, it estimates that the project will be substantially complete by March 2007, six months later than the corresponding milestone in Schedule Six.

CHELSEA RELIEF SEWERS

Chelsea Trunk Sewer Replacement

MWRA completed this project in 2000, on schedule. The 1997 Facilities Plan/EIR recommended replacing a trunk sewer in Chelsea with larger pipe, to minimize CSO discharges to the Inner Harbor 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 relied sewer and outfalls.



Chelsea Branch Sewer Relief

MWRA completed this project in 2001, on schedule. 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. The construction contract also included repairs to the existing CSO outfall at CHE008. 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.

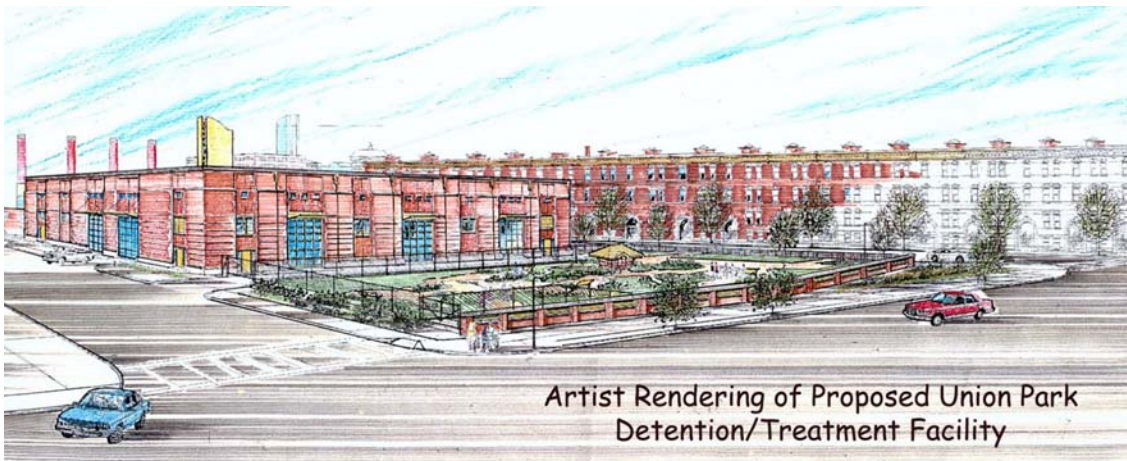
CHE008 Floatables Control and Outfall Repairs

This project was completed in 2001, on schedule. 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 at the sole regulator structure associated with this outfall, to provide floatables control.

UNION PARK DETENTION/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	January 2006

The Union Park Detention/Treatment Facility will improve water quality in the Fort Point Channel by providing treatment of CSO flows that are discharged through BWSC’s Union Park Pumping Station. The existing pumping station, constructed in 1976, provides flood control for the South End neighborhood of Boston. Pumping station discharges account for 88% of the annual CSO volume to the Fort Point Channel.



Artist Rendering of Proposed Union Park Detention/Treatment Facility

Flows to the pumping station will pass through the new treatment facility before entering the pumping station wet well. The new treatment facility will include coarse screens, fine screens, disinfection with sodium hypochlorite, dechlorination with sodium bisulfite and odor control equipment. A new building will be constructed adjacent to the existing pumping station to house the new treatment equipment. New underground detention basins, which will have a combined storage capacity of 2.2 million gallons, are intended to reduce the average annual number of pumping station discharges to the Fort Point Channel

from 25 to 17 per year and to detain flows that exceed the storage capacity in larger storms to allow a level of solids removal.

The project also includes modifications to the existing pumping station, to consolidate space and operations with the new treatment facility and to improve the reliability of the pumping station, per BWSC plans. The cost of the pumping-related improvements is being paid by BWSC.

MWRA commenced construction in March 2003, in compliance with Schedule Six. MWRA is conducting the excavation work under a Utility Release Abatement Measure (URAM) plan due to current and historical contamination releases on the property site. To date, the contractor has excavated the entire site to depths exceeding 40 feet and removed over 60,000 tons of contaminated soil (more than 90% of the project total), to construct the massive underground storage basins. The Contractor has also placed over 10,000 cubic yards of concrete, approximately 80% of the project total. In the area of the new building, the Contractor encountered a differing site condition consisting of peat at the subbase requiring overexcavation to a deeper level and replacement with suitable material for the building foundation. The additional work caused by this unforeseen condition delayed the placement of the concrete base slab by approximately one month.

The contractor has completed considerable work within the existing Union Park Pumping Station, including major structural modifications to reconfigure the building layout to accommodate integration with the new CSO facility. Substantial structural modifications were also undertaken to install two new pumps #5 and #6, for BWSC flood control service. The contractor also installed a new 50 foot stack to service the new turbine, furnished and installed a new 1250 kw emergency standby generator, new electrical switchgear, two new motor control centers and new primary and secondary duct banks.



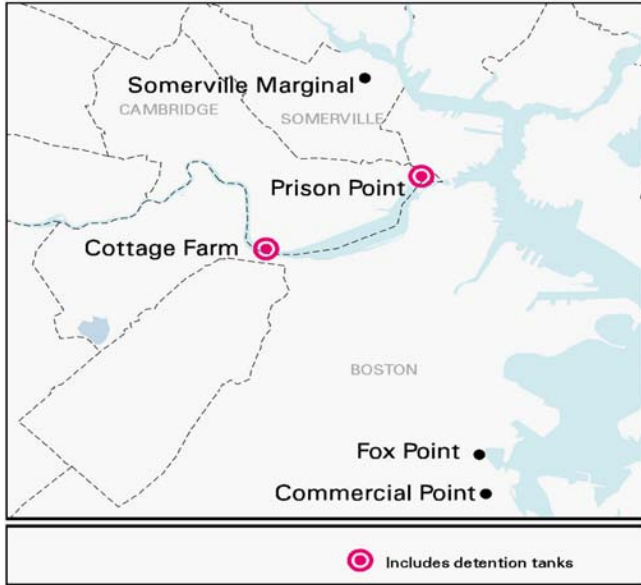
Union Park Construction 11/1/04

Portions of the existing wetwell and discharge chamber have been demolished and a new pump room was built including an intermediate concrete floor slab, new structural steel, grating platform and stairs. The new pumps have been set. Various other trades have commenced work within the existing building including plumbing, HVAC, fire protection, roofer and painters.

With additional progress in the first quarter of 2005, work on the project is approximately

61% complete, compared to 25% complete a year ago. In 2004, MWRA extended the contract schedule twice, by a total of 109 days, to January 16, 2006, due to the additional work required to remove the abandoned foundation of a 1914 pumping station and related contaminated soil disposal, as well as the required suspension of work during the Democratic National Convention. MWRA is now evaluating two additional time extensions requested by the contractor related to the overexcavation of subbase material and to design changes in the new pump room.

UPGRADES TO EXISTING CSO FACILITIES



MWRA upgraded five of its six CSO 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. A sixth facility, at Constitution Beach in East Boston, was decommissioned by MWRA in 2000, following completion of sewer separation work in that area (see later discussion, under “Constitution Beach Sewer Separation”). 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. All five facilities are meeting the discharge limits in MWRA’s NPDES permit.



6.2 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	November 2008

This project is intended to eliminate CSO discharges to South Dorchester Bay by separating combined sewer systems in Dorchester. The separation work primarily involves the construction of new storm drains and appurtenant structures, 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. The plan calls for approximately 136,000 linear feet of new storm drains. BWSC is implementing the project with MWRA funds.

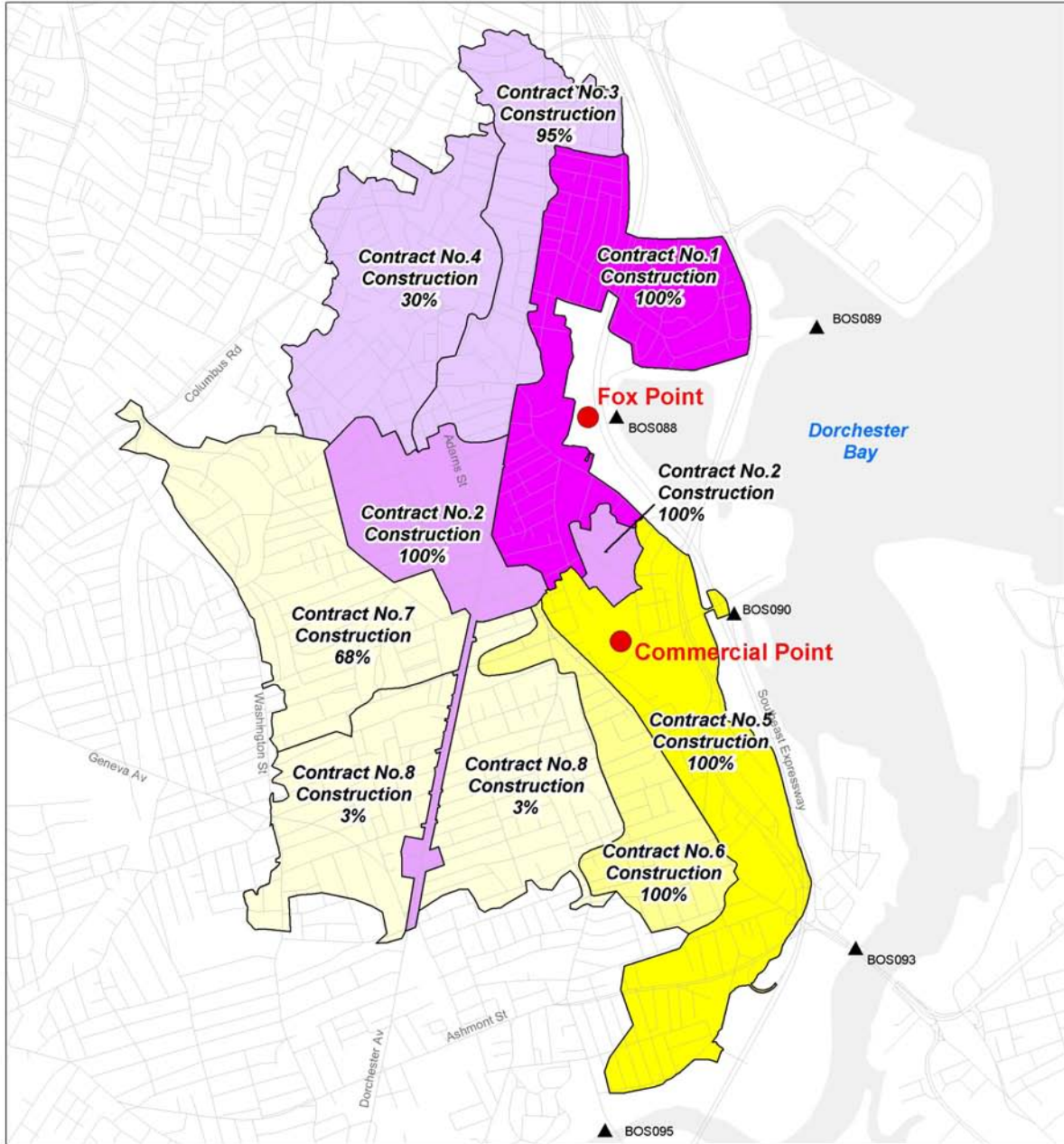


Figure 10 and Table 5 show the project's design and construction progress. Schedule Six requires a construction progress rate of 10% per year from the commencement of construction in April 1999. As of December 2004 construction was 70% complete, measured as linear feet of installed storm drain, compared to the court required level of 56.7% for the same period. In 2004, BWSC installed 24,074 linear feet of new storm drain, 18% of the total length to be installed by this project. BWSC plans to install a similar amount of storm drain in 2005. This project comprises eight major sewer separation construction contracts. BWSC has awarded all of these contracts and has completed four of them. Two of the ongoing four contracts were awarded by BWSC in 2004.

Disconnection of downspouts from the combined sewer systems is necessary to remove enough stormwater from the sewers to meet CSO control goals, in this case elimination. The initial downspout disconnection contract for Dorchester, which also included downspout disconnection work in other CSO project areas, such as Jamaica Plain (Stony Brook project), Neponset and East Boston (Constitution Beach), was completed in 2004. The second downspout disconnection contract for the Dorchester area was awarded in late 2004. BWSC's plans include one additional downspout disconnection contract in Dorchester.

BWSC completed the second of three project related street paving contracts during 2004 and plans to award the final paving contract soon. BWSC plans to award a total of 16 construction contracts (sewer separation, downspout removal and paving) to complete the South Dorchester Bay sewer separation project. Once these contracts are complete and the CSO regulators are closed, MWRA plans to decommission the Commercial Point and Fox Point CSO treatment facilities.

FIGURE 10
South Dorchester Bay Sewer Separation



Contract 1 - Sewer separation complete	Contract 5 - Sewer separation complete
Contract 2 - Sewer separation complete	Contract 6 - Sewer separation complete
Contract 3 - Sewer separation 95% complete	Contract 7 - Sewer separation 68% complete
Contract 4 - Sewer separation 30% complete	Contract 8 - Sewer separation 3% complete

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MwraGIS 401-4

**Massachusetts Water Resources Authority
Combined Sewer Overflow Control Plan
Annual Progress Report – 2004**

**ANNUAL PROGRESS OF MWRA/BWSC DRAIN INSTALLED IN DORCHESTER 088/089
AND 090 AREAS**

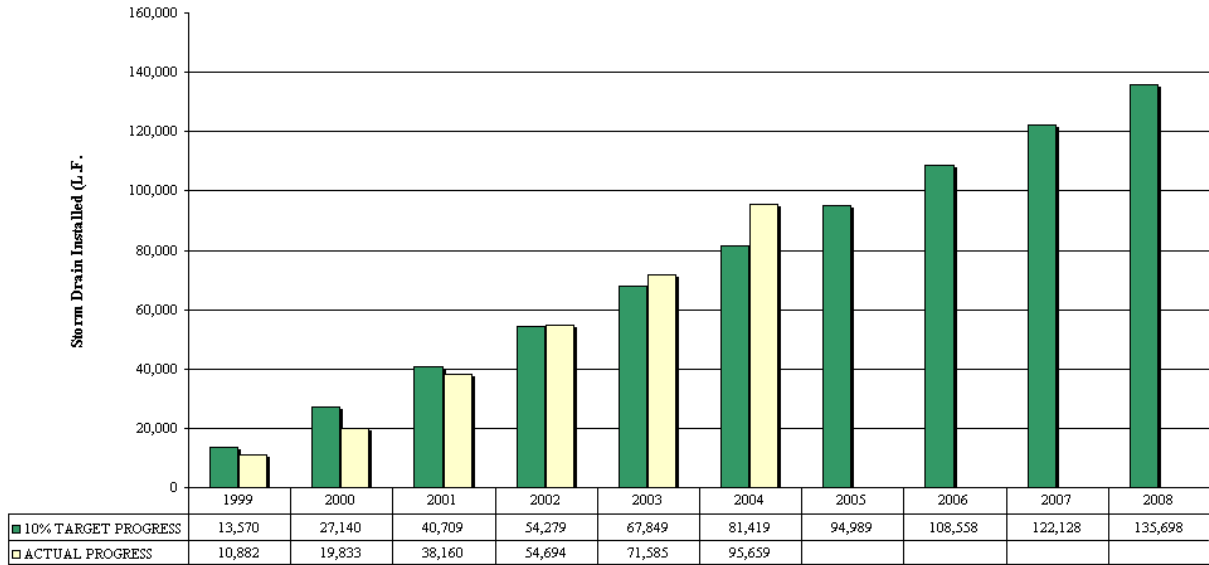


Table 5 South Dorchester Bay Sewer Separation Progress

Construction Contract	Total Linear Ft. Storm Drain	NTP	Percent Complete												
			Thru 2000		Thru 2001		Thru 2002		Thru 2003		Thru 2004		1st Q 2005		
			Design	Construction	Design	Construction	Design	Construction	Design	Construction	Design	Construction	Design	Construction	
1	15,770	Apr-99	100	67	100	98	100	100	100	100	100	100	100	100	100
2	16,803	Sep-00	100	0	100	36	100	91	100	100	100	100	100	100	100
3	17,765	Dec-02	75	0	90	0	100	0	100	42	100	95	100	100	
4	20,060	Jun-03	10	0	20	0	75	0	100	0	100	30	100	35	
5A	865	May-00	100	95	100	100	100	100	100	100	100	100	100	100	
5	7,936	Apr-99	100	100	100	100	100	100	100	100	100	100	100	100	
6	16,669	Aug-01	90	0	100	10	100	68	100	100	100	100	100	100	
7	20,810	Jan-03	10	0	20	0	100	8	100	32	100	68	100	70	
8	19,020	Oct-03	10	0	20	0	20	0	100	0	100	3	100	5	
TOTAL	135,698		66%	14%	81%	26%	87%	37%	100%	53%	100%	70%	100%	72%	
Related Contracts															
9	-	006-2007	10	0	15	0	15	0	15	0	100	0	0	0	
10	-	Nov-02	50	0	50	0	100	0	100	100	100	100	100	100	
Paving 1	-	Jun-99	100	50	100	75	100	90	100	100	100	100	100	100	
Paving 2	-	Apr-03	50	0	75	0	100	0	100	22	100	78	100	78	
Paving 3	-	Apr-06	50	0	75	0	75	0	100	0	100	0	100	0	
Downspout Removal	-	Mar-03	50	0	75	0	100	0	100	0	100	25	100	25	

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

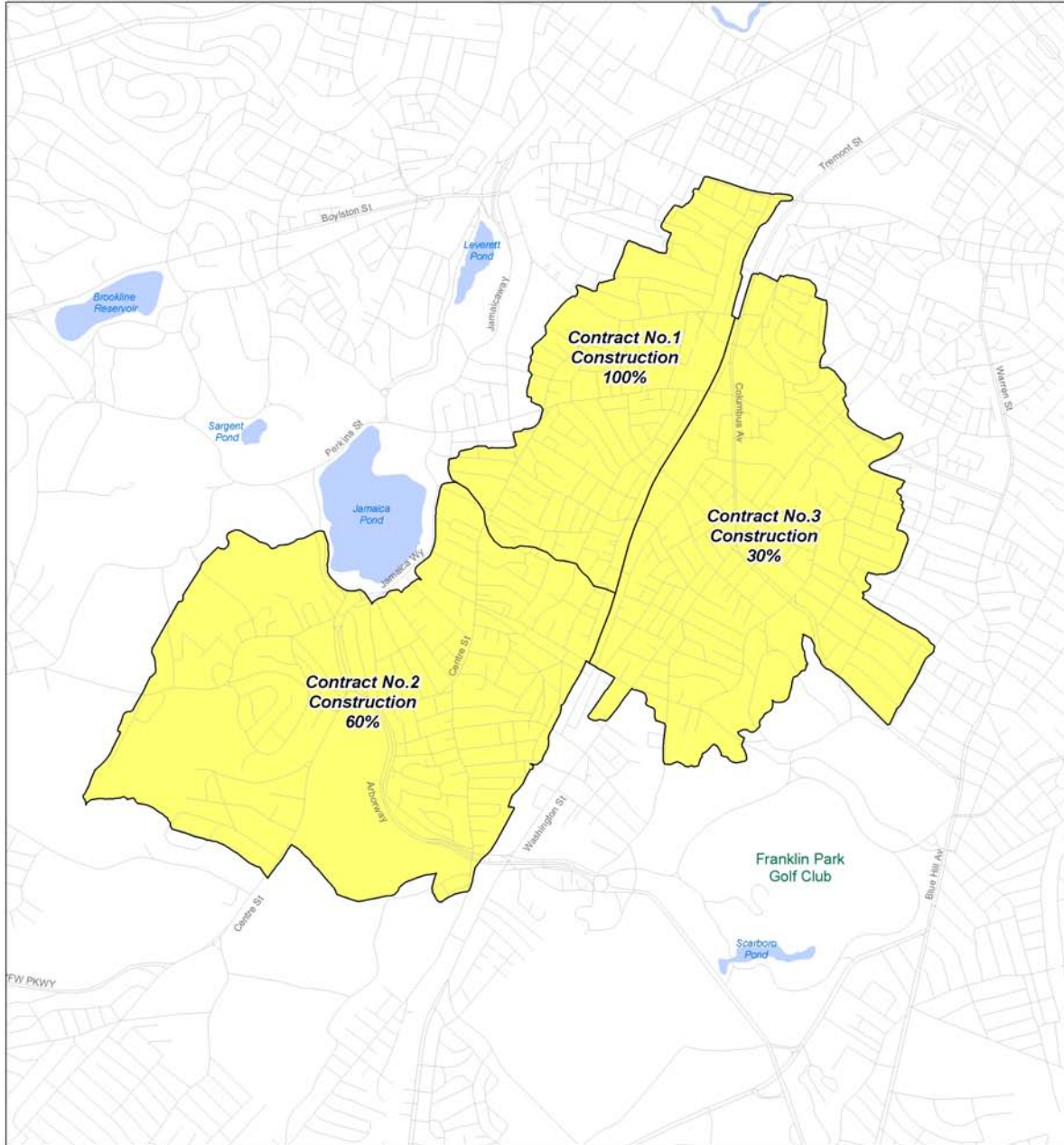
This project is intended to minimize CSO discharges to the Stony Brook Conduit and the Back Bay Fens, both of which drain to the Charles River, by separating combined sewers in parts of Roxbury and Jamaica Plain. The separation work involves the installation of approximately 73,300 linear feet of new storm drain. BWSC is implementing the project with MWRA funds.



Figure 11 and Table 6 show the project’s design and construction progress. Schedule Six requires a construction progress rate of 15% per year from the commencement of construction in July 2000. As of December 2004, construction was 68% complete, measured as linear feet of installed storm drain, compared to the court required level of 67.5% for the same period. In 2004, BWSC installed approximately 12,000 linear feet of storm drain, 16% of the total length of storm drain to be installed under this project. BWSC plans to install a similar amount of storm drain in 2005. All four major construction contracts have been awarded, and two of them, Contracts 1 and 4, are complete. Contract 2, which BWSC commenced in March 2003, is approximately 60% complete. Contract 3, the last major contract, which BWSC commenced in March 2004, is approximately 30% complete.

In 2004, BWSC also completed the first of two paving contracts. In addition, BWSC made progress with other contracts to separate downspouts from the sewer system. It completed the first downspout disconnection contract in February 2005. The final paving contract is anticipated to be awarded in the spring of 2005. BWSC plans a total of seven construction contracts (sewer separation, paving and downspout disconnection) to complete the Stony Brook sewer separation project.

FIGURE 11
Stony Brook Sewer Separation



 Stony Brook Sewer Separation CIP-344	<i>Contract 1 - DONE</i>
	<i>Contract 2 - Sewer separation 60% complete</i>
	<i>Contract 3 - Sewer separation 30% complete</i>
	<i>Contract 4 - DONE</i>

**Massachusetts Water Resources Authority
Combined Sewer Overflow Control Plan
Annual Progress Report – 2004**

ANNUAL PROGRESS OF MWRA/BWSC DRAIN INSTALLED IN STONY BROOK CSO AREAS

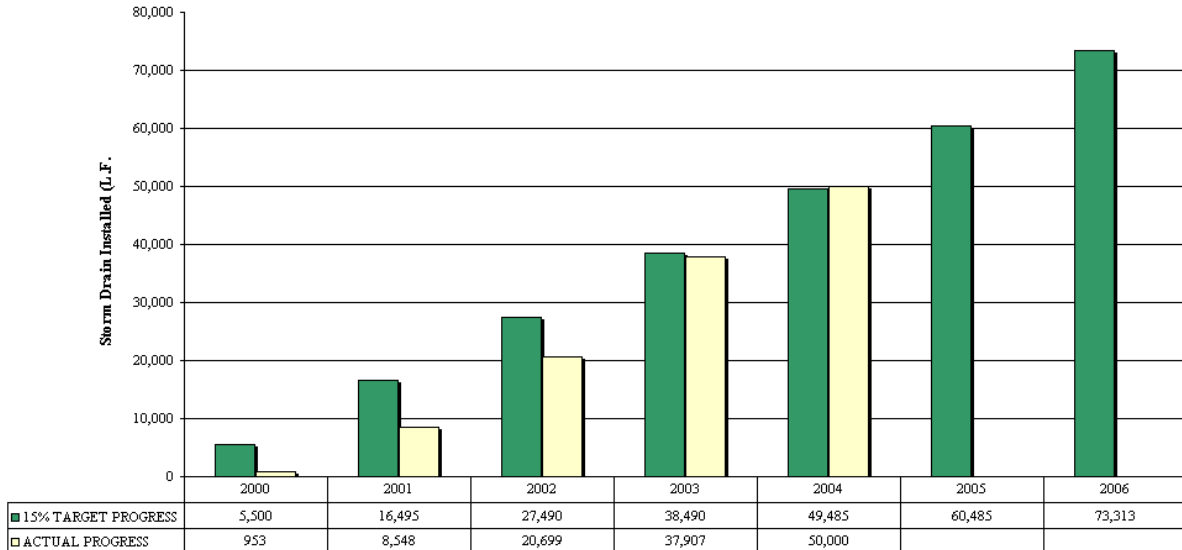


Table 6 Stony Brook Sewer Separation Progress

Construction Contract	Total Linear Ft. Storm Drain	NTP	Percent Complete												
			Thru 2000		Thru 2001		Thru 2002		Thru 2003		Thru 2004		1st Q 2005		
			Design	Construction	Design	Construction	Design	Construction	Design	Construction	Design	Construction	Design	Construction	
1	27,230	Apr-01	100	0	100	8	100	66	100	99	100	100	100	100	100
2	26,810	Dec-02	75	0	90	0	100	0	100	35	100	60	100	62	
3	17,985	Apr-04	50	0	90	0	90	0	100	0	100	30	100	32	
4	1,288	Jul-00	100	100	100	100	100	100	100	100	100	100	100	100	
TOTAL	73,313		81%	2%	95%	12%	98%	29%	100%	51%	100%	68%	100%	69%	
Related Contracts															
Downspout Removal	-	Jul-02	50	0	75	0	100	0	100	38	100	80	100	82	
Paving 1	-	Jul-02	50	0	75	0	100	0	100	25	100	100	100	100	
Paving 2	-	Jun-04	-	-	-	-	90	0	100	0	100	0	100	0	
Post construction Monitoring	-	Jun-04	-	-	-	-	-	-	-	-	-	-	-	-	

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

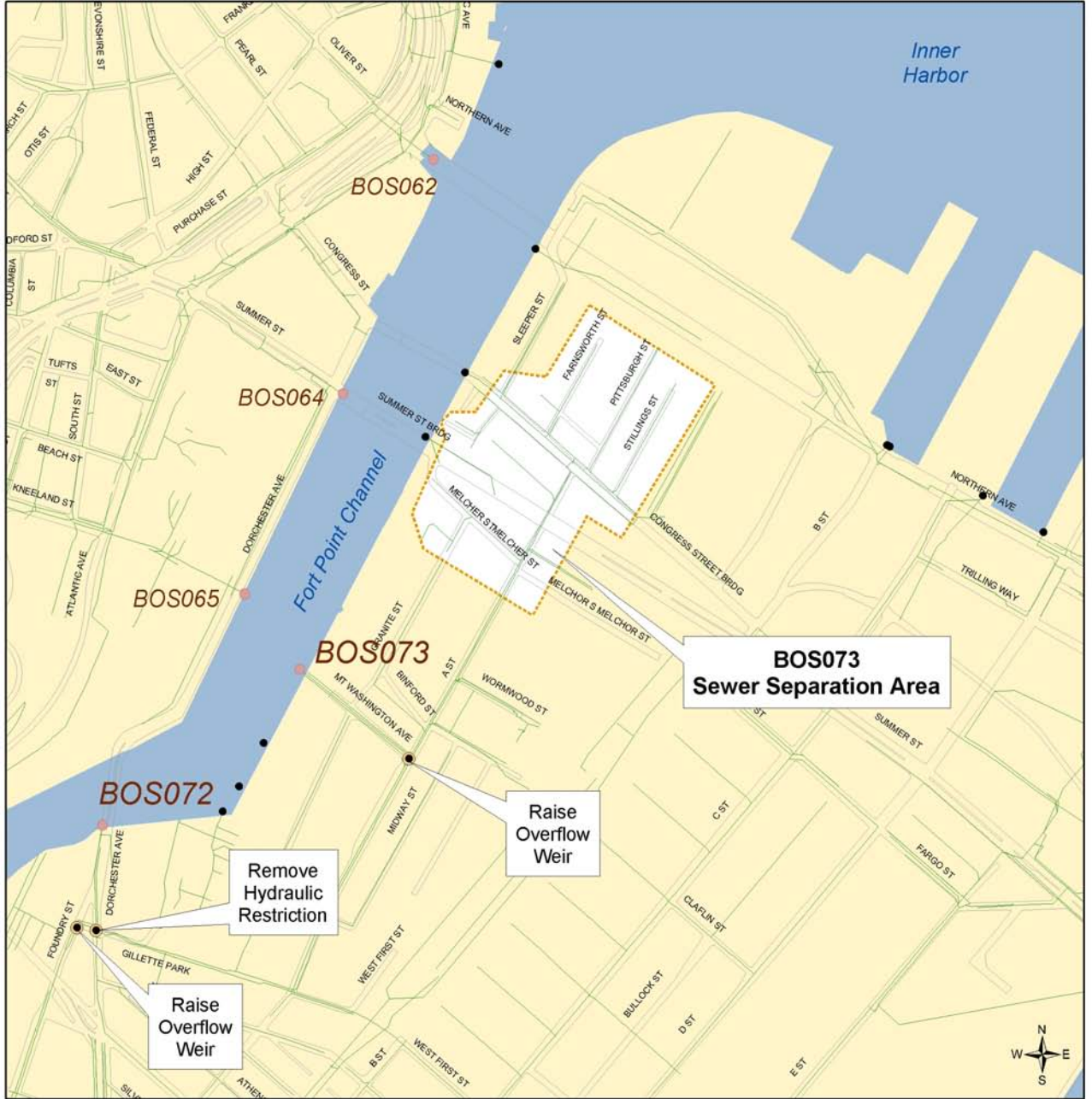
In July 2002, MWRA commenced the design contract for the CSO storage conduit that the 1997 Facilities Plan/EIR had recommended to control CSO discharges at outfalls BOS072 and BOS073. As an initial design effort, MWRA conducted a project reassessment to address new information regarding development in the area and its effects on the sewer system and CSO flows, as well as new information on soil and groundwater contamination. In June 2003, MWRA completed the Fort Point Channel reassessment report and filed with MEPA a Notice of Project Change (the “NPC”) recommending that the storage conduit project be replaced with a plan for sewer separation and system optimization. The NPC concluded that sewer separation in the BOS073 tributary area, along with optimization at the BOS072 CSO regulator, would meet or exceed the CSO control goals established in the 1997 plan for these outfalls (2 overflows per year with a total annual discharge volume of 1.4 million gallons), at greatly reduced cost. The NPC also demonstrated that eliminating the need for the permanent aboveground facilities associated with storage pumping and odor control would remove long-term impacts.

The Secretary’s Certificate on the NPC required MWRA to “look towards feasible methods of increasing the rate of inflow removal in this project as the final design progresses.” Specifically, the NPC conservatively assumed that 70 percent of the stormwater inflow to the combined sewer system could be removed with the sewer separation project. The Certificate noted that up to 90 percent removal had been achieved on other sewer separation projects, the higher level should be examined for the Fort Point Channel. In response to this direction and similar concerns voiced by EPA, MWRA revised its plan to target 90% inflow removal and zero discharges in a typical year. It also expanded the system optimization measures to further control CSO discharges. On February 27, 2004, the Federal District Court endorsed a motion from MWRA seeking to incorporate the project change, along with the enhancements, for outfalls BOS072 and BOS073 into Schedule Six, with no change to construction milestone dates.



MWRA and BWSC agreed that the BOS072-073 project, like other sewer separation projects in the CSO control plan, should be implemented under the CSO MOU and FAA, with BWSC performing final design, construction services and construction, and MWRA funding eligible costs. BWSC would own and operate the separated systems upon construction completion. With BWSC Board of Commissioners and MWRA Board of Directors approvals, the agreements were amended on June 21, 2004, to include the revised Fort Point Channel project. Since then, BWSC has made substantial design progress and commenced construction of a portion of the sewer separation work in early March 2005, in compliance with the milestone in Schedule Six. Other portions of the work are under design, and one

FIGURE 12
 Sewer Separation and System Optimization for BOS072-073



map1102-7

additional construction contract is scheduled to begin later in 2005. BWSC expects to complete all of the construction work by March 2007, on schedule.

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. BWSC performed the work with MWRA funds.

BWSC completed storm drain construction and closed the last remaining CSO outfall to the Neponset River in June 2000. 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 funds.

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.

CAMBRIDGE/ALEWIFE BROOK SEWER SEPARATION

	<u>Court Milestone</u>	<u>Project Schedule</u>
Commence Design	January 1997	January 1997
Commence Construction	July 1998	July 1998
Complete Construction	January 2000	Under review

Background on the Revised Plan for Alewife Brook Sewer Separation

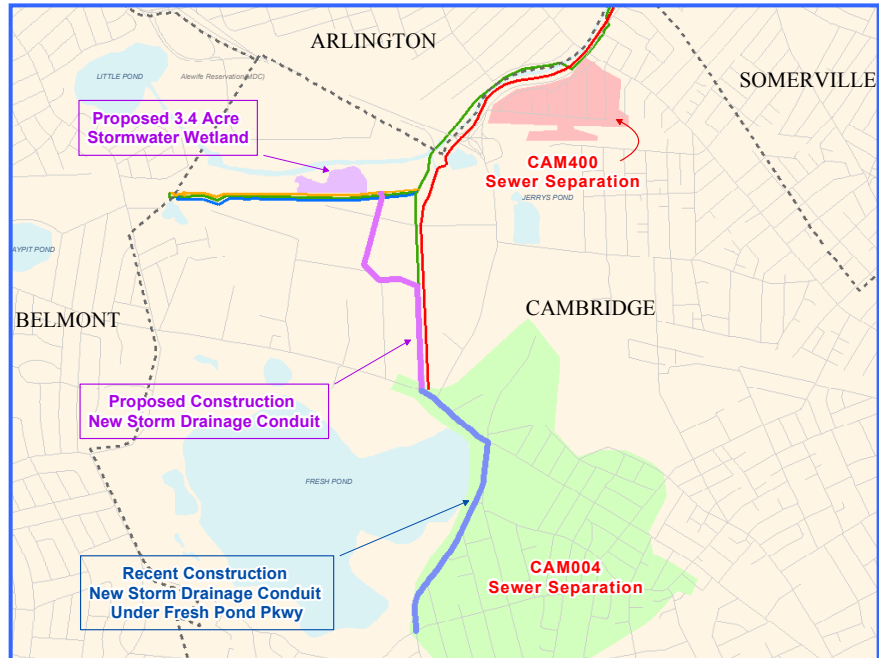
This project is intended to minimize CSO flows to Alewife Brook, primarily by separating combined sewer systems in parts of Cambridge. The separation work is being done by the City of Cambridge with MWRA funds under a Memorandum of Understanding and Financial Assistance Agreement. Cambridge began construction of the sewer separation plan in July 1998, in accordance with the recommended plan in the 1997 Facilities Plan/EIR and in compliance with Schedule Six. Cambridge has since completed all four of the construction contracts it awarded. The work already completed has significantly reduced CSO discharges to Alewife Brook. Hydraulic model simulations show that CSO discharges have been reduced from 63 times per year on average with 50 million gallons annual volume to 25 times per year on average with 33 million gallons annual volume.

However, in 2000 MWRA and Cambridge suspended further design work and construction contract awards necessary to complete the 1997 plan, based on new information showing that conditions in the Cambridge combined sewer system were markedly different from conditions assumed in the 1997 plan. They determined that considerably more work, as well as changes in the scope of work, would be

**Massachusetts Water Resources Authority
Combined Sewer Overflow Control Plan
Annual Progress Report – 2004**

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 a 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 effect on Alewife Brook flood elevations and that the wetland basin will contribute to the ecological and recreational goals in DCR’s Master Plan for the Alewife Reservation. Submission of the Response to Comments document effectively marked completion of the MEPA review process for this project, allowing MWRA and Cambridge to move the project into design and construction.

Updated Plans and Cost Concerns

Since 2003, Cambridge has been updating its preliminary design plans to reflect the additional plan changes that resulted from MEPA review, public comments and new field information. Cambridge has also been updating design and construction schedules and cost estimates. While updating the plans, Cambridge has also pursued final design on key portions of the work, namely “Contract 12”, which involves construction of the wetland basin and new storm drain outfall in the Alewife Reservation.

On December 17, 2004, MWRA received the Draft Second Supplemental Preliminary Design Report (“SSPDR”) from Cambridge, which provides an update of the work plans, design and construction contract requirements, schedules and costs for the Cambridge, Alewife Brook Sewer Separation project. MWRA has reviewed the document and met with members of the Cambridge Department of Public Works and Cambridge’s design consultants to discuss the new information. The SSPDR showed that the total project cost for the Alewife sewer separation plan and for Cambridge floatables control is now estimated by Cambridge to be \$94 million, compared to the estimate of \$74 million in the 2001 Notice of Project, though the general scope of work and level of CSO control have not changed. Table 7 below shows a comparison of cost breakdowns, by contract, between the 2001 Notice of Project Change and

Massachusetts Water Resources Authority
 Combined Sewer Overflow Control Plan
 Annual Progress Report – 2004

2004 SSPDR. The cost increases are primarily due to detailed design changes and construction requirements (using costs from completed construction contracts), additional hazardous materials management requirements, Cambridge’s selection of floatables control technologies, and inflation.

Table 7: Breakdown of Alewife Plan Costs

Area/Outfall	Construction Contract	Construction and Engineering Cost Estimate	
		2001 NPC	2004 SSPDR
CAM002,004	Contracts 1 through 3	\$26,128,000	\$26,843,000
CAM004	Contract 12	\$20,826,000	\$21,676,000
	Contract 8A	\$21,890,000	\$10,818,000
	Contract 8B		\$12,563,000
	Contract 9		\$9,841,000
CAM400	Contract 13	\$1,217,000	\$3,247,000
CAM007,009,011	Contract 5	\$2,509,000	\$4,255,000
CAM017	(Floatables Control)		
CAM001,004	Contract 4		
CAM002,401B	(Floatables Control)		
MWR003	Gate/siphon/floatables control	\$1,451,000	\$1,371,000*
Total		\$74,021,000	\$94,055,000

* MWRA cost estimate (Approved FY05 CIP)
 Contracts 1, 2A, and 2B sewer separation in the CAM004 area.
 Contract 3 sewer separation in the CAM002 area.
 Contracts 4 and 5 floatables control along Alewife Brook and Charles River.
 Contracts 8A, 8B and 9 sewer separation in the CAM004 area
 Contract 12 outfall for separated CAM004 area
 Contract 13 common manhole separation in CAM400 area
 Note: Contracts 6, 7 and 11 are no longer part of the plan

It should be noted that the current cost estimate is expressed in November 2004 dollars. If these costs are inflated to the currently estimated mid-point of construction, the total cost of the recommended plan is on the order of \$102 million.

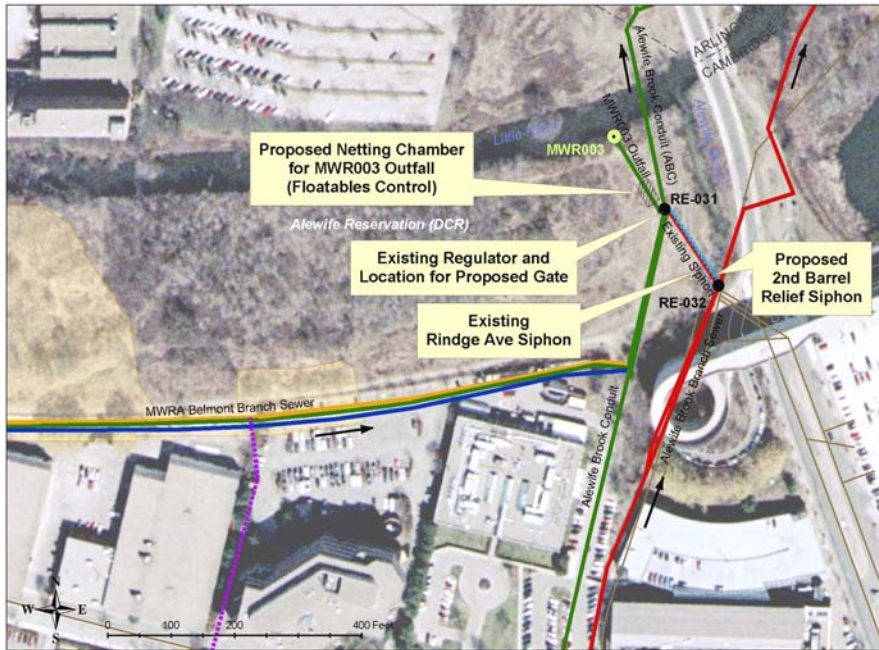
The Authority is greatly concerned that cost estimates have risen significantly. The \$74 million estimate, developed with the 2001 Notice of Project Change, was itself a huge cost increase from the original 1997 CSO plan estimate of \$13.8 million (the \$13.8 million plan is what the Authority originally agreed to in the Court schedule). The latest additional, large increase in estimated cost will compel the Authority to reevaluate again the cost effectiveness of the plan.

MWRA is continuing to meet with the Cambridge Department of Public Works to fully understand the updated information and resolve outstanding issues. From this review, MWRA expects to make a series of recommendations to its Board of Directors soon, regarding the reasonableness of Cambridge’s updated plans and cost estimates, the appropriateness of moving forward with the Alewife Brook plan at a higher cost, the amount of the cost that is eligible for MWRA funding, and appropriate amendments to the agreements with Cambridge.

In the meantime, Cambridge has made significant progress in completing the design work for Contract 12. The new wetland basin and outfall that will be constructed under this contract are necessary to accommodate future sewer separation in the upstream CAM004 area and eventually to close the CAM004 regulator. Cambridge received a Wetlands Order of Conditions for Contract 12 from the Cambridge Conservation Commission in June 2004, which was appealed by a group of citizens seeking a Superseding Order of Conditions from DEP. Cambridge has since provided information to support DEP's review of the appeal, including conducting a visit to the proposed stormwater basin site. Cambridge expects that DEP will issue a Superseding Order of Conditions soon. There is the continued possibility, however, of further appeals and other legal action that could compromise Cambridge's ability to construct the contract, placing all other components of the Alewife CSO plan at risk.

MWRA Planned Improvements at Outfall MWR003 and Rindge Avenue Siphon

While a majority of the revised Alewife Brook CSO Control Plan is being 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, consisting of 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.

In 2004, MWRA prepared a draft scope of services for design and engineering services during construction for these components of the

Alewife Brook plan. The design work is scheduled to commence in 2005, but this work is also dependent upon the feasibility of moving forward with Cambridge's Contract 12.

6.3 Region-wide 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
Commence Construction	May 2001	See text below for MWRA, BWSC and Cambridge schedules

The 1997 Facilities Plan/EIR called for the control of floatable materials in all remaining CSO discharges, in accordance with the National CSO Policy. Floatables controls will be installed at many of the 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.

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.

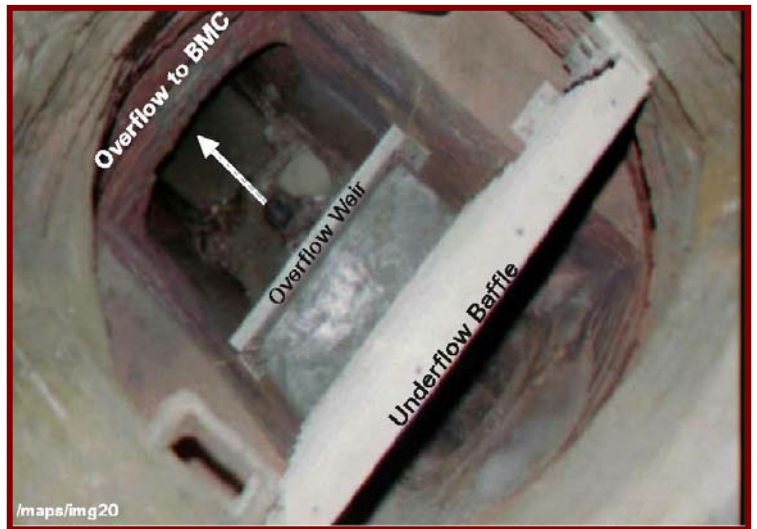
MWRA FLOATABLES CONTROL AT OUTFALLS MWR018–020 AND OUTFALL CLOSINGS AT MWR021-022

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 not required to install floatables control for 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.



CSO CONTROL AT OUTFALL MWR010

In April and May 2001, MWRA submitted reports to EPA and DEP on studies it conducted to reassess CSO discharges at outfall MWR010. The scope of the reassessment included updating the hydraulic

model of the combined sewer systems affecting this outfall, evaluating the feasibility of closing the outfall to CSO discharges, and recommending measures to minimize discharges if the outfall could not be closed.

Results of the reassessment showed that the outfall did not discharge CSO in a typical rainfall year. Furthermore, CSO discharges could be reduced to the level of not occurring up to a 5-year storm by bringing back into service a blocked connection between the Town of Brookline and MWRA systems. The reports also concluded that MWR010 should not be permanently closed, since closure of the outfall was predicted to result in upstream flooding during extreme storms.

On October 29, 2002, DEP issued its approval, subject to MWRA and Brookline maintaining the dry weather connection in an operable condition. In addition, DEP requested that MWRA evaluate further system optimization measures to minimize CSO discharges at MWR010 and at the hydraulically connected Cottage Farm CSO facility and implement Best Management Practices in the tributary area to minimize wet weather pollutant loadings. The results of initial system optimization evaluations were reported in the *Cottage Farm CSO Facility Assessment Report* in January 2004, which also described ongoing work by the Town of Brookline to separate sewers, which will enhance CSO control at MWR010 and at Cottage Farm. MWRA tracks the performance of the reactivated Brookline connection by reviewing upstream velocity and depth data collected by a permanent flow meter.

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 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

This work involves providing floatables control at nine outfalls located along Alewife Brook and the Charles River in Cambridge. Since Cambridge will be responsible for the operation and maintenance of its floatables control devices, MWRA has agreed to allow Cambridge to install devices of its choice, provided they meet the level of floatables control that would be achieved by MWRA's recommended plan. At five locations along Alewife Brook, the floatables controls are being designed and installed in conjunction with the Cambridge/Alewife Brook sewer separation project. Controls at four locations along the Charles River are being separately designed and installed by Cambridge. At these locations, Cambridge discovered structural problems with the existing outfalls, which have increased the scope of its work and delayed installation of floatables control.

Design work on floatables control has recently resumed with construction at the Charles River outfalls expected to commence in September 2005 and be completed in 2007. Construction of floatables controls on the Alewife is scheduled to commence in January 2007 and be completed in 2011, and are dependent on work being done as part of the Alewife sewer separation project. Cambridge completed construction of floatables control at one of the Alewife Brook outfalls, CAM401A, as part of a Cambridge storm drainage contract titled "Bellis Circle Improvements" in 2003.

SOMERVILLE FLOATABLES CONTROL

The final CSO plan 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.

**Massachusetts Water Resources Authority
Combined Sewer Overflow Control Plan
Annual Progress Report – 2004**

The revised Alewife project in part calls for enlarging the local system connection to the MWRA interceptor at SOM001A, in addition to providing floatables control. MWRA and the City of Cambridge are now developing plans and schedules for design and construction of floatables control at this outfall, as a part of the proposal MWRA plans to make to the Court Parties in seeking revisions to Schedule Six milestones for completing the Alewife project. In the meantime, the City of Somerville continues to maintain a boom as an interim floatables control measure at this outfall.

However, the plan for floatables control at SOM001A is dependent on the recommendations that will come from studies of the Tannery Brook that Somerville is conducting in compliance with conditions in the Alewife Brook/Upper Mystic River Variance Extension issued by DEP in September 2004. Any further work to implement a long term plan for floatables control should await the result of that study, due no earlier than September 2005.

7. Planned CSO Program Activities in 2005

Schedule Six of the Federal Court Order in the Boston Harbor Case includes seven CSO control milestones in 2005.

Date	Milestone	MWRA Schedule
Mar 2005	<i>MWRA to submit annual report on CSO control progress</i>	MWRA submitted this Annual Report for 2004 on March 15, 2005.
	<i>MWRA to complete construction of consolidation facilities for BOS 076-080</i>	In 2004, MWRA gained regulatory acceptance on a revised plan for CSO control at Reserved Channel outfalls BOS076-080, substituting the consolidation facilities with a plan for sewer separation. MWRA proposes to commence design in January 2007, commence construction in May 2009 and complete construction in December 2017.
	<i>MWRA, in cooperation with BWSC, to commence construction of sewer separation and system optimization for BOS072 and BOS073</i>	BWSC commenced construction of the sewer separation and system optimization project for Fort Point Channel outfalls BOS072 and BOS073 in March 2005. MWRA is funding the project.
	<i>MWRA to commence construction of hydraulic relief for BOS 017</i>	MWRA completed the hydraulic relief project at outfall BOS017 (Mystic River, Charlestown) in 2000.
	<i>MWRA to commence construction of storage conduit for BOS 019</i>	MWRA plans to commence construction of the BOS019 CSO storage conduit and related facilities by March 31, 2005.
Sep 2005	<i>MWRA to complete construction of interceptor relief for BOS 003-014</i>	MWRA completed the first construction contract for CSO control at East Boston outfalls BOS003-014 in 2004. MWRA has suspended remaining design and construction work pending agreement with EPA and DEP on a final plan.
	<i>MWRA to complete construction of detention and treatment facility at Union Park Pump Station</i>	Construction is 55% complete. MWRA extended the construction contract to January 16, 2006, to cover additional work and work delays. MWRA is presently reviewing additional requests from the contractor for further contract extension.

MWRA expects to continue its discussions with EPA and DEP with the purpose of gaining regulatory acceptance of revised plans for CSO control in areas where MWRA completed project reassessments, along with regulatory acceptance of an overall long-term plan and revised implementation schedule that defines the scope and cost of MWRA's obligations for CSO control under the Court Order. With such agreement, MWRA expects to propose revisions to Schedule Six to incorporate new plans for CSO control for North Dorchester Bay, Reserved Channel, East Boston and Alewife Brook, as well as to extend the construction schedules for the Union Park Detention/Treatment Facility and the BOS019 CSO Storage Conduit.

North Dorchester Bay

MWRA plans to complete final design of the North Dorchester Bay storage tunnel and advertise the construction contract by the end of 2005.

Pleasure Bay and Morrissey Boulevard Storm Drains

MWRA plans to complete design and commence construction for relocation of Pleasure Bay stormwater to the Reserved Channel. MWRA and BWSC plan to amend their CSO Memorandum of Understanding and Financial Assistance Agreement to add the scope and eligible cost of the Morrissey Boulevard storm drain project, to allow BWSC to commence final design by June.

Inner Harbor/East Boston

MWRA expects to reach agreement with EPA and DEP soon on a final plan for controlling CSO discharges in East Boston. MWRA plans to resume final design of the East Boston Branch Sewer Relief project in 2005, with regulatory agreement.

Inner Harbor/Charlestown

MWRA plans to award the construction contract for the BOS019 CSO Storage Conduit by March 31, in compliance with Schedule Six.

Charles River Basin

BWSC will continue a high level of construction activity on the Stony Brook Sewer Separation project toward completion of the project by the September 2006 milestone in Schedule Six. Cambridge plans to commence construction to provide floatables controls at its CSO outfalls along the Charles River.

Pursuant to the conditions with the Charles River CSO variance extension, MWRA will pursue implementation of the system optimization measures recommended in the Cottage Farm CSO Facility Assessment Report to reduce treated CSO discharges at Cottage Farm and will track efforts by Brookline and Cambridge to separate combined sewer systems and further reduce CSOs to the Basin. MWRA will also track I/I control efforts in community systems that affect Charles River CSO discharges and will continue its long-term water quality monitoring program in the Basin.

South Dorchester Bay

BWSC will continue its efforts to complete construction of the South Dorchester Bay sewer separation project by November 2008, in compliance with Schedule Six.

Fort Point Channel

MWRA expects construction of the Union Park Detention/Treatment Facility to be substantially complete by January 2006.

BWSC commenced construction of a portion of the Fort Point Channel sewer separation and system optimization project for outfalls BOS072 and BOS073 March, 2005 in compliance with Schedule Six. BWSC will continue final design efforts for other portions of the work and plans to issue additional construction contracts in 2005.

Alewife Brook/Upper Mystic River

MWRA and Cambridge plan to finalize the implementation plans, schedules and cost estimates for the revised Cambridge/Alewife Brook sewer separation project. MWRA will then approach the Court Parties with a proposal to revise the project related milestones in Schedule Six. In 2005, Cambridge also plans to complete final design of the wetland basin and stormwater outfall (Contract 12) that will allow Cambridge to pursue separation of the combined sewer systems tributary to outfall CAM004 and the closing of this outfall to CSO discharges. Cambridge's schedule calls for commencing the construction contract for the basin and the stormwater outfall in early 2006, if it is able to obtain the necessary regulatory and land approvals. For its part, MWRA plans to commence design of the improvements recommended at outfall MWR003 and relief of its Rindge Avenue siphon in 2005, again assuming that environmental and land approvals for Contract 12 can be secured such that Cambridge can commence construction of Contract 12.

Annual CSO Discharge Reporting

In compliance with its NPDES permit, MWRA recently completed hydraulic modeling work to estimate CSO discharges during storms that occurred in calendar year 2004. MWRA is sharing the results with its CSO communities to verify the estimates and coordinate the submissions to EPA and DEP. MWRA uses the annual CSO discharge estimates to verify progress in controlling CSO discharges towards realizing the goals of the long-term CSO control plan and meeting related NPDES permit limits that are the basis for compliance with water quality standards.

Later in 2005, MWRA will conduct flow monitoring and hydraulic modeling to estimate CSO discharges for storms occurring this year.

The End