2010 Annual Report
National Pollutant Discharge Elimination System

FOR THE

CITY OF CAMBRIDGE, MASSACHUSETTS
COMBINED SEWER OVERFLOW PERMIT
#MA0101974

April 2011

Submitted to:

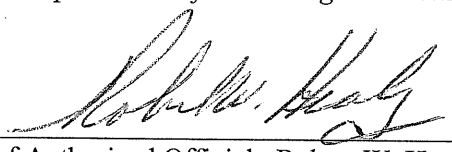
U.S. Environmental Protection Agency
Water Technical Unit

MA Department of Environmental Protection
Bureau of Resource Protection

Submitted by:

City of Cambridge
Department of Public Works

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



Signature of Authorized Official: Robert W. Healy
City Manager, City of Cambridge

4/29/11

Date

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1.0 Purpose of Report

This report has been prepared in accordance with Part I, Section D of Permit No. MA0101974, issued to the City of Cambridge Department of Public Works on September 30, 2009. The permit authorizes the City of Cambridge to discharge flow from twelve (12) Combined Sewer Overflow (CSO) regulators to the receiving water bodies named in the permit.

The City is additionally required to provide an assessment of the potential for inflow from Alewife Brook to enter the combined sewer system through the existing regulator structures over a range of flood conditions and corresponding Brook levels, and to complete an assessment of the cost, feasibility, and effectiveness of installing inflow controls on the remaining CSO outfalls if flow does enter the combined sewer system more frequently than the 100 year storm with this second Annual Report (April 30, 2011).

2.0 Combined Sewer Overflow Monitoring Plan

As part of the Year 1 Annual Report the City revised weir equations for use in estimating combined sewer overflow quantities at the various regulators. During Year 2 (2010) the City, further refined these results using model simulations where CSO activations are impacted by the river systems.

Section 2.1 describes the existing methodology by which the City estimates effluent volumes and characterizes CSO events. Section 2.2 presents data from calendar year 2010 based on this approach, and Section 2.3 describes recommended enhancements and reporting methodology to be utilized by the City going forward.

2.1 Existing CSO Monitoring Methodology

As part of the City's current NPDES Permit, the Department of Public Works (DPW) monitors flow weirs within combined sewer overflow regulator structures to estimate CSO discharge to the Charles River and Alewife Brook. Currently there are 12 permitted CSO locations associated with 11 CSO regulator structures. CAM 002A and CAM 002B are associated with a single regulator structure at CAM 002A. Of these 11 regulator structures, three have been temporarily plugged (CAM 002B, CAM 009, and CAM 011) resulting in nine active CSO outfalls currently being metered: CAM 001 (Alewife Brook Parkway), CAM 002A (Massachusetts Ave. at Alewife Brook Parkway), CAM 004 (Fresh Pond Rotary), CAM 400 (Harrison Ave. at Alewife Brook Parkway), CAM 401A (Bellis Circle/Sherman Street), CAM 401B (Massachusetts Ave. at Alewife Brook Parkway) discharging to Alewife Brook; and CAM 005 (Mount Auburn Hospital), CAM 007 (Memorial Drive at Hawthorne Street), and CAM 017 (Binney Street at First Street) discharging to the Charles River.

Metering is typically performed by measuring the depth of flow in the structure and computing discharge using a weir equation. In addition, CAM 002A and CAM 005 have secondary area and velocity flow measuring devices in place at the CSO outfall pipe to more accurately determine the CSO overflow discharge.

Weir Equation: Currently the City uses the following rectangular contracted weir equation as provided by the flow meter manufacturer to compute flow over a standard weir:

$$Q = K(l - 0.2h)h^{1.5}$$

Where:

Q is flow measured in cubic feet per second (CFS)

l is the weir crest length in feet

K is the weir coefficient equal to 3.330, when $1 \leq l \leq 10$ feet

h is the head on the weir in feet, the limits of which vary according to l as follows:

Weir Length l (ft.)	h minimum (ft.)	h maximum (ft.)
1	0.2	0.5
1.5	0.2	0.75
2	0.2	1.0
2.5	0.2	1.25
3	0.2	1.5
4	0.2	2.0
5	0.2	2.5
6	0.2	3.0
8	0.2	4.0
10	0.2	4.5

The CSO regulator weir crest lengths as reported under existing conditions are:

Location	Weir Length (ft.)
CAM 001 (Alewife Brook Pkwy)	1.46
CAM 002A (Massachusetts Ave at Alewife Brook Pkwy)	3.97
CAM 004 (Fresh Pond Rotary)	7.50
CAM 400 (Harrison Ave at Alewife Brook Pkwy)	7.48
CAM 401A (Bellis Circle at Sherman Street)	19.96
CAM 401B (Massachusetts Ave at Alewife Brook Pkwy)	2.17
CAM 005 (Mount Auburn Hospital)	3.94
CAM 007 (Memorial Drive at Hawthorne Street)	6.29
CAM 017 (Binney Street at First Street)	8.00

The summary of CSO activations for 2010 which follows is based on activation and quantification results based on weir equations, flow measuring devices and modeling software (Infoworks) in use during 2010.

2.2 Summary of 2010 CSO Activations

Activation Frequency and Discharge Volumes

Based on the monitoring procedures described above, thirteen (13) total activations occurred at Charles River CSO regulators during six (6) separate storm events. Sixty-five (65) total activations occurred at Alewife Brook CSO regulators during twenty-one

(21) separate storm events. A summary of 2010 activations are provided in Table 2.1 and 2.2 for the Charles River and Alewife brook, respectively.

Precipitation data for each day of the 2010 reporting period is provided in monthly tables in **Appendix I**. In conformance with permit requirements under Part 1, Section D, Paragraph 2, data is provided for each day, including total rainfall, peak intensity, and average intensity. The monthly CSO volume data sheets are provided in **Appendix II**.

Table 2.1
Summary of 2010 Activations
Charles River CSOs

Receiving Water	Outfall No.	Discharge Location	2010 Activation Frequency	2010 Activation Volume (million gallons)
Charles River	CAM005	Lowell St. @ Mt. Auburn St.	6	5.02
	CAM007	Memorial Dr. @ Hawthorne Street	5	5.35
	CAM009	Memorial Dr. @ Old Murray Rd.	*	n/a
	CAM011	Plympton St.	*	n/a
	CAM017	Edwin Land Blvd. @ Binney St.	2	11.64
	TOTAL			**22.01**
* CAM009 and CAM011 are temporarily blocked				

Table 2.2
Summary of 2010 Activations
Alewife Brook CSOs

Receiving Water	Outfall No.	Discharge Location	2010 Activation Frequency	2010 Activation Volume (million gallons)
Alewife Brook	CAM001*	Foch St. @ Alewife Brook Pkwy.	7	5.58
	CAM002A** CAM002B**	Mass Ave @ Alewife Brook Pkwy	12	3.85
	CAM004	Concord Ave Rotary @ Fresh Pond Pkwy	19	42.76
	CAM400	Harrison Ave @ Alewife Brook Pkwy	5	1.97
	CAM401A	Sherman St. @ B&M Railroad	10	14.37
	CAM401B	Mass Ave/Columbus Ave @ Alewife Brook Pkwy	12	18.08
	TOTAL			**86.61**

* CAM001 meter was removed for construction on September 29, 2010
** CAM002 meter was removed for construction on August 21, 2010

2.3 Modifications to CSO Monitoring Plan

The purpose of this analysis is to evaluate the current monitoring plan and to improve upon it, if possible, by modifying the present metering approach, and thus improve CSO activation reporting under the current NPDES permit.

River Backwater Effects

While the Charles River is controlled by a downstream dam and has an average water surface elevation between 12.2-ft and 13.0-ft Cambridge City Base (CCB) datum, the Alewife Brook is more prone to hydraulic grade line impacts during storm events, and in many situations may rise above the outlet pipe or weir crest elevation, further restricting discharge from the pipe. Table 2.4 provides an estimate of when each CSO structure may experience backwater conditions associated with high river levels that surcharge over the weir elevation. More information on the impact of inflow is provided in Section 4.0 of this report.

Table 2.3
CSO Overflow Backwater Impact Summary

CSO Regulator Structure	Existing Weir Elevation (CCB)	Proposed Weir Elevation (CCB)	Approximate Storm Event with Tailwater Submergence
CAM 001	14.52	15.2	> 5-year
CAM 002A CAM002B	17.36 blocked	16.3 16.0	> 25-year > 25-year
CAM 004	14.49 15.16	-	> 5-year
CAM 400	14.94	-	> 5-year
CAM 401A	17.04	-	25-year
CAM 401B	14.84	14.2	5-year
CAM 005	14.82	-	N/A
CAM 007	13.15	-	N/A
CAM 017	14.49	-	N/A

CSO Regulator Structures

The methodology used to calculate overflows at each regulator structure has been reviewed and evaluated as described below. Where appropriate, revisions to existing calculation methodology are proposed. In addition, calculations will continue to be updated based on field investigations in order to reflect current field conditions.

CAM 001

Through September 29th 2010, CAM 001 CSO structure contained a weir at an elevation 0.34 feet above the pipe invert (elevation = 14.52-ft CCB), with a remaining clearance of approximately 1.1 feet. It should also be noted that this overflow is located high within the structure, so the estimated clearance between the weir configuration and the structure ceiling was approximately 2.1-ft during this time. After September 29th, the CAM 001 meter was taken off line as part of the floatables control construction project (Contract 4) and was not metered. During this time new floatable control device was installed in the structure. The proposed design called for a steel plate weir to be installed at an elevation of 15.22, however, during construction a brick weir was installed at an elevation of 15.22. The City is currently reviewing this design change and will report any addition changes to the structure in the 2011 annual report.

Francis Weir Equation $Q = 2/3*C*L_{EFF} *\sqrt{(2g)}*h^{1.5}$

Orifice Equation $Q = A*C_V *\sqrt{(2*g*h_O)}$

Through September 29th 2010 CSO activations were modeled using a Francis Weir Equation when flows were below 1.1 feet above the weir and an orifice equation for all flows above 1.1 feet above the weir. A river analysis was also completed for CAM 001. During a number of storms the Alewife Brook flowed back into the sewer through the CAM 001 regulator. A submerged weir and Orifice equation was used to determine the flow once the Alewife Brook began to flow into the CSO structure. At times during these events the elevation of the Alewife Brook exceeded the elevation recorded by the meter located in CAM 001. At these instances it was determined that no CSO event occurred because the hydraulic pressure of the Alewife Brook prevented an overflow.

CAM 002A

The CAM 002 meter was removed for construction of floatables control under the Contract 4 construction project on August 21, 2010. For the portion of the year that the meter was in place the weir was set at an elevation of 17.36-ft (CCB). A standard weir equation was used to calculate the CSO activation volume for each storm. Due to the close proximity of the CSO structure and the Alewife Brook an analysis of the river elevation and CAM 002 was completed. At no time during the year did the Alewife Brook influence the weir located in the structure. The elevation of the weir exceeds the highest elevation that the Alewife Brook reached for the entire year.

CAM 004

This CSO is located within a drainage confluence structure called Drain Vault 5 within the Alewife Brook Rotary at the junction of Concord Avenue and The Alewife Brook

Parkway. The weir structure within this CSO is a complex weir with the lowest weir having a length of 7.5 ft and being perpendicular to the direction of flow, the two higher weirs are aligned parallel to the direction of flow and are 8 inches higher with a total weir length of an additional 17 feet.

After reviewing the data from the storms that occurred this year the current multi-step weir equation was considered no longer valid. Instead, the MWRA/MWH Infoworks calibrated model was used to calculate the total amount of CSO's that occurred at this structure. River elevations for the year were taken from a meter that was located inside of CAM 401B and translated to the outfall of CAM 004. The weir structure was modified to be two separate weirs as described above. The heights or "h" values that were calculated by Infoworks were consistent with "h" values that the flow meter was reading.

Another factor to consider is that under future conditions, the downstream Wheeler Street drain is scheduled to be further modified and additional infrastructure put in place as part of the City's CAM004 sewer separation contract (Contract 12). The results of these improvements will again impact the predicted model values and a revised curve will be developed at that time to more accurately represent these future conditions.

CAM 400

The downstream combined sewer system for CAM 400 was under construction as part of common manhole separation project (Contract 13) for part of the year. This construction consisted of laying new storm sewer and sanitary sewer mains and separating common manholes. When the sewer separation work is completed in 2011 the CAM400 CSO regulator structure will be closed.

CAM 400 was metered for the entire year and a standard equation was used to determine the flow based off a flow meter recording the height above the weir. A river analysis was also used to determine the flow leaving the structure and entering the Alewife Brook. When the river elevation entered the structure a submerged weir equation was used to determine the flow. However there were a number of instances where the river elevation was greater than what was being recorded in the structure. For this time periods it can be assumed that no CSO activations were occurring and the hydraulic pressure from the Alewife Brook was creating a stagnant flow or reverse flow condition.

CAM 401A

Due to the complicated nature of this structure and the existing floatables control brush screen at the existing weir, an alternative weir equation was used for comparison to the standard equation. This configuration requires a weir coefficient of K = 2.4 (based on information from the brush screen manufacturer) to replace the standard weir equation coefficient of 3.33. Consequently the equation used for this CSO structure overflow was:

$$Q = 2.4(l - 0.2h)h^{1.5}$$

The City will use this revised weir equation for future flow estimates. It should be noted that similar to other CSOs, this system will experience a backwater effect above the weir elevation for the 25-year storm event and above and will be subject to additional analysis when submitting annual reports.

CAM 401B

CAM 401B was under construction for part of the year in 2010 as part of Contract 4. Work at this regulator was completed by the end of October 2010. For the first part of the year, a Francis Weir equation will be used for elevation 1.9 feet above the weir and an orifice equation will be used for all measurements above 1.9 feet above the weir. Construction included the installation of a new floatable control baffles were constructed and the weir wall was removed from the structure. However due to the size of the outlet a rectangular weir will still be used up to an elevation of 1.4 feet above the bottom of the invert and an orifice equation will be used for all flows above 1.4 feet.

The Infoworks modeling software will be used to help determine backflow conditions and CSO flows for the next annual report.

CAM 005

An area / velocity meter has been installed in the downstream overflow pipe, and it will continue to authenticate CSO overflows from the CAM 005 regulator instead of relying solely on the weir equations or model output. To determine flow values for CAM 005 the velocity meter and flow meter data was reviewed. When the velocities where positive a standard rectangular weir equation was used.

CAM 007

The standard weir equation is accurate in this scenario, and the City will continue to use this existing equation for flow approximation purposes.

CAM 017

For the CAM017 structure, a flow meter was installed and collected data for the entire year and values were downloaded monthly. After reviewing the data it can be concluded that there was a malfunction in the meter and the data is considered invalid. Since the meter data is invalid, the MWRA\MWH calibrated Infoworks model was used to determine the CSO flows at this structure. The flows were consistent with the broad-crested weir equation using the “h” that was calculated by Infoworks.

CAM 017 will be remodeled during the upcoming year.

Note: CAM017 will undergo considerable modifications during 2011 to replace the existing weir configuration and install a large bending weir flow control device. The equations and curves will be re-evaluated following construction to ensure that the most appropriate assumptions are being used. See **Appendix III** for more information.

3.0 Status of CSO Abatement Projects

3.1 Project Updates

The City of Cambridge continues to implement abatement projects in accordance with the Massachusetts Water Resources Authority (MWRA) Final CSO Facilities Plan, the Federal Court Order (US v. MDC., et al., No. 85-0489 (D. Mass)), as amended by the Second Stipulation of the United States and the Massachusetts Water Resources Authority on Responsibility and Legal Liability for Combined Sewer Overflow Control. The information provided in this Annual Report conforms to information and data submitted to the MWRA for inclusion in their court-ordered annual report on CSO abatement project progress.

As described in more detail in the MWRA 2010 CSO Annual Progress Report (available at http://www.mwra.com/cso/csoannualreports.htm), the CSO Control Plan for Alewife Brook includes four project components for which the City of Cambridge is responsible, including:

- CAM004 Stormwater Outfall and Wetland Basin (Contract 12)
- CAM004 Sewer Separation (Contracts 8A, 8B, and 9)
- CAM400 Common Manhole Separation (Contract 13)
- Interceptor Connection Relief and Floatables Control (Contract 4)

Contract 4 and Contract 13

Soon after work began , the City determined that technical and cost efficiencies could be gained by combining two of the projects – Interceptor Connection Relief and Floatables Control at CAM002 and CAM401B (Contract 4) and CAM400 Manhole Separation (Contract 13) – into one construction package, now referred to as Contract 4/13. The projects are located along and near the same stretch of Alewife Brook Parkway at the intersection with Massachusetts Avenue. The City issued the Notice to Proceed for Contract 4/13 on January 26, 2010, in accordance with the schedule for these projects MWRA and the City had proposed to EPA and DEP in September 2009. Commencement of this construction was a major milepost in moving the revised Alewife Brook sewer separation plan forward after several years of delay.

In October 2010, the City attained substantial completion of the Interceptor Relief and Floatables Controls at CAM002 and CAM401B and Floatables Control at CAM001 project (Contract 4) in accordance with the schedule MWRA and the City proposed to EPA and DEP in September 2009. With respect to the CAM400 Manhole Separation project (Contract 13), the City has completed approximately 65% of the common manhole separation work by December 2010. Substantial completion of this project is scheduled for March 31, 2011, as previously proposed.

Contract 12

The City was unable to commence construction of CAM004 Stormwater Outfall and Wetland Basin (Contract 12) in July 2010, as proposed to EPA and DEP in September 2009, despite great progress we had made in completing design, obtaining several permits and easements, and advertising and receiving construction bids. On August 9, 2010, a major authorization was realized when the Governor signed legislation pursuant to Article 97 of the Massachusetts Constitution allowing the transfer of easements to the City on state land within the Alewife Brook Reservation. The City and MWRA had worked closely with DCR during development and environmental review of the Alewife Brook CSO control plan to ensure that the new

facilities will be compatible with DCR's Master Plan for the Alewife Reservation, and the City and DCR cooperatively filed the Article 97 legislation. The City selected a bidder, P. Gioioso and Sons, but was unable to issue the Notice to Proceed (NTP) for construction of the contract because all easements need to be secured in order for DEP to authorize the City to issue the NTP in accordance with the Massachusetts Clean Water Revolving Fund regulations. The City is continuing to negotiate the final easements necessary and expects to issue the NTP in 2011.

In an effort to mitigate further delay with commencement of Contract 12, the City is working with the contractor in reviewing shop drawings and submittals and purchasing materials to accelerate mobilization once the contract is signed.

Contracts 8A, 8B and 9

The City plans to condense the construction duration of the CAM004 sewer separation project (Contracts 8A, 8B and 9), in order to maintain the December 2015 construction completion date previously proposed by MWRA and the City. Design of Contract 8A began in December 2010. Construction is anticipated to begin in Summer 2012. Design for Contract 8B and 9 are scheduled to begin in January 2012 and January 2013 respectively.

3.2 Project Schedule

Design and construction milestones for the Alewife Brook projects were added to Schedule Seven in 2006 when EPA and DEP approved the regional long-term CSO control plan. However, the wetland appeals process continued through 2007 and into 2008. As a result of the delays associated with the wetlands appeals, the City has developed new project schedules and time estimates to complete major design, permitting and construction tasks.

Project	Benefit	Implementation Status	Scheduled Completion
Contract 4: Interceptor Connection Relief and Floatables Control	Upgrades connections between Cambridge and MWRA systems to provide greater capacity; provides floatables control.	Project completed in October 2010.	2010
Contract 13: CAM400 Manhole Separation	Removes stormwater from the sewer system; eliminate CSO at Outfall CAM400.	In construction, sewer separation work to be completed in March 2011.	2011
Contract 12: CAM004 Stormwater Outfall and Wetland Basin	Conveys separated stormwater flows to wetland system for treatment and flow attenuation.	Commence construction in Spring 2011.	2013
Contracts 8A, 8B and 9: CAM004 Sewer Separation	Removes stormwater from the sewer system; eliminate CSO at Outfall CAM004.	Early work along Fresh Pond Parkway was completed in 2000-02. Sewer Separation design has begun in Contract 8A.	2015

MWRA is seeking approval on the federal court case to amend the Schedule Seven milestones in accordance with the proposed project schedules. The projects are anticipated to meet existing and proposed milestone deadlines established in Schedule Seven of the Order.

MWRA plans to resume discussions with EPA and DEP on the proposed schedules for the Alewife Brook projects and related proposed changes to respective milestones in Schedule Seven once the NTP is issued for construction of Contract 12.

Table 3.1 – City of Cambridge CSO Abatement Projects and Status, December 2010

CSO Outfall	Required Project Type Under 2nd Stipulation	Receiving Water	Contract / Project Name	Completion Date or *Proposed Completion Date*	Notes
CAM001	Floatables Control	Alewife	Contract 4 - Floatables	*October 2010*	Baffles installed.
CAM002	Floatables control; interceptor relief	Alewife	Contract 4 - Floatables	*October 2010*	Baffles installed 2010 and underflow enlarged.
CAM004	Sewer Separation	Alewife	2A/2B Fresh Pond Parkway	2001	CSO is now controlled by Drain Vault 5
CAM004	Sewer Separation	Alewife	Contract 8A/8B/9	*December 2015*	At completion, CSO at CAM004 will be eliminated
CAM004	Sewer Separation	Alewife	Contract 12- Stormwater Outfall	*July 2012*	Stormwater outfall and treatment wetland
CAM400	Sewer Separation / common manholes	Alewife	Contract 13	*March 2011*	CSO regulator to be eliminated; convert to stormwater outfall. 65% of sewer separation completed.
CAM401A	Floatables Control	Alewife	Bellis Circle	2005	Installed brush screen
CAM401B	Floatables control; interceptor relief	Alewife	Contract 4- Floatables	*October 2010*	Baffles installed in 2010 and underflow enlarged.
CAM005	Hydraulic Relief	Charles	MWRA CAM005 Hydraulic Relief	2000	For full project description see: http://www.mwra.com/annual/csoar/2009/csoar2009.pdf
CAM007	Floatables Control	Charles	Contract 5	2009	Baffle installed
CAM009	Floatables Control	Charles	Contract 5	2009	Outfall temporarily plugged
CAM011	Floatables Control	Charles	Contract 5	2009	Outfall temporarily plugged
CAM017	Floatables Control	Charles	Contract 5	2009	Baffles were installed in 2009.

4.0 Modifications to Nine Minimum Controls Plan

The Nine Minimum Controls Plan (NMCP) was updated in its entirety and submitted together with the first annual report (April 2009). The Plan provides a summary of the evaluations undertaken to address each control measure since the original plan was developed in 1997. Enhancements were made to the NMCP to meet the minimum implementation levels stipulated in the permit. During 2010 and in accordance with Part 1, Section D, Paragraph.5 of Permit No. MA0101974 the City performed an assessment of the potential for inflow from Alewife Brook to enter the combined sewer system through the existing regulator structures over a range of flood conditions and corresponding Brook levels. This assessment includes a summary of cost, feasibility, and effectiveness of installing inflow controls on the remaining CSO outfalls if flow does enter the combined sewer system more frequently than the 100 year storm. This assessment is provided in its entirety in **Appendix IV**.

APPENDIX I

2010 Precipitation Data

- Fresh Pond Parkway (USGS)
- DPW
- Water Department

- Fresh Pond Parkway (USGS) Rain Gauge

CITY OF CAMBRIDGE
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
1/1/2010	0.05	0.04	0.04
1/2/2010	0.05	0.04	0.04
1/3/2010	0.00	0.00	0.00
1/4/2010	0.00	0.00	0.00
1/5/2010	0.00	0.00	0.00
1/6/2010	0.00	0.00	0.00
1/7/2010	0.00	0.00	0.00
1/8/2010	0.00	0.00	0.00
1/9/2010	0.00	0.00	0.00
1/10/2010	0.00	0.00	0.00
1/11/2010	0.00	0.00	0.00
1/12/2010	0.00	0.00	0.00
1/13/2010	0.00	0.00	0.00
1/14/2010	0.00	0.00	0.00
1/15/2010	0.00	0.00	0.00
1/16/2010	0.00	0.00	0.00
1/17/2010	0.46	0.20	0.09
1/18/2010	0.57	0.16	0.06
1/19/2010	0.61	0.12	0.05
1/20/2010	0.14	0.04	0.04
1/21/2010	0.00	0.00	0.00
1/22/2010	0.00	0.00	0.00
1/23/2010	0.00	0.00	0.00
1/24/2010	0.00	0.00	0.00
1/25/2010	1.08	0.48	0.15
1/26/2010	0.02	0.04	0.04
1/27/2010	0.00	0.00	0.00
1/28/2010	0.04	0.04	0.04
1/29/2010	0.00	0.00	0.00
1/30/2010	0.00	0.00	0.00
1/31/2010	0.00	0.00	0.00
Jan-10	**3.02**		

Notes:
Rainfall data provided by USGS based on rainfall measured at Fresh Pond gauge

Rainfall was measured in fifteen minute intervals
"*" denotes peak intensity measured over a 15 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
2/1/2010	0.00	0.00	0.00
2/2/2010	0.00	0.00	0.00
2/3/2010	0.02	0.04	0.04
2/4/2010	0.00	0.00	0.00
2/5/2010	0.00	0.00	0.00
2/6/2010	0.00	0.00	0.00
2/7/2010	0.00	0.00	0.00
2/8/2010	0.00	0.00	0.00
2/9/2010	0.00	0.00	0.00
2/10/2010	0.05	0.04	0.04
2/11/2010	0.00	0.00	0.00
2/12/2010	0.00	0.00	0.00
2/13/2010	0.00	0.00	0.00
2/14/2010	0.00	0.00	0.00
2/15/2010	0.00	0.00	0.00
2/16/2010	0.24	0.08	0.05
2/17/2010	0.21	0.12	0.06
2/18/2010	0.00	0.00	0.00
2/19/2010	0.00	0.00	0.00
2/20/2010	0.00	0.00	0.00
2/21/2010	0.00	0.00	0.00
2/22/2010	0.00	0.00	0.00
2/23/2010	0.05	0.08	0.05
2/24/2010	2.43	0.32	0.12
2/25/2010	1.57	0.44	0.12
2/26/2010	0.06	0.08	0.05
2/27/2010	0.09	0.12	0.06
2/28/2010	0.00	0.00	0.00
Feb-10	**4.72**		

Notes:
Rainfall data provided by USGS based on rainfall measured at Fresh Pond gauge

Rainfall was measured in fifteen minute intervals
"*" denotes peak intensity measured over a 15 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
3/1/2010	0.20	0.08	0.04
3/2/2010	0.00	0.00	0.00
3/3/2010	0.04	0.04	0.04
3/4/2010	0.05	0.04	0.04
3/5/2010	0.01	0.04	0.04
3/6/2010	0.00	0.00	0.00
3/7/2010	0.00	0.00	0.00
3/8/2010	0.00	0.00	0.00
3/9/2010	0.00	0.00	0.00
3/10/2010	0.00	0.00	0.00
3/11/2010	0.06	0.08	0.05
3/12/2010	0.00	0.00	0.00
3/13/2010	1.39	0.24	0.10
3/14/2010	5.82	1.32	0.25
3/15/2010	2.32	0.32	0.12
3/16/2010	0.00	0.00	0.00
3/17/2010	0.00	0.00	0.00
3/18/2010	0.00	0.00	0.00
3/19/2010	0.00	0.00	0.00
3/20/2010	0.00	0.00	0.00
3/21/2010	0.00	0.00	0.00
3/22/2010	0.10	0.08	0.05
3/23/2010	1.78	0.48	0.13
3/24/2010	0.01	0.04	0.04
3/25/2010	0.00	0.00	0.00
3/26/2010	0.14	0.08	0.04
3/27/2010	0.00	0.00	0.00
3/28/2010	0.00	0.00	0.00
3/29/2010	1.97	0.40	0.11
3/30/2010	3.33	0.64	0.15
3/31/2010	0.06	0.04	0.04
Mar-10	**17.28**		

Notes:
Rainfall data provided by USGS based on rainfall measured at Fresh Pond gauge

Rainfall was measured in fifteen minute intervals
"*" denotes peak intensity measured over a 15 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
4/1/2010	0.00	0.00	0.00
4/2/2010	0.00	0.00	0.00
4/3/2010	0.00	0.00	0.00
4/4/2010	0.00	0.00	0.00
4/5/2010	0.00	0.00	0.00
4/6/2010	0.00	0.00	0.00
4/7/2010	0.00	0.00	0.00
4/8/2010	0.00	0.00	0.00
4/9/2010	0.91	0.24	0.10
4/10/2010	0.00	0.00	0.00
4/11/2010	0.00	0.00	0.00
4/12/2010	0.00	0.00	0.00
4/13/2010	0.00	0.00	0.00
4/14/2010	0.00	0.00	0.00
4/15/2010	0.00	0.00	0.00
4/16/2010	0.52	0.16	0.08
4/17/2010	0.21	0.04	0.04
4/18/2010	0.07	0.08	0.05
4/19/2010	0.00	0.00	0.00
4/20/2010	0.00	0.00	0.00
4/21/2010	0.00	0.00	0.00
4/22/2010	0.03	0.04	0.04
4/23/2010	0.00	0.00	0.00
4/24/2010	0.00	0.00	0.00
4/25/2010	0.00	0.00	0.00
4/26/2010	0.03	0.04	0.04
4/27/2010	0.14	0.12	0.06
4/28/2010	0.05	0.04	0.04
4/29/2010	0.00	0.00	0.00
4/30/2010	0.00	0.00	0.00
Apr-10	**1.96**		

Notes:
Rainfall data provided by USGS based on rainfall measured at Fresh Pond gauge

Rainfall was measured in fifteen minute intervals
"*" denotes peak intensity measured over a 15 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
5/1/2010	0.00	0.00	0.00
5/2/2010	0.00	0.00	0.00
5/3/2010	0.03	0.04	0.04
5/4/2010	0.04	0.12	0.08
5/5/2010	0.00	0.00	0.00
5/6/2010	0.01	0.04	0.04
5/7/2010	0.00	0.00	0.00
5/8/2010	0.92	0.52	0.13
5/9/2010	0.00	0.00	0.00
5/10/2010	0.00	0.00	0.00
5/11/2010	0.00	0.00	0.00
5/12/2010	0.00	0.00	0.00
5/13/2010	0.00	0.00	0.00
5/14/2010	0.40	0.96	0.18
5/15/2010	0.00	0.00	0.00
5/16/2010	0.00	0.00	0.00
5/17/2010	0.00	0.00	0.00
5/18/2010	0.92	0.40	0.14
5/19/2010	0.37	0.32	0.07
5/20/2010	0.00	0.00	0.00
5/21/2010	0.00	0.00	0.00
5/22/2010	0.00	0.00	0.00
5/23/2010	0.00	0.00	0.00
5/24/2010	0.00	0.00	0.00
5/25/2010	0.00	0.00	0.00
5/26/2010	0.03	0.12	0.12
5/27/2010	0.06	0.20	0.12
5/28/2010	0.00	0.00	0.00
5/29/2010	0.10	0.28	0.20
5/30/2010	0.00	0.00	0.00
5/31/2010	0.00	0.00	0.00
May-10	**2.88**		

Notes:
Rainfall data provided by USGS based on rainfall measured at Fresh Pond gauge

Rainfall was measured in fifteen minute intervals
"*" denotes peak intensity measured over a 15 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
6/1/2010	0.96	1.44	0.35
6/2/2010	0.00	0.00	0.00
6/3/2010	0.43	1.16	0.86
6/4/2010	0.00	0.00	0.00
6/5/2010	0.56	1.72	0.37
6/6/2010	1.23	2.28	0.62
6/7/2010	0.00	0.00	0.00
6/8/2010	0.00	0.00	0.00
6/9/2010	0.06	0.04	0.04
6/10/2010	0.13	0.04	0.04
6/11/2010	0.00	0.00	0.00
6/12/2010	0.30	0.32	0.07
6/13/2010	0.04	0.08	0.05
6/14/2010	0.00	0.00	0.00
6/15/2010	0.00	0.00	0.00
6/16/2010	0.01	0.04	0.04
6/17/2010	0.00	0.00	0.00
6/18/2010	0.00	0.00	0.00
6/19/2010	0.00	0.00	0.00
6/20/2010	0.02	0.04	0.04
6/21/2010	0.00	0.00	0.00
6/22/2010	0.00	0.00	0.00
6/23/2010	0.11	0.12	0.07
6/24/2010	0.18	0.56	0.18
6/25/2010	0.00	0.00	0.00
6/26/2010	0.00	0.00	0.00
6/27/2010	0.00	0.00	0.00
6/28/2010	0.00	0.00	0.00
6/29/2010	0.00	0.00	0.00
6/30/2010	0.00	0.00	0.00
Jun-10	**4.03**		

Notes:
Rainfall data provided by USGS based on rainfall measured at Fresh Pond gauge

Rainfall was measured in fifteen minute intervals
"*" denotes peak intensity measured over a 15 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
7/1/2010	0.00	0.00	0.00
7/2/2010	0.00	0.00	0.00
7/3/2010	0.00	0.00	0.00
7/4/2010	0.00	0.00	0.00
7/5/2010	0.00	0.00	0.00
7/6/2010	0.00	0.00	0.00
7/7/2010	0.00	0.00	0.00
7/8/2010	0.00	0.00	0.00
7/9/2010	0.00	0.00	0.00
7/10/2010	1.77	4.68	0.88
7/11/2010	0.14	0.24	0.19
7/12/2010	0.00	0.00	0.00
7/13/2010	0.05	0.08	0.05
7/14/2010	0.14	0.04	0.04
7/15/2010	0.00	0.00	0.00
7/16/2010	0.09	0.12	0.06
7/17/2010	0.00	0.00	0.00
7/18/2010	0.00	0.00	0.00
7/19/2010	0.11	0.12	0.09
7/20/2010	0.00	0.00	0.00
7/21/2010	0.01	0.04	0.04
7/22/2010	0.03	0.12	0.12
7/23/2010	0.43	0.68	0.11
7/24/2010	0.00	0.00	0.00
7/25/2010	0.00	0.00	0.00
7/26/2010	0.00	0.00	0.00
7/27/2010	0.00	0.00	0.00
7/28/2010	0.00	0.00	0.00
7/29/2010	0.06	0.08	0.06
7/30/2010	0.00	0.00	0.00
7/31/2010	0.00	0.00	0.00
Jul-10	**2.83**		

Notes:
Rainfall data provided by USGS based on rainfall measured at Fresh Pond gauge

Rainfall was measured in fifteen minute intervals
"*" denotes peak intensity measured over a 15 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
8/1/2010	0.00	0.00	0.00
8/2/2010	0.00	0.00	0.00
8/3/2010	0.00	0.00	0.00
8/4/2010	0.00	0.00	0.00
8/5/2010	0.70	1.08	0.47
8/6/2010	0.00	0.00	0.00
8/7/2010	0.00	0.00	0.00
8/8/2010	0.00	0.00	0.00
8/9/2010	0.00	0.00	0.00
8/10/2010	0.06	0.04	0.04
8/11/2010	0.01	0.04	0.04
8/12/2010	0.00	0.00	0.00
8/13/2010	0.00	0.00	0.00
8/14/2010	0.00	0.00	0.00
8/15/2010	0.00	0.00	0.00
8/16/2010	0.15	0.20	0.09
8/17/2010	0.00	0.00	0.00
8/18/2010	0.00	0.00	0.00
8/19/2010	0.00	0.00	0.00
8/20/2010	0.00	0.00	0.00
8/21/2010	0.00	0.00	0.00
8/22/2010	0.25	0.12	0.05
8/23/2010	0.70	0.12	0.05
8/24/2010	0.77	0.20	0.08
8/25/2010	2.79	0.92	0.25
8/26/2010	0.00	0.00	0.00
8/27/2010	0.00	0.00	0.00
8/28/2010	0.00	0.00	0.00
8/29/2010	0.00	0.00	0.00
8/30/2010	0.00	0.00	0.00
8/31/2010	0.00	0.00	0.00
Aug-10	**5.43**		

Notes:
Rainfall data provided by USGS based on rainfall measured at Fresh Pond gauge

Rainfall was measured in fifteen minute intervals
"*" denotes peak intensity measured over a 15 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
9/1/2010	0.00	0.00	0.00
9/2/2010	0.00	0.00	0.00
9/3/2010	0.29	0.24	0.09
9/4/2010	0.16	0.36	0.11
9/5/2010	0.00	0.00	0.00
9/6/2010	0.00	0.00	0.00
9/7/2010	0.00	0.00	0.00
9/8/2010	0.43	1.12	0.34
9/9/2010	0.00	0.00	0.00
9/10/2010	0.00	0.00	0.00
9/11/2010	0.02	0.04	0.04
9/12/2010	0.00	0.00	0.00
9/13/2010	0.15	0.28	0.09
9/14/2010	0.09	0.36	0.36
9/15/2010	0.00	0.00	0.00
9/16/2010	0.14	0.16	0.08
9/17/2010	0.12	0.04	0.04
9/18/2010	0.01	0.04	0.04
9/19/2010	0.01	0.04	0.04
9/20/2010	0.00	0.00	0.00
9/21/2010	0.00	0.00	0.00
9/22/2010	0.00	0.00	0.00
9/23/2010	0.02	0.04	0.04
9/24/2010	0.00	0.00	0.00
9/25/2010	0.00	0.00	0.00
9/26/2010	0.00	0.00	0.00
9/27/2010	0.14	0.24	0.07
9/28/2010	0.87	0.92	0.27
9/29/2010	0.01	0.04	0.04
9/30/2010	0.01	0.04	0.04
Sep-10	**2.47**		

Notes:
Rainfall data provided by USGS based on rainfall measured at Fresh Pond gauge

Rainfall was measured in fifteen minute intervals
"*" denotes peak intensity measured over a 15 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
10/1/2010	0.74	0.32	0.12
10/2/2010	0.00	0.00	0.00
10/3/2010	0.00	0.00	0.00
10/4/2010	0.34	0.20	0.08
10/5/2010	0.09	0.04	0.04
10/6/2010	1.31	0.48	0.10
10/7/2010	0.01	0.04	0.04
10/8/2010	0.00	0.00	0.00
10/9/2010	0.00	0.00	0.00
10/10/2010	0.00	0.00	0.00
10/11/2010	0.01	0.04	0.04
10/12/2010	0.07	0.08	0.06
10/13/2010	0.01	0.04	0.04
10/14/2010	0.05	0.08	0.05
10/15/2010	1.74	0.52	0.18
10/16/2010	0.00	0.00	0.00
10/17/2010	0.00	0.00	0.00
10/18/2010	0.00	0.00	0.00
10/19/2010	0.00	0.00	0.00
10/20/2010	0.00	0.00	0.00
10/21/2010	0.04	0.08	0.05
10/22/2010	0.00	0.00	0.00
10/23/2010	0.00	0.00	0.00
10/24/2010	0.01	0.04	0.04
10/25/2010	0.02	0.04	0.04
10/26/2010	0.00	0.00	0.00
10/27/2010	0.06	0.08	0.06
10/28/2010	0.00	0.00	0.00
10/29/2010	0.02	0.08	0.08
10/30/2010	0.00	0.00	0.00
10/31/2010	0.00	0.00	0.00
Oct-10	**4.52**		

Notes:
Rainfall data provided by USGS based on rainfall measured at Fresh Pond gauge

Rainfall was measured in fifteen minute intervals
"*" denotes peak intensity measured over a 15 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
11/1/2010	0.00	0.00	0.00
11/2/2010	0.00	0.00	0.00
11/3/2010	0.00	0.00	0.00
11/4/2010	0.83	0.20	0.09
11/5/2010	0.52	0.48	0.11
11/6/2010	0.00	0.00	0.00
11/7/2010	0.09	0.08	0.06
11/8/2010	0.65	0.36	0.07
11/9/2010	0.06	0.08	0.05
11/10/2010	0.05	0.08	0.07
11/11/2010	0.00	0.00	0.00
11/12/2010	0.00	0.00	0.00
11/13/2010	0.00	0.00	0.00
11/14/2010	0.00	0.00	0.00
11/15/2010	0.00	0.00	0.00
11/16/2010	0.02	0.04	0.04
11/17/2010	1.09	0.52	0.16
11/18/2010	0.00	0.00	0.00
11/19/2010	0.00	0.00	0.00
11/20/2010	0.00	0.00	0.00
11/21/2010	0.00	0.00	0.00
11/22/2010	0.01	0.04	0.04
11/23/2010	0.00	0.00	0.00
11/24/2010	0.00	0.00	0.00
11/25/2010	0.00	0.00	0.00
11/26/2010	0.19	0.08	0.04
11/27/2010	0.00	0.00	0.00
11/28/2010	0.00	0.00	0.00
11/29/2010	0.00	0.00	0.00
11/30/2010	0.00	0.00	0.00
Nov-10	**3.51**		

Notes:
Rainfall data provided by USGS based on rainfall measured at Fresh Pond gauge

Rainfall was measured in fifteen minute intervals
"*" denotes peak intensity measured over a 15 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
12/1/2010	0.48	0.40	0.08
12/2/2010	0.00	0.00	0.00
12/3/2010	0.00	0.00	0.00
12/4/2010	0.00	0.00	0.00
12/5/2010	0.00	0.00	0.00
12/6/2010	0.00	0.00	0.00
12/7/2010	0.00	0.00	0.00
12/8/2010	0.00	0.00	0.00
12/9/2010	0.00	0.00	0.00
12/10/2010	0.00	0.00	0.00
12/11/2010	0.00	0.00	0.00
12/12/2010	1.77	0.56	0.14
12/13/2010	0.38	1.00	0.38
12/14/2010	0.00	0.00	0.00
12/15/2010	0.00	0.00	0.00
12/16/2010	0.00	0.00	0.00
12/17/2010	0.00	0.00	0.00
12/18/2010	0.00	0.00	0.00
12/19/2010	0.00	0.00	0.00
12/20/2010	0.00	0.00	0.00
12/21/2010	0.00	0.00	0.00
12/22/2010	0.00	0.00	0.00
12/23/2010	0.00	0.00	0.00
12/24/2010	0.00	0.00	0.00
12/25/2010	0.00	0.00	0.00
12/26/2010	0.00	0.00	0.00
12/27/2010	0.00	0.00	0.00
12/28/2010	0.00	0.00	0.00
12/29/2010	0.00	0.00	0.00
12/30/2010	0.00	0.00	0.00
12/31/2010	0.00	0.00	0.00
Dec-10	**2.63**		

Notes:
Rainfall data provided by USGS based on rainfall measured at Fresh Pond gauge

Rainfall was measured in fifteen minute intervals
"*" denotes peak intensity measured over a 15 minute time period.
Shaded Data denotes CSO discharge.

- DPW Rain Gauge

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
2010 DAILY RAINFALL DATA
147 HAMPSHIRE STREET, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
1/1/2010	N/A	N/A	N/A
1/2/2010	N/A	N/A	N/A
1/3/2010	N/A	N/A	N/A
1/4/2010	N/A	N/A	N/A
1/5/2010	N/A	N/A	N/A
1/6/2010	N/A	N/A	N/A
1/7/2010	N/A	N/A	N/A
1/8/2010	N/A	N/A	N/A
1/9/2010	N/A	N/A	N/A
1/10/2010	N/A	N/A	N/A
1/11/2010	N/A	N/A	N/A
1/12/2010	N/A	N/A	N/A
1/13/2010	N/A	N/A	N/A
1/14/2010	N/A	N/A	N/A
1/15/2010	N/A	N/A	N/A
1/16/2010	N/A	N/A	N/A
1/17/2010	N/A	N/A	N/A
1/18/2010	N/A	N/A	N/A
1/19/2010	N/A	N/A	N/A
1/20/2010	N/A	N/A	N/A
1/21/2010	N/A	N/A	N/A
1/22/2010	N/A	N/A	N/A
1/23/2010	N/A	N/A	N/A
1/24/2010	N/A	N/A	N/A
1/25/2010	N/A	N/A	N/A
1/26/2010	N/A	N/A	N/A
1/27/2010	N/A	N/A	N/A
1/28/2010	N/A	N/A	N/A
1/29/2010	N/A	N/A	N/A
1/30/2010	N/A	N/A	N/A
1/31/2010	N/A	N/A	N/A
Jan-10	**0.00**		

Notes:
Rainfall data measured at Cambridge Department of Public Works gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
2010 DAILY RAINFALL DATA
147 HAMPSHIRE STREET, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
2/1/2010	N/A	N/A	N/A
2/2/2010	N/A	N/A	N/A
2/3/2010	N/A	N/A	N/A
2/4/2010	N/A	N/A	N/A
2/5/2010	N/A	N/A	N/A
2/6/2010	N/A	N/A	N/A
2/7/2010	N/A	N/A	N/A
2/8/2010	N/A	N/A	N/A
2/9/2010	N/A	N/A	N/A
2/10/2010	N/A	N/A	N/A
2/11/2010	N/A	N/A	N/A
2/12/2010	N/A	N/A	N/A
2/13/2010	N/A	N/A	N/A
2/14/2010	N/A	N/A	N/A
2/15/2010	N/A	N/A	N/A
2/16/2010	N/A	N/A	N/A
2/17/2010	N/A	N/A	N/A
2/18/2010	N/A	N/A	N/A
2/19/2010	N/A	N/A	N/A
2/20/2010	N/A	N/A	N/A
2/21/2010	N/A	N/A	N/A
2/22/2010	N/A	N/A	N/A
2/23/2010	N/A	N/A	N/A
2/24/2010	N/A	N/A	N/A
2/25/2010	N/A	N/A	N/A
2/26/2010	N/A	N/A	N/A
2/27/2010	N/A	N/A	N/A
2/28/2010	N/A	N/A	N/A
Feb-10	**0.00**		

Notes:
Rainfall data measured at Cambridge Department of Public Works gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
2010 DAILY RAINFALL DATA
147 HAMPSHIRE STREET, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
3/1/2010	N/A	N/A	N/A
3/2/2010	N/A	N/A	N/A
3/3/2010	N/A	N/A	N/A
3/4/2010	N/A	N/A	N/A
3/5/2010	N/A	N/A	N/A
3/6/2010	N/A	N/A	N/A
3/7/2010	N/A	N/A	N/A
3/8/2010	N/A	N/A	N/A
3/9/2010	N/A	N/A	N/A
3/10/2010	N/A	N/A	N/A
3/11/2010	0.05	0.06	0.04
3/12/2010	0.00	0.00	0.00
3/13/2010	1.74	0.24	0.12
3/14/2010	6.15	0.66	0.26
3/15/2010	2.72	0.36	0.14
3/16/2010	N/A	N/A	N/A
3/17/2010	N/A	N/A	N/A
3/18/2010	N/A	N/A	N/A
3/19/2010	N/A	N/A	N/A
3/20/2010	N/A	N/A	N/A
3/21/2010	N/A	N/A	N/A
3/22/2010	0.06	0.03	0.03
3/23/2010	2.22	0.78	0.13
3/24/2010	0.03	0.03	0.03
3/25/2010	0.00	0.00	0.00
3/26/2010	0.22	0.06	0.05
3/27/2010	0.00	0.00	0.00
3/28/2010	0.00	0.00	0.00
3/29/2010	2.07	0.36	0.11
3/30/2010	3.61	0.57	0.17
3/31/2010	0.15	0.36	0.07
Mar-10	**19.02**		

Notes:
Rainfall data measured at Cambridge Department of Public Works gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
2010 DAILY RAINFALL DATA
147 HAMPSHIRE STREET, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
4/1/2010	0.00	0.00	0.00
4/2/2010	0.00	0.00	0.00
4/3/2010	0.00	0.00	0.00
4/4/2010	0.00	0.00	0.00
4/5/2010	0.00	0.00	0.00
4/6/2010	0.00	0.00	0.00
4/7/2010	0.00	0.00	0.00
4/8/2010	0.00	0.00	0.00
4/9/2010	0.94	0.24	0.08
4/10/2010	0.00	0.00	0.00
4/11/2010	0.00	0.00	0.00
4/12/2010	0.00	0.00	0.00
4/13/2010	0.00	0.00	0.00
4/14/2010	0.00	0.00	0.00
4/15/2010	0.00	0.00	0.00
4/16/2010	0.40	0.12	0.06
4/17/2010	0.34	0.12	0.04
4/18/2010	0.06	0.06	0.04
4/19/2010	0.01	0.03	0.03
4/20/2010	0.00	0.00	0.00
4/21/2010	0.00	0.00	0.00
4/22/2010	0.17	0.48	0.26
4/23/2010	0.00	0.00	0.00
4/24/2010	0.00	0.00	0.00
4/25/2010	0.00	0.00	0.00
4/26/2010	0.02	0.03	0.03
4/27/2010	0.15	0.12	0.06
4/28/2010	0.06	0.03	0.03
4/29/2010	0.00	0.00	0.00
4/30/2010	0.00	0.00	0.00
Apr-10	**2.15**		

Notes:
Rainfall data measured at Cambridge Department of Public Works gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
2010 DAILY RAINFALL DATA
147 HAMPSHIRE STREET, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
5/1/2010	0.00	0.00	0.00
5/2/2010	0.00	0.00	0.00
5/3/2010	0.02	0.03	0.03
5/4/2010	0.02	0.06	0.06
5/5/2010	0.00	0.00	0.00
5/6/2010	0.01	0.03	0.03
5/7/2010	0.00	0.00	0.00
5/8/2010	1.12	0.66	0.15
5/9/2010	0.00	0.00	0.00
5/10/2010	0.00	0.00	0.00
5/11/2010	0.00	0.00	0.00
5/12/2010	0.00	0.00	0.00
5/13/2010	0.00	0.00	0.00
5/14/2010	0.35	0.69	0.21
5/15/2010	0.00	0.00	0.00
5/16/2010	0.00	0.00	0.00
5/17/2010	0.00	0.00	0.00
5/18/2010	0.70	0.27	0.11
5/19/2010	0.93	0.54	0.11
5/20/2010	0.00	0.00	0.00
5/21/2010	0.00	0.00	0.00
5/22/2010	0.00	0.00	0.00
5/23/2010	0.00	0.00	0.00
5/24/2010	0.00	0.00	0.00
5/25/2010	0.00	0.00	0.00
5/26/2010	0.00	0.00	0.00
5/27/2010	0.07	0.09	0.05
5/28/2010	0.00	0.00	0.00
5/29/2010	0.06	0.18	0.18
5/30/2010	0.00	0.00	0.00
5/31/2010	0.00	0.00	0.00
May-10	**3.28**		

Notes:
Rainfall data measured at Cambridge Department of Public Works gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
2010 DAILY RAINFALL DATA
147 HAMPSHIRE STREET, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
6/1/2010	0.75	0.57	0.20
6/2/2010	0.00	0.00	0.00
6/3/2010	0.26	0.57	0.39
6/4/2010	0.01	0.03	0.03
6/5/2010	0.41	1.08	0.21
6/6/2010	1.30	1.68	0.49
6/7/2010	0.00	0.00	0.00
6/8/2010	0.00	0.00	0.00
6/9/2010	0.05	0.03	0.03
6/10/2010	0.15	0.03	0.03
6/11/2010	0.00	0.00	0.00
6/12/2010	0.38	0.54	0.09
6/13/2010	0.04	0.06	0.04
6/14/2010	0.00	0.00	0.00
6/15/2010	0.00	0.00	0.00
6/16/2010	0.00	0.00	0.00
6/17/2010	0.00	0.00	0.00
6/18/2010	0.00	0.00	0.00
6/19/2010	0.00	0.00	0.00
6/20/2010	0.00	0.00	0.00
6/21/2010	0.00	0.00	0.00
6/22/2010	0.00	0.00	0.00
6/23/2010	0.07	0.12	0.07
6/24/2010	0.12	0.18	0.09
6/25/2010	0.00	0.00	0.00
6/26/2010	0.00	0.00	0.00
6/27/2010	0.00	0.00	0.00
6/28/2010	0.00	0.00	0.00
6/29/2010	0.00	0.00	0.00
6/30/2010	0.00	0.00	0.00
Jun-10	**3.54**		

Notes:
Rainfall data measured at Cambridge Department of Public Works gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
2010 DAILY RAINFALL DATA
147 HAMPSHIRE STREET, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
7/1/2010	0.00	0.00	0.00
7/2/2010	0.00	0.00	0.00
7/3/2010	0.00	0.00	0.00
7/4/2010	0.00	0.00	0.00
7/5/2010	0.00	0.00	0.00
7/6/2010	0.00	0.00	0.00
7/7/2010	0.00	0.00	0.00
7/8/2010	0.00	0.00	0.00
7/9/2010	0.00	0.00	0.00
7/10/2010	3.57	4.68	1.79
7/11/2010	0.07	0.18	0.11
7/12/2010	0.65	1.83	0.98
7/13/2010	0.04	0.03	0.03
7/14/2010	0.11	0.09	0.04
7/15/2010	0.00	0.00	0.00
7/16/2010	0.06	0.12	0.06
7/17/2010	0.00	0.00	0.00
7/18/2010	0.00	0.00	0.00
7/19/2010	0.04	0.06	0.04
7/20/2010	0.00	0.00	0.00
7/21/2010	0.01	0.03	0.03
7/22/2010	0.07	0.12	0.11
7/23/2010	0.47	0.78	0.12
7/24/2010	0.00	0.00	0.00
7/25/2010	0.00	0.00	0.00
7/26/2010	0.00	0.00	0.00
7/27/2010	0.00	0.00	0.00
7/28/2010	0.00	0.00	0.00
7/29/2010	0.06	0.12	0.06
7/30/2010	0.00	0.00	0.00
7/31/2010	0.00	0.00	0.00
Jul-10	**5.15**		

Notes:
Rainfall data measured at Cambridge Department of Public Works gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
2010 DAILY RAINFALL DATA
147 HAMPSHIRE STREET, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
8/1/2010	0.00	0.00	0.00
8/2/2010	0.00	0.00	0.00
8/3/2010	0.00	0.00	0.00
8/4/2010	0.00	0.00	0.00
8/5/2010	1.05	0.93	0.35
8/6/2010	0.00	0.00	0.00
8/7/2010	0.00	0.00	0.00
8/8/2010	0.00	0.00	0.00
8/9/2010	0.00	0.00	0.00
8/10/2010	0.07	0.06	0.35
8/11/2010	0.00	0.00	0.00
8/12/2010	0.00	0.00	0.00
8/13/2010	0.01	0.03	0.03
8/14/2010	0.00	0.00	0.00
8/15/2010	0.00	0.00	0.00
8/16/2010	0.19	0.21	0.06
8/17/2010	0.00	0.00	0.00
8/18/2010	0.00	0.00	0.00
8/19/2010	0.00	0.00	0.00
8/20/2010	0.00	0.00	0.00
8/21/2010	0.00	0.00	0.00
8/22/2010	0.25	0.12	0.05
8/23/2010	0.80	0.15	0.06
8/24/2010	0.99	0.30	0.08
8/25/2010	3.02	1.08	0.23
8/26/2010	0.00	0.00	0.00
8/27/2010	0.00	0.00	0.00
8/28/2010	0.00	0.00	0.00
8/29/2010	0.00	0.00	0.00
8/30/2010	0.00	0.00	0.00
8/31/2010	0.00	0.00	0.00
Aug-10	**6.38**		

Notes:
Rainfall data measured at Cambridge Department of Public Works gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
2010 DAILY RAINFALL DATA
147 HAMPSHIRE STREET, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
9/1/2010	0.00	0.00	0.00
9/2/2010	0.00	0.00	0.00
9/3/2010	0.26	0.27	0.11
9/4/2010	0.08	0.12	0.05
9/5/2010	0.00	0.00	0.00
9/6/2010	0.00	0.00	0.00
9/7/2010	0.00	0.00	0.00
9/8/2010	0.20	0.39	0.15
9/9/2010	0.00	0.00	0.00
9/10/2010	0.00	0.00	0.00
9/11/2010	0.00	0.00	0.00
9/12/2010	0.00	0.00	0.00
9/13/2010	0.13	0.18	0.08
9/14/2010	0.08	0.18	0.12
9/15/2010	0.00	0.00	0.00
9/16/2010	0.11	0.12	0.05
9/17/2010	0.16	0.12	0.04
9/18/2010	0.00	0.00	0.00
9/19/2010	0.00	0.00	0.00
9/20/2010	0.00	0.00	0.00
9/21/2010	0.00	0.00	0.00
9/22/2010	0.00	0.00	0.00
9/23/2010	0.00	0.00	0.00
9/24/2010	0.00	0.00	0.00
9/25/2010	0.00	0.00	0.00
9/26/2010	0.00	0.00	0.00
9/27/2010	0.03	0.03	0.03
9/28/2010	0.81	0.72	0.19
9/29/2010	0.00	0.00	0.00
9/30/2010	0.00	0.00	0.00
Sep-10	**1.86**		

Notes:
Rainfall data measured at Cambridge Department of Public Works gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
2010 DAILY RAINFALL DATA
147 HAMPSHIRE STREET, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
10/1/2010	0.77	0.33	0.10
10/2/2010	0.00	0.00	0.00
10/3/2010	0.00	0.00	0.00
10/4/2010	0.42	0.21	0.07
10/5/2010	0.12	0.03	0.03
10/6/2010	1.49	0.39	0.10
10/7/2010	0.00	0.00	0.00
10/8/2010	0.00	0.00	0.00
10/9/2010	0.00	0.00	0.00
10/10/2010	0.00	0.00	0.00
10/11/2010	0.00	0.00	0.00
10/12/2010	0.06	0.06	0.05
10/13/2010	0.00	0.00	0.00
10/14/2010	0.04	0.06	0.05
10/15/2010	2.08	0.54	0.21
10/16/2010	0.00	0.00	0.00
10/17/2010	0.00	0.00	0.00
10/18/2010	0.00	0.00	0.00
10/19/2010	0.00	0.00	0.00
10/20/2010	0.00	0.00	0.00
10/21/2010	0.05	0.09	0.05
10/22/2010	0.00	0.00	0.00
10/23/2010	0.00	0.00	0.00
10/24/2010	0.01	0.03	0.03
10/25/2010	0.02	0.03	0.03
10/26/2010	0.00	0.00	0.00
10/27/2010	0.14	0.03	0.14
10/28/2010	0.00	0.00	0.00
10/29/2010	0.01	0.03	0.03
10/30/2010	0.00	0.00	0.00
10/31/2010	0.00	0.00	0.00
Oct-10	**5.21**		

Notes:
Rainfall data measured at Cambridge Department of Public Works gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
2010 DAILY RAINFALL DATA
147 HAMPSHIRE STREET, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
11/1/2010	0.00	0.00	0.00
11/2/2010	0.00	0.00	0.00
11/3/2010	0.00	0.00	0.00
11/4/2010	1.04	0.30	0.10
11/5/2010	0.53	0.36	0.08
11/6/2010	0.00	0.00	0.00
11/7/2010	0.07	0.12	0.06
11/8/2010	0.87	0.18	0.07
11/9/2010	0.11	0.06	0.04
11/10/2010	0.07	0.09	0.04
11/11/2010	0.00	0.00	0.00
11/12/2010	0.00	0.00	0.00
11/13/2010	0.00	0.00	0.00
11/14/2010	0.00	0.00	0.00
11/15/2010	0.00	0.00	0.00
11/16/2010	0.05	0.03	0.03
11/17/2010	1.09	0.33	0.16
11/18/2010	0.00	0.00	0.00
11/19/2010	0.00	0.00	0.00
11/20/2010	0.00	0.00	0.00
11/21/2010	0.00	0.00	0.00
11/22/2010	0.00	0.00	0.00
11/23/2010	0.00	0.00	0.00
11/24/2010	0.00	0.00	0.00
11/25/2010	0.00	0.00	0.00
11/26/2010	0.17	0.06	0.04
11/27/2010	0.00	0.00	0.00
11/28/2010	0.00	0.00	0.00
11/29/2010	0.00	0.00	0.00
11/30/2010	0.00	0.00	0.00
Nov-10	**4.00**		

Notes:
Rainfall data measured at Cambridge Department of Public Works gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
2010 DAILY RAINFALL DATA
147 HAMPSHIRE STREET, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
12/1/2010	0.48	0.27	0.09
12/2/2010	0.00	0.00	0.00
12/3/2010	0.00	0.00	0.00
12/4/2010	0.00	0.00	0.00
12/5/2010	0.00	0.00	0.00
12/6/2010	0.00	0.00	0.00
12/7/2010	0.00	0.00	0.00
12/8/2010	0.00	0.00	0.00
12/9/2010	0.00	0.00	0.00
12/10/2010	0.00	0.00	0.00
12/11/2010	0.00	0.00	0.00
12/12/2010	1.65	0.33	0.11
12/13/2010	0.32	0.48	0.20
12/14/2010	0.00	0.00	0.00
12/15/2010	0.00	0.00	0.00
12/16/2010	0.00	0.00	0.00
12/17/2010	0.00	0.00	0.00
12/18/2010	0.00	0.00	0.00
12/19/2010	0.00	0.00	0.00
12/20/2010	0.00	0.00	0.00
12/21/2010	0.11	0.18	0.10
12/22/2010	N/A	N/A	N/A
12/23/2010	N/A	N/A	N/A
12/24/2010	N/A	N/A	N/A
12/25/2010	N/A	N/A	N/A
12/26/2010	N/A	N/A	N/A
12/27/2010	N/A	N/A	N/A
12/28/2010	N/A	N/A	N/A
12/29/2010	N/A	N/A	N/A
12/30/2010	N/A	N/A	N/A
12/31/2010	N/A	N/A	N/A
Dec-10	**2.56**		

Notes:
Rainfall data measured at Cambridge Department of Public Works gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

- Water Department Rain Gauge

CITY OF CAMBRIDGE WATER DEPARTMENT
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
1/1/2010	N/A	N/A	N/A
1/2/2010	N/A	N/A	N/A
1/3/2010	N/A	N/A	N/A
1/4/2010	N/A	N/A	N/A
1/5/2010	N/A	N/A	N/A
1/6/2010	N/A	N/A	N/A
1/7/2010	N/A	N/A	N/A
1/8/2010	N/A	N/A	N/A
1/9/2010	N/A	N/A	N/A
1/10/2010	N/A	N/A	N/A
1/11/2010	N/A	N/A	N/A
1/12/2010	N/A	N/A	N/A
1/13/2010	N/A	N/A	N/A
1/14/2010	N/A	N/A	N/A
1/15/2010	N/A	N/A	N/A
1/16/2010	N/A	N/A	N/A
1/17/2010	N/A	N/A	N/A
1/18/2010	N/A	N/A	N/A
1/19/2010	N/A	N/A	N/A
1/20/2010	N/A	N/A	N/A
1/21/2010	N/A	N/A	N/A
1/22/2010	N/A	N/A	N/A
1/23/2010	N/A	N/A	N/A
1/24/2010	N/A	N/A	N/A
1/25/2010	N/A	N/A	N/A
1/26/2010	N/A	N/A	N/A
1/27/2010	N/A	N/A	N/A
1/28/2010	N/A	N/A	N/A
1/29/2010	N/A	N/A	N/A
1/30/2010	N/A	N/A	N/A
1/31/2010	N/A	N/A	N/A
Jan-10	**0.00**		

Notes:
Rainfall data measured at Cambridge Water Department gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE WATER DEPARTMENT
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
2/1/2010	N/A	N/A	N/A
2/2/2010	N/A	N/A	N/A
2/3/2010	N/A	N/A	N/A
2/4/2010	N/A	N/A	N/A
2/5/2010	N/A	N/A	N/A
2/6/2010	N/A	N/A	N/A
2/7/2010	N/A	N/A	N/A
2/8/2010	N/A	N/A	N/A
2/9/2010	N/A	N/A	N/A
2/10/2010	N/A	N/A	N/A
2/11/2010	N/A	N/A	N/A
2/12/2010	N/A	N/A	N/A
2/13/2010	N/A	N/A	N/A
2/14/2010	N/A	N/A	N/A
2/15/2010	N/A	N/A	N/A
2/16/2010	N/A	N/A	N/A
2/17/2010	N/A	N/A	N/A
2/18/2010	N/A	N/A	N/A
2/19/2010	N/A	N/A	N/A
2/20/2010	N/A	N/A	N/A
2/21/2010	N/A	N/A	N/A
2/22/2010	N/A	N/A	N/A
2/23/2010	N/A	N/A	N/A
2/24/2010	N/A	N/A	N/A
2/25/2010	N/A	N/A	N/A
2/26/2010	N/A	N/A	N/A
2/27/2010	N/A	N/A	N/A
2/28/2010	N/A	N/A	N/A
Feb-10	**0.00**		

Notes:
Rainfall data measured at Cambridge Water Department gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE WATER DEPARTMENT
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
3/1/2010	N/A	N/A	N/A
3/2/2010	N/A	N/A	N/A
3/3/2010	N/A	N/A	N/A
3/4/2010	N/A	N/A	N/A
3/5/2010	N/A	N/A	N/A
3/6/2010	N/A	N/A	N/A
3/7/2010	N/A	N/A	N/A
3/8/2010	N/A	N/A	N/A
3/9/2010	N/A	N/A	N/A
3/10/2010	N/A	N/A	N/A
3/11/2010	N/A	N/A	N/A
3/12/2010	N/A	N/A	N/A
3/13/2010	N/A	N/A	N/A
3/14/2010	N/A	N/A	N/A
3/15/2010	N/A	N/A	N/A
3/16/2010	N/A	N/A	N/A
3/17/2010	N/A	N/A	N/A
3/18/2010	N/A	N/A	N/A
3/19/2010	N/A	N/A	N/A
3/20/2010	N/A	N/A	N/A
3/21/2010	N/A	N/A	N/A
3/22/2010	N/A	N/A	N/A
3/23/2010	0.05	0.03	0.03
3/24/2010	1.05	0.27	0.08
3/25/2010	0.01	0.03	0.03
3/26/2010	0.00	0.00	0.00
3/27/2010	0.11	0.03	0.03
3/28/2010	N/A	N/A	N/A
3/29/2010	N/A	N/A	N/A
3/30/2010	N/A	N/A	N/A
3/31/2010	N/A	N/A	N/A
Mar-10	**1.22**		

Notes:
Rainfall data measured at Cambridge Water Department gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE WATER DEPARTMENT
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
4/1/2010	N/A	N/A	N/A
4/2/2010	N/A	N/A	N/A
4/3/2010	N/A	N/A	N/A
4/4/2010	N/A	N/A	N/A
4/5/2010	N/A	N/A	N/A
4/6/2010	N/A	N/A	N/A
4/7/2010	N/A	N/A	N/A
4/8/2010	N/A	N/A	N/A
4/9/2010	1.11	0.30	0.09
4/10/2010	0.00	0.00	0.00
4/11/2010	0.00	0.00	0.00
4/12/2010	0.00	0.00	0.00
4/13/2010	0.00	0.00	0.00
4/14/2010	0.00	0.00	0.00
4/15/2010	0.00	0.00	0.00
4/16/2010	0.50	0.15	0.08
4/17/2010	0.30	0.12	0.03
4/18/2010	0.07	0.09	0.05
4/19/2010	0.00	0.00	0.00
4/20/2010	0.00	0.00	0.00
4/21/2010	0.00	0.00	0.00
4/22/2010	0.02	0.03	0.03
4/23/2010	0.00	0.00	0.00
4/24/2010	0.00	0.00	0.00
4/25/2010	0.00	0.00	0.00
4/26/2010	0.01	0.03	0.03
4/27/2010	0.19	0.12	0.05
4/28/2010	0.07	0.03	0.03
4/29/2010	0.00	0.00	0.00
4/30/2010	0.00	0.00	0.00
Apr-10	**2.27**		

Notes:
Rainfall data measured at Cambridge Water Department gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE WATER DEPARTMENT
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
5/1/2010	0.00	0.00	0.00
5/2/2010	0.00	0.00	0.00
5/3/2010	0.02	0.03	0.03
5/4/2010	0.03	0.09	0.09
5/5/2010	0.00	0.00	0.00
5/6/2010	0.01	0.03	0.03
5/7/2010	0.00	0.00	0.00
5/8/2010	1.08	0.66	0.14
5/9/2010	0.00	0.00	0.00
5/10/2010	0.00	0.00	0.00
5/11/2010	0.00	0.00	0.00
5/12/2010	0.00	0.00	0.00
5/13/2010	0.00	0.00	0.00
5/14/2010	0.45	1.02	0.17
5/15/2010	0.00	0.00	0.00
5/16/2010	0.00	0.00	0.00
5/17/2010	0.00	0.00	0.00
5/18/2010	0.70	0.39	0.12
5/19/2010	0.84	0.45	0.09
5/20/2010	0.01	0.03	0.03
5/21/2010	0.00	0.00	0.00
5/22/2010	0.00	0.00	0.00
5/23/2010	0.00	0.00	0.00
5/24/2010	0.00	0.00	0.00
5/25/2010	0.00	0.00	0.00
5/26/2010	0.00	0.00	0.00
5/27/2010	0.11	0.18	0.08
5/28/2010	0.00	0.00	0.00
5/29/2010	0.10	0.27	0.15
5/30/2010	0.00	0.00	0.00
5/31/2010	0.00	0.00	0.00
May-10	**3.35**		

Notes:
Rainfall data measured at Cambridge Water Department gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE WATER DEPARTMENT
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
6/1/2010	1.09	1.74	0.30
6/2/2010	0.01	0.03	0.03
6/3/2010	0.49	0.81	0.74
6/4/2010	0.00	0.00	0.00
6/5/2010	0.66	1.53	0.40
6/6/2010	1.38	2.01	0.52
6/7/2010	0.00	0.00	0.00
6/8/2010	0.00	0.00	0.00
6/9/2010	0.05	0.03	0.03
6/10/2010	0.13	0.03	0.03
6/11/2010	0.00	0.00	0.00
6/12/2010	0.33	0.30	0.07
6/13/2010	0.04	0.06	0.04
6/14/2010	0.00	0.00	0.00
6/15/2010	0.00	0.00	0.00
6/16/2010	0.00	0.00	0.00
6/17/2010	0.00	0.00	0.00
6/18/2010	0.00	0.00	0.00
6/19/2010	0.00	0.00	0.00
6/20/2010	0.00	0.00	0.00
6/21/2010	0.00	0.00	0.00
6/22/2010	0.00	0.00	0.00
6/23/2010	0.11	0.15	0.08
6/24/2010	0.21	0.51	0.21
6/25/2010	0.00	0.00	0.00
6/26/2010	0.00	0.00	0.00
6/27/2010	0.00	0.00	0.00
6/28/2010	0.00	0.00	0.00
6/29/2010	0.00	0.00	0.00
6/30/2010	0.00	0.00	0.00
Jun-10	**4.50**		

Notes:
Rainfall data measured at Cambridge Water Department gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE WATER DEPARTMENT
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
7/1/2010	0.00	0.00	0.00
7/2/2010	0.00	0.00	0.00
7/3/2010	0.00	0.00	0.00
7/4/2010	0.00	0.00	0.00
7/5/2010	0.00	0.00	0.00
7/6/2010	0.00	0.00	0.00
7/7/2010	0.00	0.00	0.00
7/8/2010	0.00	0.00	0.00
7/9/2010	0.00	0.00	0.00
7/10/2010	2.14	4.20	0.92
7/11/2010	0.14	0.33	0.14
7/12/2010	0.01	0.03	0.03
7/13/2010	0.05	0.03	0.03
7/14/2010	0.14	0.06	0.04
7/15/2010	0.00	0.00	0.00
7/16/2010	0.09	0.06	0.05
7/17/2010	0.00	0.00	0.00
7/18/2010	0.00	0.00	0.00
7/19/2010	0.11	0.12	0.08
7/20/2010	0.01	0.03	0.03
7/21/2010	0.04	0.12	0.12
7/22/2010	0.00	0.00	0.00
7/23/2010	0.50	0.60	0.11
7/24/2010	0.00	0.00	0.00
7/25/2010	0.00	0.00	0.00
7/26/2010	0.00	0.00	0.00
7/27/2010	0.00	0.00	0.00
7/28/2010	0.00	0.00	0.00
7/29/2010	0.05	0.06	0.05
7/30/2010	0.00	0.00	0.00
7/31/2010	0.00	0.00	0.00
Jul-10	**3.28**		

Notes:
Rainfall data measured at Cambridge Water Department gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE WATER DEPARTMENT
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
8/1/2010	0.00	0.00	0.00
8/2/2010	0.00	0.00	0.00
8/3/2010	0.00	0.00	0.00
8/4/2010	0.01	0.03	0.03
8/5/2010	0.78	1.14	0.59
8/6/2010	0.00	0.00	0.00
8/7/2010	0.00	0.00	0.00
8/8/2010	0.00	0.00	0.00
8/9/2010	0.00	0.00	0.00
8/10/2010	0.06	0.06	0.04
8/11/2010	0.00	0.00	0.00
8/12/2010	0.00	0.00	0.00
8/13/2010	0.00	0.00	0.00
8/14/2010	0.00	0.00	0.00
8/15/2010	0.00	0.00	0.00
8/16/2010	0.17	0.21	0.09
8/17/2010	0.00	0.00	0.00
8/18/2010	0.00	0.00	0.00
8/19/2010	0.00	0.00	0.00
8/20/2010	0.00	0.00	0.00
8/21/2010	0.00	0.00	0.00
8/22/2010	0.25	0.12	0.05
8/23/2010	0.84	0.15	0.06
8/24/2010	1.03	0.27	0.09
8/25/2010	3.36	0.99	0.27
8/26/2010	0.00	0.00	0.00
8/27/2010	0.00	0.00	0.00
8/28/2010	0.00	0.00	0.00
8/29/2010	0.00	0.00	0.00
8/30/2010	0.00	0.00	0.00
8/31/2010	0.00	0.00	0.00
Aug-10	**6.50**		

Notes:
Rainfall data measured at Cambridge Water Department gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE WATER DEPARTMENT
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
9/1/2010	0.00	0.00	0.00
9/2/2010	0.00	0.00	0.00
9/3/2010	0.34	0.21	0.09
9/4/2010	0.20	0.30	0.10
9/5/2010	0.00	0.00	0.00
9/6/2010	0.00	0.00	0.00
9/7/2010	0.00	0.00	0.00
9/8/2010	0.48	1.17	0.36
9/9/2010	0.00	0.00	0.00
9/10/2010	0.00	0.00	0.00
9/11/2010	0.00	0.00	0.00
9/12/2010	0.00	0.00	0.00
9/13/2010	0.15	0.24	0.08
9/14/2010	0.10	0.30	0.30
9/15/2010	0.00	0.00	0.00
9/16/2010	0.14	0.12	0.06
9/17/2010	0.10	0.06	0.03
9/18/2010	0.00	0.00	0.00
9/19/2010	0.00	0.00	0.00
9/20/2010	0.00	0.00	0.00
9/21/2010	0.00	0.00	0.00
9/22/2010	0.00	0.00	0.00
9/23/2010	0.00	0.00	0.00
9/24/2010	0.00	0.00	0.00
9/25/2010	0.00	0.00	0.00
9/26/2010	0.00	0.00	0.00
9/27/2010	0.13	0.18	0.08
9/28/2010	0.98	1.17	0.27
9/29/2010	0.00	0.00	0.00
9/30/2010	0.00	0.00	0.00
Sep-10	**2.62**		

Notes:
Rainfall data measured at Cambridge Water Department gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE WATER DEPARTMENT
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
10/1/2010	0.97	0.36	0.12
10/2/2010	0.00	0.00	0.00
10/3/2010	0.00	0.00	0.00
10/4/2010	0.41	0.18	0.08
10/5/2010	0.12	0.03	0.03
10/6/2010	1.65	0.63	0.11
10/7/2010	0.00	0.00	0.00
10/8/2010	0.00	0.00	0.00
10/9/2010	0.00	0.00	0.00
10/10/2010	0.00	0.00	0.00
10/11/2010	0.00	0.00	0.00
10/12/2010	0.06	0.09	0.06
10/13/2010	0.00	0.00	0.00
10/14/2010	0.12	0.21	0.09
10/15/2010	2.24	0.57	0.22
10/16/2010	0.00	0.00	0.00
10/17/2010	0.00	0.00	0.00
10/18/2010	0.00	0.00	0.00
10/19/2010	0.00	0.00	0.00
10/20/2010	0.00	0.00	0.00
10/21/2010	0.04	0.06	0.06
10/22/2010	0.00	0.00	0.00
10/23/2010	0.00	0.00	0.00
10/24/2010	0.01	0.03	0.03
10/25/2010	0.02	0.03	0.03
10/26/2010	0.00	0.00	0.00
10/27/2010	0.06	0.06	0.05
10/28/2010	0.00	0.00	0.00
10/29/2010	0.02	0.06	0.06
10/30/2010	0.00	0.00	0.00
10/31/2010	0.00	0.00	0.00
Oct-10	**5.72**		

Notes:
Rainfall data measured at Cambridge Water Department gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE WATER DEPARTMENT
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
11/1/2010	0.00	0.00	0.00
11/2/2010	0.00	0.00	0.00
11/3/2010	0.00	0.00	0.00
11/4/2010	1.07	0.33	0.09
11/5/2010	0.64	0.51	0.10
11/6/2010	0.00	0.00	0.00
11/7/2010	0.09	0.12	0.07
11/8/2010	1.03	0.45	0.07
11/9/2010	0.08	0.06	0.04
11/10/2010	0.07	0.06	0.04
11/11/2010	0.00	0.00	0.00
11/12/2010	0.00	0.00	0.00
11/13/2010	0.00	0.00	0.00
11/14/2010	0.00	0.00	0.00
11/15/2010	0.00	0.00	0.00
11/16/2010	0.07	0.06	0.04
11/17/2010	1.21	0.57	0.17
11/18/2010	0.00	0.00	0.00
11/19/2010	0.00	0.00	0.00
11/20/2010	0.00	0.00	0.00
11/21/2010	0.00	0.00	0.00
11/22/2010	0.00	0.00	0.00
11/23/2010	0.00	0.00	0.00
11/24/2010	0.00	0.00	0.00
11/25/2010	0.00	0.00	0.00
11/26/2010	0.21	0.06	0.04
11/27/2010	0.00	0.00	0.00
11/28/2010	0.00	0.00	0.00
11/29/2010	0.00	0.00	0.00
11/30/2010	0.00	0.00	0.00
Nov-10	**4.47**		

Notes:
Rainfall data measured at Cambridge Water Department gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

CITY OF CAMBRIDGE WATER DEPARTMENT
2010 DAILY RAINFALL DATA
FRESH POND PARKWAY, CAMBRIDGE, MA

Date	Daily Rainfall (in.)	Maximum Intensity (in./hr.)*	Average Intensity (in./hr.)
12/1/2010	0.57	0.39	0.08
12/2/2010	0.00	0.00	0.00
12/3/2010	0.00	0.00	0.00
12/4/2010	0.00	0.00	0.00
12/5/2010	0.00	0.00	0.00
12/6/2010	0.00	0.00	0.00
12/7/2010	0.00	0.00	0.00
12/8/2010	0.00	0.00	0.00
12/9/2010	0.00	0.00	0.00
12/10/2010	0.00	0.00	0.00
12/11/2010	0.00	0.00	0.00
12/12/2010	2.23	0.54	0.15
12/13/2010	0.30	0.81	0.30
12/14/2010	0.02	0.06	0.06
12/15/2010	0.00	0.00	0.00
12/16/2010	0.00	0.00	0.00
12/17/2010	0.00	0.00	0.00
12/18/2010	0.00	0.00	0.00
12/19/2010	0.00	0.00	0.00
12/20/2010	0.00	0.00	0.00
12/21/2010	0.24	0.30	0.10
12/22/2010	N/A	N/A	N/A
12/23/2010	N/A	N/A	N/A
12/24/2010	N/A	N/A	N/A
12/25/2010	N/A	N/A	N/A
12/26/2010	N/A	N/A	N/A
12/27/2010	N/A	N/A	N/A
12/28/2010	N/A	N/A	N/A
12/29/2010	N/A	N/A	N/A
12/30/2010	N/A	N/A	N/A
12/31/2010	N/A	N/A	N/A
Dec-10	**3.36**		

Notes:
Rainfall data measured at Cambridge Water Department gauge
Rainfall was measured in twenty minute intervals
"*" denotes peak intensity measured over a 20 minute time period.
Shaded Data denotes CSO discharge.

APPENDIX II

2010 Monthly CSO Activations

January 2010 Daily Rainfall and Combined Sewer Overflows

				Alewife Brook						Charles River			
January	Rain Gauges			CAM 001	CAM 002	CAM 401B	CAM 400	CAM 004	CAM 401A	CAM 005	CAM 007	CAM 017	Total
	DPW 147 Hampshire Street	Water Dept. Fresh Pond	USGS Fresh Pond	Alewife Brook Parkway @ Foch St.	Alewife Brook Parkway @ Mass Ave.	Mass Ave. @ Alewife Brook Parkway	Harrison Ave. @ Alewife Brook Parkway	Fresh Pond Rotary	Bellis Circle/ Sherman St.	Lowell St. @ Mt. Auburn Hospital	Hawthorne St. @ Memorial Dr.	Edwin Land Blvd. @ Binney St.	
	(in)	(in)	(in)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	**(GPD)**
1			0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
2			0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
3			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
4			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
5			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
6			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
7			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
8			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
9			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
10			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
11			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
12			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
13			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
14			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
15	Rain Gauge	Rain Gauge	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
16	Removed	Removed for	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
17	for Winter	Winter	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
18			0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
19			0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
20			0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
21			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
22			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
23			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
24			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
25			1.08	0.00	127,810.02	38,545.25	412,550.00	0.00	0.00	0.00	0.00	0.00	**451,095.25**
26			0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
27			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
28			0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
29			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
30			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
31			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Total			3.02	0.00	127,810.02	38,545.25	412,550.00	0.00	0.00	0.00	0.00	0.00	**451,095.25**

Alewife Brook outfall CAM002B is temporarily plugged
Charles River outfalls CAM009 and CAM011 are temporarily plugged

February 2010 Daily Rainfall and Combined Sewer Overflows

				Alewife Brook						Charles RIver			
February	Rain Gauges			CAM 001	CAM 002	CAM 401B	CAM 400	CAM 004	CAM 401A	CAM 005	CAM 007	CAM 017	Total
	DPW 147 Hampshire Street	Water Dept. Fresh Pond	USGS Fresh Pond	Alewife Brook Parkway @ Foch St.	Alewife Brook Parkway @ Mass Ave.	Mass Ave. @ Alewife Brook Parkway	Harrison Ave. @ Alewife Brook Parkway	Fresh Pond Rotary	Bellis Circle/ Sherman St.	Lowell St. @ Mt. Auburn Hospital	Memorial Dr. @ Hawthorne St.	Binney St. @ First St.	
	(in)	(in)	(in)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	**(GPD)**
1			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
2			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
3			0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
4			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
5			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
6			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
7			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
8			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
9			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
10			0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
11			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
12			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
13			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
14			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
15	Rain Gauge	Rain Gauge	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
16	Removed	Removed for	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
17	for Winter	Winter	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
18			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
19			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
20			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
21			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
22			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
23			0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
24			2.43	0.00	0.00	0.00	0.00	183,655.54	0.00	0.00	0.00	0.00	**183,655.54**
25			1.57	6,405.62	20,374.46	27,748.11	0.00	287,758.12	0.00	0.00	0.00	0.00	**342,286.30**
26			0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
27			0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
28			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
													0.00
													0.00
													0.00
Total			4.72	6,405.62	20,374.46	27,748.11	0.00	471,413.66	0.00	0.00	0.00	0.00	**525,941.84**

Alewife Brook outfall CAM002B is temporarily plugged
Charles River outfalls CAM009 and CAM011 are temporarily plugged

March 2010 Daily Rainfall and Combined Sewer Overflows

				Alewife Brook						Charles River			
March	Rain Gauges			CAM 001	CAM 002	CAM 401B	CAM 400	CAM 004	CAM 401A	CAM 005	CAM 007	CAM 017	Total
	DPW 147 Hampshire Street	Water Dept. Fresh Pond	USGS Fresh Pond	Alewife Brook Parkway @ Foch St.	Alewife Brook Parkway @ Mass Ave.	Mass Ave. @ Alewife Brook Parkway	Harrison Ave. @ Alewife Brook Parkway	Fresh Pond Rotary	Bellis Circle/ Sherman St.	Lowell St. @ Mt. Auburn Hospital	Memorial Dr. @ Hawthorne St.	Binney St. @ First St.	
	(in)	(in)	(in)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	**(GPD)**
1			0.2	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	**0.00**
2			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
3			0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
4			0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
5			0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
6			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
7	Rain gauge		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
8	installed	Rain gauge	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
9	March 10	installed	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
10		March 11	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
11	0.05	ND	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
12	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
13	1.74	ND	1.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
14	6.15	ND	5.09	68,629.84	856,432.99	2,540,248.53	45,937.52	12,242,736.33	407,738.41	1,655,448.23	2,127,547.75	0.00	**19,944,719.59**
15	2.72	ND	2.29	3,674,441.39	159,478.41	9,864,463.18	0.00	2,873,290.05	0.00	24,127.88	0.00	0.00	**16,595,800.91**
16	0	ND	0	948,546.13	0.00	2,529,560.87	1,110,015.48	0.00	0.00	0.00	0.00	0.00	**4,588,122.47**
17	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
18	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
19	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
20	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
21	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
22	0.06	0.05	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
23	2.22	1.05	1.78	0.00	69,175.73	2,793.62	0.00	1,409,463.18	0.00	0.00	0.00	0.00	**1,481,432.54**
24	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
25	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
26	0.22	0.11	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
27	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
28	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
29	2.07	ND	1.97	20,913.88	22,158.84	51,600.73	0.00	615,002.54	0.00	0.00	0.00	0.00	**709,676.00**
30	3.61	ND	3.33	21,472.24	626,261.02	653,595.80	188,309.53	3,545,500.32	907,001.48	928,820.59	807,087.40	0.00	**7,678,048.37**
31	0.15	ND	0.06	0.00	0.00	0.00	0.00	217,756.92	0.00	0.00	0.00	0.00	**217,756.92**
Total	19.02	1.22	16.52	4,734,003.48	1,733,506.99	15,642,262.73	1,344,262.53	20,903,749.33	1,314,739.89	2,608,396.70	2,934,635.14	0.00	**51,215,556.80**

Alewife Brook outfall CAM002B is temporarily plugged

Charles River outfalls CAM009 and CAM011 are temporarily plugged

CAM 001 Alewife Brook exceeded elevation of water surface in the interior of the manhole during March14-16 and also on March 29-30. No flow was record during that occurrence.

CAM 001 Submerged Weir and/or Orifice Equations were used once the Alewife Brook Exceeded the elevation of the weir in CAM 001.

CAM 002 Alewife Brook exceeded elevation of water surface in the interior of the manhole during March14-16 and also on March 29-30. No flow was record during that occurrence.

CAM 002 Submerged Weir an/or Orifice Equations were used once the Alewife Brook Exceeded the elevation of the weir in CAM 002.

CAM 400 Alewife Brook exceeded elevation of water surface in the interior of the manhole during March14-16 and also on March 29-30. No flow was record during that occurrence.

CAM400 Submerged Weir and/or Orifice Equations were used once the Alewife Brook Exceeded the elevation of the weir in CAM 002.

The March 13-16 event and the March 29-31 event were extreme rainfall events. Due to surcharging, river levels, local flooding, and other factors data can not be considered accurate.

April 2010 Daily Rainfall and Combined Sewer Overflows

				Alewife Brook						Charles River			
April	Rain Gauges			CAM 001	CAM 002	CAM 401B	CAM 400	CAM 004	CAM 401A	CAM 005	CAM 007	CAM 017	Total
	DPW 147 Hampshire Street	Water Dept. Fresh Pond	USGS Fresh Pond	Alewife Brook Parkway @ Foch St.	Alewife Brook Parkway @ Mass Ave.	Mass Ave. @ Alewife Brook Parkway	Harrison Ave. @ Alewife Brook Parkway	Fresh Pond Rotary	Bellis Circle/ Sherman St.	Lowell St. @ Mt. Auburn Hospital	Memorial Dr. @ Hawthorne St.	Binney St. @ First St.	
	(in)	(in)	(in)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	**(GPD)**
1	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
2	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
3	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
4	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
5	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
6	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
7	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
8	0	ND	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
9	0.94	1.11	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
10	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
11	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
12	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
13	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
14	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
15	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
16	0.4	0.5	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
17	0.34	0.3	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
18	0.06	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
19	0.01	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
20	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
21	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
22	0.17	0.02	0.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
23	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
24	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
25	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
26	0.02	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
27	0.15	0.19	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
28	0.06	0.07	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
29	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
30	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
													0.00
Total	2.15	2.27	2.23	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	**0.00**

Alewife Brook outfall CAM002B is temporarily plugged

Charles River outfalls CAM009 and CAM011 are temporarily plugged

May 2010 Daily Rainfall and Combined Sewer Overflows

				Alewife Brook						Charles River			
May	Rain Gauges			CAM 001	CAM 002	CAM 401B	CAM 400	CAM 004	CAM 401A	CAM 005	CAM 007	CAM 017	Total
	DPW 147 Hampshire Street	Water Dept. Fresh Pond	USGS Fresh Pond	Alewife Brook Parkway @ Foch St.	Alewife Brook Parkway @ Mass Ave.	Mass Ave. @ Alewife Brook Parkway	Harrison Ave. @ Alewife Brook Parkway	Fresh Pond Rotary	Bellis Circle/ Sherman St.	Lowell St. @ Mt. Auburn Hospital	Memorial Dr. @ Hawthorne St.	Binney St. @ First St.	
	(in)	(in)	(in)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	**(GPD)**
1	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
2	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
3	0.02	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
4	0.02	0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
5	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
6	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
7	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
8	1.12	1.08	0.92	0.00	0.00	0.00	0.00	85,728.59	0.00	0.00	0.00	0.00	**85,728.59**
9	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
10	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
11	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
12	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
13	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
14	0.35	0.45	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
15	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
16	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
17	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
18	0.7	0.7	0.92	0.00	0.00	0.00	0.00	103,363.09	0.00	0.00	0.00	0.00	**103,363.09**
19	0.93	0.84	0.37	0.00	2,871.28	0.00	0.00	1,443,844.77	0.00	0.00	0.00	0.00	**1,446,716.05**
20	0	0.01	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
21	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
22	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
23	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
24	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
25	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
26	0	0	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
27	0.07	0.11	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
28	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
29	0.06	0.1	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
30	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
31	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Total	3.28	3.35	2.88	0.00	2,871.28	0.00	0.00	1,632,936.45	0.00	0.00	0.00	0.00	**1,635,807.73**

Alewife Brook outfall CAM002B is temporarily plugged
Charles River outfalls CAM009 and CAM011 are temporarily plugged

June 2010 Daily Rainfall and Combined Sewer Overflows

				Alewife Brook						Charles River			
June	Rain Gauges			CAM 001	CAM 002	CAM 401B	CAM 400	CAM 004	CAM 401A	CAM 005	CAM 007	CAM 017	Total
	DPW 147 Hampshire Street	Water Dept. Fresh Pond	USGS Fresh Pond	Alewife Brook Parkway @ Foch St.	Alewife Brook Parkway @ Mass Ave.	Mass Ave. @ Alewife Brook Parkway	Harrison Ave. @ Alewife Brook Parkway	Fresh Pond Rotary	Bellis Circle/ Sherman St.	Lowell St. @ Mt. Auburn Hospital	Memorial Dr. @ Hawthorne St.	Binney St. @ First St.	
	(in)	(in)	(in)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	**(GPD)**
1	0.75	1.09	0.96	0.00	43,240.69	0.00	0.00	6,741.20	508,564.47	86,459.13	0.00	0.00	**645,005.50**
2	0	0.01	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
3	0.26	0.49	0.43	0.00	306,263.39	5,064.49	0.00	0.00	0.00	0.00	0.00	0.00	**311,327.87**
4	0.01	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
5	0.41	0.66	0.56	0.00	218,371.65	0.00	0.00	95,071.03	570,901.96	0.00	0.00	0.00	**884,344.63**
6	1.3	1.38	1.23	620,304.14	561,145.36	94,953.96	5,346.26	1,767,905.86	1,571,216.57	540,294.80	1,863.54	0.00	**5,163,030.49**
7	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
8	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
9	0.05	0.05	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
10	0.15	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
11	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
12	0.38	0.33	0.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
13	0.04	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
14	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
15	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
16	0	0	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
17	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
18	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
19	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
20	0	0	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
21	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
22	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
23	0.07	0.11	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
24	0.12	0.21	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
25	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
26	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
27	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
28	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
29	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
30	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
													0.00
Total	3.54	4.50	4.03	620,304.14	1,129,021.08	100,018.44	5,346.26	1,869,718.09	2,650,683.01	626,753.93	1,863.54	0.00	**7,003,708.50**

Alewife Brook outfall CAM002B is temporarily plugged
Charles River outfalls CAM009 and CAM011 are temporarily plugged

July 2010 Daily Rainfall and Combined Sewer Overflows

				Alewife Brook						Charles River			
July	Rain Gauges			CAM 001	CAM 002	CAM 401B	CAM 400	CAM 004	CAM 401A	CAM 005	CAM 007	CAM 017	**Total**
	DPW 147 Hampshire Street	Water Dept. Fresh Pond	USGS Fresh Pond	Alewife Brook Parkway @ Foch St.	Alewife Brook Parkway @ Mass Ave.	Mass Ave. @ Alewife Brook Parkway	Harrison Ave. @ Alewife Brook Parkway	Fresh Pond Rotary	Bellis Circle/ Sherman St.	Lowell St. @ Mt. Auburn Hospital	Memorial Dr. @ Hawthorne St.	Binney St. @ First St.	
	(in)	(in)	(in)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	**(GPD)**
1	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
2	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
3	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
4	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
5	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
6	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
7	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
8	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
9	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
10	3.57	2.14	1.77	115,734.72	770,043.54	264,058.99	118,172.60	6,662,279.13	6,159,344.52	1,685,331.26	1,850,861.76	10,585,930.00	**28,211,756.52**
11	0.07	0.14	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
12	0.65	0.01	0	0.00	0.00	0.00	0.00	879,138.60	0.00	0.00	0.00	0.00	**879,138.60**
13	0.04	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
14	0.11	0.14	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
15	0	0	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
16	0.06	0.09	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
17	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
18	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
19	0.04	0.11	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
20	0	0.01	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
21	0.01	0	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
22	0.07	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
23	0.47	0.5	0.43	0.00	0.00	0.00	0.00	6,593.46	0.00	0.00	0.00	0.00	**6,593.46**
24	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
25	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
26	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
27	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
28	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
29	0.06	0.05	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
30	0	0	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
31	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Total	5.15	3.28	2.83	115,734.72	770,043.54	264,058.99	118,172.60	7,548,011.19	6,159,344.52	1,685,331.26	1,850,861.76	10,585,930.00	**29,097,488.58**

The July 10th event was an extreme localized rainfall. Rainfall amounts occurred during a short period of time (2-3 hours). Due to surcharging, local flooding, and other factors data can not be considered accurate.
Alewife Brook outfall CAM002B is temporarily plugged
Charles River outfalls CAM009 and CAM011 are temporarily plugged

August 2010 Daily Rainfall and Combined Sewer Overflows

				Alewife Brook						Charles River			
August	Rain Gauges			CAM 001	CAM 002	CAM 401B	CAM 400	CAM 004	CAM 401A	CAM 005	CAM 007	CAM 017	Total
	DPW 147 Hampshire Street	Water Dept. Fresh Pond	USGS Fresh Pond	Alewife Brook Parkway @ Foch St.	Alewife Brook Parkway @ Mass Ave.	Mass Ave. @ Alewife Brook Parkway	Harrison Ave. @ Alewife Brook Parkway	Fresh Pond Rotary	Bellis Circle/ Sherman St.	Lowell St. @ Mt. Auburn Hospital	Memorial Dr. @ Hawthorne St.	Binney St. @ First St.	
	(in)	(in)	(in)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	**(GPD)**
1	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
2	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
3	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
4	0	0.01	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
5	1.05	0.78	0.7	0.00	65,796.72	0.00	0.00	1,260,675.91	0.00	0.00	0.00	0.00	**1,326,472.63**
6	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
7	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
8	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
9	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
10	0.07	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
11	0	0	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
12	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
13	0.01	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
14	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
15	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
16	0.19	0.17	0.015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
17	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
18	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
19	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
20	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
21	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
22	0.25	0.25	0.25	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
23	0.8	0.84	0.7	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
24	0.99	1.01	0.76	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
25	3.02	3.38	2.8	104,355.88		1,120,041.15	87,157.87	5,110,717.99	2,628,308.10	96,180.09	560,878.45	1,049,450.00	**10,757,089.53**
26	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
27	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
28	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
29	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
30	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
31	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Total	6.38	6.50	5.30	104,355.88	65,796.72	1,120,041.15	87,157.87	6,371,393.90	2,628,308.10	96,180.09	560,878.45	1,049,450.00	**12,083,562.16**

CAM 002 Meter was removed for construction on August 21
Alewife Brook outfall CAM002B is temporarily plugged
Charles River outfalls CAM009 and CAM011 are temporarily plugged

September Daily Rainfall and Combined Sewer Overflows

				Alewife Brook						Charles River			
	Rain Gauges			CAM 001	CAM 002	CAM 401B	CAM 400	CAM 004	CAM 401A	CAM 005	CAM 007	CAM 017	
September	DPW 147 Hampshire Street	Water Dept. Fresh Pond	USGS Fresh Pond	Alewife Brook Parkway @ Foch St.	Alewife Brook Parkway @ Mass Ave.	Mass Ave. @ Alewife Brook Parkway	Harrison Ave. @ Alewife Brook Parkway	Fresh Pond Rotary	Bellis Circle/ Sherman St.	Lowell St. @ Mt. Auburn Hospital	Memorial Dr. @ Hawthorne St.	Binney St. @ First St.	**Total**
	(in)	(in)	(in)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	**(GPD)**
1	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
2	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
3	0.26	0.33	0.27	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
4	0.08	0.21	0.18	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
5	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
6	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
7	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
8	0.2	0.48	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
9	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
10	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
11	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
12	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
13	0.13	0.15	0.15	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
14	0.08	0.1	0.09	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
15	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
16	0.11	0.14	0.14	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
17	0.16	0.1	0.12	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
18	0	0	0.01	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
19	0	0	0.01	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
20	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
21	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
22	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
23	0	0	0.02	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
24	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
25	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
26	0	0	0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
27	0.03	0.13	0.14	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
28	0.81	0.98	0.87	4,437.34		745,906.33	0.00	581,091.34	633,777.83	0.00	0.00	0.00	**1,965,212.85**
29	0	0	0.01			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
30	0	0	0.01			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
													0.00
Total	1.86	2.62	2.02	4,437.34	0.00	745,906.33	0.00	581,091.34	633,777.83	0.00	0.00	0.00	**1,965,212.85**

CAM 001 Meter was removed for construction on September 29th
CAM 002 Meter was removed for construction on August 21
Alewife Brook outfall CAM002B is temporarily plugged
Charles River outfalls CAM009 and CAM011 are temporarily plugged

October 2010 Daily Rainfall and Combined Sewer Overflows

				Alewife Brook						Charles River			
	Rain Gauges			CAM 001	CAM 002	CAM 401B	CAM 400	CAM 004	CAM 401A	CAM 005	CAM 007	CAM 017	
October	DPW 147 Hampshire Street	Water Dept. Fresh Pond	USGS Fresh Pond	Alewife Brook Parkway @ Foch St.	Alewife Brook Parkway @ Mass Ave.	Mass Ave. @ Alewife Brook Parkway	Harrison Ave. @ Alewife Brook Parkway	Fresh Pond Rotary	Bellis Circle/ Sherman St.	Lowell St. @ Mt. Auburn Hospital	Memorial Dr. @ Hawthorne St.	Binney St. @ First St.	**Total**
	(in)	(in)	(in)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	**(GPD)**
1	0.77	0.97	0.74			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
2	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
3	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
4	0.42	0.41	0.34			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
5	0.12	0.11	0.08			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
6	1.49	1.66	1.32			134,801.21	0.00	95,093.17	0.00	0.00	0.00	0.00	**229,894.38**
7	0	0	0.01			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
8	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
9	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
10	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
11	0	0	0.01			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
12	0.06	0.06	0.07			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
13	0	0	0.01			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
14	0.04	0.05	0.03			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
15	2.08	2.31	1.76			0.00	0.00	2,590,162.40	408,752.12	0.00	0.00	0.00	**2,998,914.53**
16	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
17	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
18	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
19	0	0	0			0.00	0.00	0.00	0.00	0.00	-2,588.32	0.00	**0.00**
20	0	0	0			0.00	0.00	0.00	0.00	0.00	-25,735.42	0.00	**0.00**
21	0.05	0.04	0.04			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
22	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
23	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
24	0.01	0.01	0.01			0.00	0.00	0.00	0.00	0.00	-13,792.20	0.00	**0.00**
25	0.02	0.02	0.02			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
26	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
27	0.14	0.06	0.06			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
28	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
29	0.01	0.02	0.02			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
30	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
31	0	0	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Total	5.21	5.72	4.52	0.00	0.00	134,801.21	0.00	2,685,255.57	408,752.12	0.00	0.00	0.00	**3,228,808.91**

Charles River Water Elevation was raised due to Charles River Regatta-Flow from river entered CAM 007
CAM 001 Meter was removed for construction on September 29th
CAM 002 Meter was removed for construction on August 21
Alewife Brook outfall CAM002B is temporarily plugged
Charles River outfalls CAM009 and CAM011 are temporarily plugged

November 2010 Daily Rainfall and Combined Sewer Overflows

				Alewife Brook						Charles River			
November	Rain Gauges			CAM 001	CAM 002	CAM 401B	CAM 400	CAM 004	CAM 401A	CAM 005	CAM 007	CAM 017	Total
	DPW 147 Hampshire Street	Water Dept. Fresh Pond	USGS Fresh Pond	Alewife Brook Parkway @ Foch St.	Alewife Brook Parkway @ Mass Ave.	Mass Ave. @ Alewife Brook Parkway	Harrison Ave. @ Alewife Brook Parkway	Fresh Pond Rotary	Bellis Circle/ Sherman St.	Lowell St. @ Mt. Auburn Hospital	Memorial Dr. @ Hawthorne St.	Binney St. @ First St.	
	(in)	(in)	(in)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	**(GPD)**
1	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
2	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
3	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
4	1.04	1.07	0.83			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
5	0.53	0.64	0.52			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
6	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
7	0.07	0.05	0.09			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
8	0.87	1.07	0.65			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
9	0.11	0.08	0.06			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
10	0.07	0.07	0.05			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
11	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
12	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
13	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
14	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
15	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
16	0.05	0.05	0.02			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
17	1.09	1.23	1.09			0.00	0.00	304,879.37	0.00	0.00	0.00	0.00	**304,879.37**
18	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
19	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
20	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
21	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
22	0	0	0.01			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
23	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
24	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
25	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
26	0.17	0.21	0.19			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
27	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
28	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
29	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
30	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
													0.00
Total	4.00	4.47	3.51	0.00	0.00	0.00	0.00	304,879.37	0.00	0.00	0.00	0.00	**304,879.37**

CAM 001 Meter was removed for construction on September 29th
CAM 002 Meter was removed for construction on August 21
Alewife Brook outfall CAM002B is temporarily plugged
Charles River outfalls CAM009 and CAM011 are temporarily plugged

December 2010 Daily Rainfall and Combined Sewer Overflows

				Alewife Brook						Charles River			
December	Rain Gauges			CAM 001	CAM 002	CAM 401B	CAM 400	CAM 004	CAM 401A	CAM 005	CAM 007	CAM 017	Total
	DPW 147 Hampshire Street	Water Dept. Fresh Pond	USGS Fresh Pond	Alewife Brook Parkway @ Foch St.	Alewife Brook Parkway @ Mass Ave.	Mass Ave. @ Alewife Brook Parkway	Harrison Ave. @ Alewife Brook Parkway	Fresh Pond Rotary	Bellis Circle/ Sherman St.	Lowell St. @ Mt. Auburn Hospital	Memorial Dr. @ Hawthorne St.	Binney St. @ First St.	
	(in)	(in)	(in)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	**(GPD)**
1	0.48	0.57	0.48			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
2	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
3	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
4	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
5	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
6	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
7	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
8	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
9	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
10	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
11	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
12	1.65	2.08	1.77			0.00	0.00	216,970.00	0.00	0.00	0.00	0.00	**216,970.00**
13	0.32	0.45	0.38			2,368.62	0.00	172,222.00	572,614.66	0.00	0.00	0.00	**747,205.28**
14	0	0.02	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
15	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
16	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
17	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
18	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
19	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
20	0	0	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
21	0.11	0.24	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
22	Rain gauge	Rain gauge	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
23	removed for	removed for	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
24	winter	winter	0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
25			0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
26			0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
27			0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
28			0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
29			0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
30			0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
31			0			0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Total	2.56	3.36	2.63	0.00	0.00	2,368.62	0.00	389,192.00	572,614.66	0.00	0.00	0.00	**964,175.28**

CAM 001 Meter was removed for construction on September 29th
CAM 002 Meter was removed for construction on August 21
Alewife Brook outfall CAM002B is temporarily plugged
Charles River outfalls CAM009 and CAM011 are temporarily plugged

Summary 2010 Combined Sewer Overflows

	Alewife Brook						Charles River			
Month	CAM 001 Alewife Brook Parkway @ Foch St.	CAM 002A Alewife Brook Parkway @ Mass Ave.	CAM 401B Mass Ave. @ Alewife Brook Parkway	CAM 400 Harrison Ave. @ Alewife Brook Parkway	CAM 004 Fresh Pond Rotary	CAM 401A Bellis Circle/ Sherman St.	CAM 005 Lowell St. @ Mt. Auburn Hospital	CAM 007 Memorial Dr. @ Hawthorne St.	CAM 017 Binney St. @ First St.	Total
	(GPM)	(GPM)	(GPM)	(GPM)	(GPM)	(GPM)	(GPM)	(GPM)	(GPM)	(GPM)
January	0.00	127,810.02	38,545.25	412,550.00	0.00	0.00	0.00	0.00	0.00	578,905.27
February	6,405.62	20,374.46	27,748.11	0.00	471,413.66	0.00	0.00	0.00	0.00	525,941.84
March	4,734,003.48	1,733,506.99	15,642,262.73	1,344,262.53	20,903,749.33	1,314,739.89	2,608,396.70	2,934,635.14	0.00	51,215,556.80
April	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
May	0.00	2,871.28	0.00	0.00	1,632,936.45	0.00	0.00	0.00	0.00	1,635,807.73
June	620,304.14	1,129,021.08	100,018.44	5,346.26	1,869,718.09	2,650,683.01	626,753.93	1,863.54	0.00	7,003,708.50
July	115,734.72	770,043.54	264,058.99	118,172.60	7,548,011.19	6,159,344.52	1,685,331.26	1,850,861.76	10,585,930.00	29,097,488.58
August	104,355.88	65,796.72	1,120,041.15	87,157.87	6,371,393.90	2,628,308.10	96,180.09	560,878.45	1,049,450.00	12,083,562.16
September	4,437.34	0.00	745,906.33	0.00	581,091.34	633,777.83	0.00	0.00	0.00	1,965,212.85
October	0.00	0.00	134,801.21	0.00	2,685,255.57	408,752.12	0.00	0.00	0.00	3,228,808.91
November	0.00	0.00	0.00	0.00	304,879.37	0.00	0.00	0.00	0.00	304,879.37
December	0.00	0.00	2,368.62	0.00	389,192.00	572,614.66	0.00	0.00	0.00	964,175.28
Total	5,585,241.19	3,849,424.09	18,075,750.84	1,967,489.26	42,757,640.90	14,368,220.13	5,016,661.98	5,348,238.89	11,635,380.00	**108,604,047.29**

Alewife Brook outfall CAM002B is temporarily plugged
Charles River outfalls CAM009 and CAM011 are temporarily plugged

APPENDIX III

CAM 017 Proposed Modification

MWH

BUILDING A BETTER WORLD

MEMORANDUM

TO: Owen O'Riordan, Cambridge DPW
Catherine Woodbury, Cambridge DPW

DATE: April 21, 2011

FROM: William Pisano, Sandy Gray, MWH

CC:

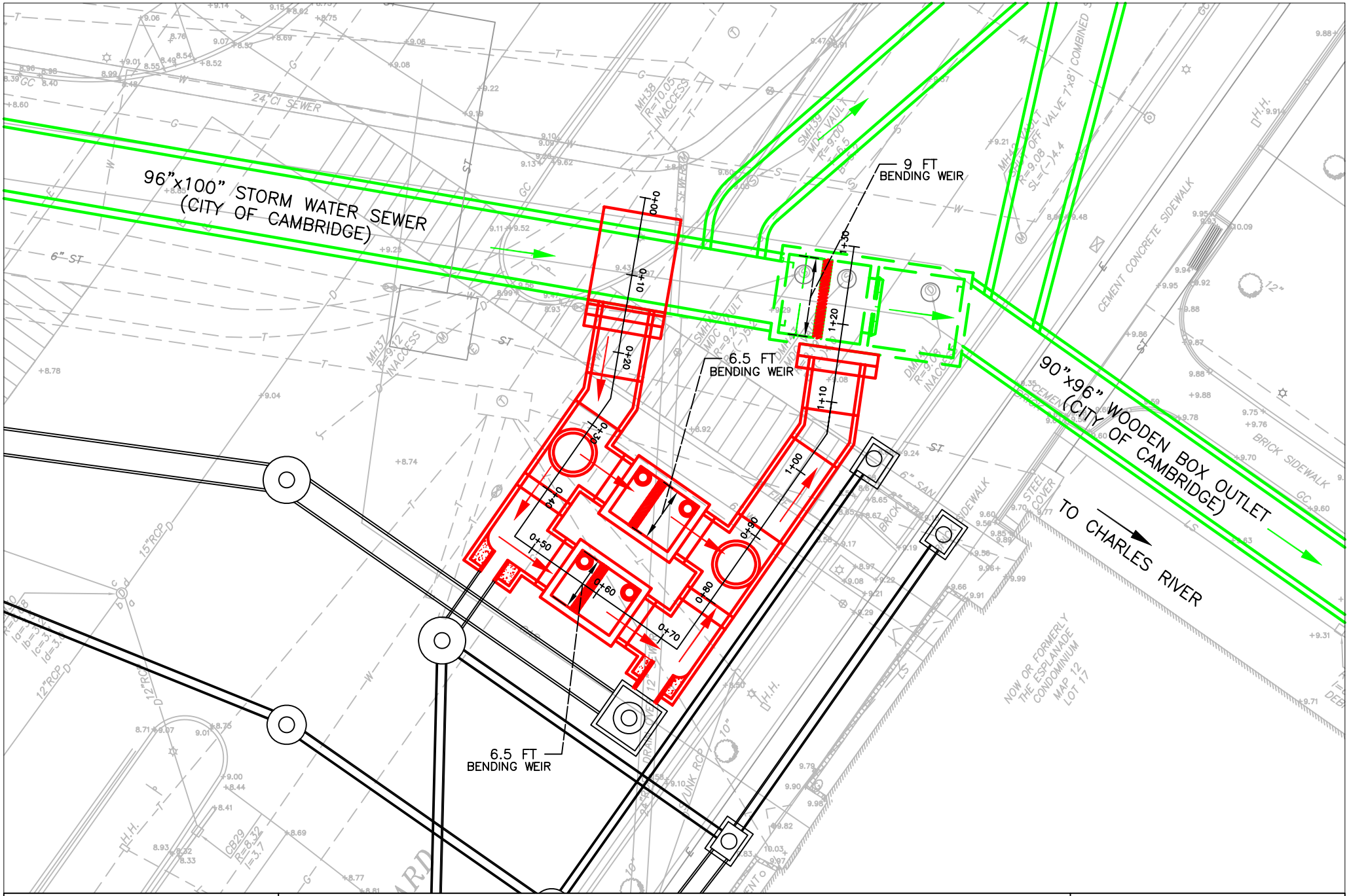
SUBJECT: ***CAM 017 Bending Weir*** Project Description

The CAM 017 Combined Sewer Overflow (CSO) regulator is located within Land Boulevard at the intersection with Binney Street. This structure is used to regulate combined flows from the CAM 017 area comprised of approximately 610-acres of densely populated residential and commercial properties. The terrain in the CAM 017 area is relatively flat and therefore low-lying areas, such as Bishop Allen Drive (7,500-ft upstream of the structure), are susceptible to flooding.

CAM 017 dry weather flows are conveyed to the MWRA via the Cambridge Marginal Conduit (96-in x 100-in). During heavy rain events, CSOs spill into the regulator structure over a 10-foot wide brick weir, through a cast iron flap gate (84-in x 84-in), and then to the Charles River via a wooden box outlet (90-in x 96-in). In 2009, an interim plate baffle was installed immediately downstream of the weir to control the release of floatables to the river.

To help alleviate flooding in low-lying areas, the structure will be modified to increase the available weir spill length to a total of 22-feet. Given construction limitations, this spill length will be provided in three segments (9-feet, 6.5-feet, and 6.5-feet). The existing weir will be retrofitted, and two additional weirs will be provided. The static weir configuration will also be replaced with a series of bending weirs designed to maintain a constant water surface elevation during wet weather events. The crest of the bending weirs will be 14.94 ft-CCB, as stipulated by the MWRA such that the events larger than the 1-year 24-hour storm will activate a spill. Limitations in construction/installation as well as maintenance of the structures were incorporated into the design of the proposed layout. A draft of the proposed plan and profile of the modified structure are shown in Figures 1 and 2.

With the proposed modifications, the peak water level at the structure will fall from 17.9 ft-CCB to 15.7 ft-CCB for a 25-year 24-hour storm, greatly improving conditions for upstream areas.



LEGEND:

- EXISTING COMBINED SEWER
- PROPOSED STRUCTURE MODIFICATIONS

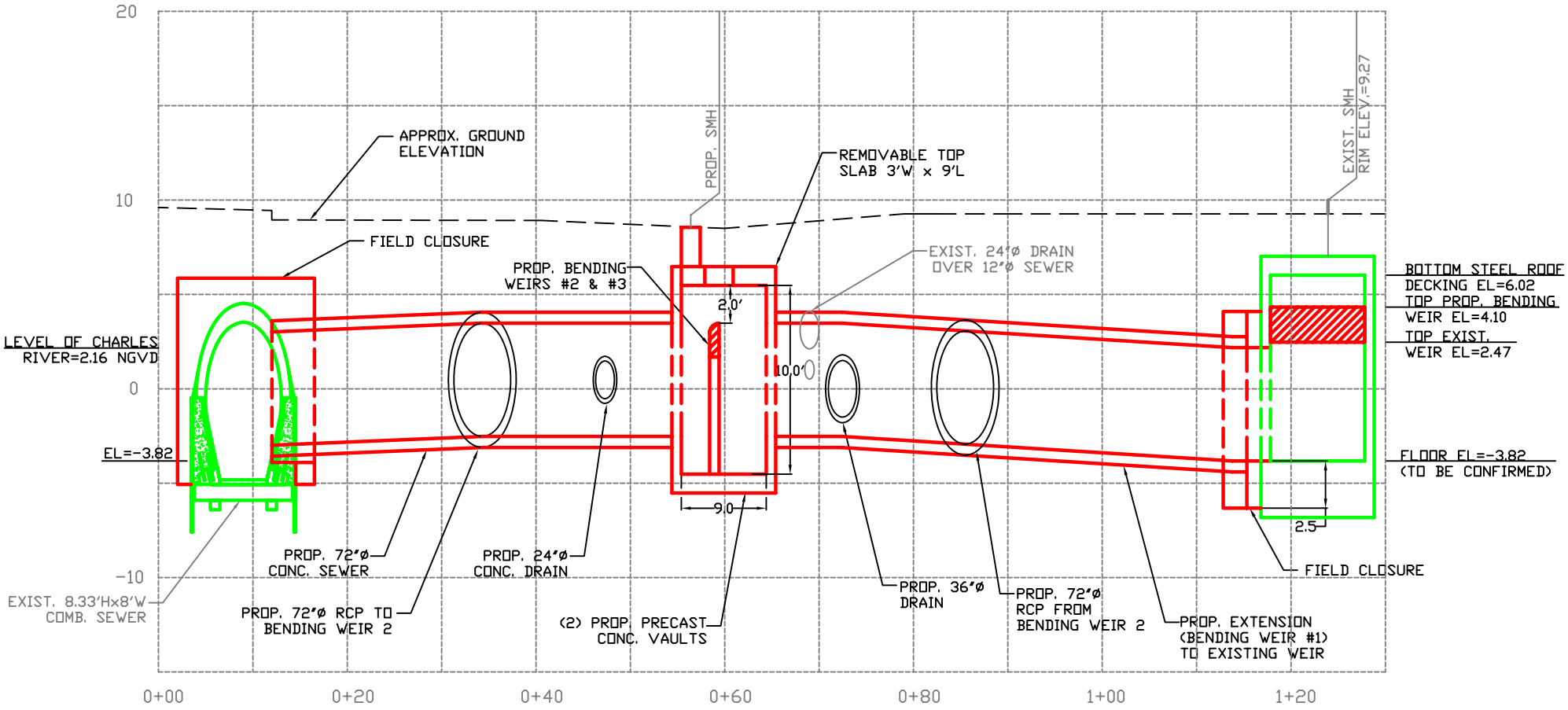
CITY OF CAMBRIDGE

DRAFT PROPOSED CAM 017 REGULATOR MODIFICATIONS

APRIL 2011

SCALE : NTS (NOT FOR CONSTRUCTION)

FIGURE 1



CAM 017 BENDING WEIR STRUCTURES - PROFILE

LEGEND:

- EXISTING COMBINED SEWER
- PROPOSED STRUCTURE MODIFICATIONS

CITY OF CAMBRIDGE

DRAFT PROPOSED CAM 017 REGULATOR MODIFICATIONS

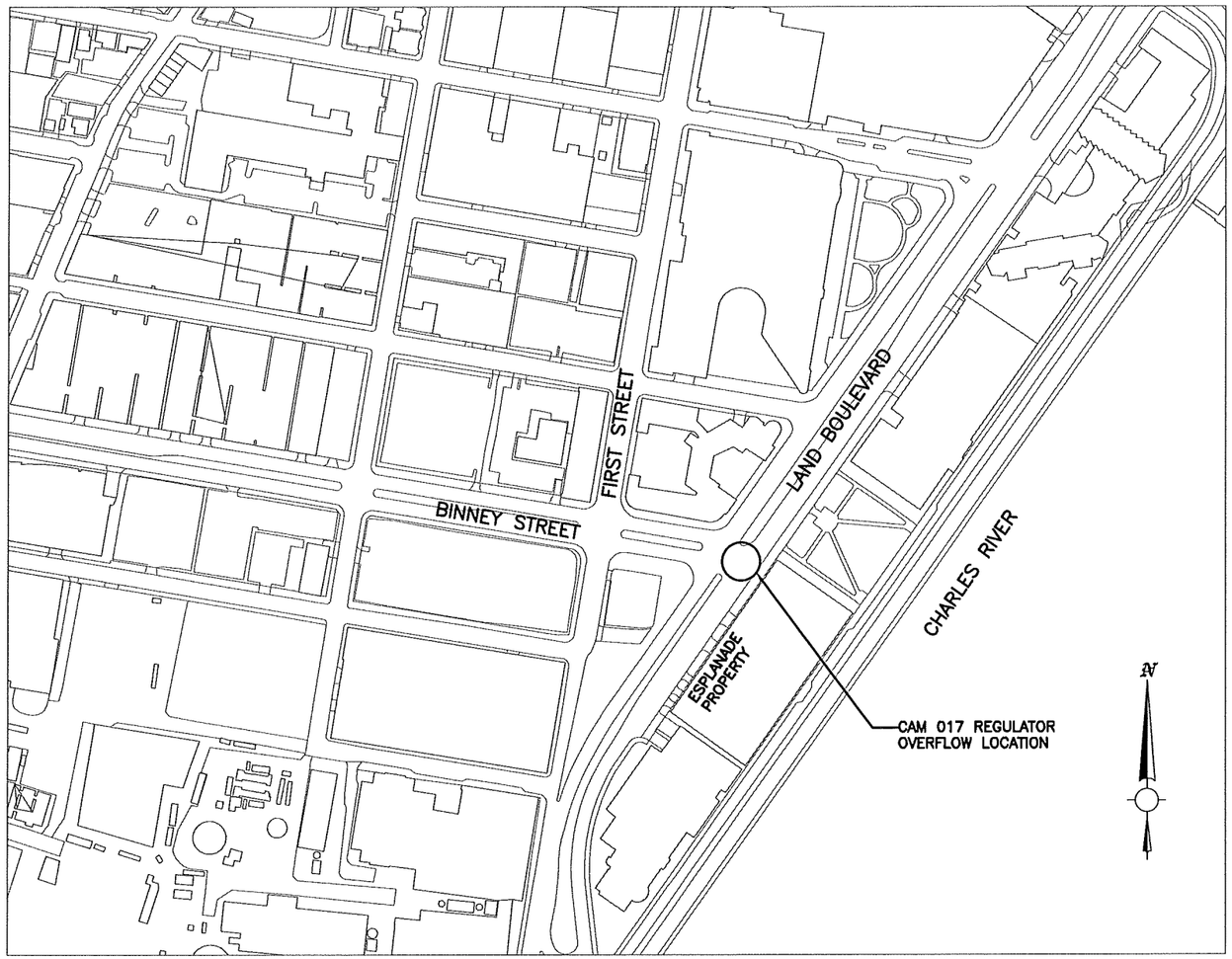
APRIL 2011

SCALE : NTS (NOT FOR CONSTRUCTION)

FIGURE 2

CITY OF CAMBRIDGE, MASSACHUSETTS

REMEDIAL RECONSTRUCTION OF SANITARY SEWERS COMBINED SEWERS AND STORM DRAINS AND EMERGENCY REPAIRS
FY08 CONTRACT
ADDENDUM NO. 3
CAM 017 BENDING WEIR



CAMBRIDGE DEPARTMENT OF PUBLIC WORKS

PROJECT DESIGN TEAM

SEA Consultants Inc.
Science/Engineering/Architecture

MWH
12 FARNSWORTH STREET, SECOND FLOOR
BOSTON, MASSACHUSETTS 02210
TEL:(617)314-7100

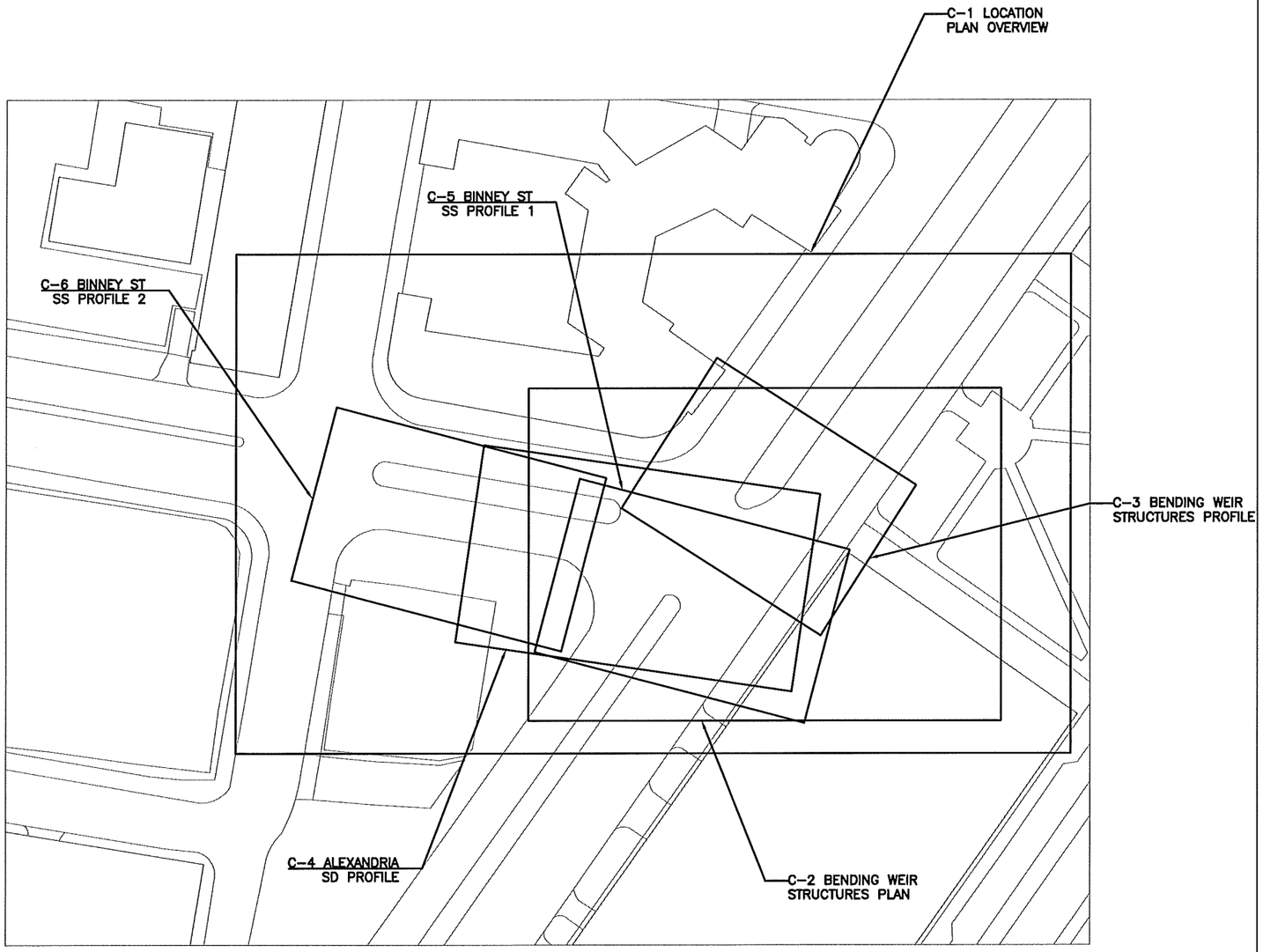
75% DRAFT
APRIL 2011

LOCUS PLAN

SCALE: NONE

DRAWING INDEX

SHEET NO.	DRAWING TITLE
G-1	COVER SHEET
G-2	INDEX OF DRAWINGS
G-3	BORINGS AND VACUUM EXCAVATIONS
CG-1	LEGEND AND GENERAL NOTES
CG-2	TRENCH SERVICE CONNECTION DETAILS
CG-3	COMMON MANHOLE SEPARATION AND PIPE CONNECTION DETAILS
CG-4	MANHOLE DETAILS 1
CG-5	BOX CULVERT AND MANHOLE DETAILS 2
CG-6	UTILITY CROSSING AND WATER DETAILS
CG-7	ROAD AND SIDEWALK DETAILS
CG-8	TRAFFIC SIGNAL DETAILS
C-1	CAM 017 BENDING WEIR PLAN
C-2	LAND BLVD CAM 017 BENDING WEIR
C-3	CAM 017 BENDING WEIR PROFILE
C-4	BINNEY ST ALEXANDRIA DRAIN PROFILE
C-5	BINNEY ST SANITARY SEWER PROFILE 1
C-6	BINNEY ST SANITARY SEWER PROFILE 2
U-1	UTILITY PLAN
SG-1	STRUCTURAL GENERAL NOTES
SG-2	STRUCTURAL TYPICAL DETAILS
S-1	COMBINED SEWER CONNECTION DETAIL
S-2	EXISTING WEIR STRUCTURE CONNECTION DETAIL
S-3	PILING DESIGN
TG-1	TRAFFIC MANAGEMENT GENERAL NOTES AND CONTROL DETAILS
T-1	TRAFFIC MANAGEMENT PLAN PHASE 1
T-2	TRAFFIC MANAGEMENT PLAN PHASE 2
T-3	TRAFFIC MANAGEMENT PLAN PHASE 3



KEY PLAN

SCALE: 1" = 40'

DRAFT
75% DESIGN SET
APRIL-2011

MWH
BOSTON MASSACHUSETTS

S E A Consultants Inc.
Science/Engineering/Architecture
CONCORD, NEW HAMPSHIRE ROCKY HILL, CONNECTICUT
CAMBRIDGE, MASSACHUSETTS

Scale	AS NOTED
Date	APRIL 2011
Job No.	
Designed by	
Drawn by	
Checked by	
Approved by	

No.	Description	Date
	REVISIONS	

THE CAMBRIDGE DEPARTMENT OF PUBLIC WORKS

CITY OF CAMBRIDGE, MASSACHUSETTS

CAM 017 BENDING WEIR

INDEX OF DRAWINGS

Sheet No. G-2

File No.

FIELD TEST BORING LOG

SHEET 1/1

S E A CONSULTANTS, INC. Science / Engineering / Architecture 215 First Street Cambridge, MA 02142	PROJECT: Bending Weir LOCATION: Land Blvd at Binney St, Cambridge MA CLIENT: City of Cambridge, MA WEATHER: Showers AM, 50°		BORING NO: B-101 PROJECT NO: 2003332.02A

Ground Elevation:
Date Started: 01/28/11
Date Finished: 01/31/11
Driller: Technical Drilling Services
Soil Engineer/Geologist: Matthew Ziroli

GROUNDWATER OBSERVATIONS			
DATE	DEPTH	CASING AT	STABILIZATION TIME
1/31/11	11.2'	–	30 minutes

Depth ft.	PID (ppm)	Sample No.	Sample Pen/Rec (in/in)	Sample Depth ft.	Sample Blows/6 inches	Strata	Visual Identification of Soil and/or Rock Sample
0	0.0	S-1	24/18	0 - 2	10-8-7-3	FILL: Sand, Gravel, Brick	**S-1: FILL:** Fine sand and nonplastic fines, some brick and asphalt pieces, little subrounded gravel, damp, medium dense, dark brown. (SP)
2	0.0	S-2	24/0	2 - 4	2-2-2-2		**S-2: No Recovery.**
4	0.0	S-3	24/7	4 - 6	0-2-2-2		**S-3: FILL:** Fine to medium sand and brick fragments, some nonplastic fines, little subangular gravel, damp, loose, dark brown & red brick in color. (SP)
6	0.0	S-4	24/4	6 - 8	1-1-1-1		**S-4: FILL:** Fine to medium sand, some nonplastic fines, some brick fragments, little angular gravel, trace glass fragments, damp, loose, dark brown & red brick in color. (SP)
						12.0'	
14	0.0	S-5	24/13	14 - 16	11-6-6-4	Fine to Medium SAND	**S-5: SAND:** Fine to medium sand, some subrounded gravel, trace coarse sand and nonplastic fines, damp, medium dense, dark gray. (SP)
18	0.0	S-6	24/8	18 - 20	17-10-8-7		**S-6: SAND:** Fine to coarse sand, some subangular gravel, trace nonplastic fines, medium dense, wet, light gray-brown (SW)
23	0.0	S-7	12/7	23 - 24	12-9		**S-7: SAND:** Fine to medium sand, some nonplastic fines, organic odor, wet, medium dense, light gray. (SM)
						24.0'	
	0.0	S-7A	12/8	24 - 25	5-7	CLAY (cont.)	**S-7A: CLAY:** Moderately plastic clay fines, stiff, wet, greenish-gray. (CH) Torvane: 0.25 - 0.20 - 0.15 ton / ft² Penetrometer: 0.15 - 0.20 - 0.15 ton / ft²

Notes:

ABBREVIATIONS USED	PROPORTIONS	GRANULAR SOILS		COHESIVE SOILS		EQUIPMENT USED	CASING	SAMPLER	CORE
		BLOWS/FT	DENSITY	BLOWS/FT	DENSITY				
HSA=Hollow Stem Auger	Trace 0 to 10%	0-4	V. LOOSE	<2	V. SOFT				
SS=Split Spoon V=Vane	Little 10 to 20%	4-10	LOOSE	2-4	SOFT	TYPE	HSA	SS	-
DCS=Driven Casing Sample	Some 21 to 35%	10-30	M. DENSE	4-8	M. STIFF	ID SIZE (in)	3 1/4	1 3/8	-
PH=Push Foot V=Vane	And 35 to 50%	30-50	DENSE	8-15	STIFF	HAMMER WT (LB)	-	140	-
ROR=Weight of Rod		>50	V. DENSE	15-30	V. STIFF	HAMMER FALL (IN)	-	30	-
WOR=Weight of Hammer				>30	HARD				

FIELD TEST BORING LOG

SHEET 2/2

S E A CONSULTANTS, INC. Science / Engineering / Architecture 215 First Street Cambridge, MA 02142	PROJECT: Bending Weir LOCATION: Land Blvd at Binney St, Cambridge MA CLIENT: City of Cambridge, MA WEATHER: Showers AM, 50°		BORING NO: B-101 PROJECT NO: 2003332.02A

Ground Elevation:
Date Started: 01/28/11
Date Finished: 01/31/11
Driller: Technical Drilling Services
Soil Engineer/Geologist: Matthew Ziroli

GROUNDWATER OBSERVATIONS			
DATE	DEPTH	CASING AT	STABILIZATION TIME
1/31/11	11.2'	–	30 minutes

Depth ft.	PID (ppm)	Sample No.	Sample Pen/Rec (in/in)	Sample Depth ft.	Sample Blows/6 inches	Strata	Visual Identification of Soil and/or Rock Sample
28	0	S-8	24/24	28 - 30	6-5-4-4	Medium Stiff to Stiff CLAY	**S-8: CLAY:** Moderately plastic clay fines, stiff, wet, greenish gray. (CH) Torvane: 0.25 - 0.20 - 0.20 ton / ft² Penetrometer: 0.50 - 0.25 - 0.25 ton / ft²
33	0.0	S-9	24/24	33 - 35	3-2-4-5		**S-9: CLAY:** Moderately plastic clay fines, medium stiff, wet, greenish-gray. (CH) Torvane: 0.20 - 0.25 - 0.15 ton / ft² Penetrometer: 0.50 - 0.25 - 0.50 ton / ft²
38	0.0	S-10	24/24	38 - 40	2-4-5-5		**S-10: CLAY:** Moderately plastic clay fines, stiff, wet, greenish-gray. (CH) Torvane: 0.15 - 0.20 - 0.15 ton / ft² Penetrometer: 0.50 - 0.75 - 0.50 ton / ft²
43	0.0	S-11	24/24	43 - 45	3-3-5-5		**S-11: CLAY:** Moderately plastic clay fines, medium stiff to stiff, wet, greenish-gray. (CH) Torvane: 0.25 - 0.20 - 0.15 ton / ft² Penetrometer: 0.50 - 0.50 - 0.50 ton / ft²
48	0.0	S-12	24/24	48 - 50	2-4-5-4		**S-12: CLAY:** Moderately plastic clay fines, stiff, wet, greenish-gray. (CH) Torvane: 0.25 - 0.15 - 0.15 ton / ft² Penetrometer: 0.25 - 0.50 - 0.25 ton / ft²
53	0.0	S-13	24/24	53 - 55	1-1-1-1		**S-13: CLAY:** Moderately plastic clay fines, soft, wet, greenish-gray. (CH) Torvane: 0.15 - 0.10 - 0.10 ton / ft² Penetrometer: 0.25 - 0.50 - 0.25 ton / ft²
58	0.0	S-14	24/24	58 - 60	1-2-5-5		**S-14: CLAY:** Moderate plastic clay fines, stiff, wet, greenish gray. (CH) Torvane: 0.20 - 0.25 - 0.15 ton / ft² Penetrometer: 0.50 - 0.25 - 0.25 ton / ft²
						60.0'	Bottom of Boring @ 60.0' bgs.

Notes:

ABBREVIATIONS USED	PROPORTIONS	GRANULAR SOILS		COHESIVE SOILS		EQUIPMENT USED	CASING	SAMPLER	CORE
		BLOWS/FT	DENSITY	BLOWS/FT	DENSITY				
HSA=Hollow Stem Auger	Trace 0 to 10%	0-4	V. LOOSE	<2	V. SOFT				
SS=Split Spoon V=Vane	Little 10 to 20%	4-10	LOOSE	2-4	SOFT	TYPE	HSA	SS	-
DCS=Driven Casing Sample	Some 20 to 35%	10-30	M. DENSE	4-8	M. STIFF	ID SIZE (in)	3 1/4	1 3/8	-
PH=Push Foot V=Vane	And 35 to 50%	30-50	DENSE	8-15	STIFF	HAMMER WT (LB)	-	140	-
ROR=Weight of Rod		>50	V. DENSE	15-30	V. STIFF	HAMMER FALL (IN)	-	30	-
WOR=Weight of Hammer				>30	HARD				

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S E A Consultants Inc.
Science/Engineering/Architecture
CONCORD, NEW HAMPSHIRE ROCKY HILL, CONNECTICUT
CAMBRIDGE, MASSACHUSETTS

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Designed by				
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Checked by		No.	Description	Date
Approved by		REVISIONS		

THE WORKS — CAMBRIDGE DEPARTMENT OF PUBLIC WORKS

CITY OF CAMBRIDGE, MASSACHUSETTS

CAM 017 BENDING WEIR

CIVIL
BORING AND VACUUM EXCAVATION DETAILS

Sheet No. G-3

File No.

LEGEND

————	ONE FOOT CONTOUR LINE
————	FIVE FOOT CONTOUR LINE
═══	GRANITE CURB
Ⓓ	DRAIN MANHOLE
Ⓔ	ELECTRIC MANHOLE
Ⓜ	MANHOLE
Ⓢ	SEWER MANHOLE
Ⓣ	TELEPHONE MANHOLE
H.H.	HAND HOLE
⊠	ELECTRIC BOX/TRANSFORMER
⊠	FIRE ALARM BOX
LS	LANDSCAPED AREA
☼	LIGHT
⋈	UTILITY POLE WITH LIGHT
□	MAIL BOX
—▫—	SIGN
⊕	GAS GATE
⊗	WATER GATE
⊗	WATER SERVICE
□	CATCH BASIN
◙	HYDRANT
○	PARKING METER
+ 22.1	SPOT GRADE
INV.	INVERT
BIT. CONC.	BITUMINOUS CONCRETE
	DECIDUOUS TREE
	CONIFEROUS TREE
———	TERMINUS UNKNOWN
H	HOOD
T	TOP
B	BOTTOM
S	SILT
W	WATER
STN	STONE
SL	SLUDGE
INACCESS	INACCESSIBLE
C	CULVERT
UNK	UNKNOWN
LP	LOW POINT
———W———	COMPILED WATER LINE
———T———	COMPILED TELEPHONE LINE
———E———	COMPILED ELECTRIC LINE
———TEC———	COMPILED TELEPHONE/ELECTRIC/CABLE LINE
———G———	COMPILED GAS LINE
———ST———	COMPILED STEAM LINE
———D———	COMPILED DRAIN LINE
———D———	DRAIN LINE
———S———	SEWER LINE
———S———	COMPILED SEWER LINE
TURB. FLOW	TURBULENT FLOW
S/UNK	SIZE UNKNOWN

SURVEYING NOTES

1. THE TOPOGRAPHY, SITE DETAIL & SURFACE IMPROVEMENTS OEPICTEO HEREON WERE OBTAINED FROM AN INSTRUMENT SURVEY CONDUCTED ON THE GROUND BY MERIDIAN ASSOCIATES, INC. AS DEPICTED HEREON SPECIFICALLY (SEPTEMBER 15, 16, 18, & 21, 2009).'

2. THE LOCATION OF ALL UNDERGROUND UTILITIES SHOWN ARE NOT DEPICTED HEREON. THE CONTRACTOR, PRIOR TO COMMENCEMENT OF CONSTRUCTION, SHALL VERIFY THE LOCATION OF ALL UTILITIES ANO CONTACT DIG SAFE AT 1–888–344–7233.

3. THE ELEVATIONS DEPICTED HEREON WERE BASEO ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29). STARTING BENCHMARK: MASSACHUSETTS GEODETIC SYRVEY DISK STAMPED 4671 LOCATED ON MEMORAL DRIVE BETWEEN HARVARD BRIDGE AND LONGFELLOW BRIDGE; ELEVATION 9.581.

4. PROPERTY LINES DEPICTED HEREON ARE BASED UPON A COMPILATION OF THE CITY OF CAMBRIDGE TAX MAPS. THIS PLAN IS NOT TO BE USED FOR THE RECONSTRUCTION OF BOUNDARY LINES OR FOR TITLE INSURANCE PURPOSES. ALL BOUNDARY LINES DEPICTEO ARE APPROXIMATE ONLY. MAI DID NOT PERFORM A BOUNDARY RETRACEMENT SURVEY.

GENERAL NOTES

1. EXACT DEPTHS OF PAVEMENT BASES AND SURFACE COURSES ARE NOT KNOWN AND SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR. APPROXIMATE DEPTHS OF PAVEMENT BASES AND SURFACE COURSES ARE INDICATED IN THE BORING LOGS.

2. IT IS INTENDED THAT THE EXISTING SANITARY SERVICES BE UTILIZED. THE OWNER OR ENGINEER WILL DETERMINE, IN EACH CASE, IF THE EXISTING SANITARY SERVICE IS IN ACCEPTABLE CONDITION OR TO BE REPLACED TO PROPERTY LINE.

3. EXISTING SANITARY SEWER SERVICES ARE, IN GENERAL, 6 INCHES IN DIAMETER, BUT LARGER OR SMALLER SERVICES MAY BE ENCOUNTEREO. SANITARY SERVICES 6 INCHES IN DIAMETER AND SMALLER SHALL BE REPLACED WITH NEW 6–INCH DIAMETER PVC PIPE, ANO SANITARY SERVICES LARGER THAN 6 INCHES IN DIAMETER SHALL BE REPLACED WITH AN EQUAL SIZE PVC SERVICE AS THE EXISTING.

4. DIVERSION, BYPASS, AND CONTROL OF SANITARY SEWER,STORM DRAIN AND DEWATERING FLOWS ARE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR'S INTENDED DIVERSION, BYPASS, AND CONTROL, AND DEWATERING PLANS SHALL BE SUBMITTED TO THE OWNER AND ENGINEER FOR REVIEW PRIOR TO ANY EXCAVATION.

5. THE CONTRACTOR SHALL TEMPORARILY MATCH EXISTING GRADES AND CONDITIONS WITHIN THE CONSTRUCTION AREA UNTIL FINAL RESTORATION IS COMPLETE.

6. CONTRACTOR SHALL PLUG OPENINGS IN EXISTING CATCH BASINS AND MANHOLES WHEN DRAWINGS INDICATE THAT PIPES ARE TO BE REMOVED OR ABANDONED. PLUG SHALL BE WATERTIGHT.

7. CONTRACTOR SHALL CUT OPENINGS IN EXISTING CATCH BASINS AND MANHOLES FOR NEW PIPES WHEN EXISTING STRUCTURES ARE TO BE INCLUDED IN THE PROPOSED COLLECTION SYSTEM. NEW CONNECTIONS SHALL BE SEALED WATERTIGHT. ALL NEW PENETRATIONS SHALL BE CIRCULAR CORED OPENINGS. SAW CUT OR HAMMERED NON–CIRCULAR OPENINGS ARE NOT ALLOWED.

8. WHEN PERFORMING DEWATERING, THE CONTRACTOR SHALL ADHERE TO THE REQUIREMENTS OF SECTION 02210, SECTION 01500, SECTION 02140, AND ALL DEWATERING PERMITS.

9. ALL EXTERIOR SURFACES OF CONCRETE STRUCTURES SHALL BE COATED IN ACCORDANCE WITH SPECIFICATION SECTION 07160 BITUMINOUS DAMPROOFING.

10. EXISTING AND PROPOSED ROADWAY CENTERLINE ELEVATIONS ARE SHOWN ON THE ROADWAY DESIGN DRAWINGS. ELEVATIONS SHOWN ON CIVIL DRAWING PROFILES ARE EXISTING CENTERLINE ELEVATION ONLY.

11. CONTRACTOR SHALL REFER TO THE CAMBRIDGE WATER DEPARTMENT, CONSTRUCTION AND OPERATING PRACTICES IN THE CONTRACT SPECIFICATION FOR ADDITIONAL CONSTRUCTION DETAILS.

12. PRIOR TO EXCAVATION, THE CONTRACTOR SHALL FIELD VERIFY THE FUNCTION (SANITARY SEWER OR STORM DRAIN) OF ALL EXISTING SERVICES, AND SHALL THEN CONNECT EACH SERVICE TO THE APPROPRIATE SANITARY SEWER OR STORM DRAIN. THE COST OF THIS VERIFICATION IS CONSIDERED INCIDENTAL TO THE COST OF THE CONTRACT AND NOT ELIGIBLE FOR SEPARATE PAYMENT.

13. THE LOCATION OF EXISTING UNDERGROUND PIPES, CABLES, CONDUITS AND STRUCTURES AS SHOWN HAS BEEN COLLECTED FROM THE BEST AVAILABLE SOURCES AND THE OWNER TOGETHER WITH ITS AGENTS DOES NOT IMPLY OR GUARANTEE THE DATA AND INFORMATION IN CONNECTION WITH THE UNDERGROUND PIPES, CABLES, CONDUITS, STRUCTURES AND SUCH OTHER PARTS AS TO THEIR COMPLETENESS NOR THEIR LOCATIONS AS INDICATEO. THE CONTRACTOR SHALL CONTACT UTILITY OWNERS AND REQUEST MARKING LOCATION OF ALL THEIR LINES IN THE WORK AREAS. THE CONTRACTOR SHALL ASSUME THAT THERE ARE EXISTING WATER, GAS, AND OTHER UTILITY CONNECTIONS TO EACH AND EVERY BUILDING ENROUTE, WHETHER THEY APPEAR ON THE PLANS OR NOT. ANY EXPENSE AND/OR DELAY OCCASIONED BY THESE UTILITIES AND STRUCTURES OR DAMAGE THERETO, INCLUDING THOSE NOT SHOWN, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND AT NO ADDITIONAL EXPENSE TO THE OWNER. (SEE SPECIAL CONDITIONS).

14. FOUNDATIONS AND LINES FOR SERVICES, POLICE AND FIRE ALARM BOXES, STREET LIGHTS, AND TRAFFIC SIGNALS ARE NOT SHOWN ON THE PLANS. THE APPROPRIATE UTILITY COMPANIES OR AUTHORITIES SHOULD BE CONTACTED AND CONSULTED FOR LOCATIONS OF THE ABOVE.

15. THE CONTRACTOR SHALL PREMARK THE EXCAVATION AREA IN WHITE AND NOTIFY THE DIG SAFE CENTER (TEL. NO.1–888–DIG–SAFE) AT LEAST 72 BUSINESS HOURS PRIOR TO ANY EXCAVATION WORK. IN ADDITION, NOTIFICATION SHALL ALSO BE GIVEN TO ALL AFFECTED PRIVATE AND/OR PUBLIC UTILITIES TO PERMIT STREET MARKING OF THEIR LINES.

16. THE STATIONS AS SHOWN FOR SEWERS AND DRAINS ARE APPROXIMATE. THE EXACT STATIONS SHALL BE DETERMINED BY THE CONTRACTOR AND RECORDED ON THE RECORD DRAWINGS.

17. ALL EXISTING MANHOLE FRAMES, COVERS, CATCH BASIN FRAMES AND GRATES REMOVED SHALL REMAIN THE PROPERTY OF THE OWNER AND THEN LATER BE SELECTED BY THE OWNER AND DELIVERED BY THE CONTRACTOR TO A LOCATION DESIGNATED BY THE OWNER. ALL REMAINING FRAMES, COVERS AND GRATES NOT SELECTED BY AND DELIVEREO TO THE OWNER SHALL BE DISPOSED OF BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.

18. BORINGS WERE TAKEN FOR THE PURPOSE OF DESIGN AND INDICATE CONDITIONS AT THE LOCATION OF THE BORING ONLY. SUBSURFACE CONDITIONS ENCOUNTERED DURING CONSTRUCTION MAY VARY FROM THOSE SHOWN IN THE BORING LOGS. GROUNDWATER LEVELS INDICATED IN THE BORING LOGS ARE THOSE EXISTING AT THE TIME SUBSURFACE INVESTIGATIONS WERE MADE AND DO NOT REPRESENT PERMANENT GROUNDWATER LEVELS. FOR BORING LOGS, SEE THE SPECIFICATIONS.

19. TEST PITS SHALL BE EXCAVATED AT THOSE LOCATIONS INDICATED ON THE DRAWINGS AND WHERE ORDERED OR APPROVED BY THE OWNER. ALL TEST PIT EXCAVATIONS SHALL BE MADE TO DETERMINE THE LOCATIONS OF EXISTING UTILITIES OR STRUCTURES AND PERFORMEO WELL IN ADVANCE OF CONSTRUCTION OPERATIONS SO THAT ANY CHANGES IN ALIGNMENT AND/OR GRADE OF THE PROPOSED WORK OR UTILITY LOCATIONS MAY BE DETERMINED. ALL DECISIONS RELATIVE TO UTILITY CONFLICTS AND RELOCATION REQUIREMENTS WILL BE MADE BY THE UTILITY OWNER.

20. AT THOSE LOCATIONS WHERE EXPLORATORY TEST PITS ARE REQUIRED TO DETERMINE THE LOCATION OF EXISTING UTILITIES, THE CONTRACTOR SHALL NOTIFY THE UTILITY COMPANIES INVOLVED AT LEAST 72 HOURS PRIOR TO EXCAVATION OF THE TEST PITS.

21. WHERE TEMPORARY OR PERMANENT UTILITY RELOCATION IS REQUIRED, THE CONTRACTOR SHALL NOTIFY THE AFFECTED UTILITY COMPANY 30 DAYS IN ADVANCE OF CONSTRUCTION AND SHALL COORDINATE THE NEW WORK WITH THE UTILITY RELOCATION.

22. THE CONTRACTOR SHALL COOROINATE THE RELOCATION OF WATER MAINS WITH THE RESIDENT ENGINEER AND THE CITY WATER DEPARTMENT.

23. LOCATIONS OF WATER, SANITARY, AND DRAINAGE SERVICE CONNECTIONS SHALL BE DETERMINED DURING CONSTRUCTION, IN CONSULTATION WITH PROPERTY OWNER AND CITY.

24. THE LIMITS OF BELOW GRADE EXCAVATIONS FOR NEW PIPELINES OR STRUCTURES ARE APPROXIMATE. ACTUAL HORIZONTAL AND VERTICAL LIMITS INCLUDING MEASUREMENT FOR THE NEW WORK SHALL BE APPROVED BY THE ENGINEER DURING CONSTRUCTION.

25. INTERRUPTIONS OF SERVICES SHALL NOT BE PERMITTED. THE CONTRACTOR SHALL COORDINATE WITH ALL UTILITIES AND PROVIDE ALL TEMPORARY UTILITIES AND CONNECTIONS TO AVOID INTERRUPTIONS OF WATER, SANITARY, DRAINAGE, ELECTRIC, PHONE, GAS, FIBEROPTICS, AND CABLE SERVICES.

26. PRIOR TO BEGINNING WORK THE CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS INFORMATION AND REPORT ANY DISCREPANCIES BETWEEN THE PLANS AND THE ACTUAL CONDITIONS TO THE ENGINEER.

27. THE CONTRACTOR SHALL PROVIDE ALL EROSION AND SEDIMENT CONTROL DEVICES, AND SHALL NOT COMMENCE CONSTRUCTION UNTIL THESE MEASURES HAVE BEEN INSTALLED AND APPROVED BY THE ENGINEER.

28. THE CONTRACTOR SHALL PROTECT ALL TRAVELED WAYS FROM DUST AND CONSTRUCTION DEBRIS AT ALL TIMES.

29. UNLESS OTHERWISE INDICATED ON THE DRAWINGS ALL AREAS ADJACENT TO THE LIMITS OF CONSTRUCTION WHICH ARE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT NO ADDITIONAL COST TO THE OWNER.

30. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL DEMOLISHED MATERIALS, RUBBISH, EXCAVATED MATERIAL AND DEBRIS, UNLESS OTHERWISE NOTED, AND IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REQUIREMENTS HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL DISPOSAL PERMITS AT NO ADDITIONAL COST TO THE OWNER.

31. THE CONTRACTOR MAY BE ASKED BY THE OWNER TO SUSPEND CONSTRUCTION OPERATIONS TEMPORARILY TO AVOID CONFLICTS WITH LARGE PUBLIC EVENTS OR LARGE STORM EVENTS. THE CONTRACTOR SHALL NOT BE COMPENSATED FOR COSTS RELATING TO SHUTDOWNS FOR THESE REASONS.

32. THE CONTRACTOR SHALL NOT BLOCK ACCESS TO STREET AND PRIVATE PARKING IN THE VICINITY OF THE LIMITS OF CONSTRUCTION AFTER WORK HOURS AND ON WEEKENDS.

33. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SNOW PLOWING AND SNOW REMOVAL FROM ALL AREAS WHERE HIS PRESENCE IS MAINTAINED INCLUDING BUT NOT LIMITED TO, UNPAVED SURFACES, PARKED EQUIPMENT AREAS OR ANY CONSTRUCTION ACTIVITY. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR STREET SWEEPING, SNOW REMOVAL FROM SIDEWALKS, TRASH REMOVAL, AND RECYCLABLE MATERIALS FROM ALL AREAS WHERE CONSTRUCTION RESTRICTS VEHICULAR OR PEDESTRIAN ACCESS TO STREETS OR SIDEWALKS AND WHERE CONTRACTORS PRESENCE INTERFERES WITH MUNICIPAL TRASH REMOVAL, STREET SWEEPING, OR SNOW PLOWING AND REMOVAL.

34. AREAS WITHIN THIS CONTRACT ARE SUBJECT TO THE UTILITY RELATED ABATEMENT MEASURE REGULATIONS OF THE MASSACHUSETTS CONTINGENCY PLAN 310 CMR 40.00 AND SECTIONS 02010 – SUBSURFACE INVESTIGATION, 02080 – WASTE MANAGEMENT, 02095 – TRANSPORTATION AND DISPOSAL OF WASTE MATERIAL, OF THE SPECIFICATIONS. THE CONTRACTOR'S ATTENTION IS SPECIFICALLY DIRECTED TO ENVIRONMENTAL DATA (SOIL AND GROUND WATER) FROM BORINGS AND MONITORING WELLS AS REPRESENTATIVE OF SUBSURFACE CONDITIONS IN URBAN AREAS. THE ENVIRONMENTAL DATA ARE APPENDED TO THE SPECIFICATIONS.

35. THE CONTRACTOR SHALL NOT BE PERMITTED TO STARTUP OR OPERATE EQUIPMENT BEFORE OR AFTER ESTABLISHED WORKING HOURS OF 7:00 AM TO 4:00 PM, MONDAY THROUGH FRIDAY WITHOUT WRITTEN APPROVAL OF THE OWNER, UNLESS NOTED OTHERWISE.

36. ALL EXISTING CATCH BASIN LATERALS WHICH ARE NOT RECONNECTED SHALL BE ABANDONED BY PLUGGING BOTH ENDS WITH BRICK MASONRY 8–INCHES THICK.

37. EXISTING CONDITIONS SHOWN ARE SCREENED.

38. ALL REPLACEMENT WATER SERVICE CONNNECTIONS TO BE 1–INCH COPPER UNLESS OTHERWEISE NOTED.

SPECIAL NOTES FOR TREE PROTECTION

1. REFER TO "CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS–DIVISION OF URBAN FORESTRY, TREE PROTECTION DURING CONSTRUCTION" IN THE CONTRACT DOCUMENTS.

2. A MASSACHUSETTS OR INTERNATIONAL CERTIFIED ARBORIST SHALL BE SUB–CONTRACTED BY THE CONTRACTOR TO PROVIDE A TREE PROTECTION PLAN AND PERFORM SPECIFIED WDRK.

3. ALL TREES NOT IDENTIFIED FOR REMOVAL SHALL BE PROTECTED AGAINST CONSTRUCTION AND TRUCKING RELATED DAMAGE TO THEIR TRUNKS, ROOTS, AND LIMBS. TREE TRUNKS SHALL BE WRAPPED AND/OR BARRICADED FOR PROTECTION IF NECESSARY. TREE LIMBS SHALL BE TEMPORARILY SUPPORTED TO AVOID DAMAGE AND/OR PROFESSIONALLY PRUNED IF THEY CAN NOT BE AVOIDED. BREAKAGE OF THE LIMBS SHALL NOT BE PERMITTED. IN ADDITION TO THE "CONSTRUCTION PRUNING" SPECIFICALLY IDENTIFIED, ALL TREES WITHIN THE PROJECT AREA AND ALONG TRUCK ROUTE, SHALL BE PROTECTED FROM DAMAGE OR PROFESSIONALLY PRUNED. "CONSTRUCTION PRUNING" SHALL CONSIST OF SQUARELY CUTTING LIMBS ONLY WHERE THEY CANNOT BE AVOIDED BY TRUCKS OR EQUIPMENT (RAISE PRUNING).

4. ALL TREE PROTECTION MEASURES AND OPERATIONS AND ALL ROOT PRUNING, TREE REMOVAL, AND TREE PRUNING SHALL BE SUBJECT TO REVIEW, APPROVAL OR CHANGE BY THE CITY ARBORIST.

5. AT THE OWNER'S DISCRETION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL ANY TREE DAMAGED BY CONSTRUCTION OR TRUCKING OPERATIONS, REMOVAL OF THE STUMP, AND REPLACEMENT OF THE TREE IN KIND AT NO ADDITIONAL COST TO THE OWNER. ADDITIONAL FINES MAY ALSO BE IMPOSED FOR DAMAGE AS PER CONTRACT SPECIFICATIONS.

6. BREAKAGE OF TREE ROOTS SHALL NOT BE PERMITTED AND ROOT PRUNING SHALL BE MINIMIZED. TREE ROOTS THAT CANNOT BE AVOIDED DURING CONSTRUCTION SHALL BE PRUNED IN ACCORDANCE WITH THE SPECIFICATIONS AND UNDER SUPERVISION OF THE CITY ARBORIST, INCLUDING ROOT TREATMENT IF REQUIRED.

7. THE CONTRACTOR SHALL COORDINATE WITH DIG SAFE PRIOR TO REMOVING ANY STUMPS. DAMAGE TO EXISTING SIDEWALKS AND UTILITIES SHALL BE REPAIRED AS SPECIFIED AFTER REMOVING STUMPS.

8. TREES AND STUMPS REMOVED DURING CONSTRUCTION SHALL BE REPLACED WITH NEW TREES AS DIRECTED. STUMP REMOVAL SHALL BE SUFFICIENT TO ALLOW PLANTING OF NEW TREE.

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THE CAMBRIDGE DEPARTMENT OF PUBLIC WORKS

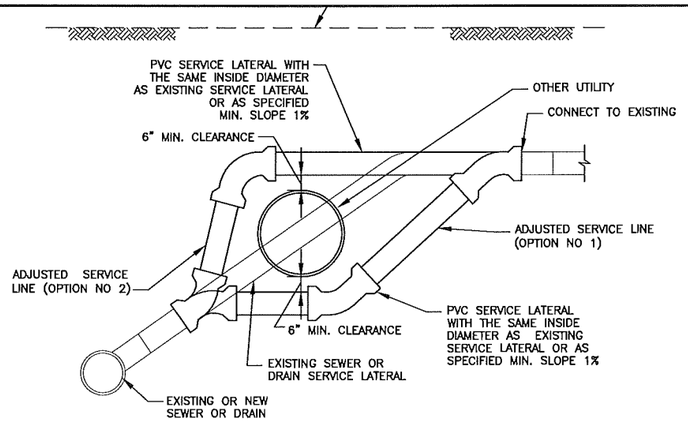
CITY OF CAMBRIDGE, MASSACHUSETTS

CAM 017 BENDING WEIR

CIVIL
LEGEND AND GENERAL NOTES

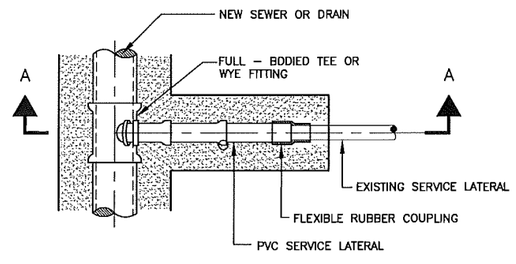
Sheet No. CG-1

File No.



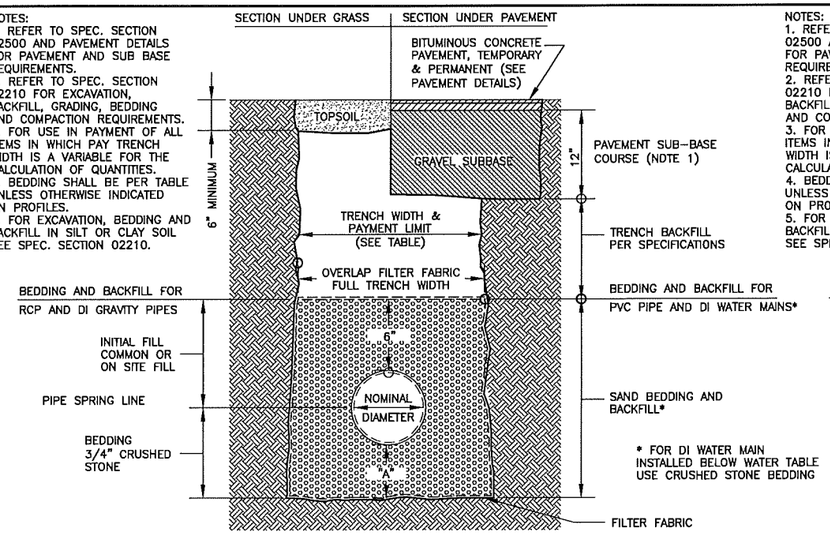
SERVICE LATERAL RECONNECTION FOR CONFLICTS WITH OTHER UTILITY

NOT TO SCALE



PLAN

NOTES:
1. REFER TO SPEC. SECTION 02500 AND PAVEMENT DETAILS FOR PAVEMENT AND SUB BASE REQUIREMENTS.
2. REFER TO SPEC. SECTION 02210 FOR EXCAVATION, BACKFILL, GRADING, BEDDING AND COMPACTION REQUIREMENTS.
3. FOR USE IN PAYMENT OF ALL ITEMS IN WHICH PAY TRENCH WIDTH IS A VARIABLE FOR THE CALCULATION OF QUANTITIES.
4. BEDDING SHALL BE PER TABLE UNLESS OTHERWISE INDICATED ON PROFILES.
5. FOR EXCAVATION, BEDDING AND BACKFILL IN SILT OR CLAY SOIL SEE SPEC. SECTION 02210.



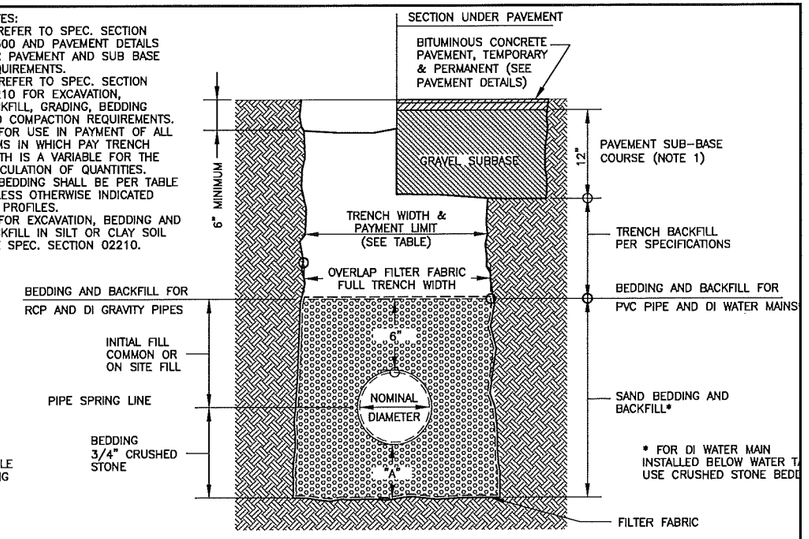
TRENCH DETAIL FOR BINNEY STREET PIPES

TRENCH PAY LIMIT TABLE FOR PIPES

PIPE SIZE (DIA.)	TRENCH WIDTH	"A"
LESS THAN 2"	2'–0"	6"
2" TO 6"	3'–0"	6"
8" TO 22"	4'–0"	9"
24" & GREATER	I.D. + 2'–0"	12"

I.D. = INSIDE DIMENSION

NOTES:
1. REFER TO SPEC. SECTION 02500 AND PAVEMENT DETAILS FOR PAVEMENT AND SUB BASE REQUIREMENTS.
2. REFER TO SPEC. SECTION 02210 FOR EXCAVATION, BACKFILL, GRADING, BEDDING AND COMPACTION REQUIREMENTS.
3. FOR USE IN PAYMENT OF ALL ITEMS IN WHICH PAY TRENCH WIDTH IS A VARIABLE FOR THE CALCULATION OF QUANTITIES.
4. BEDDING SHALL BE PER TABLE UNLESS OTHERWISE INDICATED ON PROFILES.
5. FOR EXCAVATION, BEDDING AND BACKFILL IN SILT OR CLAY SOIL SEE SPEC. SECTION 02210.

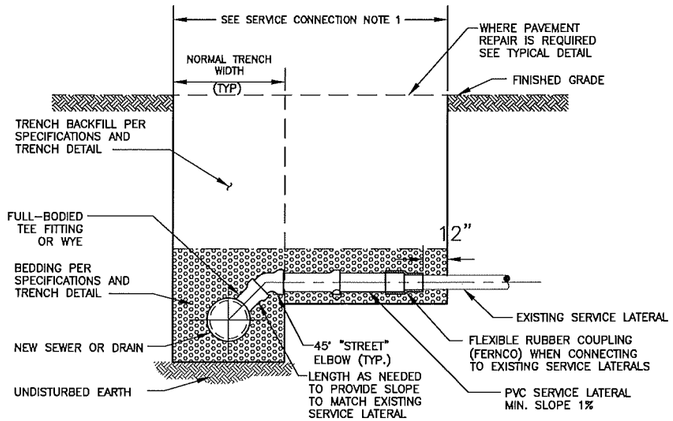


TRENCH DETAIL FOR LAND BOULEVARD PIPES

TRENCH PAY LIMIT TABLE FOR PRECAST STRUCTURES

WALL THICKNESS	TRENCH WIDTH	"A"
LESS THAN 6"	I.D. + 5'–0"	12"
6" TO 12"	I.D. + 6'–0"	12"
13" TO 18"	I.D. + 7'–0"	12"
19" & GREATER	O.D. + 6'–0"	12"

I.D. = INSIDE DIMENSION
O.D. = OUTSIDE DIMENSION



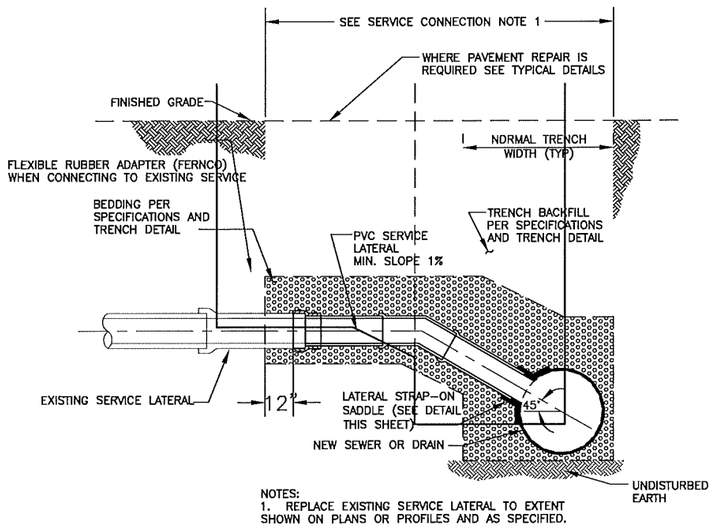
NOTES:
1. REPLACE EXISTING SERVICE LATERAL TO EXTENT SHOWN ON PLANS OR PROFILES AND AS SPECIFIED.
2. EXCAVATE & REMOVE EXISTING LATERAL AS REQUIRED TO ALLOW RECONSTRUCTION.

SECTION A–A
SEWER OR DRAIN SERVICE CONNECTION < 12' DEEP

NOT TO SCALE

TRENCH DETAILS FOR SEWER, DRAIN AND WATER PIPES

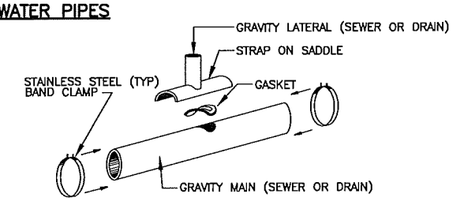
NOT TO SCALE



NOTES:
1. REPLACE EXISTING SERVICE LATERAL TO EXTENT SHOWN ON PLANS OR PROFILES AND AS SPECIFIED.

SERVICE CONNECTION WITH LATERAL STRAP–ON SADDLE

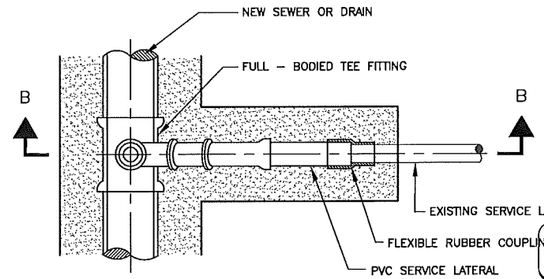
NOT TO SCALE



LATERAL STRAP–ON SADDLE

NOT TO SCALE

NOTES:
1. GRAVITY LATERAL (SEWER OR DRAIN) SIZES 4", 6" AND 8"
2. GRAVITY MAINS (SEWER OR DRAIN) SIZES UP TO 94" O.D.
3. ONLY FOR USE CONNECTING TO EXISTING MAINS. CONNECTION TO NEW MAINS SHALL BE MADE WITH FULL BODY FITTING



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THE CAMBRIDGE DEPARTMENT OF PUBLIC WORKS

CITY OF CAMBRIDGE, MASSACHUSETTS

CAM 017 BENDING WEIR

CIVIL

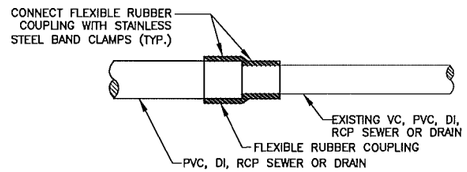
TRENCH AND SERVICE CONNECTION DETAILS

Sheet No. CG-2

File No.

NOTES:

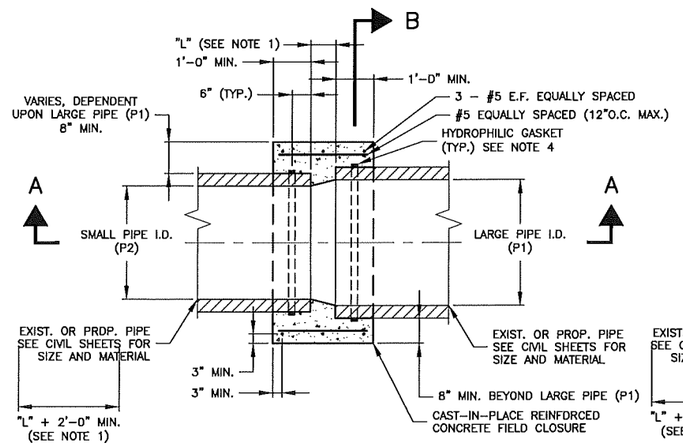
1. SPACING BETWEEN PIPES (L) DEPENDS ON PIPE SIZES, FOR PIPES OF THE SAME SIZE USE 4". THE DISTANCE "L" EQUALS THE LARGE PIPE I.D. MINUS THE SMALL PIPE I.D. TIMES TWO [L=(P1−P2)x2].
2. PROPOSED PIPE INVERT SHALL MATCH EXISTING PIPE INVERT UNLESS OTHERWISE SHOWN ON CIVIL SHEETS.
3. SAND BLAST EXISTING PIPE PERIMETER AND APPLY BONDING AGENT PRIOR TO CONCRETE ENCASEMENT.
4. INSTALL HYDROPHILIC (WATER STOP) GASKET ALONG PIPE PERIMETER FOR EACH PIPE AS SPECIFIED.
5. CONCRETE AND REBAR REQUIREMENTS SHALL CONFORM TO SHEET SG−1 AND SPECIFICATIONS.
6. LOCATION OF FIELD CLOSURE SHALL BE SUBJECT TO THE ENGINEER'S APPROVAL.
7. MAINTAIN 2" COVER BETWEEN PIPE AND ALL REINFORCING AND AT ALL CONCRETE SURFACES UNLESS OTHERWISE NOTED.



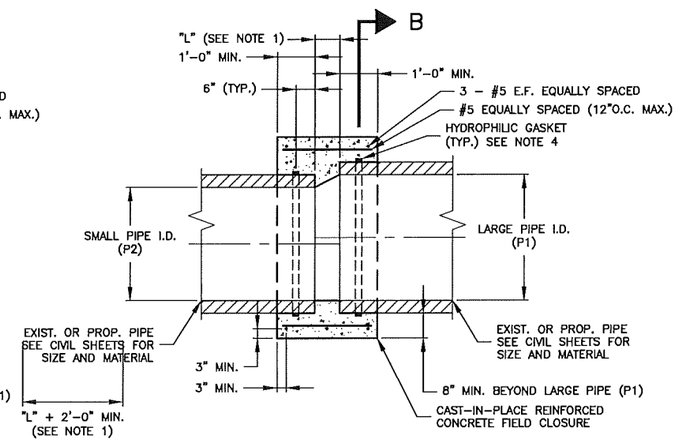
PIPE FIELD ENCLOSURE (FLEXIBLE RUBBER) DETAIL – TYPE 2

FOR NON−PRESSURE PIPES OF DIFFERENT MATERIALS OR SIZES

NOTES:
FOR GRAVITY LATERAL PIPES (SEWERS OR DRAINS).
SEE SPECIFICATIONS FOR MATERIALS AND REQUIREMENTS.



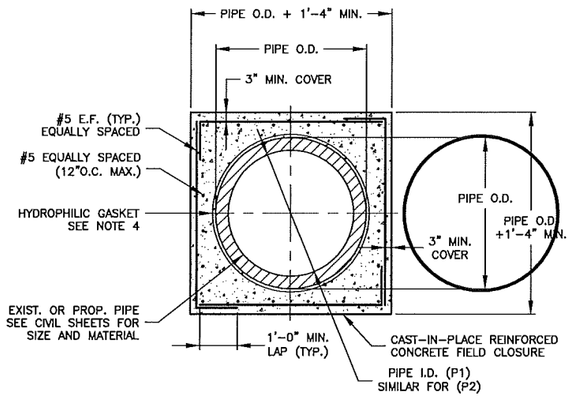
PLAN VIEW
NOT TO SCALE



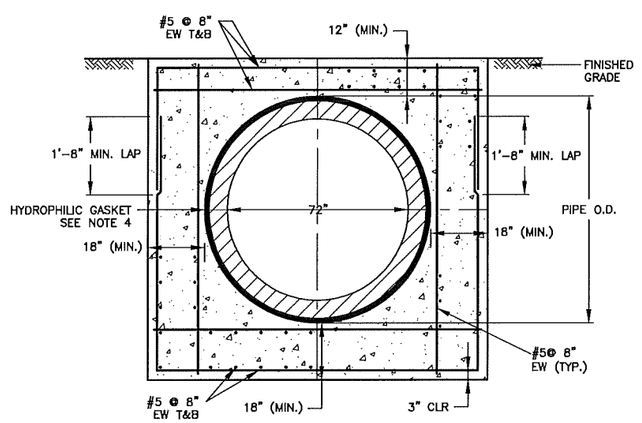
SECTION A−A
NOT TO SCALE

PIPE FIELD CLOSURE (CAST−IN−PLACE) DETAIL – TYPE 1

FOR NON−PRESSURE PIPES OF DIFFERENT MATERIALS OR SIZES



SECTION B−B (P1=48" MAX.)
NOT TO SCALE



SECTION B−B (P1= 72")
NOT TO SCALE

SEE NOTE 1 FOR LENGTH REQUIREMENT OF CAST−IN−PLACE COLLAR APPLICABLE TO 72"ø PIPE.

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THE WORKS — CAMBRIDGE DEPARTMENT OF PUBLIC WORKS

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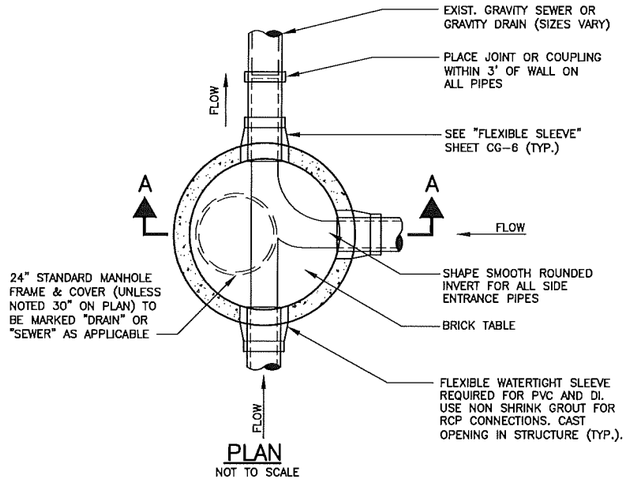
CAM 017 BENDING WEIR

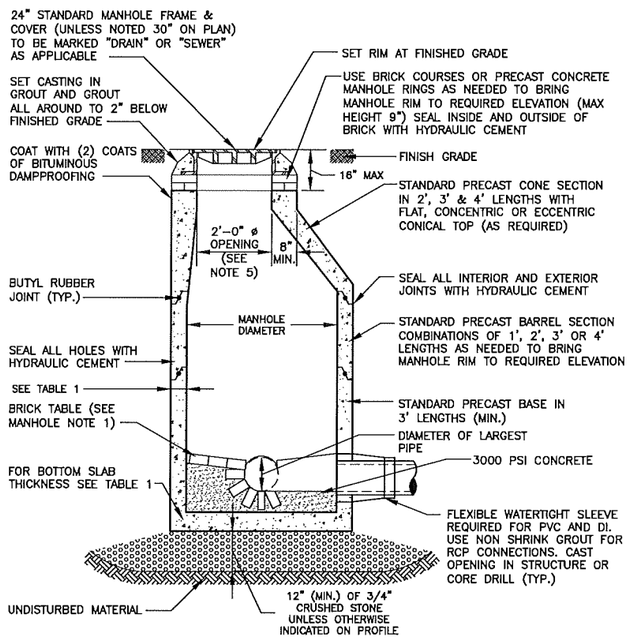
CIVIL
COMMON MANHOLE SEPARATION AND PIPE CONNECTION DETAILS 1

Sheet No. CG-3

File No.

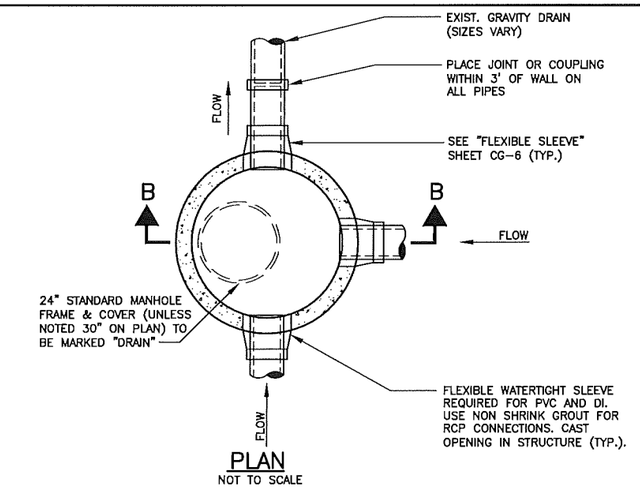


PLAN
NOT TO SCALE

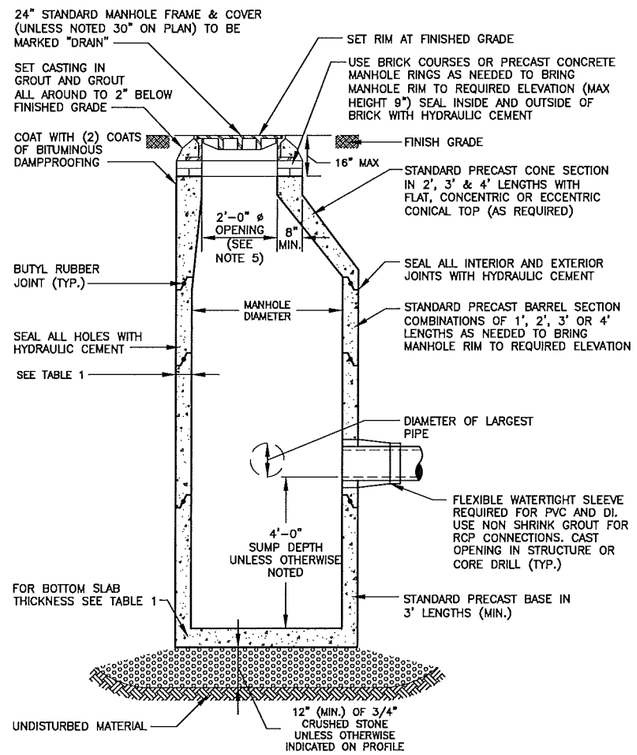


SECTION "A-A"
NOT TO SCALE

MANHOLE DETAIL – TYPE 1
(STANDARD MANHOLE)



PLAN
NOT TO SCALE



SECTION "B-B"
NOT TO SCALE

MANHOLE DETAIL – TYPE 4
(STANDARD MANHOLE WITH SUMP)

MANHOLE NOTES:

1. INNER EDGE OF BRICK TABLE TO BE AT ELEV OF CROWN OF TOP OF PIPE. TABLE TO SLOPE AT 8.3% TO INSIDE OF MANHOLE BASE.
2. SEWER OR DRAIN MANHOLE DIAMETER SHALL BE 4', 5', 6', OR 8' AS SHOWN ON PLAN/PROFILE VIEWS.
3. DESIGN PRECAST SECTIONS WITH FRAME AND COVER FOR AASHTO H20 LOADINGS.
4. FOR DESCRIPTION OF MATERIALS, SEE SPECIFICATIONS.
5. OPENING IN TOP MANHOLE SECTION SHALL MATCH CASTING NOMINAL DIAMETER.

TABLE 1 : MANHOLE DIMENSIONS

MANHOLE DIAMETER	SIDE WALL MIN. THICKNESS	BOTTOM SLAB MIN. THICKNESS	MAX PIPE DIAMETER * RCP	MAX PIPE DIAMETER * DI/PVC
4'	5"	6"	24"	30"
5'	6"	8"	36"	42"
6'	6"	8"	48"	54"
8'	8"	8"	66"	72"
10'	10"	10"	72"	84"

* MAY VARY DEPENDING ON SIZE AND LOCATION OF ADDITIONAL PENETRATIONS OR RELATIONSHIP OF PENETRATIONS IN MANHOLE

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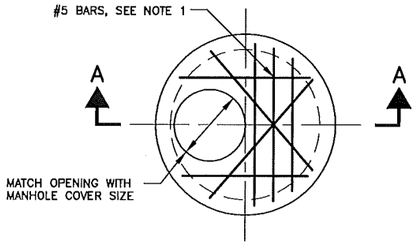
CIVIL
MANHOLE DETAILS 1

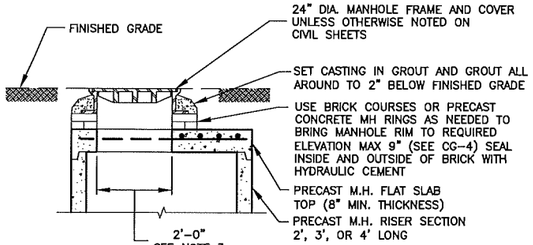
Sheet No.
CG-4

File No.



PLAN VIEW

NOT TO SCALE



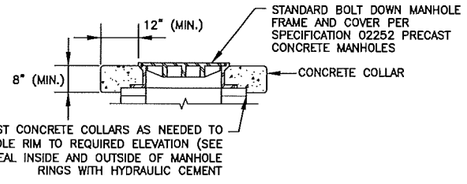
SECTION A–A

NOT TO SCALE

TYPICAL PRECAST (FLAT) TOP SLAB DETAIL

NOTES:

1. DESIGN PRECAST SECTIONS WITH FRAME AND COVER FOR AASHTO H20 LOADINGS.
2. FOR DESCRIPTION OF MATERIALS, SEE SPECIFICATIONS.
3. OPENING IN TOP MANHOLE SECTION SHALL MATCH CASTING NOMINAL DIAMETER.

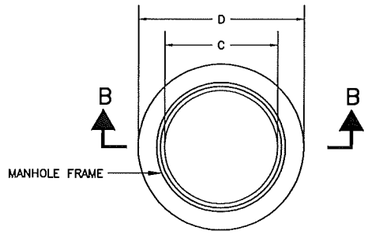


BOLT DOWN COVER WITH REINFORCED COLLAR DETAIL

NOT TO SCALE

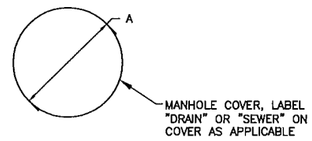
NOTES:

1. DESIGN FRAME AND COVER FOR AASHTO H20 LOADINGS.
2. CONCRETE COLLAR SHALL BE DESIGNED TO MEET H20 LOADING.
3. FOR DESCRIPTION OF MATERIALS, SEE SPECIFICATIONS.



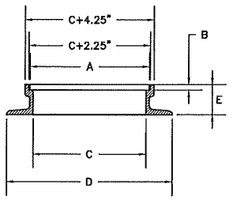
FRAME PLAN

NOT TO SCALE



COVER PLAN

NOT TO SCALE



SECTION B–B

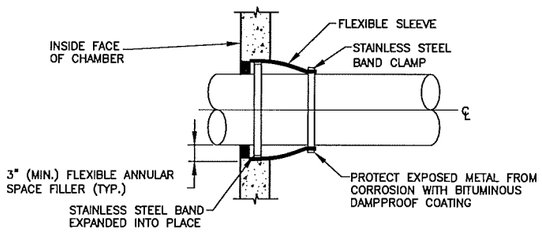
NOT TO SCALE

MH FRAME AND COVER DIMENSIONAL RANGE TABLE				
SIZE	24" NOMINAL	30" NOMINAL	30" NOMINAL– LOW PROFILE	30" NOMINAL– BOLT DOWN COVER
A	26"	31 3/4 – 32 1/4"	32 – 34"	32 – 33 3/4"
B	1 1/8 – 1 1/2"	1 1/4 – 1 3/4"	1 3/8 – 2 1/2"	1 1/2 – 1 3/4"
C	23 7/8 – 24"	30"	30 – 30 1/2"	28 1/4 – 30"
D	34 1/8 – 38"	38 – 44"	36 – 41"	40 – 46"
E	8 – 8 1/8"	6 – 8"	4"	7 – 8"

NOTES:

1. DESIGN FRAME AND COVER FOR AASHTO H20 LOADINGS.
2. FOR DESCRIPTION OF MATERIALS, SEE SPECIFICATIONS.

DPW MANHOLE FRAME AND COVER DETAIL

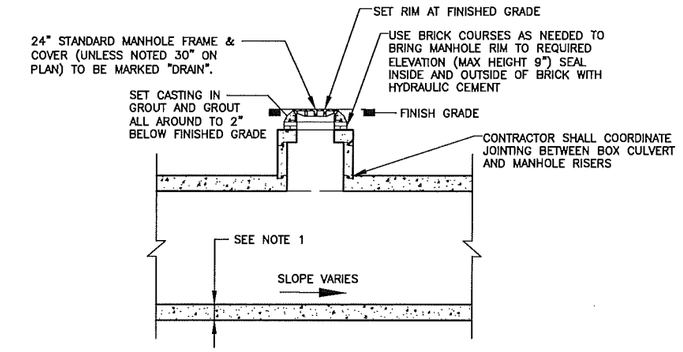


FLEXIBLE SLEEVE CONNECTION DETAIL

NOT TO SCALE

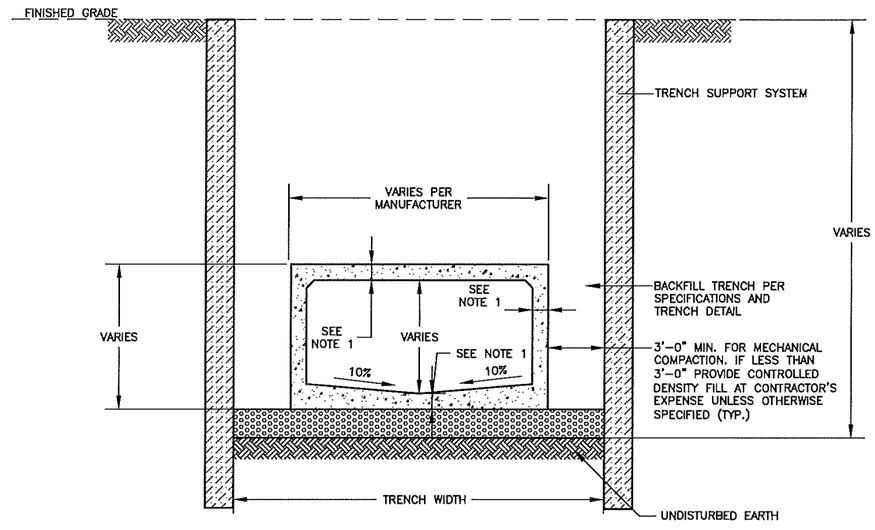
NOTE:

1. PRECAST OPENING OR CORE DRILLED INTO EXISTING STRUCTURE. SIZE VARIES TO ACCOMMODATE EXTENSION BONNET FLANGE DIAMETER OR PIPE.



LONGITUDINAL SECTION

NOT TO SCALE



TYPICAL BOX CULVERT DETAIL

NOT TO SCALE

NOTES:

1. PRECAST REINFORCED CONCRETE BOX SECTIONS MANUFACTURED IN ACCORDANCE WITH ASTM C789 SPECIFICATIONS SECTION D2715 AND AS SPECIFIED. WATER–TIGHT GASKET JOINTS AS SPECIFIED.
2. SEE SPECIFICATION SECTION D3410 FOR PRECAST CONCRETE REQUIREMENTS.

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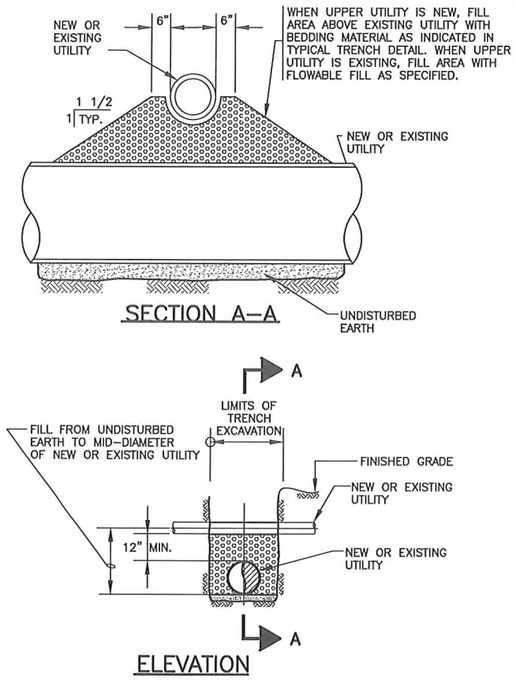
CAM 017 BENDING WEIR

CIVIL

BOX CULVERT AND MANHOLE DETAILS 2

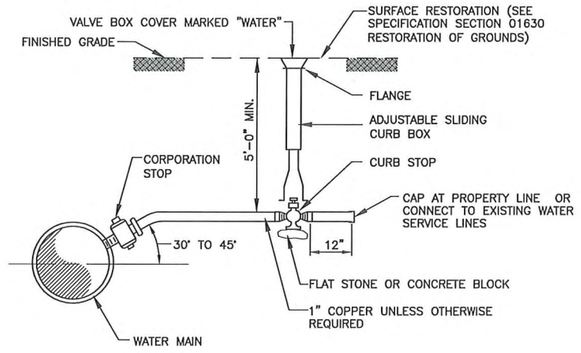
Sheet No. CG-5

File No.



UTILITY CROSSING DETAIL

NOT TO SCALE



NEW WATER SERVICE DETAIL

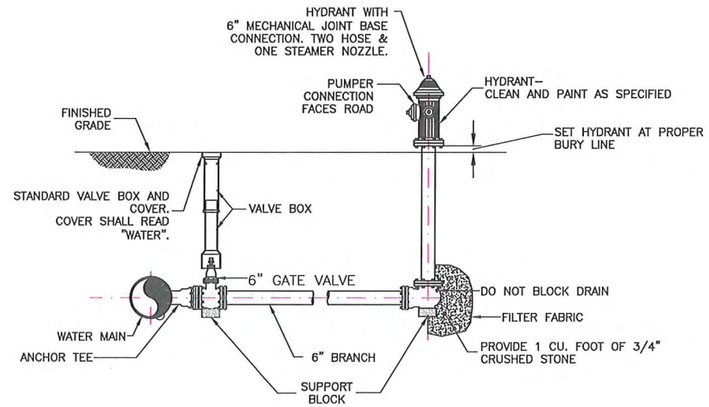
NOT TO SCALE

WATER NOTES:

1. ANY WATER MAIN TO BE ENCASED IN CONCRETE FOR STRUCTURAL PURPOSES SHALL BE WITHIN FLOWABLE WILL WITH 0% ASH CONTENT.

2. ALL GATE VALVES SHALL BE RESILIENT SEATED AND "OPEN RIGHT".

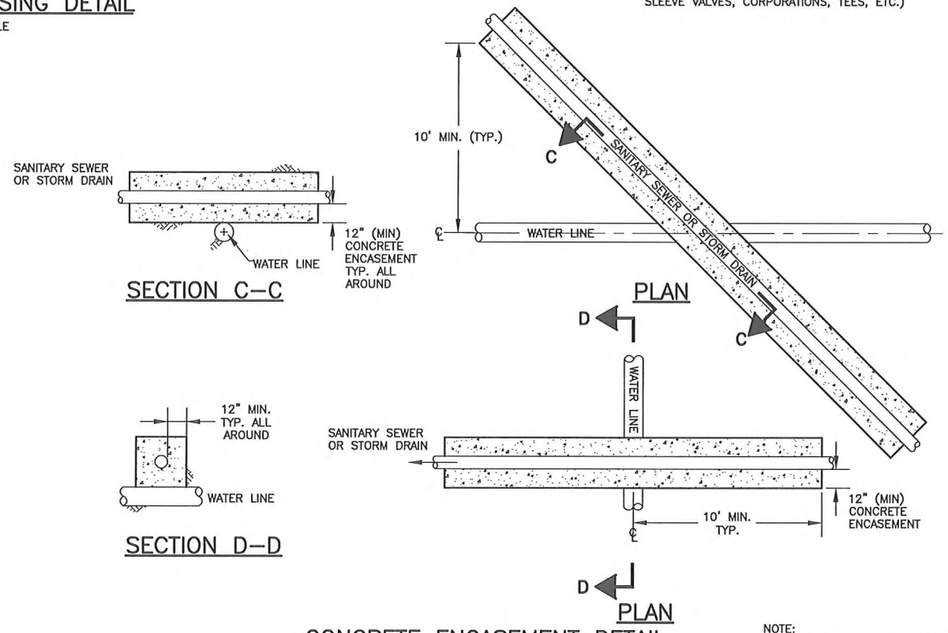
3. ALL NEW WATER MAN TO BE WRAPPED IN POLY >/= 9 MIL. THICK (INCLDING TAPPING SLEEVE VALVES, CORPORATIONS, TEES, ETC.)



NOTES:
1. PROVIDE HYDRANT AND VALVE JOINTS WITH APPROVED MECHANICAL JOINTS.
2. SUPPORT BLOCKS TO BE PRESSURE TREATED WOOD OR CONCRETE MASONRY BLOCK.
3. ALL VALVES OPEN LEFT.

FIRE HYDRANT DETAIL

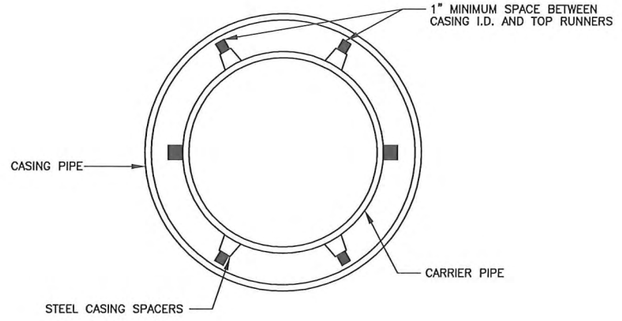
NOT TO SCALE



CONCRETE ENCASEMENT DETAIL

NOT TO SCALE

NOTE:
CONCRETE SHALL HAVE A MINIMUM 3,000 PSI STRENGTH AS INDICATED IN SPECIFICATION SECTION 03300.



PIPE CASING DETAIL

NOT TO SCALE

NOTE:
1. FOR PIPE CASING WATER MAINS, THE CARRIER PIPES SHALL BE MECHANICALLY BOLTED (I.E. BELLS CUT–OFF).
2. TOP RUNNERS SHALL BE FIBERGLASS OR OTHER MATERIAL APPROVED BY THE ENGINEER

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CAM 017 BENDING WEIR

CIVIL
UTILITY CROSSING AND WATER DETAILS

Sheet No.
CG-6

File No.

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CIVIL
ROAD AND SIDEWALK DETAILS

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CG-7

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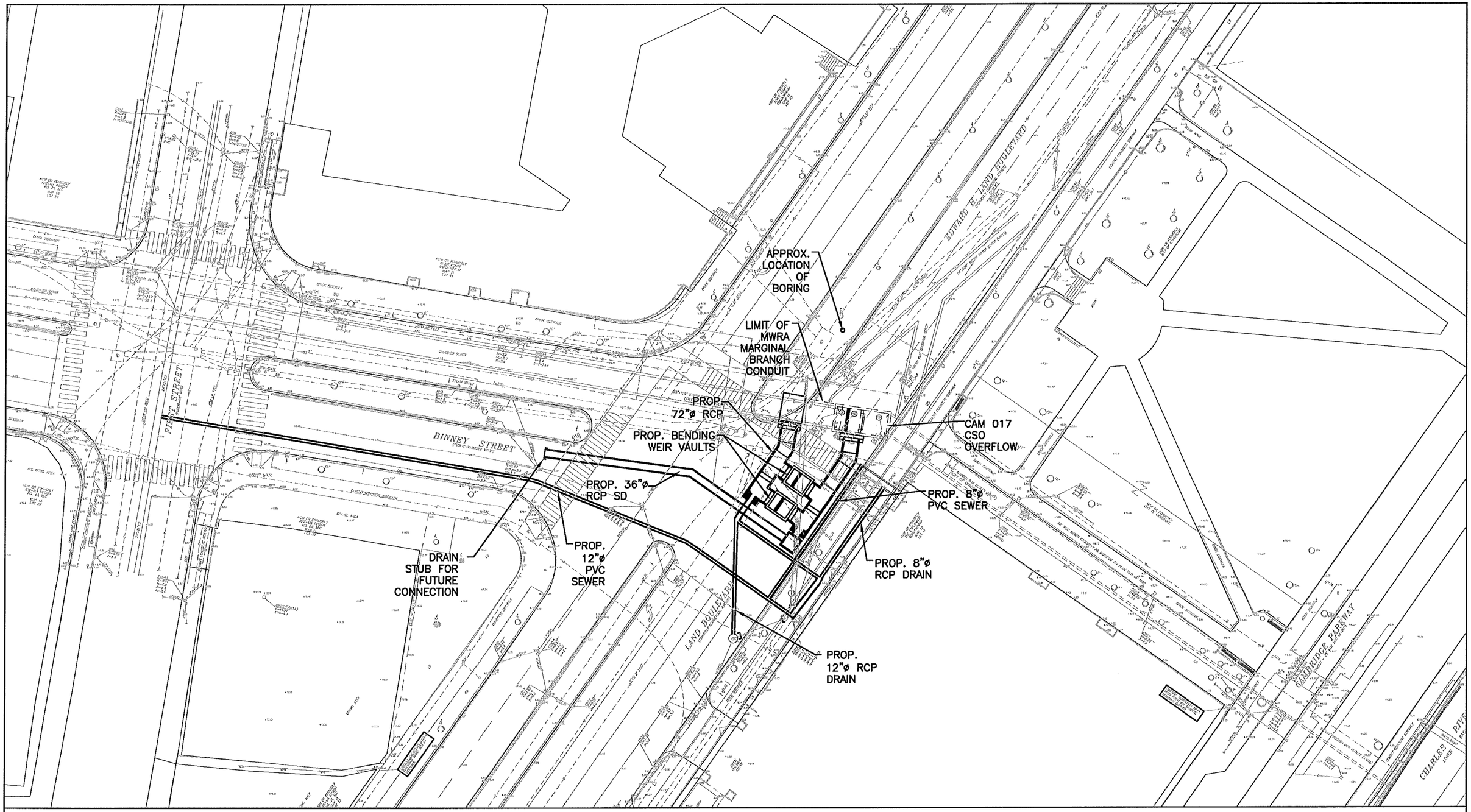

SYSTEM PLAN

SCALE: 1" = 20'

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CITY OF CAMBRIDGE, MASSACHUSETTS

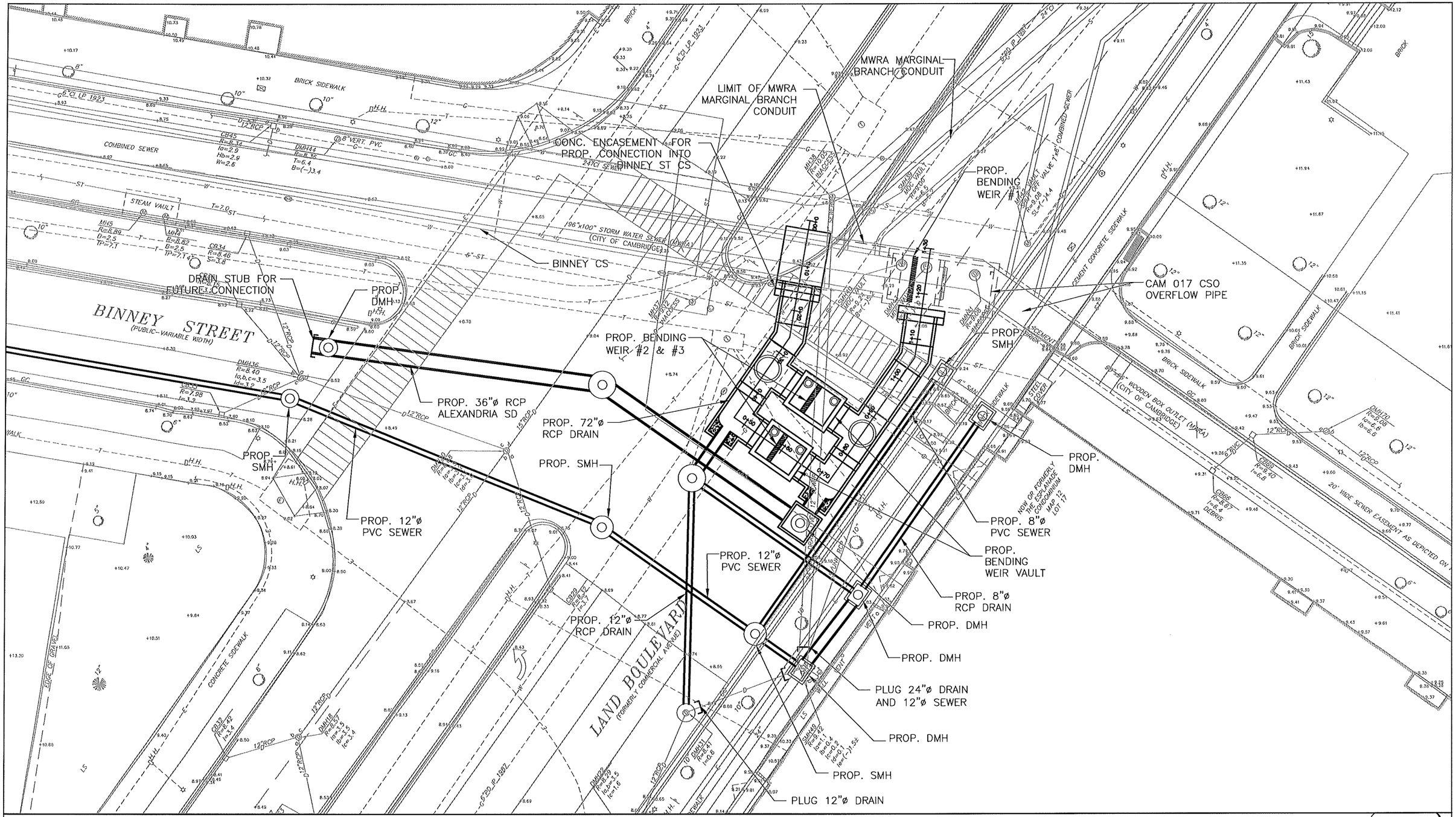
CAM 017 BENDING WEIR

CIVIL

LAND BLVD CAM 017 BENDING WEIR PLAN

Sheet No. C-1

File No.



CONSTRUCTION PLAN

SCALE: 1" = 10'

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THE CAMBRIDGE DEPARTMENT OF PUBLIC WORKS

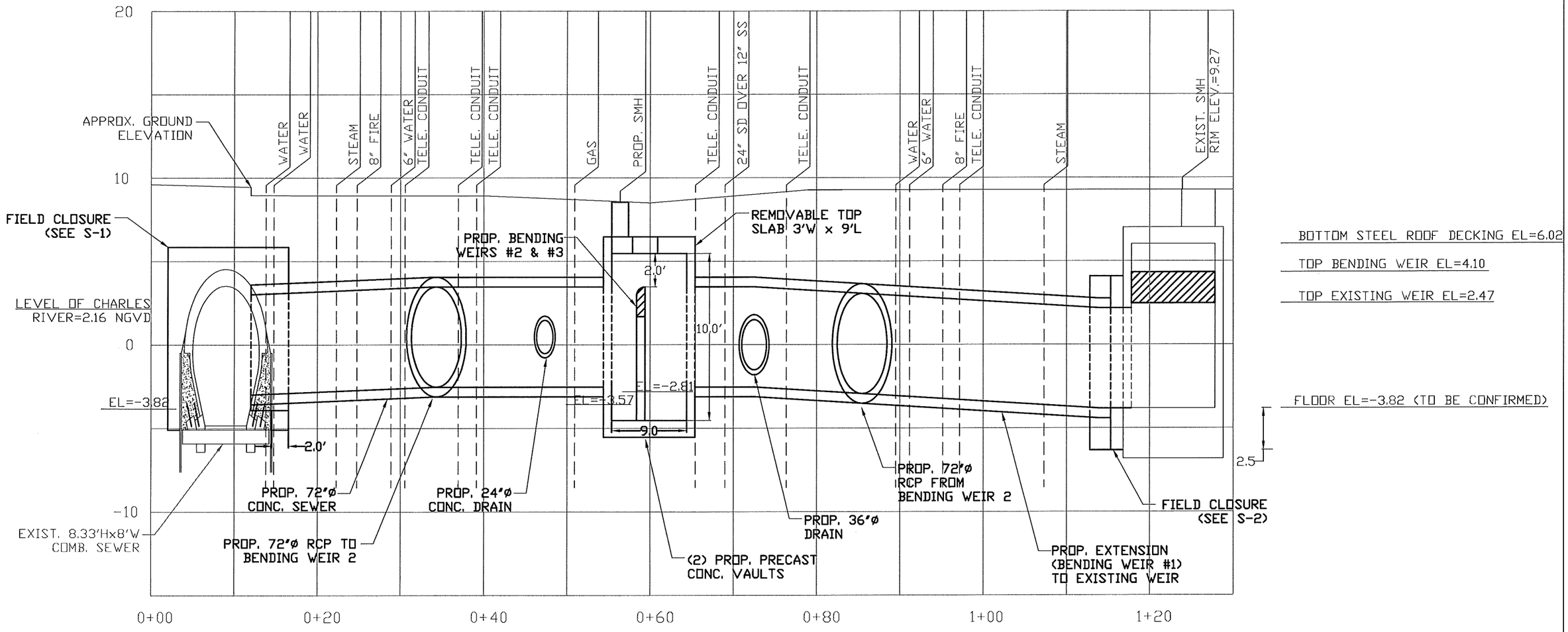
CITY OF CAMBRIDGE, MASSACHUSETTS

CAM 017 BENDING WEIR

CIVIL
LAND BLVD CAM 017 BENDING WEIR

Sheet No. C-2

File No.



SCALE: 1"=10' HORIZONTAL
SCALE: 1"=5' VERTICAL

CAM 017 BENDING WEIR STRUCTURES - PROFILE

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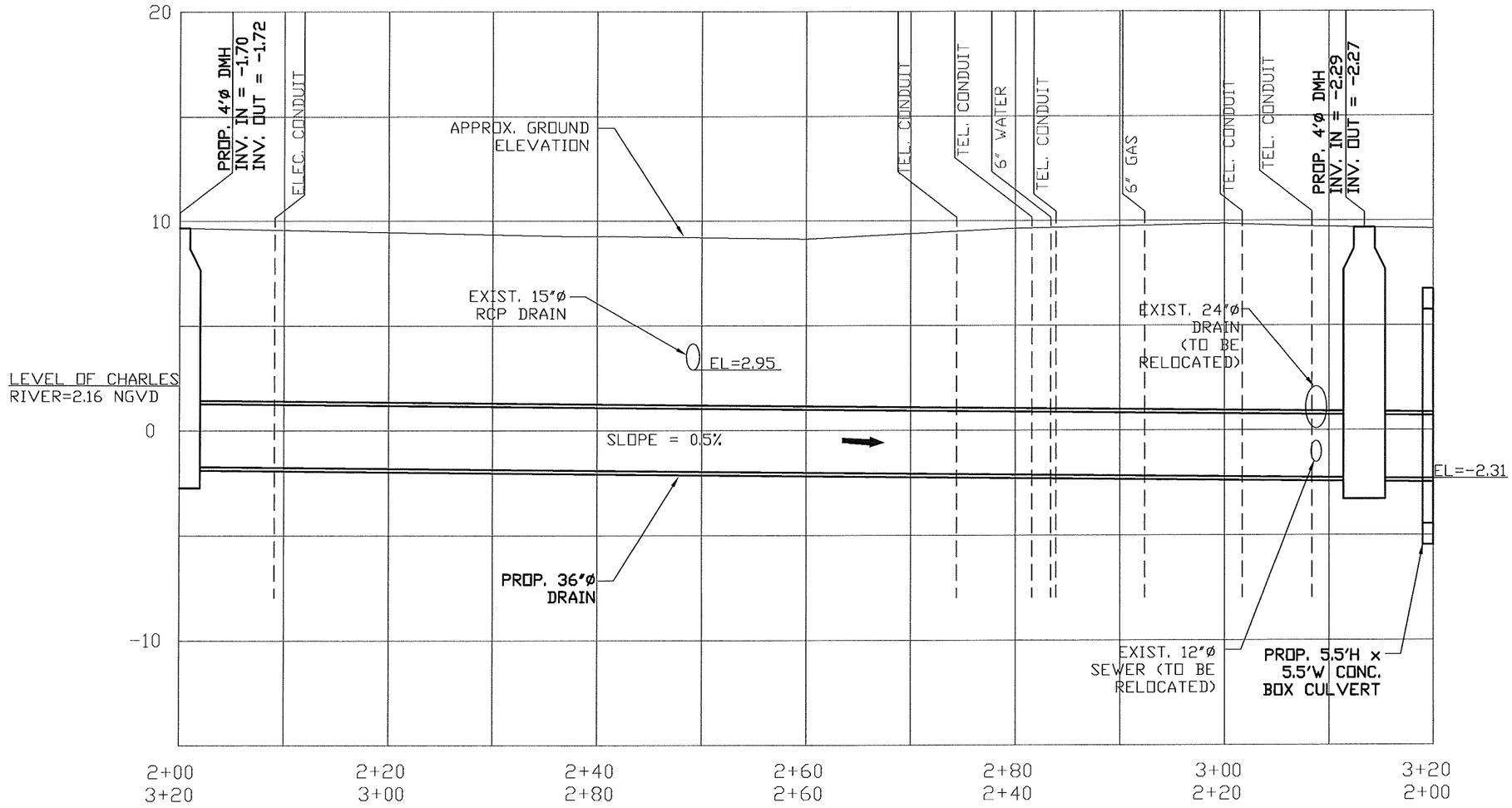
CIVIL

LAND BLVD CAM 017 BENDING WEIR PROFILE

Sheet No. C-3

File No.



SCALE: 1"=10' HORIZONTAL
SCALE: 1"=5' VERTICAL

ALEXANDRIA STORM DRAIN - PROFILE

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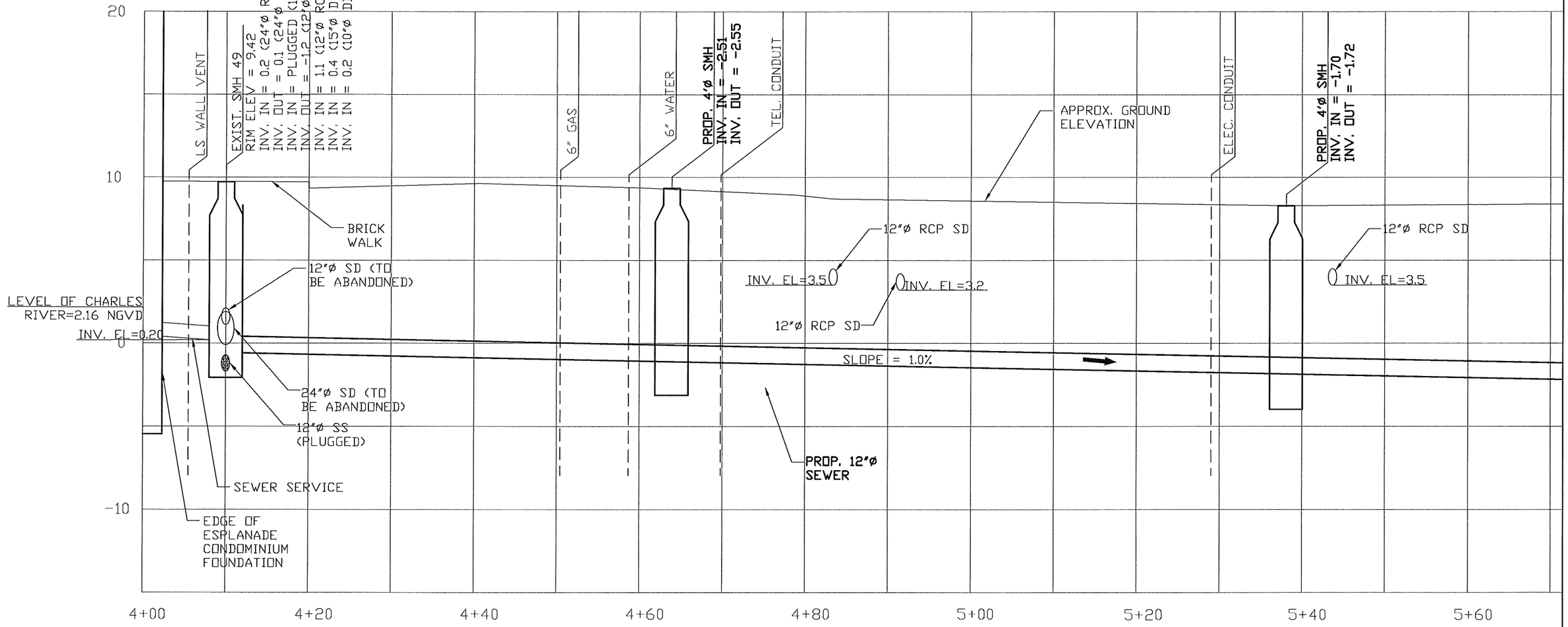
CIVIL
BINNEY ST ALEXANDRIA DRAIN PROFILE

Sheet No. C-4

File No.



SCALE: 1"=10' HORIZONTAL
SCALE: 1"=5' VERTICAL

BINNEY STREET 12" SANITARY SEWER - PROFILE

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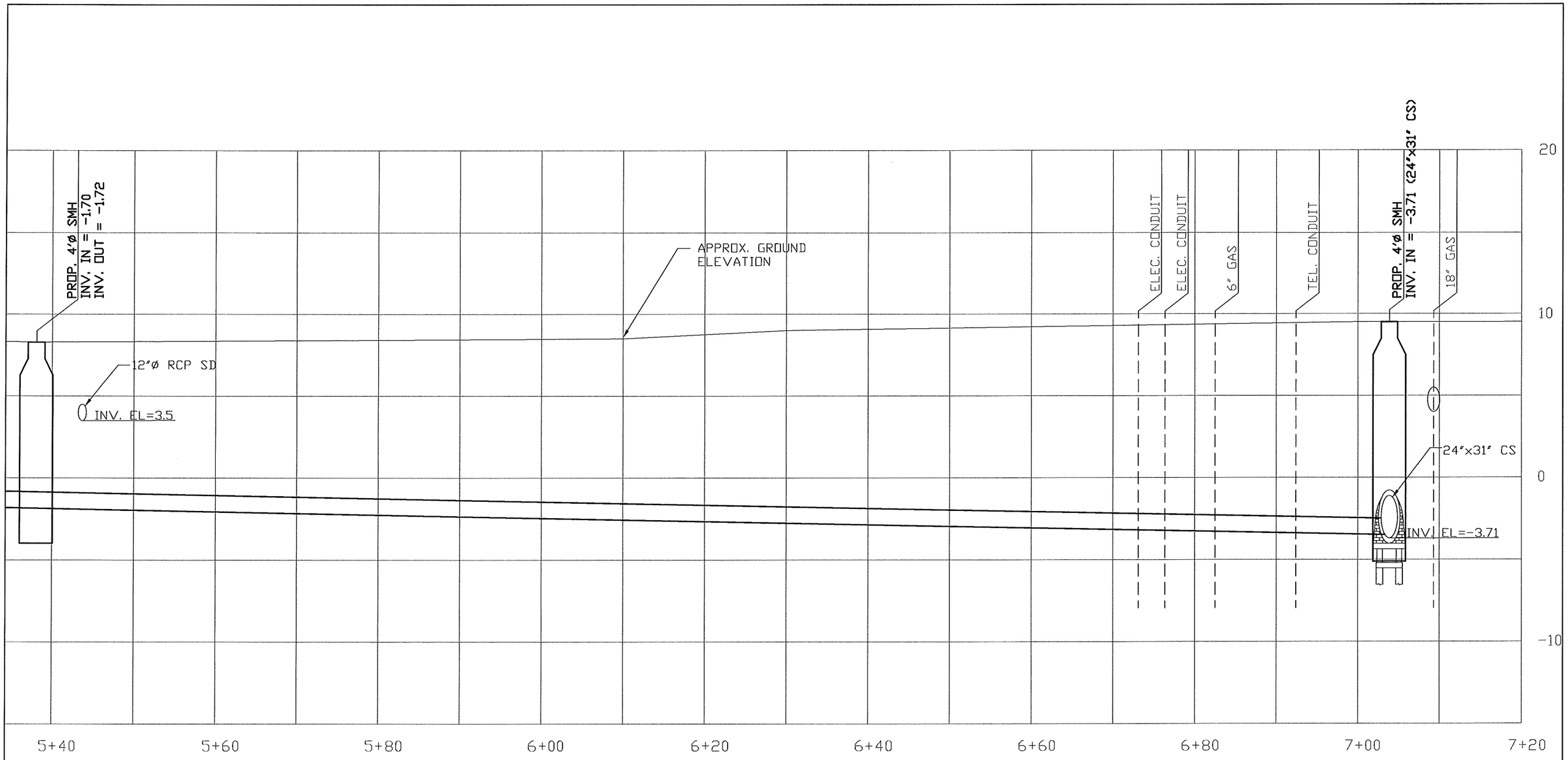
CIVIL

BINNEY ST SANITARY SEWER PROFILE 1

Sheet No. C-5

File No.



SCALE: 1"=10' HORIZONTAL
SCALE: 1"=5' VERTICAL

BINNEY STREET 12" SANITARY SEWER - PROFILE

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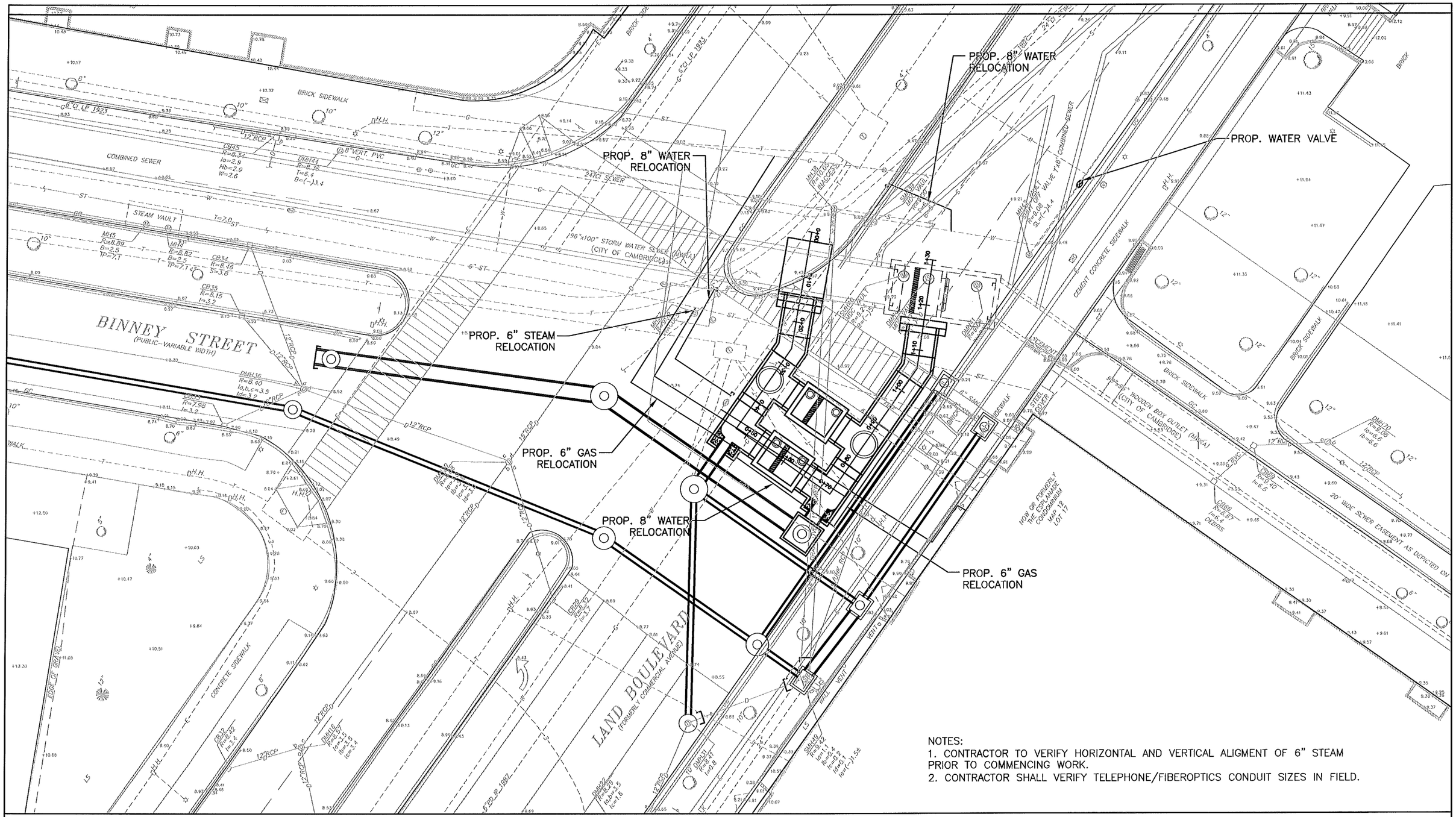
CAM 017 BENDING WEIR

CIVIL
BINNEY ST SANITARY SEWER PROFILE 2

Sheet No. C-6

File No.



NOTES:
1. CONTRACTOR TO VERIFY HORIZONTAL AND VERTICAL ALIGMENT OF 6" STEAM PRIOR TO COMMENCING WORK.
2. CONTRACTOR SHALL VERIFY TELEPHONE/FIBEROPTICS CONDUIT SIZES IN FIELD.

UTILITY PLAN
SCALE: 1" = 10'

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CAM 017 BENDING WEIR

UTILITY PLAN

Sheet No. U-1

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CAM 017 BENDING WEIR

STRUCTURAL
GENERAL NOTES

Sheet No.
SG-1

File No.

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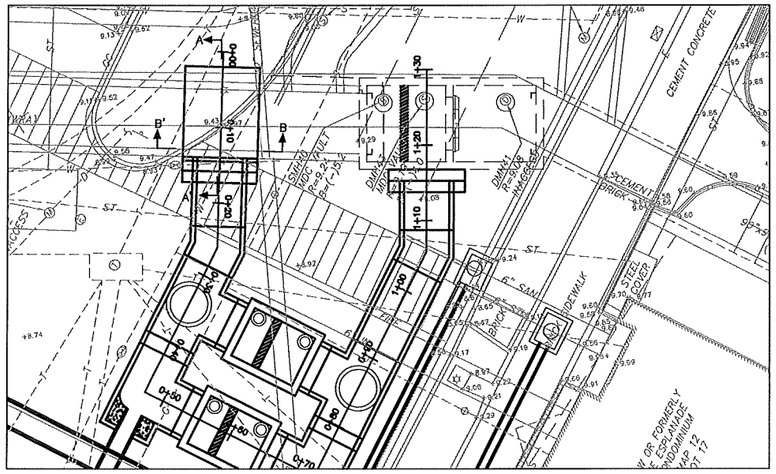
CAM 017 BENDING WEIR

STRUCTURAL
TYPICAL DETAILS

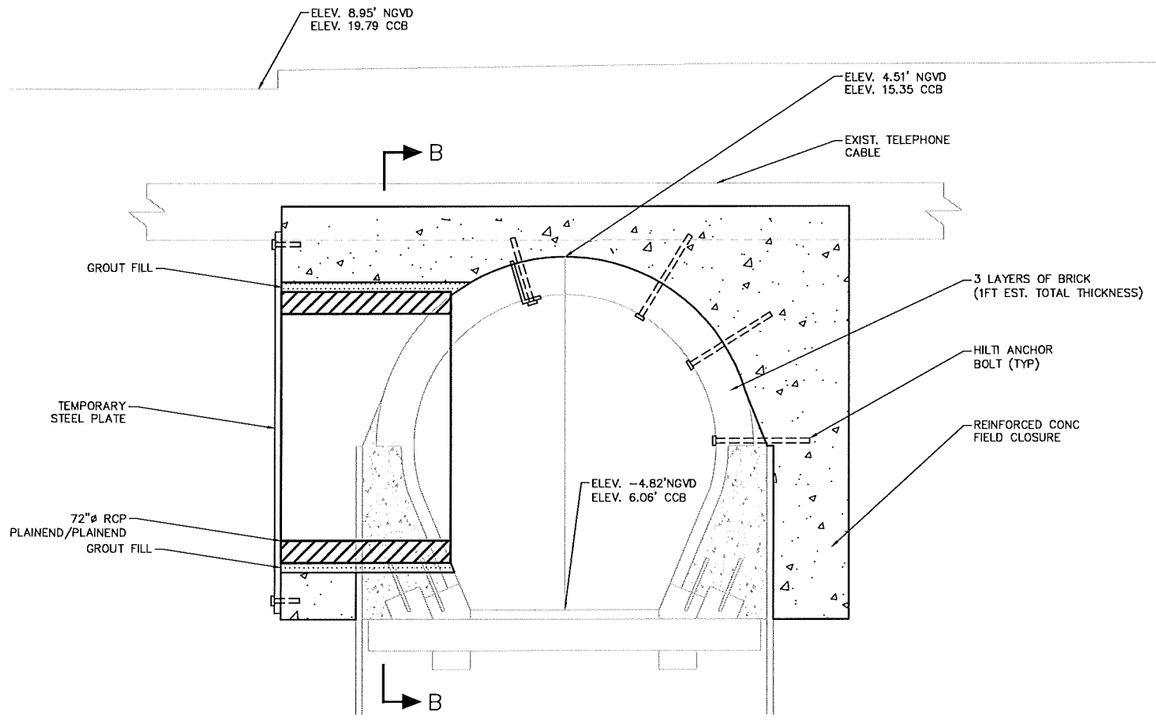
Sheet No.
SG-2

File No.



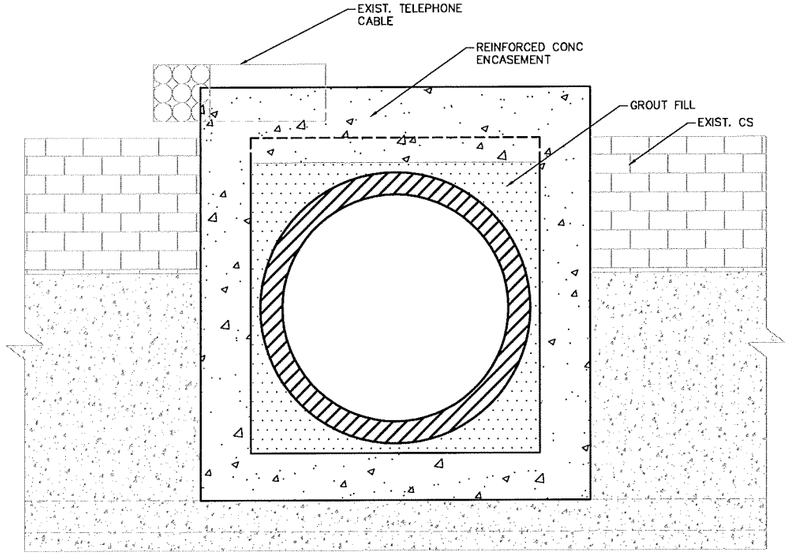
WEIR STRUCTURE

SCALE: 1" = 20'



SECTION A'–A

SCALE: 1" = 4'



SECTION B'–B

SCALE: 1" = 4'

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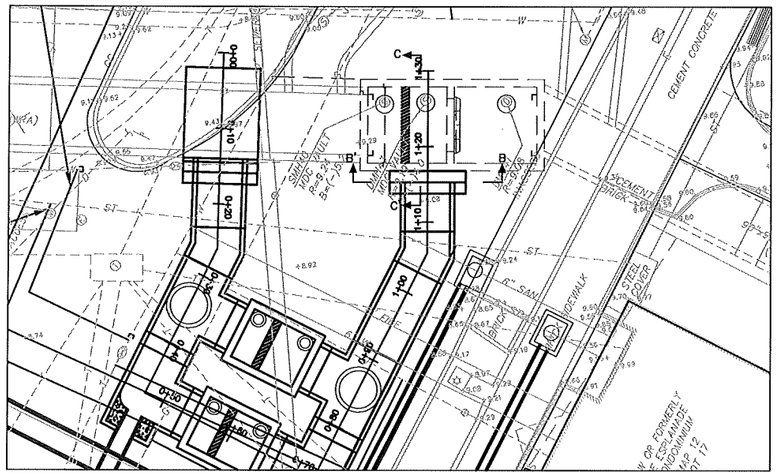
CAM 017 BENDING WEIR

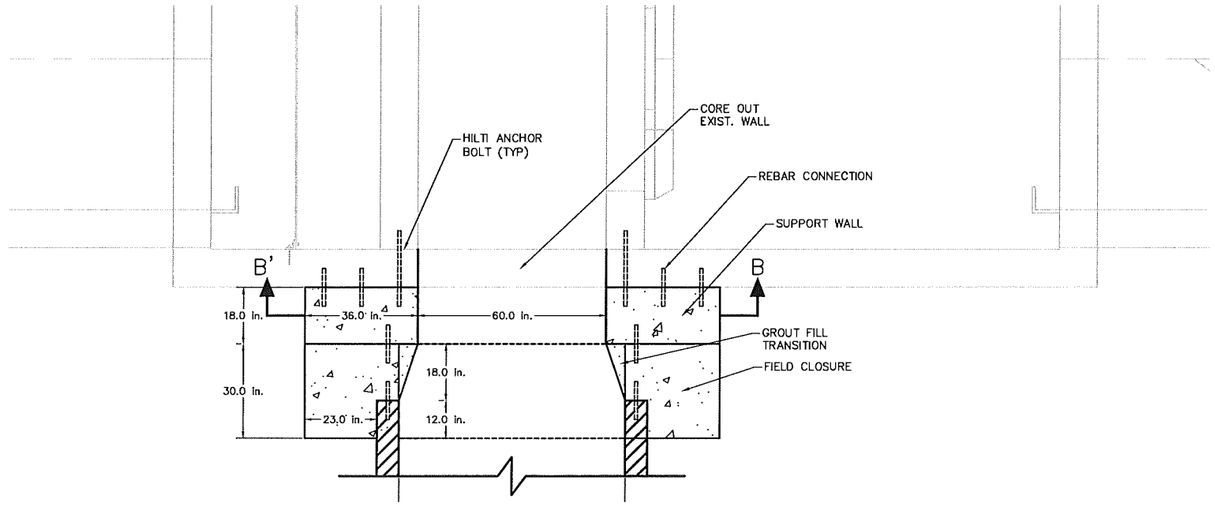
COMBINED SEWER CONNECTION DETAIL
LAND BOULEVARD CAM 017 BENDING WEIR MODIFICATIONS

Sheet No. S-1

File No.



WEIR STRUCTURE
SCALE: 1" = 20'



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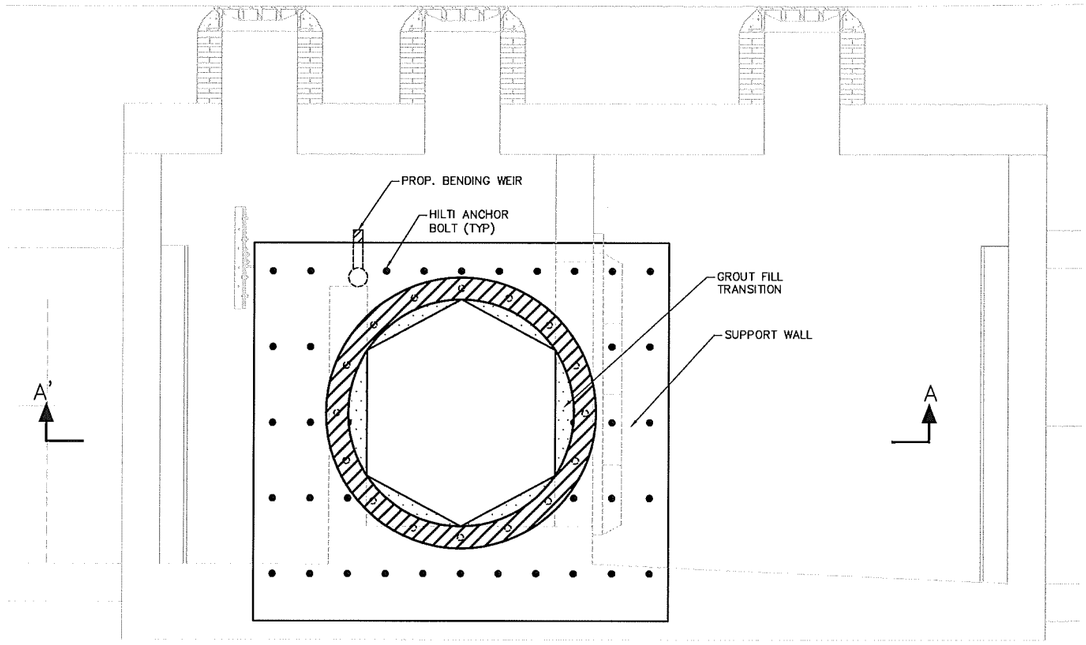
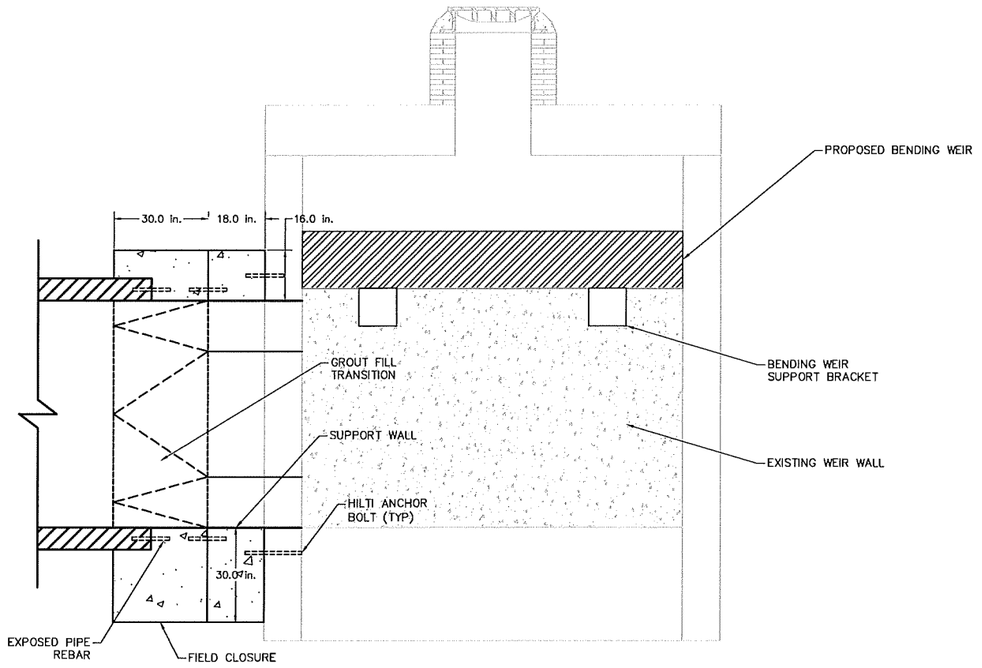
SCALE: 1" = 4'



SECTION B'–B
SCALE: 1" = 4'



SECTION C'–C
SCALE: 1" = 4'

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CAM 017 BENDING WEIR

EXISTING WIER STRUCTURE CONNECTION
LAND BOULEVARD CAM 017 BENDING WEIR MODIFICATIONS

Sheet No. S-2

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CAM 017 BENDING WEIR

STRUCTURAL
PILING DESIGN

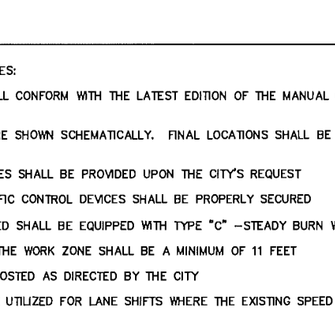
Sheet No.
S-3

File No.

TRAFFIC MANAGEMENT GENERAL NOTES:

1. ALL TRAFFIC CONTROL DEVICES SHALL CONFORM WITH THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D)
2. ALL SIGN LOCATIONS ON DETAILS ARE SHOWN SCHEMATICALLY. FINAL LOCATIONS SHALL BE DETERMINED BASED ON ACTUAL FIELD CONDITIONS AND CITY APPROVAL
3. ADDITIONAL TRAFFIC CONTROL DEVICES SHALL BE PROVIDED UPON THE CITY'S REQUEST
4. ALL TEMPORARY SIGNAGE AND TRAFFIC CONTROL DEVICES SHALL BE PROPERLY SECURED
5. ALL DRUMS NOT OTHERWISE SPECIFIED SHALL BE EQUIPPED WITH TYPE "C" –STEADY BURN WARNING LIGHTS
6. TEMPORARY TRAFFIC LANES WITHIN THE WORK ZONE SHALL BE A MINIMUM OF 11 FEET
7. ADVISORY SPEED LIMITS SHALL BE POSTED AS DIRECTED BY THE CITY
8. FLASHING ARROW BOARDS SHALL BE UTILIZED FOR LANE SHIFTS WHERE THE EXISTING SPEED LIMIT IS 35 M.P.H. OR GREATER
9. NON–ESSENTIAL TRAFFIC CONTROL DEVICES SHALL BE COVERED OR REMOVED DURING NON–WORK HOURS
10. ALL TRAVEL WAYS SHALL BE PROTECTED FROM DUST AND CONSTRUCTION DEBRIS AT ALL TIMES
11. TRAFFIC CONTROL INCLUDES NECESSARY STREET SWEEPING AND SNOW REMOVAL WITHIN THE WORK ZONE
12. VEHICULAR AND PEDESTRIAN SHALL BE ALLOWED ACCESS TO PRIVATE PROPERTY AT ALL TIMES DURING CONSTRUCTION
13. ALL TRAFFIC CONTROL DEVICES SHALL BE PLACED AND MOVED AS NECESSARY TO MAINTAIN ADEQUATE ABUTTER ACCESS AT ALL TIMES. WORK MAY REQUIRE ADDITIONAL SIGNAGE AND OTHER TRAFFIC CONTROL DEVICES, GRADING AND TEMPORARY PAVEMENT FOR PASSAGE OF PEDESTRIAN, VEHICULAR AND EMERGENCY TRAFFIC THROUGH WORK AREAS BOTH DURING AND AFTER WORK HOURS
14. EACH ABUTTER SHALL BE NOTIFIED BY THE CONTRACTOR AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS
15. CONSTRUCTION WORK ZONE SHALL BE STAGED AS TO ALLOW FOR CONTINUOUS ACCESS AT DRIVE ENTRANCES AND TO MINIMIZE DETOURS TO CAMBRIDGE ROADS
16. EXCAVATIONS SHALL BE PROTECTED BY STEEL PLATES OR BARRICADES DURING NON–WORK HOURS
17. GRADE SEPARATIONS IN EXCESS OF 2" DURING NON WORKING HOURS WILL REQUIRE DELINEATION BY DRUMS
18. EXCAVATION EDGES IN EXCESS OF 4" DEEP SHALL BE PROTECTED DURING NON–WORKING HOURS BY BACKFILLING WITH A WEDGE OF GRAVEL COMPACTED TO A 4:1 SLOPE
19. SAFE PEDESTRIAN WALKWAYS SHALL BE PROVIDED AND ACCESS TO LOCAL BUSINESSES AND RESIDENCES. PUBLIC WALKWAYS SHALL REMAIN OPEN AND ACCESSIBLE UNLESS OTHERWISE DIRECTED BY CITY.
20. ALL EXISTING PEDESTRIAN CROSSINGS SHALL BE MAINTAINED. ALTERNATIVE CROSSING SHALL BE PROVIDED WHEN EXISTING CROSSINGS ARE DISRUPTED BY CONSTRUCTION ACTIVITY. TEMPORARY LOCATIONS, SAFETY SIGNAGE AND SAFETY CONTROLS SHALL BE APPROVED BY THE CITY PRIOR TO IMPLEMENTATION
21. PEDESTRIAN WALKWAYS SHALL BE PROTECTED ALONG WORK ZONE WITH CONCRETE BARRIERS AND FENCING
22. POLICE DETAILS SHALL BE SCHEDULED AND COORDINATED BY THE CONTRACTOR TO MAINTAIN THE SAFETY OF PEDESTRIAN AND VEHICULAR TRAFFIC
23. DETOURS SHALL ONLY BE ALLOWED AS INDICATED OR AS APPROVED BY THE CITY OF CAMBRIDGE TRAFFIC AND PARKING DEPARTMENT

LEGEND



CONSTRUCTION SIGN LEGEND

IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	TEXT DIMENSIONS			COLOR		
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW	BACK–GROUND	LEGEND	BORDER
G20–2	36"	24"	END ROAD WORK	MUTCD STANDARD DETAIL			MUTCD STANDARD DETAIL		
W4–2L	48"	48"							
W4–2R	48"	48"							
R3–7L	48"	48"	LEFT LANE MUST TURN LEFT						
R3–7R	48"	48"	RIGHT LANE MUST TURN RIGHT						
W20–1	36"	36"	ROAD WORK AHEAD						
W20–4	48"	48"	ONE LANE ROAD AHEAD						
W20–5R	48"	48"	RIGHT LANE CLOSED AHEAD						
W20–5L	48"	48"	LEFT LANE CLOSED AHEAD						
W20–8	36"	36"	POLICE OFFICER AHEAD						
W4–7R	36"	36"	THRU TRAFFIC MERGE RIGHT						
W12–1	36"	30"							

DRAFT
75% DESIGN SET
APRIL 2011

MWH
BOSTON
MASSACHUSETTS

S E A Consultants Inc.
Science/Engineering/Architecture
CONCORD, NEW HAMPSHIRE ROCKY HILL, CONNECTICUT
CAMBRIDGE, MASSACHUSETTS

Scale	AS NOTED
Date	APRIL 2011
Job No.	
Designed by	
Drawn by	
Checked by	
Approved by	

No.	Description	Date
	REVISIONS	

THE WORKS — CAMBRIDGE DEPARTMENT OF PUBLIC WORKS

CITY OF CAMBRIDGE, MASSACHUSETTS

CAM 017 BENDING WEIR

TRAFFIC MANAGEMENT PLAN
GENERAL NOTES AND CONTROL DETAILS

Sheet No. TG-1

File No.

NOTE:
TMP TO BE UPDATED ONCE ALIGNMENT IS FINALIZED.

TEMP. TRAFFIC SIGNAL

TEMPORARILY RELOCATE TRAFFIC SIGNAL

TEMPORARILY RELOCATED CURB ASPHALT

PHASE 1 CONST. ZONE

TRENCH

SHEETING

JERSEY BARRIER

TEMP. REMOVE MAST AND TRAFFIC SIGNAL

WHITE THERMOPLASTIC LANE LINE

TEMP. TRAFFIC SIGNAL

TEMP. TRAFFIC SIGNAL

BINNEY STREET

LAND BOULEVARD (FORMERLY COMMERCIAL AVENUE)

CONCRETE SIDEWALK

BRICK SIDEWALK

96"x100" STORM WATER SEWER (CITY OF CAMBRIDGE)

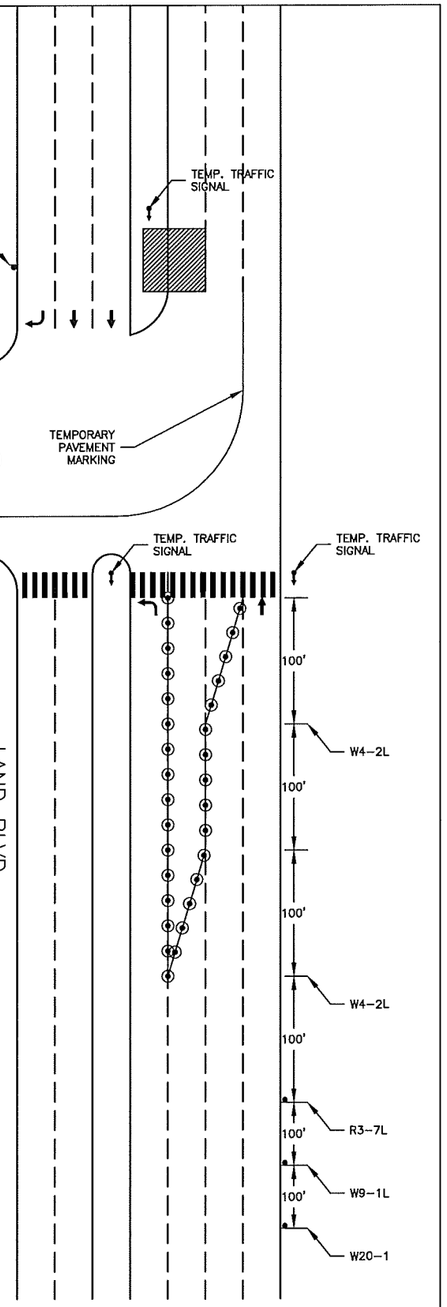
COMBINED SEWER

24"CI SEWER

NOW OR FORMERLY THE ESPLANADE CONDOMINIUM MAP 12 LOT 17

N

CONSTRUCTION SEQUENCE– PHASE 1



SIGN PLAN

SCALE: N.T.S.

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No.	Description	Date
	REVISIONS	

CAMBRIDGE DEPARTMENT OF PUBLIC WORKS

CITY OF CAMBRIDGE, MASSACHUSETTS

CAM 017 BENDING WEIR

TRAFFIC MANAGEMENT PLAN
PHASE 1

Sheet No. T-1

File No.

NOTE:
CONTRACTOR TMP TO BE UPDATED ONCE ALIGNMENT IS FINALIZED.

TEMPORARILY RELOCATE TRAFFIC SIGNAL

TEMPORARILY RELOCATED CURB ASPHALT

PHASE 2 CONST. ZONE

SHEETING

JERSEY BARRIER

TRENCH

TEMP. REMOVE MAST AND TRAFFIC SIGNAL

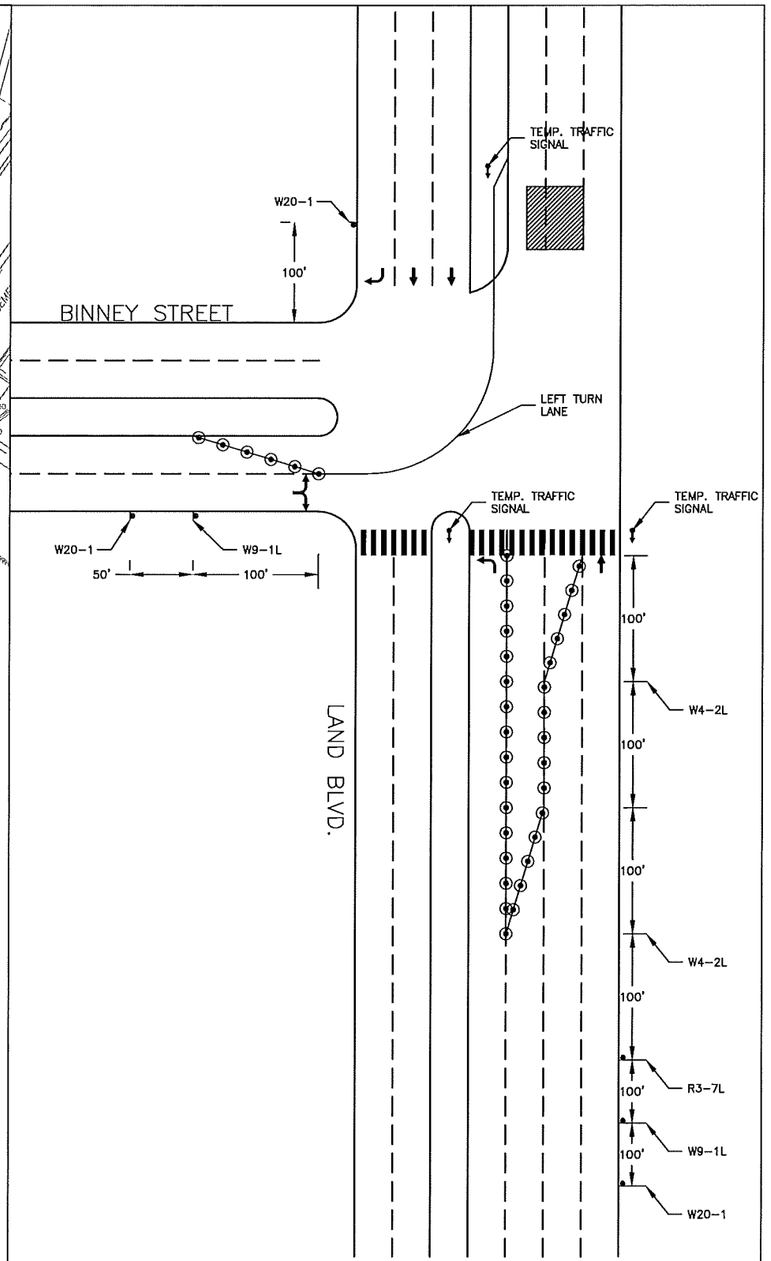
TEMP. TRAFFIC SIGNAL

TEMP. TRAFFIC SIGNAL

BINNEY STREET

LAND BOULEVARD

CONSTRUCTION SEQUENCE– PHASE 2



SIGN PLAN

SCALE: N.T.S.

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THE CAMBRIDGE DEPARTMENT OF PUBLIC WORKS

CITY OF CAMBRIDGE, MASSACHUSETTS

CAM 017 BENDING WEIR

TRAFFIC MANAGEMENT PLAN
PHASE 2

Sheet No. T-2

File No.

NOTE:
TMP TO BE UPDATED ONCE ALIGNMENT IS FINALIZED.

TEMP. TRAFFIC SIGNAL

TEMPORARILY RELOCATE TRAFFIC SIGNAL

TEMPORARILY RELOCATED CURB ASPHALT

PHASE 3 CONST. ZONE

TEMP. REMOVE MAST AND TRAFFIC SIGNAL

TRENCH

SHEETING

JERSEY BARRIER

TEMP. TRAFFIC SIGNAL

TEMP. TRAFFIC SIGNAL

BINNEY STREET

LAND BOULEVARD (FORMERLY COMMERCIAL AVENUE)

CONCRETE SIDEWALK

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196"x100" STORM WATER SEWER (CITY OF CAMBRIDGE)

24"CI SEWER

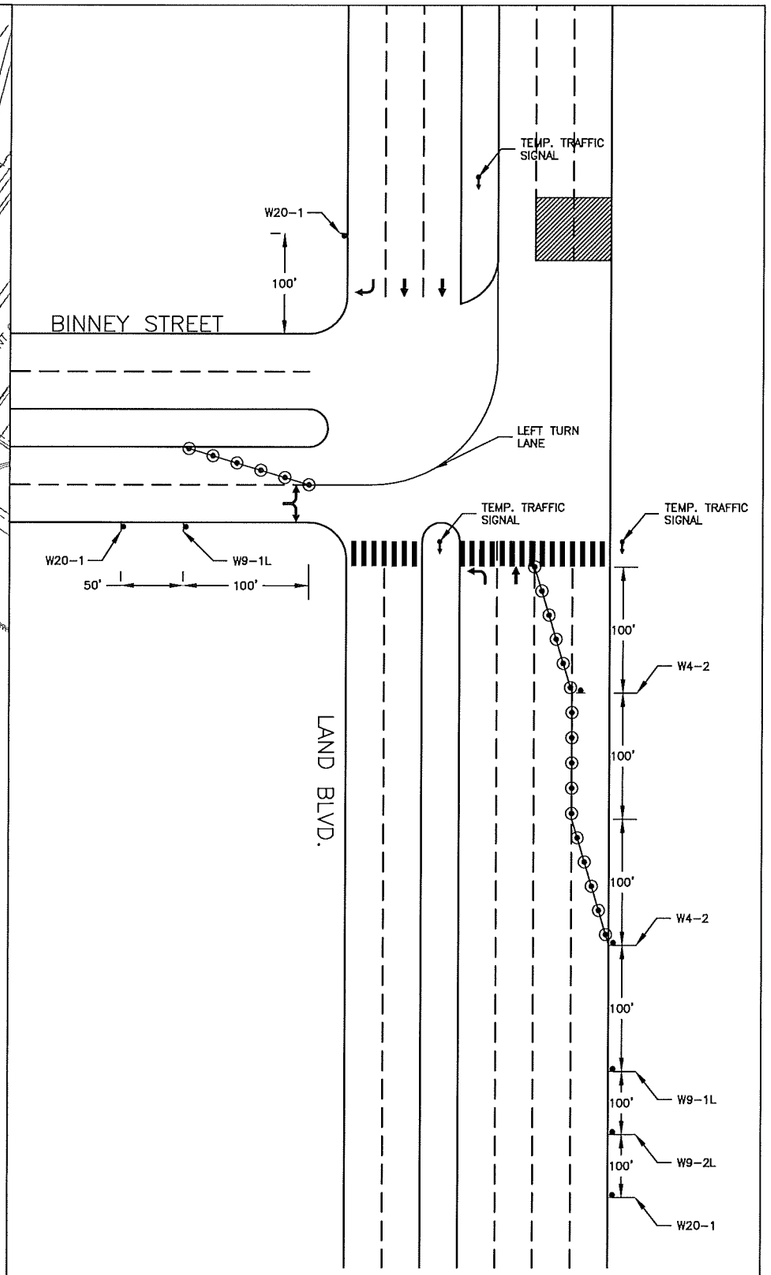
COMBINED SEWER

STEAM VAULT

NOW OR FORMERLY THE ESPLANADE CONDOMINIUM MAP 12 LOT 17

N

CONSTRUCTION SEQUENCE– PHASE 3



SIGN PLAN

SCALE: N.T.S.

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THE WORKS
CAMBRIDGE DEPARTMENT OF PUBLIC WORKS

CITY OF CAMBRIDGE, MASSACHUSETTS

CAM 017 BENDING WEIR

TRAFFIC MANAGEMENT PLAN
PHASE 3

Sheet No.
T-3

File No.

APPENDIX IV

Nine Minimum Controls Plan

Inflow Assessment for Alewife Brook CSOs

NINE MINIMUM CONTROLS PLAN

INFLOW ASSESSMENT FOR ALEWIFE BROOK COMBINED SEWER OVERFLOWS

FOR THE

CITY OF CAMBRIDGE, MASSACHUSETTS
COMBINED SEWER OVERFLOW PERMIT
#MA0101974

APRIL 2011

Submitted by:

City of Cambridge
Department of Public Works

1. Executive Summary

The City of Cambridge (City) is authorized to discharge Combined Sewer Overflows (CSOs) at twelve (12) locations to both the Alewife Brook and the Charles River in accordance with its National Pollution Discharge Elimination System (NPDES) Permit No. MA 0101974. The following assessment was performed to examine the extent and impact of inflow from the Alewife Brook entering the combined sewer system through the existing regulator structures over a range of flood conditions and corresponding Alewife Brook elevations; and an assessment of the cost, feasibility and effectiveness of installing inflow controls where flow enters the combined sewer system with a higher percentage frequently than the 100-year storm event.

The following assumptions were used to build the model and perform this assessment:

- Future 2015 conditions for the Massachusetts Water Resources Authority's (MWRA's) Alewife Brook Long Term-Control Plan (LTCP).

- Evaluation of flap gates on all Cambridge CSO locations (CAM 001, CAM 002A/B, CAM 401A, and CAM 401B), in addition to MWRA (MWR 003) and Somerville (SOM 001) CSO locations along the Alewife Brook;

- Alewife Brook Pump Station capacity at 75 MGD (per the MWRA 2009 NPDES Plan);

- 2010 FEMA Flood Insurance Study (FIS) model for river elevations in response to 2, 10, 25 and 100-year 24-hour design storms; and

- Analysis of the 24 hour duration of the storm event and the 48-hour period following the event (i.e. total 72 hour duration) to assess CSO contributions to the brook as well as inflow from the brook.

In summary, the following were determined from this analysis:

- Inflow from the Alewife Brook does not enter the combined sewer system on a regular basis but rather is confined to relatively rare events. The 2-year 24-hour design event peak water elevation in the Alewife Brook is at, or below, the various CSO crest elevations. A minimal level of inflow (0.34 MG) enters the combined sewer system during the 10 year event and a relatively small amount of water enters the systems from the Brook (6.25 MG) during the 25-year 24-hour event. No inflow is expected at the MWRA and Somerville CSO locations under these storm conditions since the critical elevations are higher than the predicated peak brook elevations.

- The most severe CSO activations and system flooding for the Cambridge system (tributary to Alewife Brook) occur during the initial storm runoff periods, (within the first 24 hours of the system response) prior to periods of maximum brook water surface elevation;

- The installation of flap gates on Cambridge CSO locations (i.e. excluding the MWRA and Somerville CSO locations) did not have a positive or negative impact on the discharge frequency or volume of CSOs to the Alewife Brook

- During extreme events, (100 year) about 10% of adjacent Alewife Brook flow is pumped by the Alewife Brook Pump Station (APS). No flooding at the APS was noted.

- Raising and/or sealing rims along the MWRA's Alewife Interceptors that are presently lower than the predicted 100-year flood plain level may be of benefit in reducing system flooding during the 100-year 24-hour event along the interceptor.

2. Foreword

The City of Cambridge's NPDES Permit requires an assessment of the potential for inflow from Alewife Brook to enter the combined sewer system through the existing regulator structures over a range of flood conditions in the Alewife Brook and that such should be submitted with the second annual report. In addition, the assessment should include the cost, feasibility and effectiveness of installing inflow controls on the remaining CSO outfalls if flow discharges from the river into the combined sewer system more frequently than the 100-year storm.

The modeling approach used for this analysis included the updated City of Cambridge InfoWorks model which is a more detailed version of the MWRA's system model which was used in the development of the LTCP. Updated brook elevation functions based on the 2010 FEMA Flood Insurance Study (FIS) for Middlesex County in Massachusetts (developed by AECOM, FEMA's consultant in establishing the FIS) using HEC-RAS model outputs) were also incorporated into the analysis. For the context of this analysis, inflow control was assumed to provide a benefit to the combined sewer system if it reduced CSO discharges (rate and volume) and surface flooding due to system surcharging.

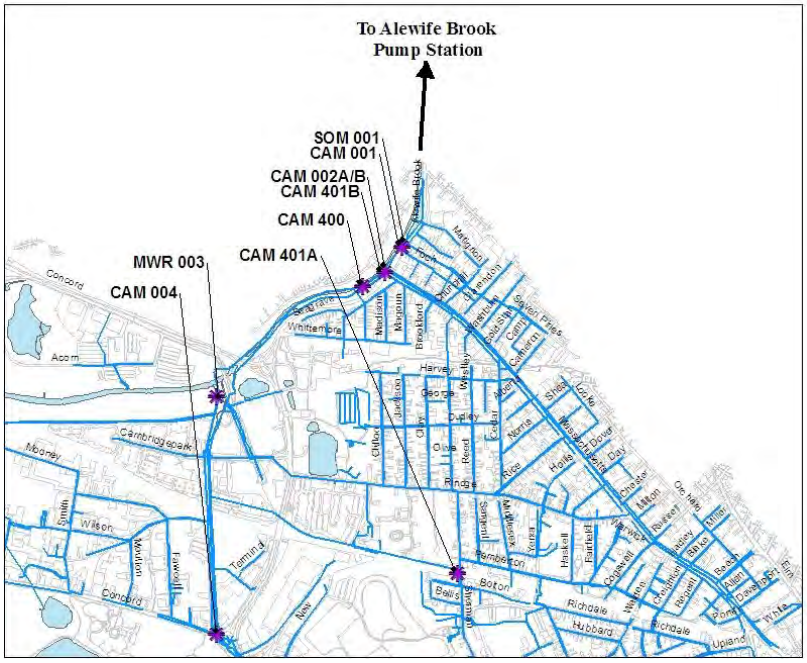
Initially, the analysis only looked at the impacts of river elevation on Cambridge CSO regulator structures, but it was determined during this analysis that both the City of Somerville (SOM 001) and the MWRA (MWR 003) CSO regulators are also impacted by inflow from the rising river elevations. To fully evaluate inflow impacts on the combined sewer system, all CSO regulator structures were evaluated with and without flap gates.

3. Computational Elements

3.1. Existing and Planned Conditions

The CSO discharges at the CAM 004, CAM 400, CAM 401A, CAM 401B, CAM 002A, CAM 002B, and CAM 001 locations along the Alewife Brook are regulated under the City's NPDES Permit No. MA 0101974. Other CSOs that impact the Alewife Brook are MWR 003 (owned and maintained by the MWRA) and SOM 001 (owned and maintained by the City of Somerville). The locations of these CSOs are shown in Figure 1. The Alewife Pump Station (APS), which is controlled by the MWRA, is downstream of these locations near the junction of the Alewife Brook and Mystic Valley Parkway in Somerville.

Figure 1: Plan of Cambridge, MWRA, and Somerville CSO locations along Alewife Brook



The MWRA's LTCP for the Alewife Brook proposes the closure of CAM 400 and CAM 004 through a series of sewer separation projects. The LTCP also requires underflow connections at CAM 002A/B, CAM401B and floatable control measures at CAM 002A, CAM 002B, CAM 401B and CAM001. In addition, the MWRA is responsible for improvements at MWR 003 and SOM 001. The planned conditions for the Alewife LTCP provided the baseline for the hydraulic model used in the simulations. Table 1 highlights aspects of the model that were updated and/or confirmed to best reflect planned future operations/conditions. Additional descriptions of updates incorporated into the model are provided in Appendix A. Characteristics of the CSO outlets modeled in the network are provided in Table 2. Note that the characteristics used at each location represent the best known conditions expected with the implementation of the LTCP.

Table 1: Summary of Alewife LTCP Area-Wide Characteristics

• APS and MET/ Relief Interceptors	The pump configuration and operation was updated based on information most recently provided by the MWRA per the 2009 NPDES Plan (i.e. increasing the capacity of the station from 60 MGD to 75 MGD)
• Storage Compensation	In the model it is infeasible to include every manhole and catch basin tributary to the Alewife Interceptors. The total volumes of these manholes /catch basins, however, were distributed amongst the modeled manholes/catch basins.
• CAM 001 CSO	Per 2010 field investigation conditions.
• CAM 002A/B CSO	Per 2010 drainage improvement/field investigation conditions and per the LTCP.
• CAM 004 Area	Final separation conditions (including removal of underflow from Drain Vault No. 5 to sanitary sewer) per 2015 closed conditions per the LTCP.
• CAM 401A Area	Per the LTCP
• CAM 401B CSO	Per 2010 drainage improvement/field investigation conditions.
• CAM 400 Area	Per 2011 final separation (no CSO at CAM 400), per the LTCP.
• MWR 003 CSO	Outlet weir width = 3-ft; outlet crest elevation = 16.22 ft-CCB; and two tributary siphons.
• Belmont Area	Orifice controlled discharge at 18.9 MGD.

Table 2: CSO Outlet Characteristics

CSO Locations		Overflow Elevation (ft-CCB)*	Outlet Dimensions (inch)	Comments
MWR 003	Alewife Parking Garage	16.2	48 (w), 36 (h)	Weir (3-ft crest width), box culvert
CAM 401A	Bellis Circle (to Wheeler St SD)	17.0	66 (diameter)	Weir (17-ft crest width), brush screens
CAM 401B	Massachusetts Ave. Bridge	14.2	30 (diameter)	
CAM 002A	Massachusetts Ave. Bridge	16.3	36 (diameter)	
CAM 002B	Massachusetts Ave. Bridge	16.0	39 (diameter)	
CAM 001	Foch Street	15.2	15 (diameter)	
SOM 001	Foch Street	16.2	48 (w), 36 (h)	Weir (4.75-ft crest width), box culvert

* CCB: City of Cambridge datum

3.2. Design Storms

Twenty-four hour design storm events for the 2, 10, 25 and 100-year return periods were used for the following assessment. Total rainfall volumes and hyetographs for these events are based on

the Natural Resources Conservation Service (NRCS) guidelines using the Type III distribution. Type III distribution is defined by the NRCS and is appropriate for hurricane prone areas such as the north-east region of the United States (Reference: Technical Release 55, Urban Hydrology for Small Watersheds (1986), NRCS). Historically the MWRA has relied upon the standard NRCS rainfall values when analyzing system hydraulics and such were used in the development of the LTCP.

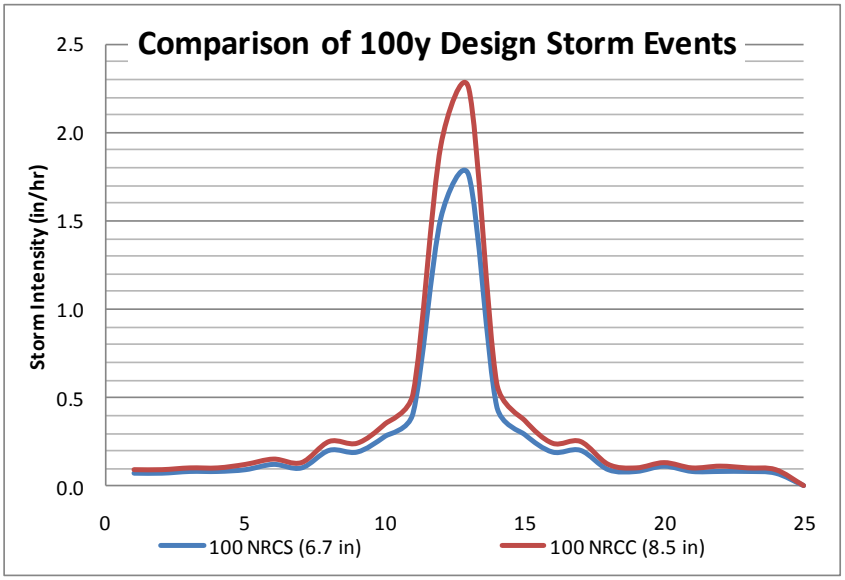
Another source of total rainfall volumes is based on the Northeast Regional Climate Center (NRCC). The same Type III distribution was assumed for the development of the NRCC storm event hyetographs. It should be noted that, NRCC values were utilized for the recent FEMA FIS.

As shown in Table 3, total precipitations for both sources are similar for the 2, 10, and 25-year return periods, however the NRCC values for the 100-year storm are almost two inches higher than for the NRCS storm event. Figure 2 shows the comparison of the peak storm intensities for the 100-year return period based on both the NRCS and NRCC total precipitation values.

Table 3: Characteristics of Design Storm Events

Return Period (years)	Total Precipitation (in)	
	NRCS	NRCC
2	3.3	3.1
10	4.7	4.8
25	5.7	5.9
100	6.7	8.5

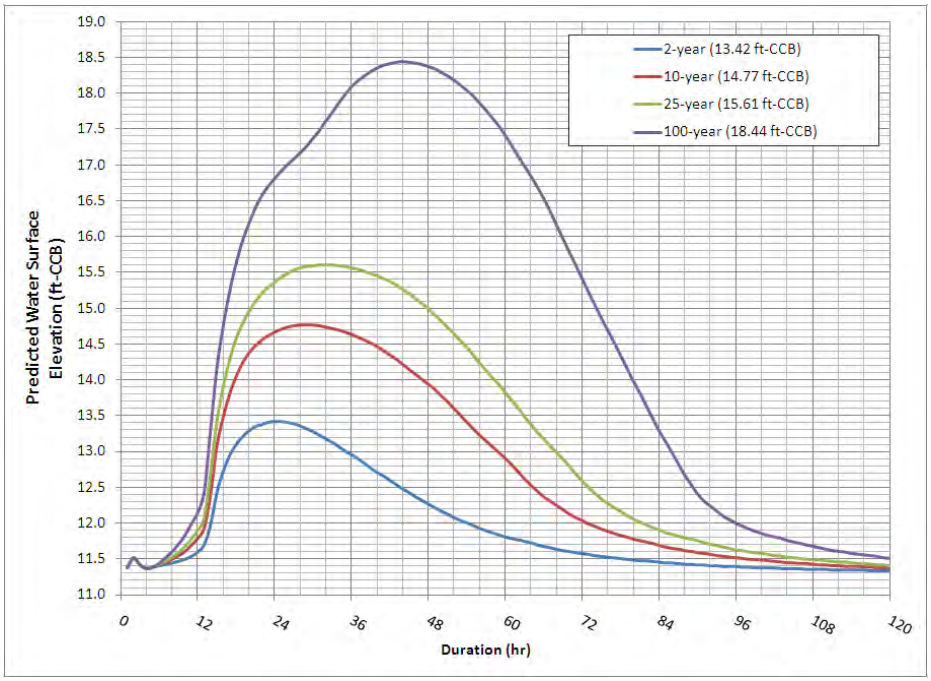
Figure 2: Comparison of NRCS and NRCC 100-year 24-hour Design Events



3.3. Predicted Alewife Brook Water Surface Levels

Using the model developed for the FEMA Flood Insurance Study (FIS) evaluation of the Mystic River, AECOM consulting engineers for the FEMA study provided the City with predicted water surface levels over time for the Alewife Brook at the respective CSO locations. The predicted water levels were determined using the NRCC total rain volumes for 2, 10, 25 and 100-year return periods over a 24-hour period using the Type III distribution. Water surface variations were obtained for up to 4 days following the design rain event. Such demonstrated the lag of the peak runoff from the basin tributary to the Mystic River. Figure 3 provides the updated level variations (based on the FEMA FIS evaluation) for the Alewife Brook that were assumed throughout this analysis.

Figure 3: Updated Alewife Brook Water Level Profiles (Between Wheeler Street and Foch Street)



As shown, the peak water levels were predicted to be 13.42, 14.77, 15.61, and 18.44 ft-CCB for the 2, 10, 25 and 100-year return periods, respectively. The critical elevations at the Cambridge CSOs range from 14.2 to 17 ft-CCB. No inflow is expected during the 2-year return period and negligible inflow is expected during the 10-year return period at these locations. Some inflow is expected during the 25 and 100-year return periods at these locations. The critical elevation at the MWRA and Somerville CSOs is 16.2 ft-CCB, and consequently no inflow is expected during the 2, 10, and 25-year return periods at these two locations.

It should be noted that since FEMA utilizes the NRCC rainfall amounts, the resulting Alewife Brook water surface elevations will be higher under the 100-year condition than if the NRCS storm values had been used. Within the context of this evaluation, variations in the water surface elevations of the Alewife Brook due to combined sewer flows entering the brook, or river water flowing into the combined sewer system from the brook, will not be calculated. The AECOM

model is based on assumptions for the entire tributary area and fixed cross-sectional dimensions of the brook and river. The Alewife Brook model, therefore, does not account for volume gains or losses within the brook or river due to adjacent combined sewer systems.

Using the NRCC 100-year 24-hour design event, it is estimated that the peak storm flow at the confluence of the Alewife Brook and the Mystic River is 304 MGD. Similarly, the peak storm flow just upstream of the Massachusetts Avenue Bridge (CAM 401B) is estimated to be 220 MGD. This information was derived from recent FEMA evaluations of the subject area, and is based on mean velocity values and cross sectional area of the floodway at specific locations. In general, the flow is maintained throughout the brook between the 259 and 323 MGD range.

4. Analysis Results

4.1. Impact of Inflow Controls (2, 10, and 25-year 24-hour NRCS Storms)

The LTCP model was simulated using the 2, 10, and 25-year 24-hour NRCS design storms and the corresponding updated Alewife Brook water surface elevations under these rainfall conditions. Simulations were first conducted assuming the absence of flap gates at CSOs CAM 001, 002A/B, 401A, 401B, MWR 003, and SOM 001, and then re-run with assumed flap gates providing inflow control at these sites.

The peak surface flooding volumes at City of Cambridge manholes for each event was computed along with the peak overflow volume at each of the Alewife CSO locations (see Tables 4 and 5). Volumes were computed for a total period of 72-hours (i.e. the 24-hours of the event as well as the 48-hours following the event). The simulations were compared with and without the inclusion of flap gates at the CSO outlets to control inflow from the Alewife Brook. Results from the simulations (based on 1 hour reporting time steps) are shown for only the City manholes (i.e. does not include surface flooding at MWRA interceptor manholes).

The total surface flooding is comprised of two contributions as calculated through the InfoWorks model. The "volume stored" is the first contribution and is stored on the surface and later returns back into the system. The second contribution is the volume "lost to surface", and this represents storm volume that is predicted to leave the system through overflows and then discharges to local water bodies or surface storage and does not return back into the sewer, storm, or combined systems.

Table 4: Comparison of Surface Flooding Volumes at Cambridge Manholes Without and With Inflow Control

Surface Volume (MG)	NO Inflow Control			WITH Inflow Control (Flap Gates)		
	2 yr	10 yr	25 yr	2yr	10 yr	25 yr
Peak Stored on Surface	0.46	1.05	1.56	0.46	1.05	1.55
Total Lost to Surface	0.00	0.29	0.87	0.00	0.29	0.86
TOTAL	**0.46**	**1.34**	**2.43**	**0.46**	**1.34**	**2.41**

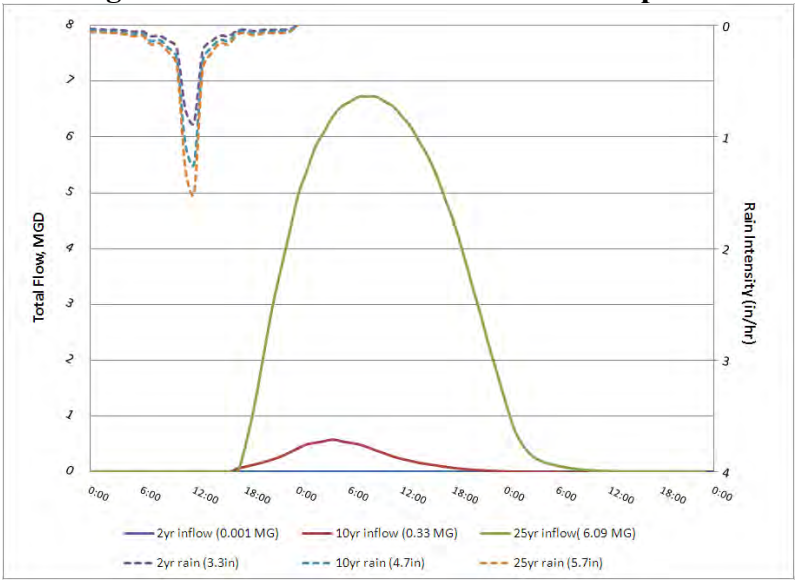
Table 5: Comparison of Total CSO Volume to River Without and With Inflow Control

	Total Volume (MG)					
	NO Inflow Control			WITH Inflow Control (Flap Gates)		
	2 yr	10 yr	25 yr	2yr	10 yr	25 yr
MWR 003	0.5	1.7	2.6	0.5	1.7	2.6
CAM 002A	0.2	0.7	1.2	0.2	0.7	1.1
CAM 002B	0.4	1.3	1.8	0.4	1.3	1.8
CAM 401B	1.5	3.8	4.5	1.5	3.8	4.8
CAM 401A	1.8	2.9	4.1	1.8	2.9	4.1
CAM 001	0.3	0.8	1.0	0.3	0.8	1.0
SOM 001	0.9	3.6	5.3	0.9	3.6	5.3
TOTAL	**5.6**	**14.8**	**20.5**	**5.6**	**14.8**	**20.7**

As shown, the inclusion of CSO inflow control (flap gates) has a negligible impact on surface flooding at the City manholes (Table 4). It should be noted that there are locations along the MWRA interceptors prone to flooding, and predicated flood volumes at these locations were not tabulated in this assessment of 2, 10, and 25 year 24-hour NRCS storm events.

The flood impact of flow entering the combined sewer system from the Alewife Brook was also assessed for several design storms (assuming no inflow control implemented at the CSO structures). Results of brook inflow (flow and volume) for the 2, 10, and 25 year 24-hour NRCS storm events are shown in Figure 4. These results reflect the response of the system over 72 hours.

Figure 4: River Inflow to MWRA Interceptors



As shown in Figure 4, the inflow from the brook occurs at the tail end of the10-year and 25-year 24-hour period when the hydraulic grade line in the interceptors recedes and as the level of the brook rises above the crest of some of the CSO structures for each of the design events. Inflow from the brook is not expected to enter the combined sewer system during the 2-year 24-hour design event since the peak Alewife Brook water levels are at, or below, the critical CSO crest elevations. Inflow predicated at the Cambridge CSO locations were 0, 0.34, and 6.28 MG for the 2, 10, and 25-year 24-hour design events, respectively. No inflow is expected at the MWRA and Somerville CSO locations under these storm conditions since the critical elevations are higher than the predicated peak Alewife Brook elevations.

Additional assessments were conducted to characterize the impact of the brook water level during larger storm events, i.e. the 100-year event, when the brook water level is expected to rise above the CSO crest elevations.

4.2. Comparison of 100-year Storms (NRCS vs. NRCC)

As previously discussed, the City has traditionally used the standard NRCS rainfall amounts for modeling of the City storm drains and combined sewer system. Recent analysis of the Alewife Brook by AECOM for the FEMA FIS study used the alternative NRCC design storm which shows a higher 100-year rainfall amount. Consequently, a comparison of the impact of using the 100-year design storm for the InfoWorks model based on total volumes derived from the NRCS versus the NRCC was also performed. The results of peak surface flooding volumes for each event was computed along with the peak overflow and volume at each of the Alewife CSO locations (see Tables 6, 7, and 8). Note that simulations were again compared with and without the inclusion of flap gates at the CSO outlets to control inflow from the Alewife Brook. Results from the simulations (based on 1-hour hydraulic model reporting time steps) are shown for City of Cambridge manholes only. These results reflect the response of the system over 72 hours, and quantify the contribution of flow from the system to the river (i.e., CSO flow and volume).

Table 6: Comparison of Surface Flooding Volumes - 100 Year NRCS and NRCC

	Surface Volume (MG)	NO Inflow Control		WITH Inflow Control	
		100 yr NRCS	100 yr NRCC	100 yr NRCS	100 yr NRCC
Cambridge Manholes	Peak Stored on Surface	2.3	5.2	2.3	5.1
	Total Lost to Surface	3.7	6.9	2.1	5.4
	TOTAL	**6.0**	**12.0**	**4.3**	**10.6**

Table 7: Comparison of Peak CSO Flow Rates to River - 100 Year NRCS and NRCC

	Peak Flow (MGD)			
	NO Inflow Control		WITH Inflow Control	
	100 yr NRCS	100 yr NRCC	100 yr NRCS	100 yr NRCC
MWR 003	27.2	28.9	26.0	28.8
CAM 002A	16.0	17.8	15.0	17.5
CAM 002B	19.4	20.7	18.5	20.6
CAM 401B	28.2	29.1	29.5	29.6
CAM 401A	55.3	65.2	55.1	65.1
CAM 001	7.3	7.5	7.0	7.3
SOM 001	58.8	59.1	55.9	58.5
TOTAL	**212.2**	**228.2**	**207.0**	**227.4**

Table 8: Comparison of Total CSO Volume to River - 100 Year NRCS and NRCC

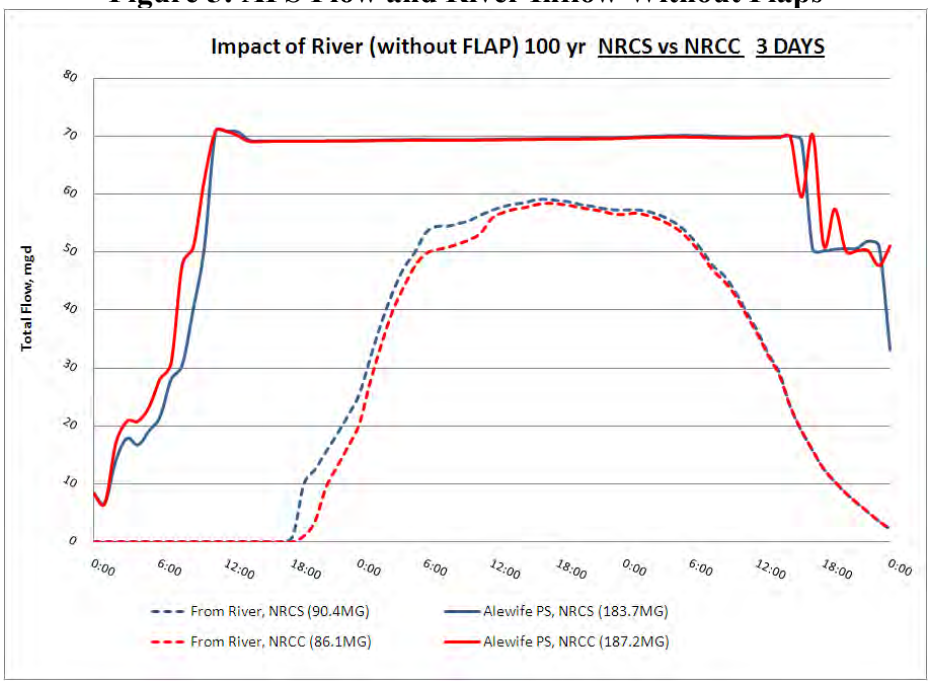
	Total Volume (MG)			
	NO Inflow Control		WITH Inflow Control	
	100 yr NRCS	100 yr NRCC	100 yr NRCS	100 yr NRCC
MWR 003	3.4	5.1	3.4	5.2
CAM 002A	1.6	2.3	1.6	2.4
CAM 002B	2.3	3.2	2.3	3.2
CAM 401B	5.2	6.2	5.3	6.0
CAM 401A	5.3	8.1	5.3	8.1
CAM 001	1.2	1.5	1.2	1.4
SOM 001	6.9	8.8	6.8	8.9
TOTAL	**26.0**	**35.2**	**25.8**	**35.2**

As can be seen in the above tables, and similar to the previous analysis of inflow control impacts during lesser storm conditions (2, 10, and 25-year events), it appears that the inclusion of inflow controls has minimal impact on the total surface flooding volume, CSO peaks, or CSO volumes. However, since the 100-year NRCC design storm results in approximately 2-inches of additional rainfall when compared to the NRCS storm, there is an obvious impact to the predicted surface flooding and CSO overflows when compared to the traditional NRCS results.

A series of simulations were then performed to assess the responsiveness of the system during the first 24-hours of an extreme design storm event and for the 48-hour period after the event as the brook level crests and then recedes. The results of these simulations were compiled to demonstrate the impact of inflow from the brook into the combined sewer system at the various CSO locations, as well as to compare the timing of the inflow with the flow pumped at the Alewife Pump Station (APS) and the occurrence of surface flooding. The results shown below were compiled for 72 hours (based on 1 hour hydraulic model reporting time steps) corresponding to the anticipated rise and fall of the brook water level.

To assess the river inflow pumped at the pump station during the design storm events, simulations were performed without inflow control at any of the CSO locations. Since the NRCS design storm events were used for the previous assessments, an initial comparison of the system performance using the NRCS versus the NRCC 100-year 24-hour storm events is shown in Figure 5. Note that the variation of inflow from the brook (without flaps) is shown along with the variation of total flows pumped at the APS over 72-hour duration.

Figure 5: APS Flow and River Inflow Without Flaps



As shown, the inflow from the brook and the flow pumped at the APS are comparable for the NRCS and NRCC design storms. The ratio of the brook inflow volume pumped at the pump station is approximately 46% (using the NRCC event) and 49% (using the NRCS event).

It should also be noted that the approximate peak rate of river inflow is 59 MGD, (using either NRCC or NRCS event conditions) and some of the river inflow contributes to surface flooding and is not conveyed to the APS. The rate of river inflow pumped at the APS is, therefore, marginally less than 59 MGD. It was also calculated that this inflow results in approximately 86.1 MG (using the NRCC event) and 90.4 MG (using the NRCS event) of river volume entering the system. The majority of this volume must be pumped at the APS during these 100-year storm events.

4.3. Impact of flap locations along Alewife Brook

A series of simulations were then performed to assess the inflow contribution at Cambridge CSO locations (CAM 001, 002A/B, 401B, and 401A) compared to the contributions of the MWRA and Somerville CSO locations (MWR 003 and SOM 001). Different combinations of inflow control at these locations were assessed and the following designations were used to describe the alternatives:

No Flaps	-	No flaps at any of the CSO locations
CAM Flaps	-	Flaps at Cambridge CSO locations ONLY
CAM, SOM	-	Flaps at Cambridge and Somerville CSO locations (no flap at MWRA CSO)
CAM, MWR, SOM	-	Flaps at Cambridge, MWRA, and Somerville CSO locations

A comparison of the brook inflow to the combined sewer system and the total flows pumped at the APS under these alternate conditions are shown in Figures 6 and 7, respectively, for the NRCC 100-year 24-hour storm event over 3 days. A summary of the total inflow and pumped volumes for all the CSO locations is also provided in Table 9**.**

Figure 6: Comparison of Brook Inflow using Flaps at Different Locations

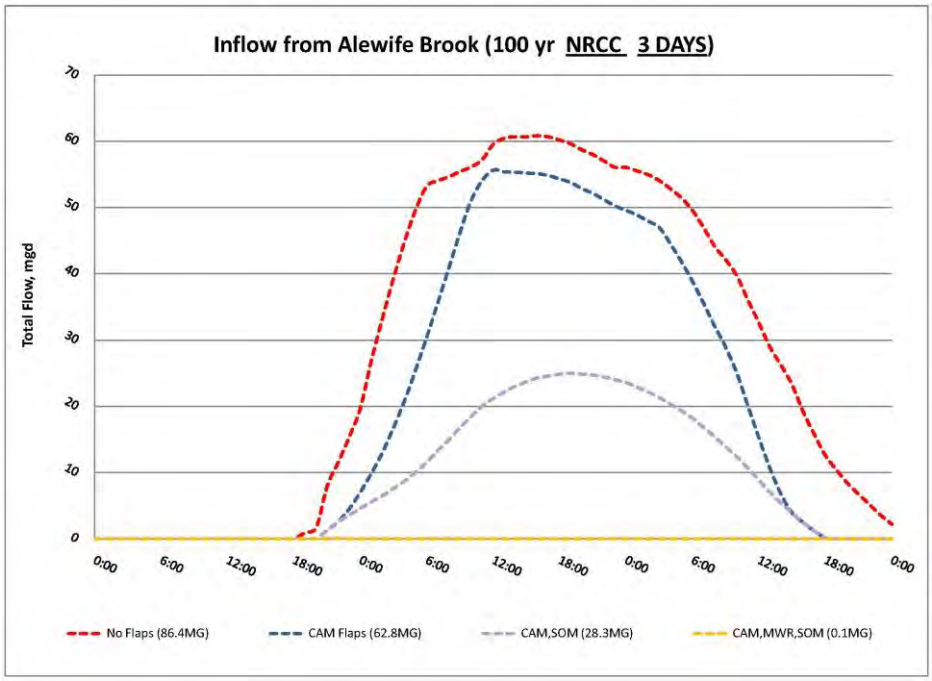


Figure 7: Comparison of Pump Station Flow using Flaps at Different Locations

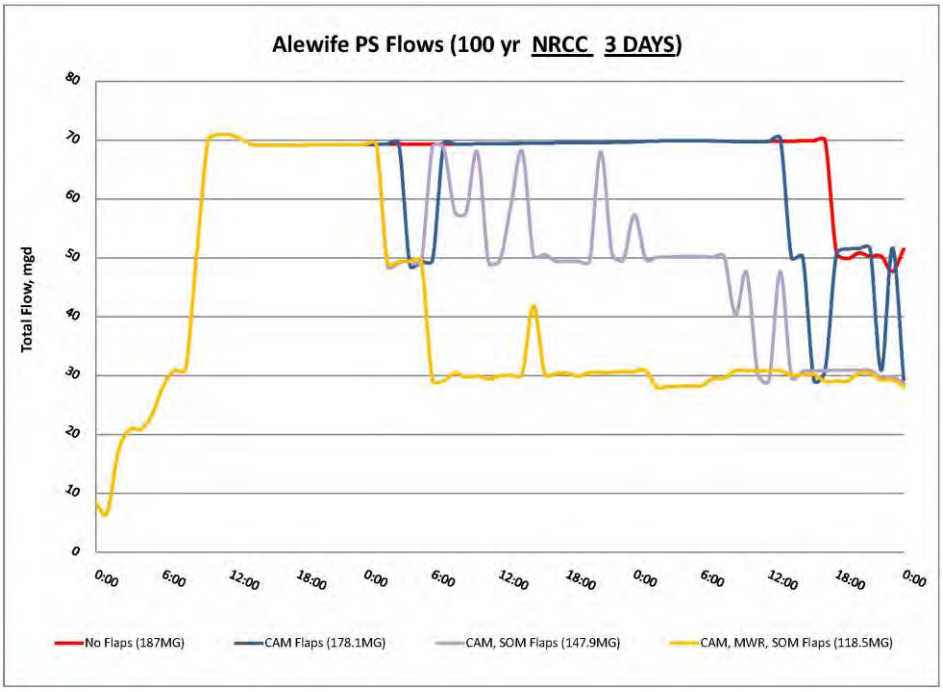


Table 9: Comparison of Brook Inflow and Pump Station Flow using Flaps at Different Locations for the 100-year event.

Scenarios for Flap Locations	Volume (MG)		Volume of Inflow Pumped at APS [=(a/b)%]
	Inflow from Alewife Brook [a]	APS [b]	
No Flaps	86.4	186.8	46%
CAM	62.8	178.0	35%
CAM, SOM	28.3	147.9	19%
CAM, MWR, SOM	0.0	118.4	0%

As shown, the addition of flaps at the CSO locations reduces the inflow to the system during the 100-year event and the volume pumped at the APS. The inclusion of flaps at the Cambridge CSO locations has a beneficial impact of reducing the inflow conveyed through the pump station.

Using the same methodology, inflow from only the Cambridge CSO locations was calculated for the scenario without flaps. This inflow is approximately 49.0 MG, and represents 57% of the total inflow to the MWRA Alewife Interceptors. The CSOs at MWR 003 and SOM 001 are, therefore, a significant source of inflow to the system. Both MWRA and Somerville CSOs have the same crest elevation (16.2 ft-CCB), however SOM 001 (4.75-ft) is wider than MWR 003 (3.0-ft) and a larger inflow contribution is expected at this location. Cambridge does not have jurisdiction over these locations and modifications of the CSOs will have to be negotiated with external parties. The feasibility and maintenance of flaps at the MWRA and Somerville locations was not addressed within the context of this assessment.

Further observation of the APS discharge illustrates that the pump station operates at maximum capacity for the first 24-hours of the onset of the 100-year storm event and also for the later 48-hours after the event. Operations of the APS are responding to the initial peak runoff of the design storm event and then later in response to the conveyance of inflow into the system as well as from municipal discharges. With the removal of inflow (using flaps at respective CSO locations) the occurrence of this later peak diminishes.

The total CSO volume and area-wide surface flooding was also compared for the variations of flaps at different locations for the 100-year event. As shown in Table 10, there was minimal variation in the total CSO volume with the alternative flap locations (based on 1 hour reporting time steps). More significant variations in flooding volumes were noted with alternative flap locations. As shown in Table 11, the largest flooding volume for Cambridge manholes was noted in the scenario with no inflow control, and the total system flooding volume reduced by about 12% with the addition of flaps at alternative locations.

To further assess the contributions of inflow conveyed to the APS and area-wide system flooding, the following simulation results were compared for each alternative of flap location: (i) variation of system flooding volume (combination of peak stored on surface and total lost to

surface), (ii) the variation of CSO volume lost per hour to the brook, (iii) the hydraulic grade line just upstream of the pump station, and also (iv) the variation of the brook water level.

Table 10: Comparison CSO Volumes using Flaps at Different Locations

Scenarios for Flap Locations	Volume (MG)	Percent Reduction
No Flaps	35.2	n/a
CAM	35.2	0.1%
CAM, SOM	35.2	0.1%
CAM, MWR, SOM	35.2	0.1%

Table 11: Comparison Flooding Volumes using Flaps at Different Locations

Scenarios for Flap Locations	Cambridge Manholes		MWRA - Alewife Interceptors		Total	
	Volume (MG)	% Difference	Volume (MG)	% Difference	Volume (MG)	% Difference
No Flaps	12.0	n/a	13.7	n/a	25.7	n/a
CAM	10.5	12%	9.8	29%	20.3	21%
CAM, SOM	10.6	11%	7.3	47%	17.9	30%
CAM, MWR, SOM	10.6	12%	7.3	47%	17.9	30%

Figures 8 through 11 show the variations for the alternative of flap location scenarios. As shown for each scenario, the CSO occurrences are in response to the initial storm event within the first 24-hours. No CSOs were caused by the brook inflow entering back into the combined sewer system.

Also as shown on Figures 8 through 11, flooding occurrences for the City manholes primarily occur within the first 24-hours in response to the initial storm event. There is some residual flooding impact approximately 6 hours after the design event as the hydraulic grade line within the system lowers and surface flooding "stored" on the surface re-enters the sub-system. It should be noted that for the scenario without flaps, approximately 81% of the flooding occurs within the first 24-hours. For scenarios with various flap combinations, approximately 87% of the flooding occurs within the first 24-hours. The majority of the flooding occurrences are therefore in response to the peak conditions of the rain event and not to the inflow of the brook into the system.

The approximate ground surface elevation at the APS (19.87 ft-CCB) is also shown on Figures 8 through 11, based on the information provided by MWRA. The modeled ground elevation is therefore higher than the hydraulic grade line within the sub-surface system upstream of the APS as well as the anticipated Alewife Brook elevations. No surface flooding is anticipated at this location in response to either the peak of the storm event or inflow from the brook. It should be noted that although flooding has been historically reported in the vicinity of the APS, this

flooding was perhaps in response to a downstream pump limitations at the Deer Island Wastewater Treatment Facility.

Figure 8: Comparison of Surface Flooding and CSO Occurrences with Water Level at APS and Brook – No Flaps

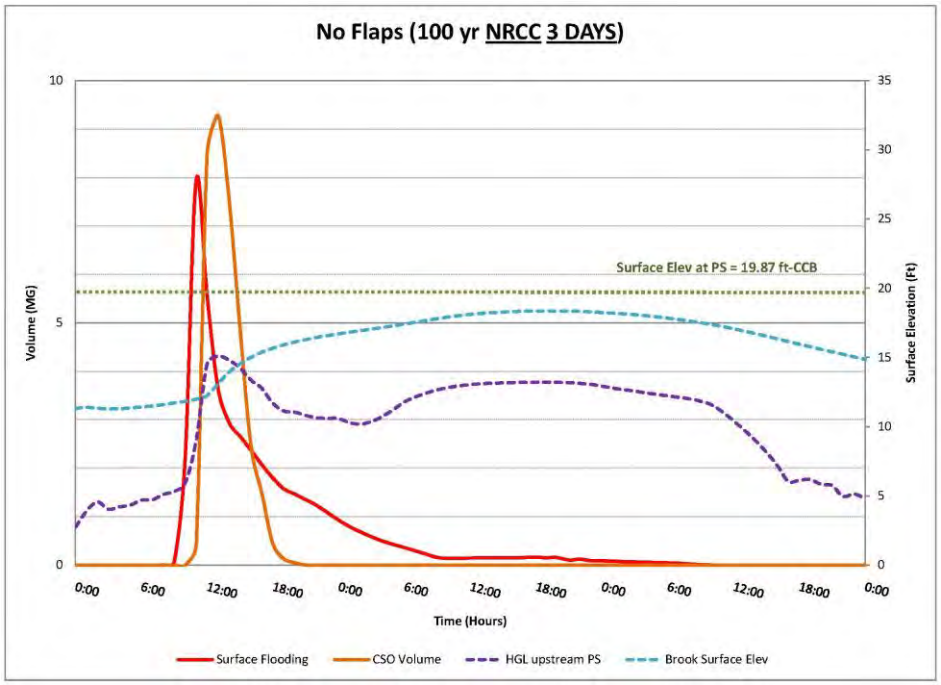


Figure 9: Comparison of Surface Flooding and CSO Occurrences with Water Level at APS and Brook – Flaps at Cambridge CSOs Only

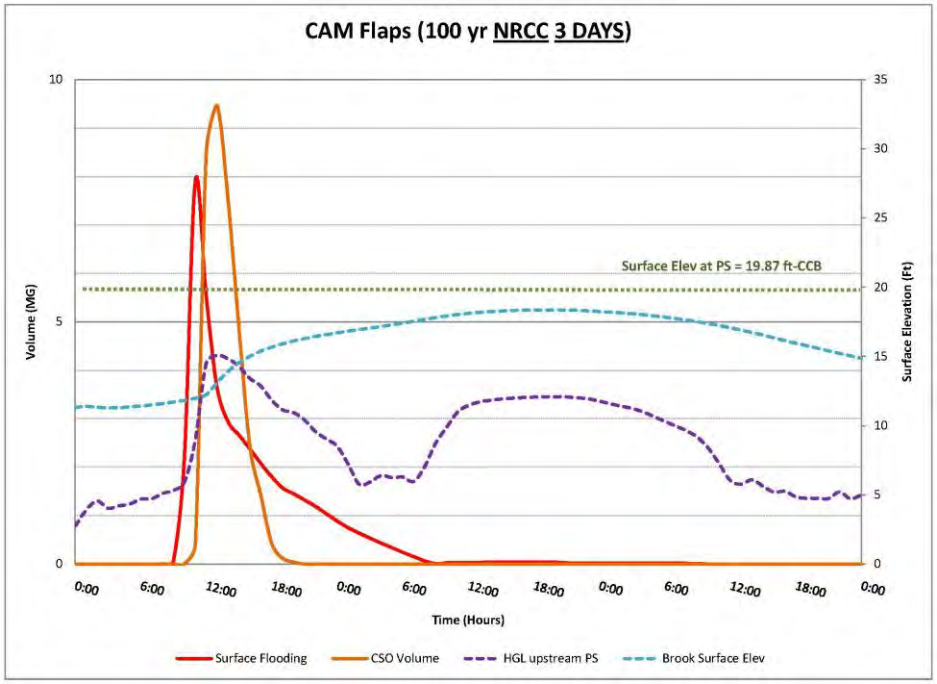


Figure 10: Comparison of Surface Flooding and CSO Occurrences with Water Level at APS and Brook – Flaps at Cambridge and Somerville CSOs

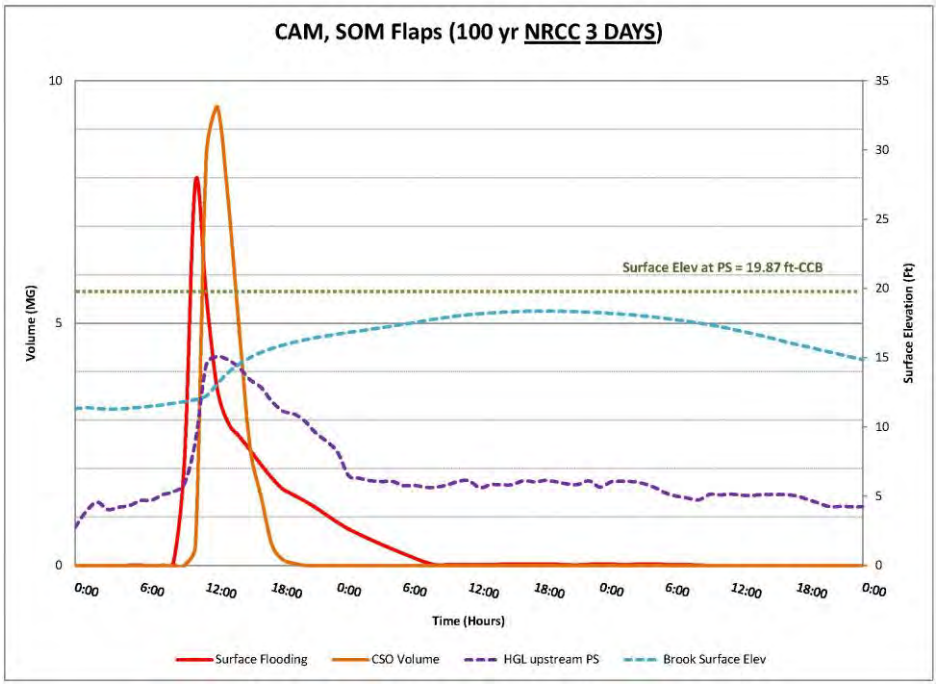
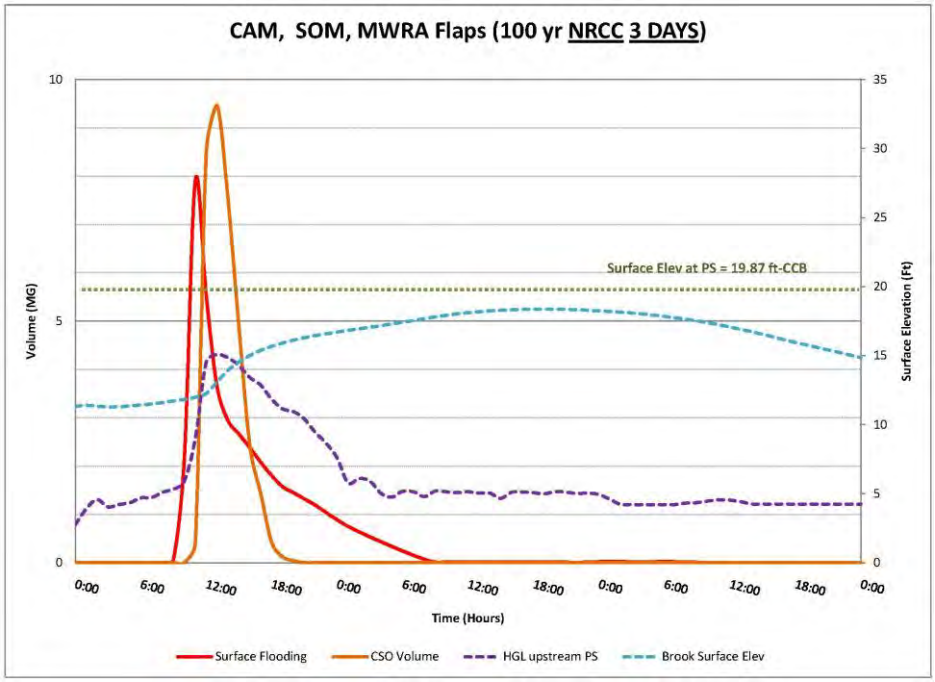


Figure 11: Comparison of Surface Flooding and CSO Occurrences with Water Level at APS and Brook – Flaps at Cambridge, MWRA, and Somerville CSOs



Locations of the system flooding within the City were also assessed for the various flap scenarios, as shown in Figures 12 through 15. The occurrences of system flooding are wide spread throughout the tributary area, and the locations of which are not substantially impacted by the absence or presence of flaps. The ground surface of most of the flooding locations are at elevations higher than the anticipated 100-year flood level and likely occur due to local depressions and/or capacity limitations during such an extreme event. For these scenarios, the peak hydraulic grade line during the 100-year 24-hour NRCC storm was above the ground level for approximately 33% (all flaps) to 36% (no flaps) of the City's modeled manholes. The surface flooding distribution was approximately 0.09 to 0.10 MG per modeled manhole.

It should be noted, however, that only a fraction (approximately 37%) of the manholes that physically exist within the areas tributary to the Alewife Brook were modeled. The distribution of flooding manholes is therefore on the order of 0.03 MG per the total number of manholes known to physically exist within the tributary area.

To assess the impact of implementing flaps at only the Cambridge CSO locations, it was noted that Cambridge surface flooding reduced by 1.47 MG compared to the scenario without flaps (see Table 11). The effective impact within the tributary area is, therefore, 0.003 MG for each of the manholes known to physically exist within the tributary area. Consequently, upstream flooding in Cambridge was reduced by the installation of flap gates on the Cambridge CSOs, and further reduction can be achieved with the installation of flap gates on the MWRA and Somerville CSOs.

Figure 12: Cambridge Surface Flooding Locations – No Flaps

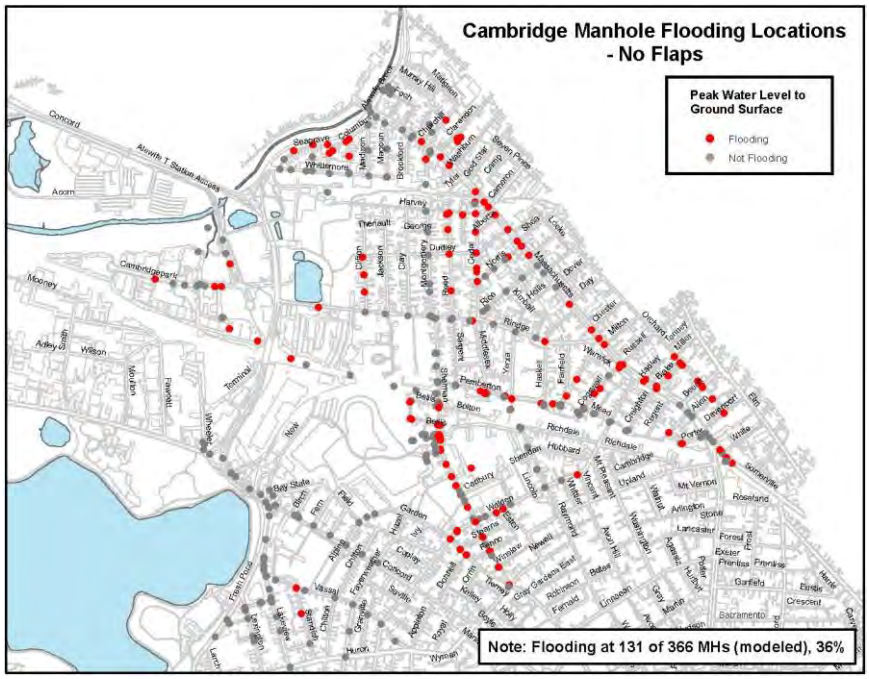


Figure 13: Cambridge Surface Flooding Locations – Flaps at Cambridge CSOs Only

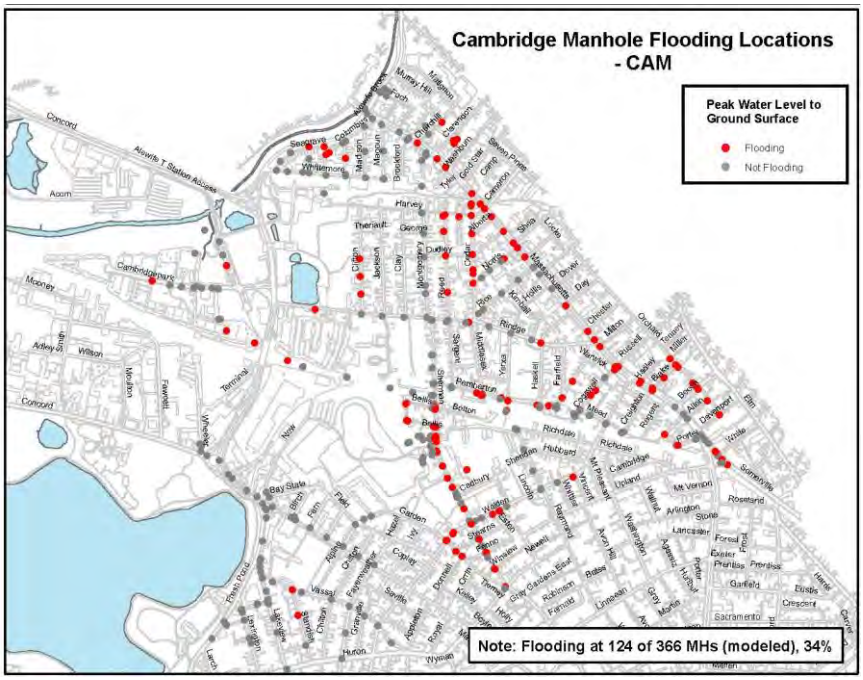


Figure 14: Cambridge Surface Flooding Locations – Flaps at Cambridge and Somerville CSOs

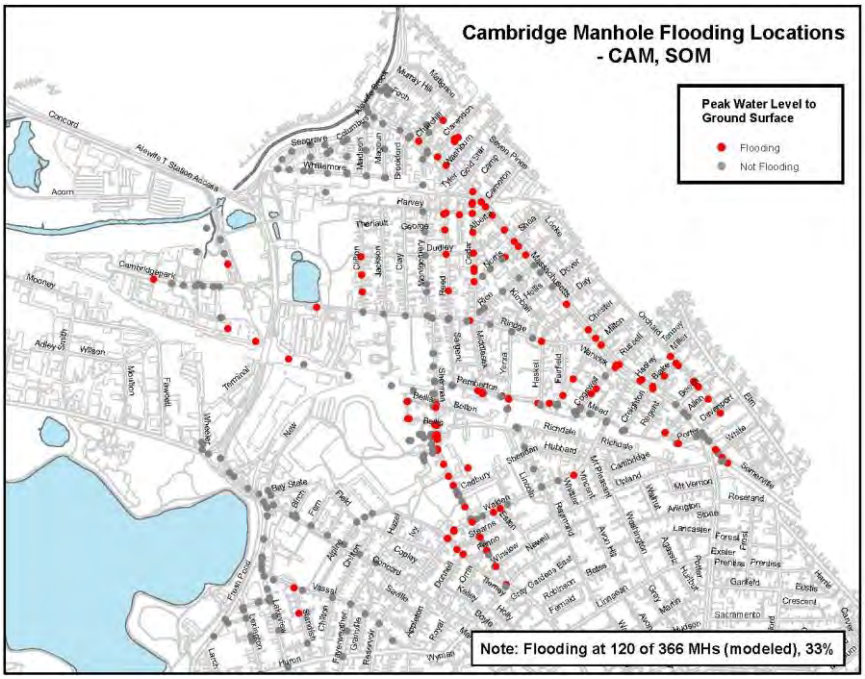
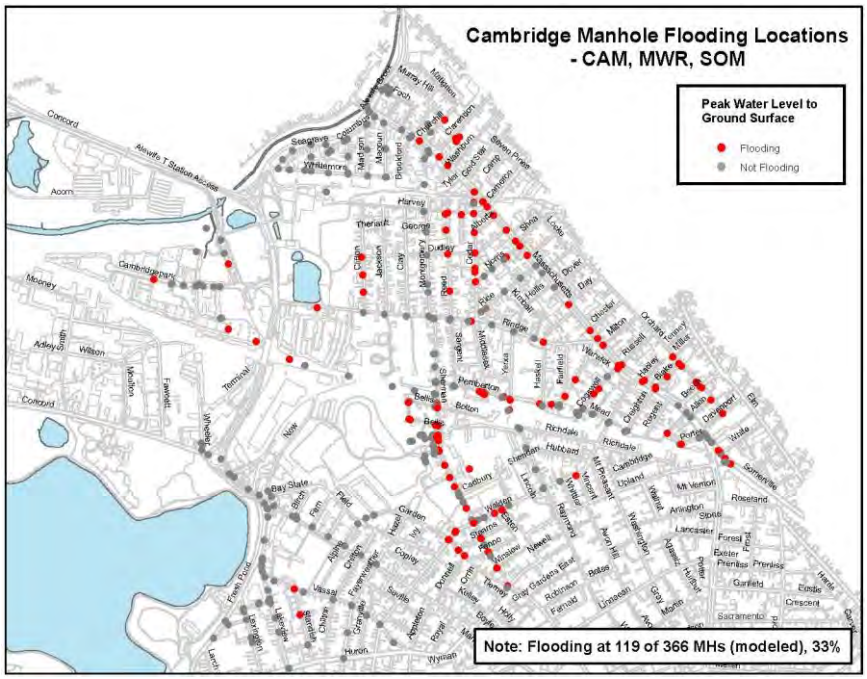


Figure 15: Cambridge Surface Flooding Locations – Flaps at Cambridge, MWRA, and Somerville CSOs



The system flooding locations along the MWRA Alewife Interceptors were also assessed to verify the distribution of flooding locations and the impact of implementing flaps at the CSOs along the Alewife Brook. As shown in Figures 16 through 19, the system flooding occurrences are primarily adjacent to Blair Pond upstream of MWR 003. The absence or presence of flaps also has a marginal impact on the locations of flooding along the interceptors. When flap gates are only provided at the Cambridge CSO locations, flooding is noted at 23% of the modeled MWRA manholes. With an additional flap at the Somerville and MWRA CSO locations, flooding is noted at 21% of the MWRA modeled manholes.

With flaps only at the Cambridge CSO locations, system flooding along the interceptors is reduced by 3.9 MG (see Table 11). This is equivalent to 0.10 MG per modeled manhole. With the addition of flaps at the Somerville and MWRA CSOs, surface flooding along the interceptors are reduced by 6.4 MG (see Table 11). This is equivalent to 0.17 MG per modeled manhole. It is assumed that the MWRA number of modeled manholes closely reflects the number of manholes known to physically exist along the interceptor. The rims of several MWRA Interceptors manholes are below the 2010 FEMA 100-year flood elevation and substantial surface flooding was noted at these locations. The rim elevations of the critical MWRA manholes should be reviewed so as to verify if raising such above the flood plain elevation, or sealing such results in a reduction in flooding caused by inflow into the system. The impact of this action should also be assessed with respect to changes to CSO volumes and flooding throughout the Cambridge system as well.

Figure 16: MWRA Interceptor Surface Flooding Locations – No Flaps

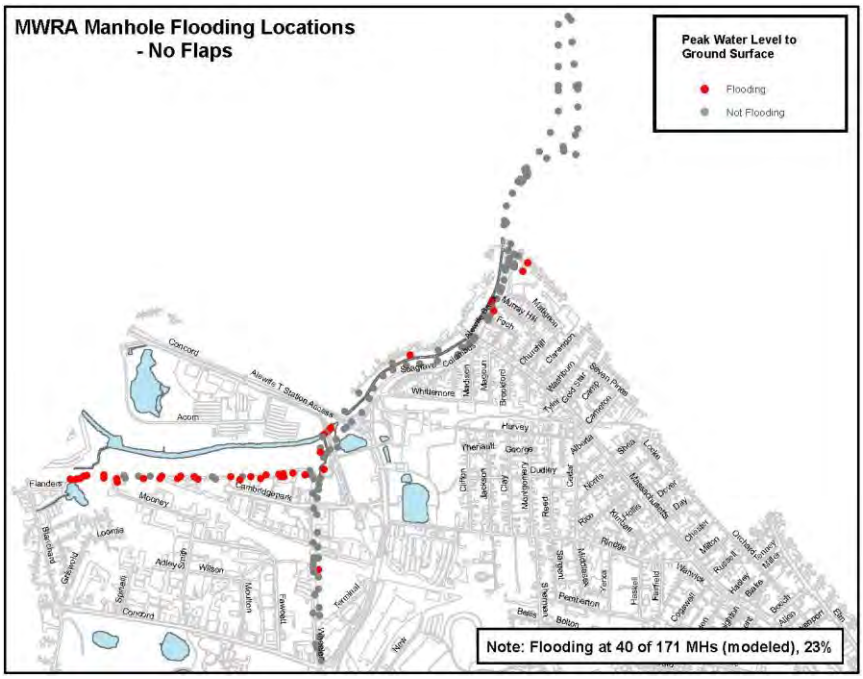


Figure 17: MWRA Interceptor Surface Flooding Locations – Flaps at Cambridge CSOs Only

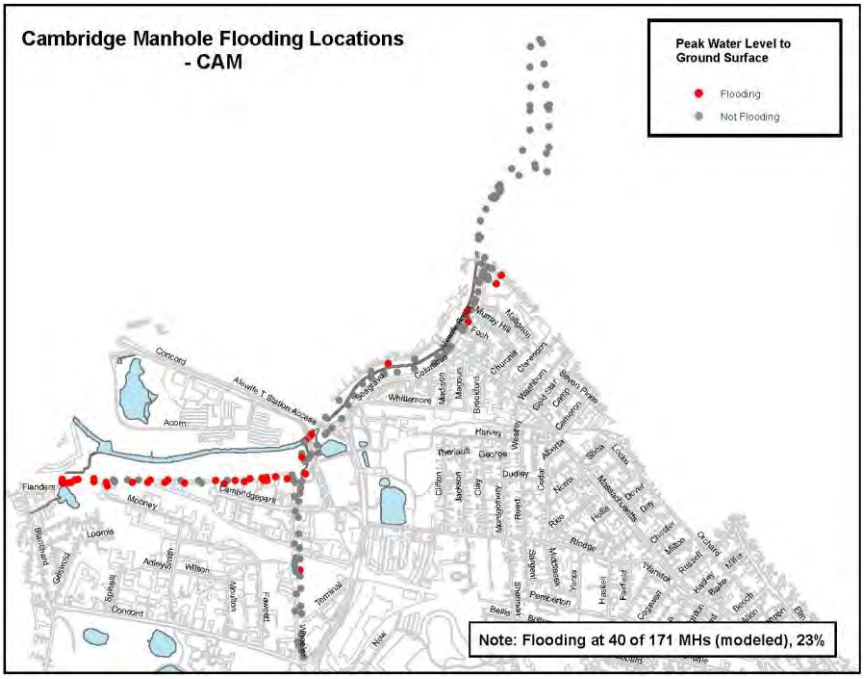


Figure 18: MWRA Interceptor Surface Flooding Locations – Flaps at Cambridge and Somerville CSOs

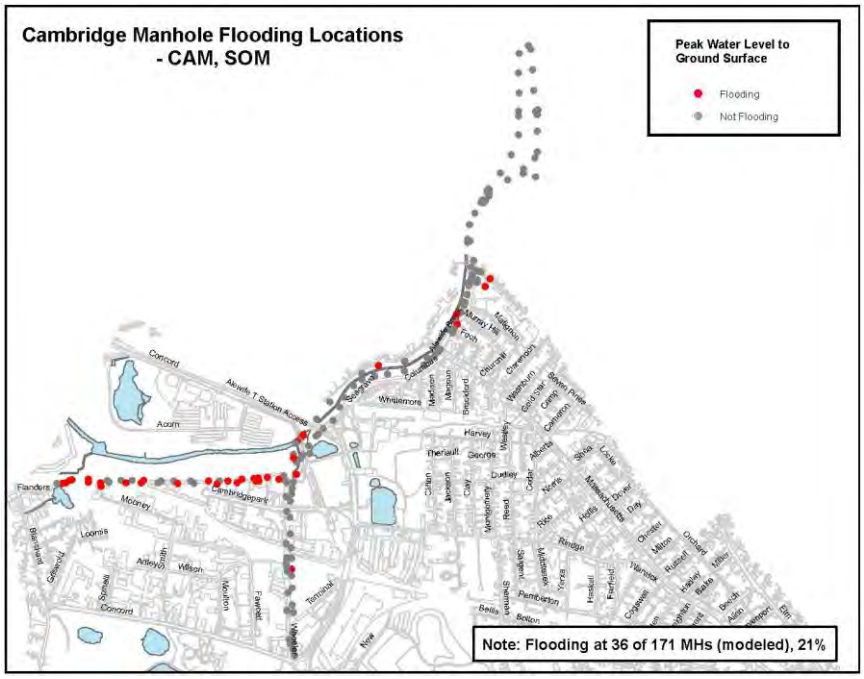
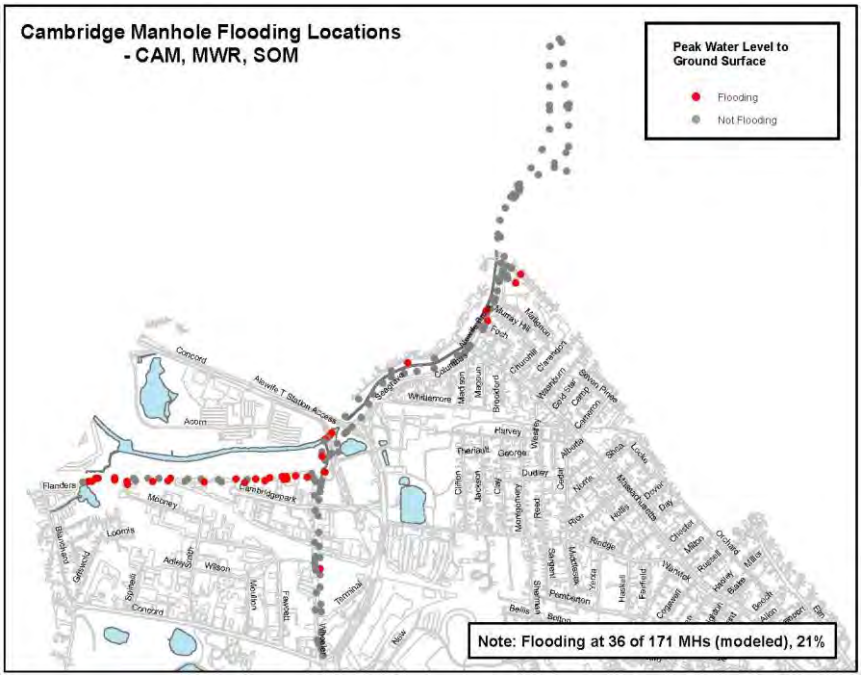


Figure 19: MWRA Interceptor Surface Flooding Locations – Flaps at Cambridge, MWRA, and Somerville CSOs



5. Global Assessment of Inflow Controls

5.1. Inflow Control Capital and Operational Costs

Probable capital and operational costs associated with the installation and maintenance of flap gates at the Cambridge CSO locations were evaluated. Locations included in the assessment were the outlets at CAM 001, CAM 002A/B, CAM 401A (i.e. Wheeler Street storm drain), and CAM 401B. The variability of the outlet pipe material, dimensions, and access were considered in the development of the probable installed capital costs. At each location, a cast iron flap gate installed at a new deep sump manhole was assumed for inflow control. The Alewife Brook is filled with vegetative debris, tree branches, etc and the manhole is needed to ensure that the flap is maintained and operating without obstructions.

As shown in Table 12, the total probable installed cost of inflow control at the Cambridge CSOs is on the order of $315,400. Assuming that this cost is annualized over 20 years at a rate of 5%, then the installed cost for inflow control is on the order of $25,600 per year. Given the nature of the Alewife Brook and the dense vegetation along parts of the channel, it is recommended that these sites should be visited every two months (6 times per year) to ensure that the gates are functioning without obstruction. The probable maintenance cost for inflow control at each location is shown in Table 13 assuming an average labor and equipment rate of $175/hr, and assumed police detail costs. The total probable maintenance cost for inflow control is on the order of $17,550 per year. No operational costs are expected with the use of these passive inflow control devices. The total annual cost associated with the installation and maintenance of inflow control devices at the Cambridge CSO locations is therefore approximately $43,150 per year.

These costs are approximate and should be used solely within the context of this inflow control cost-benefit assessment. The opportunity cost associated with increased head loss throughout the area and likelihood of debris obstructing the outlet should be considered prior to the installation of flap gates at the critical outlet locations.

As previously assessed, the CSO locations owned and operated by the MWRA (MWR 003) and Somerville (SOM 001) are significant sources of inflow to the Alewife Inceptors and APS. Since the City has no jurisdiction at these locations, cooperation with these entities would be needed to implement a more complete and effective inflow control program.

Table 12: Probable Installation Costs for Cambridge Inflow Control

CSO Location	Installation		Installed Capital Cost	
	Material	Gate Size	Sub-Total	Annualized
CAM 001	RCP	15"	$ 40,200	$ 3,300
CAM 002A	Gran. Block	36"W x 40"H	$ 41,600	$ 3,400
CAM 002B	Gran. Block	36"W x 42"H	$ 41,600	$ 3,400
CAM 401A	Concrete	72"	$ 135,000	$ 10,900
CAM 401B	RCP	30"	$ 57,000	$ 4,600
		TOTAL	$ 315,400	$ 25,600

Table 13: Probable Maintenance Costs for Cambridge Inflow Control

CSO Location	Annual Maintenance Inspections		Annual Maintenance Cost
	Visit Duration (hr)	No. of Visits	
CAM 001	2.0	6	$ 2,700
CAM 002A	3.0	6	$ 4,050
CAM 002B	3.0	6	$ 4,050
CAM 401A	3.0	6	$ 4,050
CAM 401B	2.0	6	$ 2,700
		TOTAL	$ 17,550

5.2. Inflow/Infiltration Costs

According to records obtained from the MWRA, approximately 7,400 MG of flow was delivered from the City to the MWRA during the annual monitoring period between 2008 and 2009. This flow was determined based on metered and estimated flows from the City and was characterized as being comprised of approximately 18% inflow and 25% infiltration from the City's sewer system.

The fee schedule for sewage treatment is based on an average delivery rate for the past three years. Records from the MWRA indicate that this fee was $1,700/MG for the City during the annual monitoring period between 2008 and 2009.

Within a typical year, storms equivalent to the 2 and 10-year NRCS 24-hour event are likely to occur with some frequency. The inflow predicted at the Cambridge CSO locations under these conditions is, however, expected to be minimal. The cost to pump this inflow at the APS is, therefore, also expected to be minimal for these smaller and more frequent events. A summary of the predicted inflow and the associated pumping costs are shown in Table 14. Note that a portion of this inflow at the CSO locations is lost to surface flooding and/or is attenuated in the system. Consequently, it is unlikely that the full inflow volumes will be pumped at the APS and the associated actual costs may be less than those shown in the table below.

More inflow is expected for the occurrence of an aggressive 25-year NRCS 24-hour event, or an extreme 100-year 24-hour (NRCS or NRCC) storm. These types of events occur less frequently and the annual costs associated with these events are also lower. A summary of the predicted inflow and the associated pumping costs are shown in Table 14. Based on this assessment, the cost to convey inflow to the MWRA is considerably less than the cost of installing and maintaining inflow controls at the Cambridge CSOs. Given that the controls need to be installed /maintained and are then likely to increase headloss/reduce efficiency at the outlets, there is no cost benefit to the City to pursue this control option.

Table 14: Estimated Costs Associated with Cambridge Pumping Inflow

Design Storm (24-hour)		Predicted Inflow at Cambridge CSOs (MG)	Cost of Cambridge I/I Payment
2	NRCS	0	$0
10	NRCS	0.34	$600
25	NRCS	6.28	$10,700
100	NRCS	53.6	$91,100
100	NRCC	50.5	$85,900

The estimated cost of delivering inflow from the MWRA and Somerville CSO locations were not calculated for this assessment. The total inflow pumped at the APS is substantially higher when the impact of MWRA, Somerville, and other communities is accounted for.

6. Conclusions

Impact of CSOs

- No inflow is expected during the 2-year return period and negligible inflow is expected during the 10-year return period storm at these locations. A small volume of inflow is expected during the 25 event and 100-year return periods at the various CSO locations.

- The maximum Alewife Brook water elevations which impact Cambridge CSO locations occur after peak rainfall/runoff conditions. The time difference between storm runoff peak and the peak river elevation increases with the severity of storm. This temporal peaking difference is nearly one day for the 100-year 24-hour NRCC design event. As a result, the most severe CSO and system flooding periods for the Alewife Cambridge system occur during the initial storm runoff periods, prior to periods of maximum brook water surface elevation.

- The installation of flap gates on Cambridge CSOs (i.e. excluding the MWRA and Somerville CSO locations) did not have a positive or negative impact on the discharge frequency or volume of CSOs to the Alewife Brook. Simulation results of the first 24-hour rainfall period compared to the following 48-hour period for the 100-year NRCC design storms indicate that implementing the use of flaps to prevent backflow into the City's sewerage systems is not warranted.

Impact on system flooding

- For the 100-year event, the City's system flooding occurs mostly in the initial periods of rainfall/runoff with minor increases when storm periods have receded and maximal river elevations occur. In comparison to the inclusion of flaps at all the City's overflow structures, the cumulative Cambridge flooding without flaps increases by only 17% during the 48-hour period after the storm event. The actual rates during the later periods are significantly lower than during initial periods and volumes could be viewed as nuisance type flooding.

- Peak Alewife Brook flows in the Cambridge/Arlington area during the 100-year 24-hour NRCC design event are in the 259 to 323 MGD range. With no flaps in the Cambridge system, peak river inflow being pumped by the APS for the 100-year NRCC storm is in the order of 33.6 MGD (Figure 5), or about 10% of adjacent Alewife Brook flow. It is noteworthy that no flooding at the Alewife Brook Pumping Station has occurred during all simulations performed for the 100-year NRCC storms, i.e., peak hydraulic gradients just before the pump station input have not exceeded ground level at the Station.

- Raising and/or sealing rims along the MWRA Alewife Interceptors that are presently lower than the predicted 100-year flood plain level may be of benefit in reducing system flooding along the interceptor. However, this effort would require additional analysis as to the domino impacts in the adjacent Arlington and Cambridge systems.

Appendix A
Model Updates to Alewife Long-Term Control Plan

Alewife Pump Station Operation

In 2009, the MWRA updated the configuration and operation set points of the Alewife Pump Station (APS) in an effort to increase the pump capacity of the station and more efficiently dewater the Alewife Interceptors during wet weather conditions. Other area wide improvements were also included in this updated configuration to improve conveyance throughout the Alewife basin in accordance with the MWRA's NPDES plan. This updated model was provided to the City of Cambridge in October 2010 (see Attachment 1).

The pump capacity of the plant was increased from 60 MGD to 75 MGD, and the "pump on" condition was set to a lower elevation in the wet well. Previously the station operated with one 12 MGD dry-weather pump, two 16 MGD variable speed wet-weather pumps, and one 16 MGD fixed speed wet-weather pump. With the new configuration, the dry-weather pump discharges 15 MGD and all the wet-weather pumps are variable speed with a maximum discharge of 20 MGD per pump. Details of the updated set points and discharge limits of the pump station are provided in Table A.1. The configuration of the dry-weather outlet pipe was also improved to allow excess flows to by-pass to the wet well or discharge directly to the wet-weather outlet pipe. In the event that the receiving dry-weather outlet pipe is over-capacity, this updated configuration provides some additional relief to that system pending availability in the wet-weather system.

Table A.1: Updated Alewife PS Operation

Pump	Previous Control Logic				Current Control Logic			
	Switch Level (ft-CCB)		Discharge Limits (MGD)		Switch Level (ft-CCB)		Discharge Limits (MGD)	
	ON	OFF	Start	Max.	ON	OFF	Start	Max.
LEAD	4.22	0.22	6	12	3.22	0.22	6	15
1st LAG	5.22	4.22	12	16	4.22	3.22	12	20
2nd LAG	6.72	4.22	12	16	4.72	3.72	12	20
3rd LAG	7.22	4.22	12	16	5.22	4.22	12	20

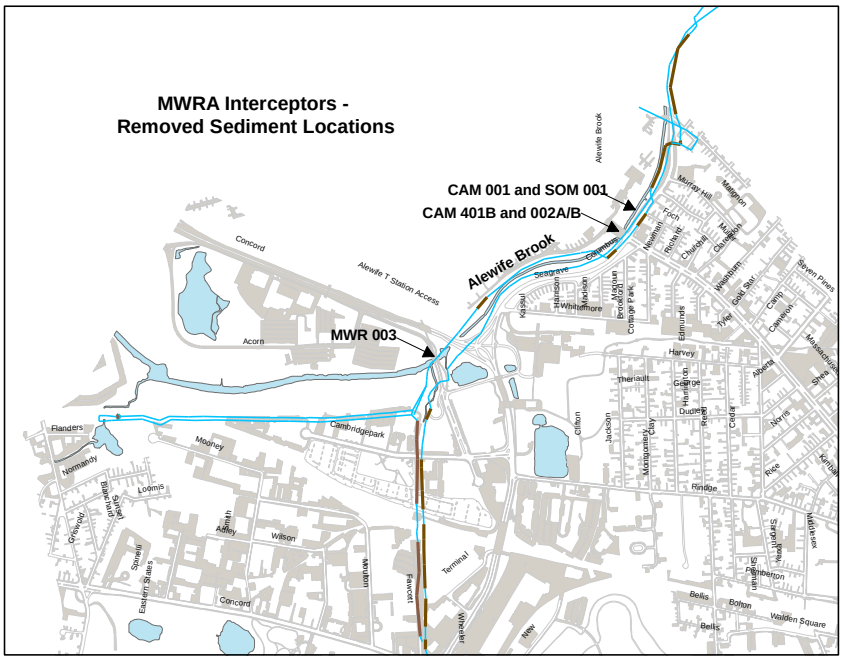
MWRA MET/ Relief Interceptors

There are two interceptors that run along the Alewife Brook. These interceptors are owned/operated by the MWRA and are tributary to the APS. The profile of the interceptors (e.g. diameter, invert elevation, roughness, etc) was modeled in accordance with the characteristics provided in the model of the MWRA's NPDES plan.

Segments of sediment were noted along the interceptors in the MWRA 2009 NPDES model. These sediment deposits should be removed under the long term control plan (LTCP) for the

Alewife system to improve conveyance to the APS. Simulations were therefore completed assuming that the sediment deposits were removed from the system.

Figure A-1: MWRA Interceptors Sediment Locations



Manhole Flooding Conditions

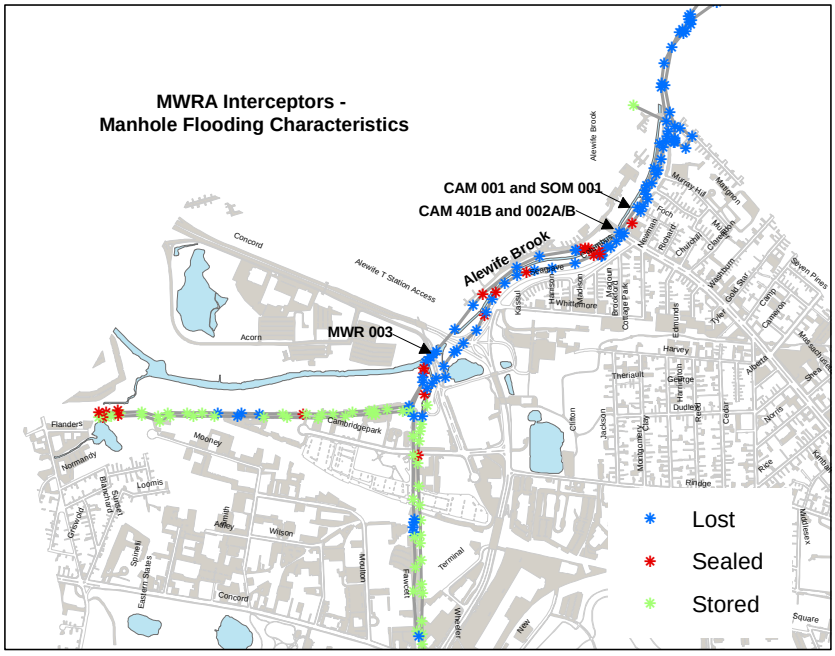
There are three characteristics used to describe manhole rim conditions when modeling a hydraulic system.

- "Stored": When the hydraulic grade line (HGL) rises above the rim elevation, the flooding volume is temporarily stored on the ground surface until the HGL lowers and there is available capacity in the system. This characteristic is typically be used if the manhole is located along a flat street or area for which some surface ponding is expected.
- "Lost": When the hydraulic grade line (HGL) rises above the rim elevation, the flooding volume is assumed to be lost from the system immediately. This characteristic is typically be used if the manhole is located adjacent to a water body, depression, or other area to which the overflow would escape.
- "Sealed": When the hydraulic grade line (HGL) rises above the rim elevation, no flooding volume is either stored or escapes from the system. The system is in effect pressurized and this characteristic is typically used if the manhole rim is bolted to the frame. Note that, a "sealed" manholes will be used in the model at a pipe gradient change (e.g. at a submerged siphon) although no manhole are physically present in the system.

As an operational procedure, the City does not purposely seal manhole covers as a means of SSO flood control. The City manholes were, therefore, modeled as "stored" or "lost" in accordance with the prevailing ground surface conditions. Sealed manholes were modeled only at locations where there is a significant pipe gradient change.

As mentioned previously, the MWRA provided a model with updated configurations pertaining to the Alewife System in October 2010. The rim conditions along the Alewife interceptors were modeled in accordance with the conditions provided in the MWRA model. All manhole rim conditions are represented along the interceptors in this model (See Figure A-2). Note also that the rim elevations were modeled based on the information provided in the MWRA 2009 NPDES model.

Figure A-2: MWRA Interceptors Manhole Characteristics



Manhole and Catch basin Storage Compensation

Hydraulic models (such as InfoWorks) do not account for the for the in-system volume available for storage in catch basins. In addition, there are typically more manholes physically present in the hydraulic system than represented in the hydraulic model.

Based on the most updated GIS information available, the number of manholes and catch basins physically present in the City's combined sewer areas were tabulated to account for this additional storage. The average manhole was assumed to be 6-ft deep and 5-ft in diameter, while the average catch basin was assumed to be 3.5-ft deep and 4-ft by 4-ft in cross-section. The manholes and catch basins physically present in the combined sewer areas tributary to the Alewife Interceptors account for approximately 4.7 Ac-ft of volume. Within that same tributary area the storage available in the modeled manholes was calculated to be 1.1 Ac-ft.

The additional 3.6 Ac-ft volume was then evenly added to the modeled manholes to represent the total storage volume available in the system.

Alewife CSO Regulator Details / Updates

In preparation for submission of the City of Cambridge's CSO Permit Annual Report dated April 2010, the City compiled data on existing CSO structures along both the Charles River and the Alewife Brook. The data summary was compiled into a tabular format and presented, along with backup photos, drawings, and field sketches, as an appendix within the Nine Minimum Controls Plan Update to the EPA, which was included in this CSO Permit Annual Report. The data presented in that document was utilized as the starting point for any updates within the model at these Alewife Brook CSO structures. Since issuance of that report in April 2010, several CSO regulator structures have undergone additional modifications as a result of construction work along the Alewife Brook near Massachusetts Avenue. Consequently, these structures have been further updated as necessary as a result of construction field changes, and these updated model conditions are explained in the sections below. Field notes to confirm as-built conditions following the 2010 construction and 2011 field verification are included for reference in Attachment 2.

CAM 001 CSO

The configuration of the CAM 001 CSO was represented in the model based on the conditions observed during 2009 field investigations. During this investigation it was noted that the outlet of the 18-inch diameter pipe was partially covered by a steel plate. The preliminary recommendation for the baffle reconfiguration included modifying the plate restriction with an effective crest elevation of 15.2 ft-CCB. The outlet pipe to the brook was to remain a 15-inch diameter pipe.

CAM 002A/B CSO

The configuration of the CAM 002A/B CSO was represented in the model based on the conditions observed during the 2009 field investigations and subsequent 2010 construction. The modifications included the addition of floatables control using baffles at the outlet pipes. Both outlet pipes were slip lined to improve conveyance and the effective diameter was 36-inch and 39-inch for CAM 002A and CAM 002B, respectively. The weir at CAM 002A was removed and the effective crest elevation was 16.3 ft-CCB. The CAM 002B outlet was previously completely bulk headed. With future modifications under the LTCP, the bulkhead will be completely removed and partially plated with an effective crest elevation of 16 ft-CCB.

CAM 004 Area

The Alewife LTCP includes the final separation of the CAM 004 area. As such, this area was modeled as a separated sanitary area. The runoff contribution from impervious surfaces to the sanitary system was assumed as per the 2006 Alewife Variance Report model. These assumptions will be further detailed in on-going CAM 004 2011 design efforts. The full implementation of modifications at Drain Vault No. 5 (DV5), were also included in the model. The two underflows at DV5 was removed and the structure functions as a storm water overflow to the storm

drain on Wheeler Street that discharges to Little Brook. The outlet at the brook is a 66-inch diameter pipe at an invert elevation of 17 ft-CCB.

CAM 401A Area

The Alewife LTCP assumes that the CAM 401A will remain a combined sewer area. The area tributary to the regulator at Bellis Circle was, therefore, modeled with these characteristics. The regulator is equipped with brush screens for floatables control and overflows to the Sherman Street drain that conveys flows to the Wheeler Street storm drain that discharges to Little Brook. Pumped flow from the Bellis Circle storm tank also discharges to this outlet downstream on the regulator structure. A flap valve at the combined sewer prevents flow from the tank or the brook from entering the combined sewer area.

CAM 401B CSO

The configuration of the CAM 401B CSO was represented in the model based on the conditions observed during the 2009 field investigations and construction modifications necessary for the inclusion of floatables control baffles at the outlet pipes. The weir plate at CAM 401B was removed and the effective crest elevation will be 14.2 ft-CCB, per the LTCP conditions. The 30-inch outlet pipe was not modified.

CAM 400 Area

In 2009/2010, the CAM 400 area was separated and the CSO was decommissioned. The regulator is now a storm drain outlet, and separated sanitary flows are conveyed to the Alewife interceptors. Note that a flap valve prevents the backflow of the Alewife interceptors to the separated sanitary system. The CAM 400 area was modeled with these characteristics.

MWR 003 CSO

The MWR 003 outlet presently operates with a SOP crest elevation at 16.22 ft-CCB. The weir width is 3-ft wide and discharges to a 48-inch wide and 36-inch height outlet pipe. Under LTCP conditions, a second 30-inch diameter siphon is planned behind the parking garage at Cambridge Park Place to improve conveyance of flows from the Rindge Avenue area. The regulator is owned/maintained by the MWRA, and modifications to the structure are outside of the City's jurisdiction.

SOM 001 CSO

The configuration of the SOM 001 CSO was represented in the model based on the conditions provided by the MWRA in the Alewife LTCP. The overflow crest elevation is 16.2 ft-CCB with a weir width of 4.75-ft, and the outlet pipe to the brook is 48-inch wide and 36-inch high.

Belmont Area

The Town of Belmont discharges combined flows to the MWRA interceptors adjacent to the Blair Pond (upstream of MWR 003). In lieu of modeling the full detail of the town's hydraulic system, the catchment area was represented in the model and flow to the MWRA interceptors was orifice controlled at 18.9 MGD, per the conditions expected in the Alewife LTCP.

Attachment 1
MWRA 2009 NPDES Model Modifications (Provided via email October 13, 2010)

2009 NPDES Model Changes

4/7/2010, **East Boston: Bremen Street Siphon**: The siphon was relined in 1993 and built sloped segments:

- The record drawing for 1993 Bremen Street Siphon Replacement project indicates that the weir upstream of one barrel is set at elev. 98.58' and invert is at elev. 95.47'.

- Added the 12" sloped segment of the Bremen Street Siphon. Abandoned the existing 18" segments into and leaving the siphon inlet and outlet structures.

- Both barrels flat section were relined in 1993. The pipe diameter is 11 inches after 1993 relining (original pipe was 12 inches).

4/9/2010, **Outfall BOS010**: BWSC cleaned the BOS010 outfall pipes 2-3 years ago, and the outfall (EB5307) is open now.

- The weir (EB5303.3) in RE010-2 is set at elev.106.1 ft.
- EBBS Relief project drawing & spec. indicate that BWSC pipe EB3009.1 is 20"Wx30"H (was 20"x34").

4/8/2010, **NDB Tunnel**: 1) Weirs in the following diversion structures are provided with access openings. These openings are in use until the tunnel is put online. The openings are typically 30"x30" square openings. Model these access openings as orifices with 2.82 ft in diameter. 2) Use the lengths between the regulators and CSO/SW diversion Structures Don Walker provided.

BOS081 and BOS084: CSO weir
BOS085 and BOS086: CSO and SW weir

3/22/2010, **North Dorchester Bay CSO Tunnel**: Modifications has been made to the regulators at outfalls to NDB and CSO & Stormwater Diversion Structures have been built as a part of the NDB Tunnel project.

Regulator	Weir@Reg.	Weir @CSO/SW diversion structure
@RE081-2	107.89'-4.25'L(was 107.67'-1.75'L)	109.0'/108.0'
@RE082-2	107.56' (was 107.44')	108.1'
@RE083-1	117.12' (was the same)	No CSO/SW Diversion Structure
@RE084-3	107.4' (was the same)	110.5'
@RE085-4	105.63' (was 107.3')	108.5'
@RE086-1	107.38' (was 106.6')	110'
@RE086-8	105.3' (was 100.4')	110'
@RE087-7	105.8 ft (was 105.05' on drawing and 105.4' in model).	

3/12/2010, New info. @**BOS049** from BWSC: Add a dummy node (1008167RG) to simulate a rising gate w/3 inches opening in the BOS049 regulator chamber just upstream of the 48" sewer to Prison Point.

3/9/2010, **Caruso Pump Station**: Remove the following elements to accurately represent what's shown on the Record Drawings.

- Two stop log grooves downstream of Junction Chamber 3 (Node 1007939)
- One sluice gate (1007941B.1) in the channel to Wet Well No. 1 (dry side)
- One sluice gate (10079445B.1) in the channel to Wet Well No. 2 (wet side)

3/8/2010, The **MWR205A** weir crest is at elev. 109.2 ft (was @108.99').

11/13/2009, **Somerville Marginal CSO Facility – Install stop planks** upstream of the facility influent gates to elev.105 ft to prevent flows into the facility through the leaking influent gates. Also new info. from Brian for existing conditions model:

- Weir in RE072A is at elev.108.75 ft (was 105.5');
- Remove flap gate and pipe to drain chamber upstream of influent gate after activation;
- Weir in RE071A is at elev.104.3 ft (no change);
- Facility operation: Open gates when level reaches elev. 108 ft (was 107.5'), close gates when level drops below elev.105 ft (was 105.5').

3/2/2010, **Outfall MWR010** Field Measured rim elevations at nodes 1007439FV, 1007439SL, 1007441, 1007441FV, 1007443, 1007443SL, 1007447, 1007453, 1007453SL and 1021487). Top of the stop planks (1007443.1) is @elev. 110.2 ft (was @109.8').

2/25/2010, **Chelsea Crescent Ave. 18-inch sewer**. City of Chelsea constructed:

- Crescent Ave. 18" sewer between Parker Street and Eastern Ave. where it connects to MWRA's Revere Extension Sewer Section 62, Sta.0+08 (node ID 1003413).

- Brick and concrete dam along invert of the existing 61"x72" combined sewer to crown elevation of the new 18" sewer (Elev. 104.72') to allow overflow to Structure C.

- Re-direct dry weather flows to 18" sewer nodes CH1820, CH1819 and CH1813 (was to CH8261, CH8255 and CH8253, respectively).

1/9/2010, **Interconnection between Sections 111 (Node 1005355) and 21B** (Node 1000905) is a continuation of Sec.22 (39.96"W x 42"H), connecting at invert elev. at both ends. This interconnection was discovered by Richard Burns on June 9, 2009.

1/28/2010, **Upper Neponset Valley Replacement Sewer**:

- Added in Upper Neponset Valley Replacement Sewer;
- Removed Upper Neponset Valley Sewer;

- Revised drainage areas tributary to the Upper Neponset Valley Replacement Sewer based on the information provided by GIS.
- Removed the half pipe in the Neponset Valley Connection chamber (node 1012479). The existing 45"x48.5" connection to Neponset Valley Sewer (node 1009617) remains;
- Sliplined the 84-inch Wellesley Extension Relief Sewer, Section 638 between Neponset Valley Connection Chamber (Sta.201+83, node 1012481) and New Haven Street Drop Chamber (Sta.192+13, node 1012409). Reduced the pipe diameter from 84" to 72" (pipes 1012481.1, 1012483.1 and 1023940.1) and increased pipe upstream and downstream ends elevations by 6".
- Modified the Manning's n value for Sections 638, 637 and 637A to 0.009, 0.02 and 0.018, respectively based on Brown& Caldwell's Model Analysis Work Plan dated December 4, 2009.

1/20/2010, **Existing Cottage Farm Operating Procedures (*apply after June 30, 2009*)**:

Please note that operational staff have the ability to take manual control of the gate to make adjustments to the rate of flow entering the facility (ex. Facility gates may be opened more than 15% if available facility capacity exists). The values provided below are an approximation of the automatic control mode of the facility.

FOD's Current Cottage Farm Operating Protocols:

- RTC for Influent Gates: Start to open all three Influent Gates when water level at Cottage Farm influent gates reaches elevation 95' (2.5% opening), open the gates to max. 15% when water level is between elev. 97' and 98', and close all three gates when level drops below elev. 95 ft.

Water Level at Influent Chamber	Gate Position (5'H according to Brian)
During dry weather conditions	All three gates are completely closed.
Between 95' and 95.5'	Open 0.125 ft (2.5% of 5' H gate)
Between 95.5' and 96'	Open 0.25 ft (5% of 5' H gate)
Between 96' and 96.5'	Open 0.375 ft (7.5% of 5' H gate)
Between 96.5' and 97'	Open 0.5 ft (10% of 5' H gate)
Between 97' and 98'	Open 0.75 ft (15% of 5'H gate; it's max. opening)
Over 98'	Open 0.75 ft (15% of 5'H gate; it's max. opening)
Below 95'	Close all three gates completely

- RTC for SG in 54" Brookline Connection: The Brookline gate has been opened when the level in the Cottage Farm Influent chamber reaches a certain elevation and closed when WSHW chokes. This has not yet been automated given that the level elements on the Boston side of the river are currently unavailable. ***USE THIS RTC AFTER JULY 1, 2009***.

    1. SG is closed during dry weather.
    2. Open SG when water level at the C.F. Influent Chamber exceeds 89 ft and WSHW does not choke.
    3. Close SG when water level at the C.F. Influent Chamber drops below 89 ft or WSHW chokes.
    4. Add a dummy flap gate to simulate allowing flow in one direction only (from C.F. to WSHW).

1/20/2010, Part of **CAM011 has been separated**:
1) 70% s.s to tributary areas 8027 (34.9ac) and 8029 (10.4 ac) and change land use type from 1C to 3.
2) Re-direct storm area 8121 (60.3 ac) from node CB7507 to node CB307 d/s of CAM011 regulator.

11/18/2009, Interconnection 183A (node 1001299): A portion of Interconnection 183A (24-inch pipe), beginning at the North Charles Relief Sewer (NCRS) and ending on the north side of Memorial Drive, was constructed as part of the NCRS contract. This 24-inch stub was plugged (and is still plugged) at the NCRS connection and at its stub end. The rest of the 24-inch interconnection was to be constructed under a separate contract that apparently never happened. Therefore, most of Interconnection 183A does not exist.

11/18/2009, **Outfall CAM009:** Cambridge slip-lined the 30"w x 26"h wood outfall (CB673.1) with a 20" plastic pipe.

11/18/2009, Since the **interconnection 183A** was never built, Cambridge added a flap gate and a short 12-inch connection from the upstream end of 24" outfall pipe @elev.108' directly into NCRS (1007253) at NCRS' crown (elev.105.24')

10/16/2009, Misc. changes from Charles River Interconnection Optimization project:

1. Re-Open Sec.162A gate on 9/22/2009. The gate is fully open (42").

2. Added 60" interconnection between NCRS and SCRS overflow chambers.

3. Added 54" Brookline connection and new RTCs for Cottage Farm three Influent Gates and the SG in 54" Brookline connection.

12/24/2009 Alewife Brook Sewer Section 43 SSO Project

1. Update Existing Conditions Model:

- Field measured rim and invert elevations from Jim Snow's 12/22/09 Sewer Structure elevation Report:

12/24/2009, from Sewer Structure Elevation Reports:
Sec.43, Sta.78+28 (1002127): Rim @113.66 ft (was 114')
Sec.43, Sta.79+84 (1002123): Rim @108.28 ft (was 114'), Invert @103.61 (was 103.37)
Sec.43, Sta.80+91 Add a new node (1002122): Rim @112.41ft, Invert @103.71
Sec.43, Sta.81+41 (1002121): Rim @113.91 ft (was 114'), Invert @104.0 (was 103.47')
Sec.43, Sta.82+95 (1002117): Rim @115.16 ft (was 114), Invert @104.01 (was 104.07)
Sec.178, 1007011: Rim @114.18' (was 113')

- 1/4/2010, Field measurement: MWR003 weir elev. is at 109.28 ft (was 111'). ~~12/22/09 at outfall MWR003, the weir crest measured by FOD is 110.1 ft~~.

- Change Sec.43, Sta.79+84 manhole flood from "Stored" (flood water is retained and returned to the system as the water level drops) to "Lost" (the flood water is lost from the system).

- At Alewife Brook Pump Station, the dry weather pump (pump No.4) capacity is 15 MGD (was 12 mgd) (installed under SCADA project in 2008). The three larger pumps are actually 26 MGD capacity. However due to age and running them simultaneously, model them as 20 MGD capacity (was 16 mgd).

The 15 MGD LEAD pump and 3-20 MGD LAG pumps are modeled as Variable Speed Pump (In the original InfoWorks model there are 1-12 MGD LEAD pump, 2-16 MGD LAG pumps and 1-16 MGD fixed pump). Current pumping capacity is 75 MGD vs. 60 MGD previously, an increase of 25%.

Pump	Previous Control Logic				Current Control Logic			
	Switch On Level (ft)	Switch Off Level (ft)	Initial Discharge (MGD)	Maximum Discharge (MGD)	Switch On Level (ft)	Switch Off Level (ft)	Initial Discharge (MGD)	Maximum Discharge (MGD)
LEAD pump	99	95	6	12	98	95	6	15
1st LAG pump	100	99	12	20 (16)	99	98	12	20
2nd LAG pump	101.5	99	12	20 (16)	99.5	98.5	12	20
3rd LAG pump	102	99	12 (16)	20 (16)	100	99	12	20

Once the pumps are running, its discharge is controlled by the real time control (RTC) scenarios. Operational set points in the model were modified based on the measured wet well levels.

Pump	Previous Control Logic		Current Control Logic	
	Wet Well Level Range	Control Rule	Wet Well Level Range	Control Rule
LEAD pump	> 99.5’	Discharge will be incremented by 1 MGD	>= 98.5 ft	Discharge will be incremented by 1 MGD
	99’ – 99.5’	Discharge will be incremented by 0.5 MGD	98’ – 98.5’	Discharge will be incremented by 0.5 MGD
	98.5’ - 99’	Discharge will be incremented by 0.1 MGD	< 98’	Discharge will be decremented by 1 MGD
	98’ – 98.5’	Discharge will be decremented by 0.1 MGD		
	97’ – 98’	Discharge will be decremented by 0.5 MGD		
	< 97’	Discharge will be decremented by 1 MGD		
1st, 2nd and 3rd LAG pumps	>= 101’	Discharge will be incremented by 2 MGD	>= 100’	Discharge will be incremented by 2 MGD
	100’ - 101’	Discharge will be incremented by 1 MGD	99’ – 100’	Discharge will be incremented by 1 MGD
	99.5’ – 100’	Discharge will be incremented by 0.2 MGD	98.5’ - 99’	Discharge will be incremented by 0.2 MGD
	99’ – 99.5’	Discharge will be decremented by 1 MGD	98’ -98.5’	Discharge will be decremented by 1 MGD
3rd LAG pump (fixed pump)	>= 102’	Switch on		
	< 99’	Switch off		