

2021 Annual Report
National Pollutant Discharge Elimination System

For The
City of Cambridge, Massachusetts
Combined Sewer Overflow Permit
#MA0101974

Submitted to
U.S. Environmental Protection Agency
Water Technical Unit

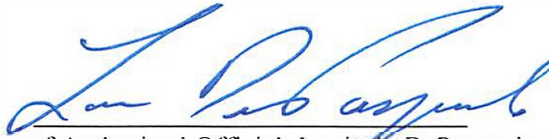
MA Department of Environmental Protection
Bureau of Resource Protection

Submitted by

City of Cambridge
Department of Public Works



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Signature of Authorized Official: Louis A. DePasquale
City Manager, City of Cambridge

04/29/2022

Date

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1. 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 Overflows (CSO) located in eleven (11) regulator structures to the receiving water bodies named in the permit.

The City of Cambridge is additionally required to provide a comparison between the precipitation for the year and the precipitation of the typical year under future planned conditions in the MWRA Final CSO Facilities Plan “Notice of Project Change for the Long Term CSO Control Plan for Alewife Brook” document. Also, required for each CSO is a comparison between the activation volume and frequency for the year and the volume and frequency during a typical year under future planned conditions.

Finally, an evaluation was performed of whether the CSO activation volumes and frequencies for 2021 are in accordance with the estimate in the MWRA Final CSO Facilities Plan or the report entitled “Notice of Project Change for the Long Term CSO Control Plan for Alewife Brook”, given the precipitation which occurred during the year, and the CSO abatement activities which have been implemented. Where CSO discharges are determined to be greater than the activation frequency or volume in either document, an assessment of the results was completed and documented.

Per the 2019 Variance for Combined Sewer Overflow Discharges to the Alewife Brook / Upper Mystic River Basin and Charles River Basin issued by the Massachusetts Department of Environmental Protection, the City is required to complete a CSO Control Plan for City-owned outfalls. The recommendations in this Report will be used to support creation of that Control Plan.

2. Hydraulic Model Updates

During calendar year 2021, the existing conditions hydraulic model was updated with several system updates as part of the ongoing system improvement work by the City of Cambridge CDPW. The most notable of these updates are recalibration of the partially-separated areas tributary to the Talbot and Endicott underflow connections, better representation and interaction with the Charles River and Alewife Brook to provide more-realistic and dynamic outlet conditions, and updating the representation of the MWRA network, which included Real Time Control parameters at Alewife Brook Pump Station, Cottage Farm CSO Facility, and Prison Point CSO Facility.

3. Combined Sewer Overflow Metering Plan

As part of the 2021 Annual CSO reporting process, a review of the available meter data for 2021 was performed. This data review identified periods with good quality meter data that could be used to cross-check against model results. Potential meter malfunctions and data discontinuities were also identified and documented. CSO activations and volumes presented in this report are based on model-simulated data, with the exception of two sites (CAM401A and CAM017), where metered data was used. The model results were cross-checked against MWRA or City of Cambridge (City) meter data, when available. This section provides an overview of the City's CSO metering program, the modelled CSO simulations, and correlation between the two at each CSO regulator.

3.1 Existing CSO Metering Methodology

3.1.1 Existing CSO Structures

In accordance with the City's current CSO permit, the city has a total of twelve combined sewer outfalls that receive overflows from 11 regulator structures, listed in **Table 1** and shown on **Figure 1**. Five outfalls are located on the Charles River and seven outfalls are located on Alewife Brook.

Seven of the twelve existing CSOs are currently open, four located on the Alewife Brook and three on the Charles River. On the Alewife Brook, the CAM004 and CAM400 regulators were permanently closed and CAM002B is temporarily closed. On the Charles River, both CAM009 and CAM011 have been temporarily closed.

Table 1 – Summary of Combined Sewer Regulator Structures

Regulator	Location	Status	Waterbody
CAM 001	Alewife Brook Parkway @ Foch St.	Open	Alewife Brook
CAM 002	2A-Massachusetts Ave. at Alewife Brook Parkway	Open	Alewife Brook
	2B-Massachusetts Ave. at Alewife Brook Parkway	Closed ¹	Alewife Brook
CAM 004	Fresh Pond Rotary	Closed ²	Alewife Brook
CAM 400	Alewife Brook Parkway and Harrison Avenue	Closed ³	Alewife Brook
CAM 401A	Sherman Street at railroad crossing	Open	Alewife Brook
CAM 401B	Massachusetts Ave. at Alewife Brook Parkway	Open	Alewife Brook
CAM 005	Mount Auburn Street @ Lowell Street	Open	Charles River
CAM 007	Memorial Drive at Hawthorne Street	Open	Charles River
CAM 009	Memorial Dr. at Old Murray Rd.	Closed ⁴	Charles River
CAM 011	Plympton St. @Memorial Dr.	Closed ⁴	Charles River
CAM 017	Binney Street at Land Blvd.	Open	Charles River

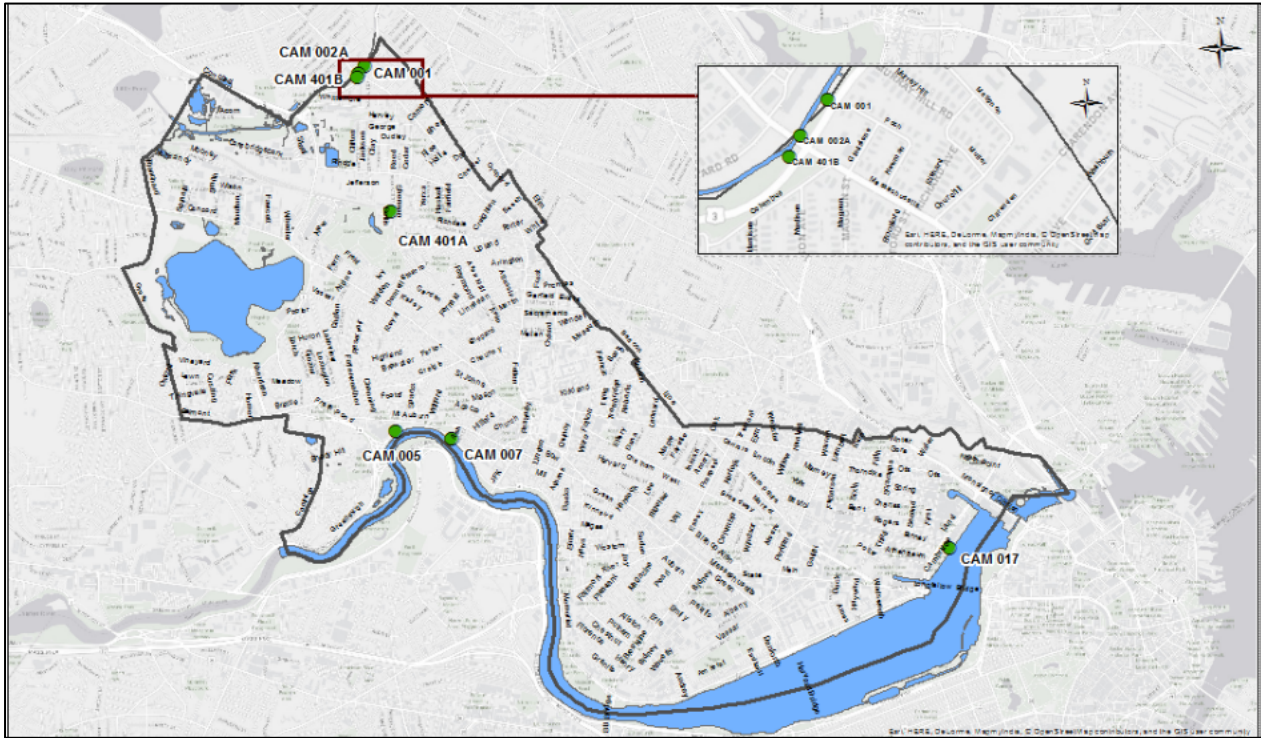
¹Temporarily closed, will be reevaluated as part of the CSO Control Plan

²Permanently closed on December 27, 2015

³Permanently closed on March 31, 2011

⁴City retains the right to re-open, will be reevaluated as part of the CSO Control Plan

Figure 1 – Active CSO Regulator Locations



3.1.2 CSO Metering and Recommendations

The following section outlines the 2021 CSO spills and volumes, along with the methodology for CSO metering at each regulator. The data analysis carried out on both the metered and modeled CSO simulations helped identify actions that the City will undergo for CSO metering moving into 2022. These actions include continued routine maintenance and calibration of sensors installed in regulators. This improves the availability of high-quality data that assists accurate reporting and supports refinement and calibration efforts to improve model simulation results. Specific metering issues are discussed in the following sections. The number of activations and total volumes for the Alewife Brook and Charles River CSOs are located in **Table 2**.

CAM 001 Metering

Hydraulic model results indicated four spills at CAM001 in 2021 with a total volume of 0.20 MG.

The CAM001 regulator is metered by an outfall pipe area velocity sensor and a level sensor in the regulator manhole. The flow meter located on the outfall pipe recorded five spills in 2021, with the one additional spill (compared to the model simulation) occurring on July 27th. The level sensor indicated a high-water level alarm on all five occasions during the reporting year, where the level exceeded 43 inches in the regulator structure.

CAM 002 Metering

Hydraulic model results indicated no spills at CAM002 in 2021.

The City has a depth sensor located in the regulator and a flow meter located on the CAM002A outfall pipe. Both of these meters indicated zero spills during the 2021 reporting year.

CAM 004 Metering

The CAM004 outfall was permanently closed on December 27th, 2015, in accordance with the MWRA's LTCP for the Alewife Brook.

CAM 400 Metering

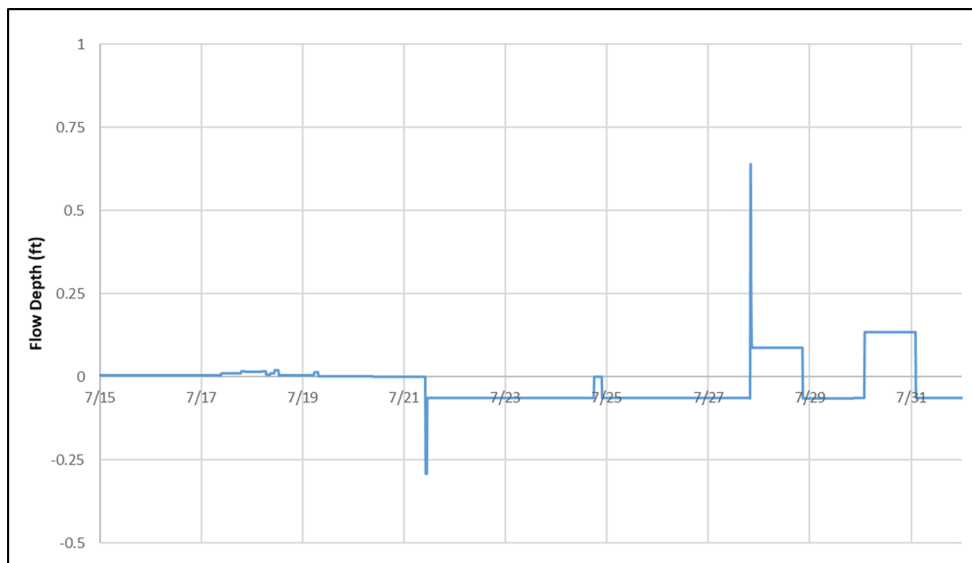
The CAM 400 CSO regulator was permanently closed in March 2011 in accordance with the MWRA's LTCP for the Alewife Brook.

CAM 401A Metering

Metering results indicated eighteen spills at CAM401A in 2021 with a total volume of 21.70 MG. Data from the level sensors and flap gate flow meter was used to validate both modeled and observed spills at the regulator.

The CAM 401A regulator structure includes a floatables control brush screen mounted on a static weir structure and flap gates located just downstream from the weir. The city has two level sensors in the 401A regulator structure and a flow meter at one of the flap gates to validate spill occurrences. Data from the flap gate flow meter was available starting in July 2021. In July 2021, the City recalibrated the primary level sensor in the regulator and programmed an offset such that a reading of zero (0) is equal to the overflow threshold. This shift in reported measurement is shown in **Figure 2**. The City will continue to check and recalibrate the level sensor inside the regulator to validate the spill threshold being used for activations and alerts.

Figure 2 - CAM401A Level Sensor Shift



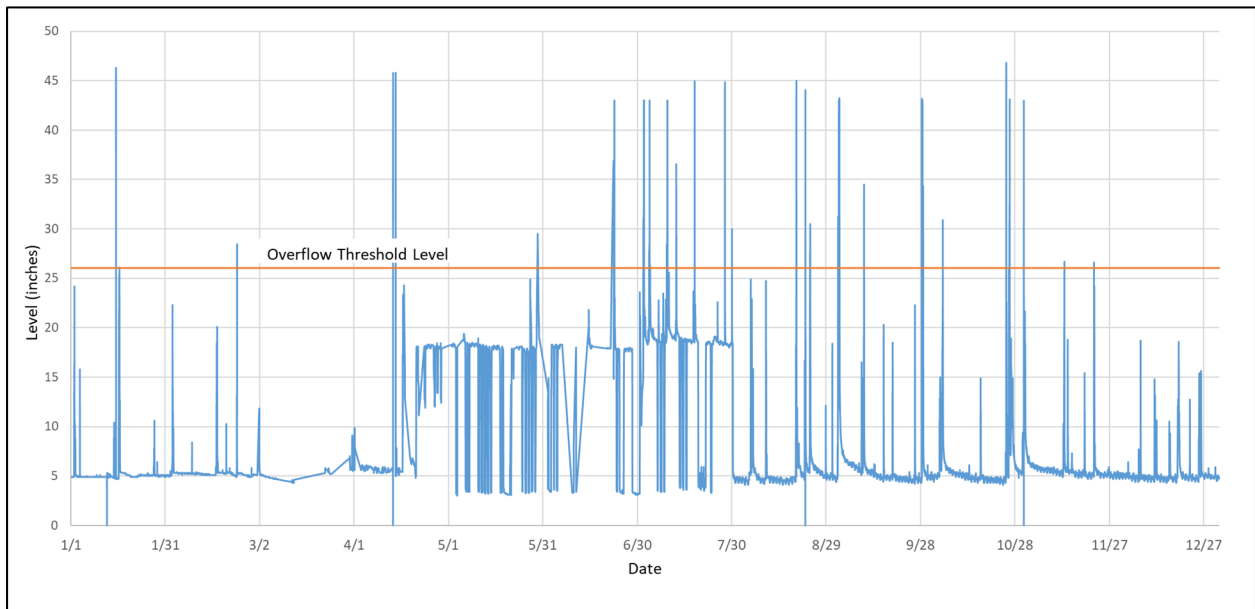
Hydraulic model results indicated a total of 12 spills in 2021. However, due to the modeling inconsistencies described in the following paragraphs, the City believes that metering results are the most-accurate data source for reporting spill occurrences and volume at CAM401A for 2021.

Similar to what was observed in 2020, the base level at CAM401A appeared to vary over the course of 2021, as shown in **Figure 3**. In 2020, the observed change in base flow level was attributed to removing sediment in the pipe downstream from the CAM401A regulator. However, based on the data collected in 2021, it appears there may be additional influences on the base flow level that need to be explored. Possible explanations for the shifting base flow levels include:

- Seasonal deposition of sediment in the pipe from the April 14th and 16th rain events “washing off” sediment into the pipeline that was built up in the service area over the winter. The sediment was then washed away from the large July rain events.
- Impacts from the combined sewer in Rindge Avenue. The combined sewer system between the CAM401A regulator and the connection to the MWRA network at MWR003 is at a very flat grade. Therefore, any backups in the combined sewer pipelines in Rindge Avenue would result in elevated base flow levels at CAM401A.
- Fouling of the level meter(s).

The CAM401A contributing areas will undergo model updates and recalibration as a part of the City’s model calibration efforts in 2022. That recalibration effort will include additional flow metering and field investigation to better understand flow patterns upstream and downstream from the CAM401A regulator. This is also discussed in Section 3.3.

Figure 3 – Shift in Base Flow Level at CAM401A During 2021



CAM 401B Metering

Hydraulic model results indicated five spills at CAM401B in 2021 with a total volume of 1.59 MG.

The City has level sensors installed in the regulator structure and outfall pipe. The regulator level sensor indicated seven spills in 2021, with additional short-duration (compared to other events) spills occurring on July 27th and August 22nd that were not observed in the model results. The level sensor in the outfall pipe was observed to have erroneous values throughout the reporting period. This sensor is used as a secondary confirmation of a CSO spill occurring. The City will check the sensor and recalibrate it to ensure that reliable data is available to confirm future events.

The CAM401B contributing areas will undergo model updates and recalibration as a part of the City's model calibration efforts in 2022. This is discussed further in Section 3.3. Even without the recalibration, however, it is believed the hydraulic model is reasonably matching wet-weather flow patterns in the CAM401B system and is believed to be more reliable than the meter data for reporting overflows.

CAM 005 Metering

Hydraulic model results indicated eight spills at CAM005 in 2021 with a total volume of 3.34 MG.

The CAM005 regulator is a multi-chamber structure that is metered with a depth and velocity sensor mounted on the upstream side of the overflow weir. Additionally, a level sensor is installed in MH D32CMH0215, which is adjacent to the south side of the regulating structure. The level sensor in the regulator indicated three additional spills (compared to the modeled spills) for a total of eleven spills. The sensor is located in a portion of the regulator that is above the dry-weather flow path and is "dry" except in larger rain events. It is believed this contributed to inconsistent reporting of levels during some of the overflow events in 2021. The City will continue to check the sensors multiple times per year to ensure that metering data collected at CAM005 is as accurate as possible.

In large wet-weather events, such as those that occurred in July 2021, the water level at the CAM005 regulator is directly controlled by the surcharge level in the MWRA interceptor. Because the MWRA network is a large, regional system, water levels during these large events will vary in response to changes in rainfall intensity and timing across the greater Boston area. The hydraulic model assumes an even distribution of rainfall across the entire service area. While model results generally match metered data, there are some slight differences between modeled and metered water levels for the larger rain events as a result of the unique variations in rainfall distribution across the larger area of the MWRA network that impacts the CAM005 CSO. Noting that these slight differences are expected to occur for large events, the hydraulic model is reasonably matching wet-weather flow patterns in the CAM005 system and is believed to be more reliable than the meter data for reporting overflows.

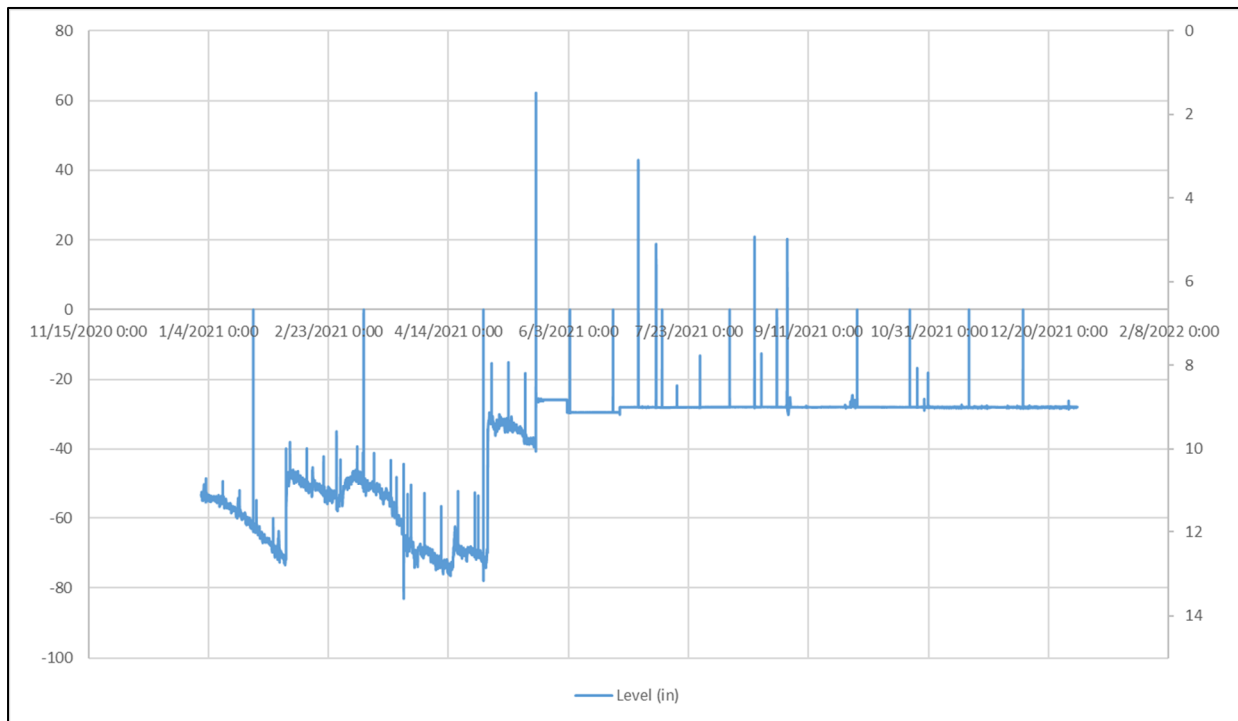
CAM 007 Metering

Hydraulic model results indicated three spills at CAM007 in 2021 with a total volume of 3.91 MG.

The CAM007 regulator has a level and velocity sensor mounted on the overflow weir in the regulator structure. During the 2020 reporting period, the City recalibrated the level sensor in the regulator and programmed an offset equal to the overflow threshold. This shift in reported measurement is shown in **Figure 4**. The updated threshold was used for reporting in 2021. The level sensor will continue to be rechecked and calibrated by the City to validate the spill threshold being used for activations and alerts. The velocity sensor on the overflow weir did not provide any meaningful data in 2021 and will be relocated to the 60-inch combined sewer so it can be used for flow metering and model calibration purposes.

The regulator level sensor indicated one additional spill (in addition to the modeled spills) on July 9th, for a total of four spills in 2021. However, there were observed inconsistencies in the level data during some of the overflow events. The City will continue to check the level sensor multiple times per year to ensure that metering data collected at CAM007 is as accurate as possible.

Figure 4 - CAM007 Sensor Shift

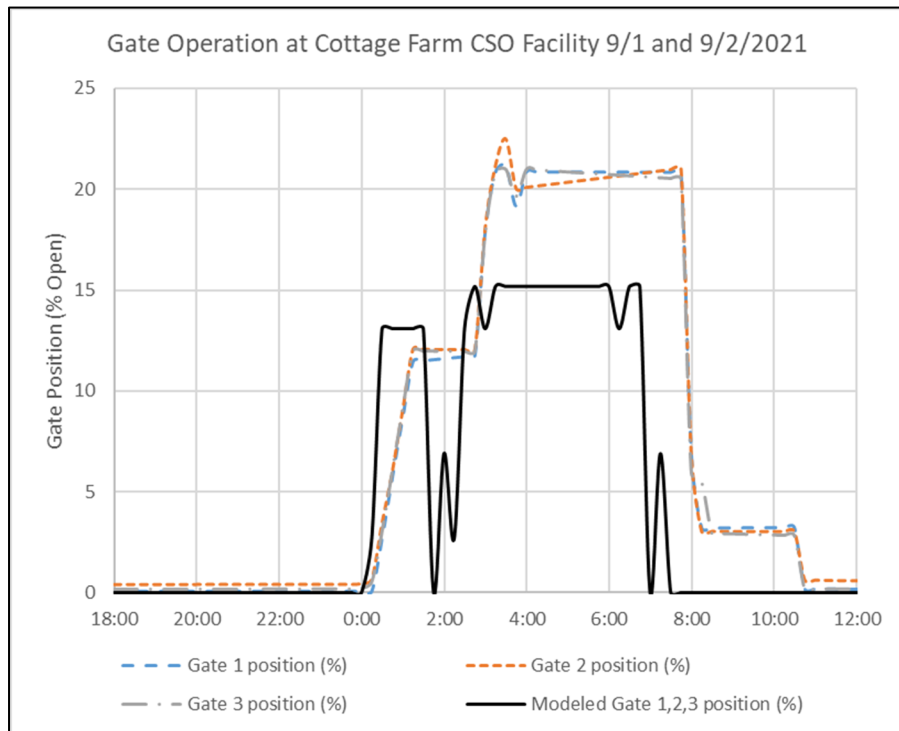
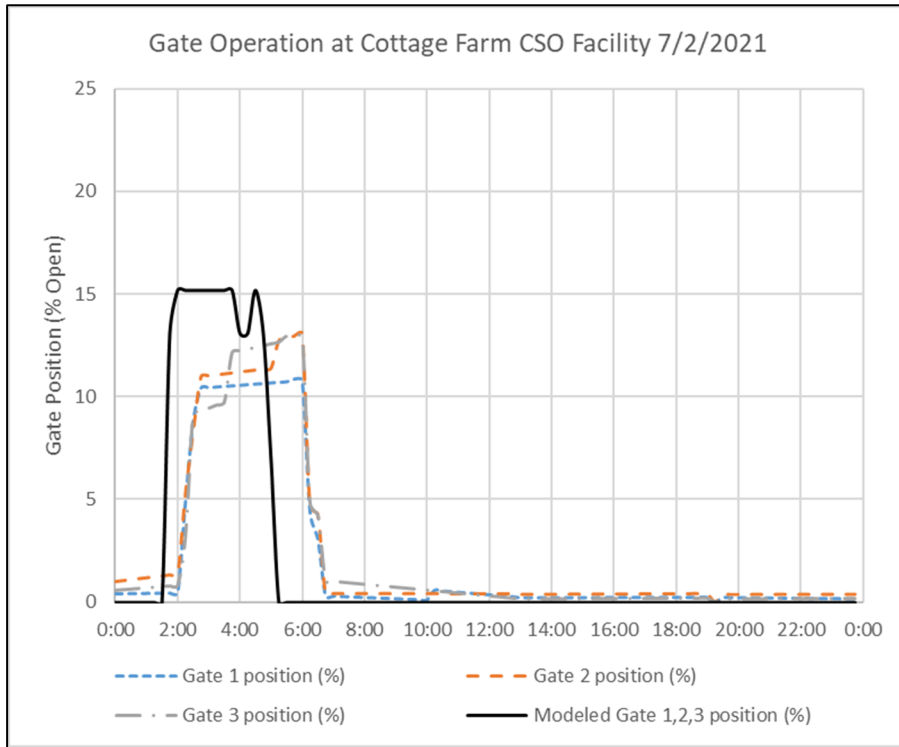


Similar to the CAM005 regulator, water levels in the CAM007 regulator are controlled by the water level in the MWRA interceptor. Therefore, during large rain events, there are slight differences between modeled and metered water levels resulting from unique variations in rainfall distribution across the MWRA network. The MWRA interceptor levels at CAM007 are also influenced by changes in the operation of the MWRA's Cottage Farm CSO Facility, particularly in larger storm events such as those that occurred in summer of 2021. The Facility is manually

operated in response to system conditions that vary for each rainfall. As such, operation of the Facility can greatly vary from event to event. Since the model uses a set of fixed Real Time Control (RTC) parameters, the simulation results can vary significantly from actual operation. The modeled versus actual operation of the influent gates to the Cottage Farm Facility for the July 2nd and September 1st, 2021 events is shown in **Figure 5**.

While model results generally match metered data, there are some slight differences between modeled and metered water levels for the larger rain events as a result of the unique variations in rainfall distribution across the larger MWRA network that impacts CAM007 CSO as well as minor changes in operation of the Cottage Farm CSO Facility that can impact CSO. Noting that these slight differences are expected to occur for large events, the hydraulic model is reasonably matching wet-weather flow patterns in the CAM007 system and is believed to be more reliable than the meter data for reporting overflows.

Figure 5 – Modeled Versus Actual Operation of Cottage Farm CSO Facility Gates



CAM017 Metering

Metering results indicated six spills at CAM017 in 2021 with a total volume of 13.00 MG. The CAM017 regulator has flow meters installed on the incoming 72-inch diameter combined sewer on Binney Street and on one of the static weir crests.

Hydraulic model results indicated five spills at CAM017 in 2021. However, due to the modeling inconsistencies described in the following paragraphs, the City believes that metering results are the most-accurate data source for reporting spill occurrences and volume at CAM017 for 2021.

Calculation of CSO volume at the CAM017 regulator is dependent on a flow split between the static and bending weirs that was determined by previous modeling results. As detailed in Section 3.3.2, recent metering data suggests that more stormwater runoff is being directed into the CAM017 service area than previous model results indicated. However, it is possible that recent recalibration efforts may now be causing the model to over-predict spill volumes at CAM017. In addition, the water levels at the CAM017 regulator are influenced by the operation of the Prison Point CSO Facility. This is particularly evident in larger storm events such as those that occurred in summer of 2021. The Facility is manually operated in response to system conditions and flooding concerns that vary for each rainfall. Since the model uses a set of fixed Real Time Control (RTC) parameters, the simulation results can vary from actual operation. The modeled versus actual operation of the influent gates to the Prison Point Facility for the July 2nd and September 1st, 2021 events is shown as shown in **Figure 6**.

The CAM017 contributing areas and review of the Prison Point operation will undergo model updates and recalibration as a part of the City's model calibration efforts in 2022.

Figure 6 – Modeled Versus Actual Operation of Prison Point CSO Facility Gates

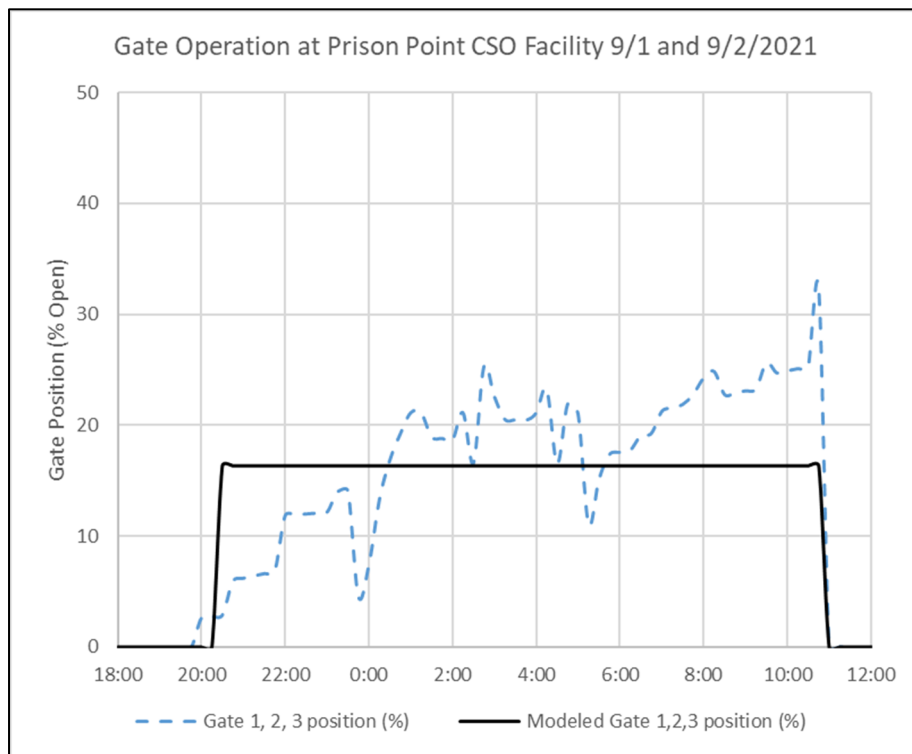
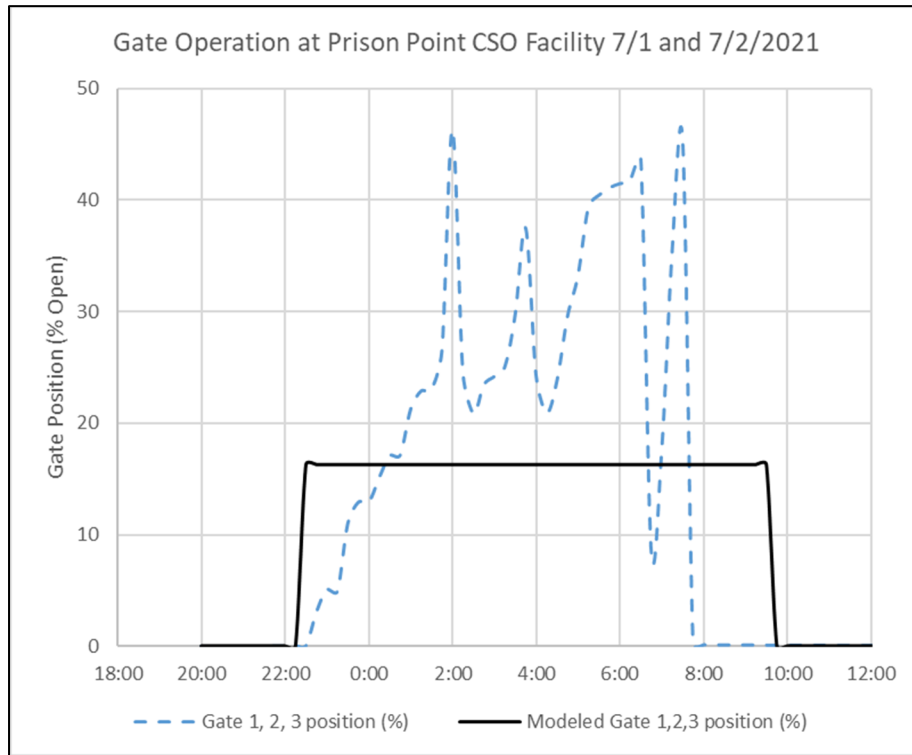


Table 2 – Modeled and Metered CSO Spill Activations and Volumes

Outfall	2021 Modeled CSO Spills	Volume (MG)	2021 Metered CSO Spills	Meter Type (Threshold)
ALEWIFE BROOK				
CAM 001	4	0.20	5	Outfall Meter (Depth, Vel > 0)
CAM 002	0	0.00	0	Level Sensor (Depth > 9.78')
CAM 401A	<i>12</i>	21.70	18	Level Sensor (Depth > 2.17')
CAM 401B	5	1.59	7	Level Sensor (Depth > 5.47')
Total	21	23.49	30	
CHARLES RIVER				
CAM 005	8	3.34	<i>11</i>	Area Velocity Sensor (Depth, Velocity>0)
CAM 007	3	3.91	4	Area Velocity Sensor (Depth, Velocity >0)
CAM 017	5	13.00	6	Inclinometer, Area Velocity Sensor (Inclinometer triggered, or Velocity across bending weir>0)
Total	16	20.25	21	

Note: Values in italics are for information and reference only

3.2 Rainfall Characteristics

In accordance with the City’s National Pollutant Discharge Elimination System (NPDES) Permit MA0101974, the CSO Annual Report must include an analysis of precipitation data from the previous calendar year (2021) compared to the MWRA Typical Year rainfall record.

The City of Cambridge currently operates a rain gauge on the roof of the Cambridge DPW that was operational from February 18th to December 17th, and a rain gauge at Fresh Pond that was operational from March 18th to December 17th. Other rain gauges in the vicinity include USGS gauges at Fresh Pond in Cambridge and Muddy Brook in Brookline. **Figure 7** shows the location of the rain gauges analyzed to obtain a composite 2021 rainfall series.

Figure 7 – Rain Gauge Locations

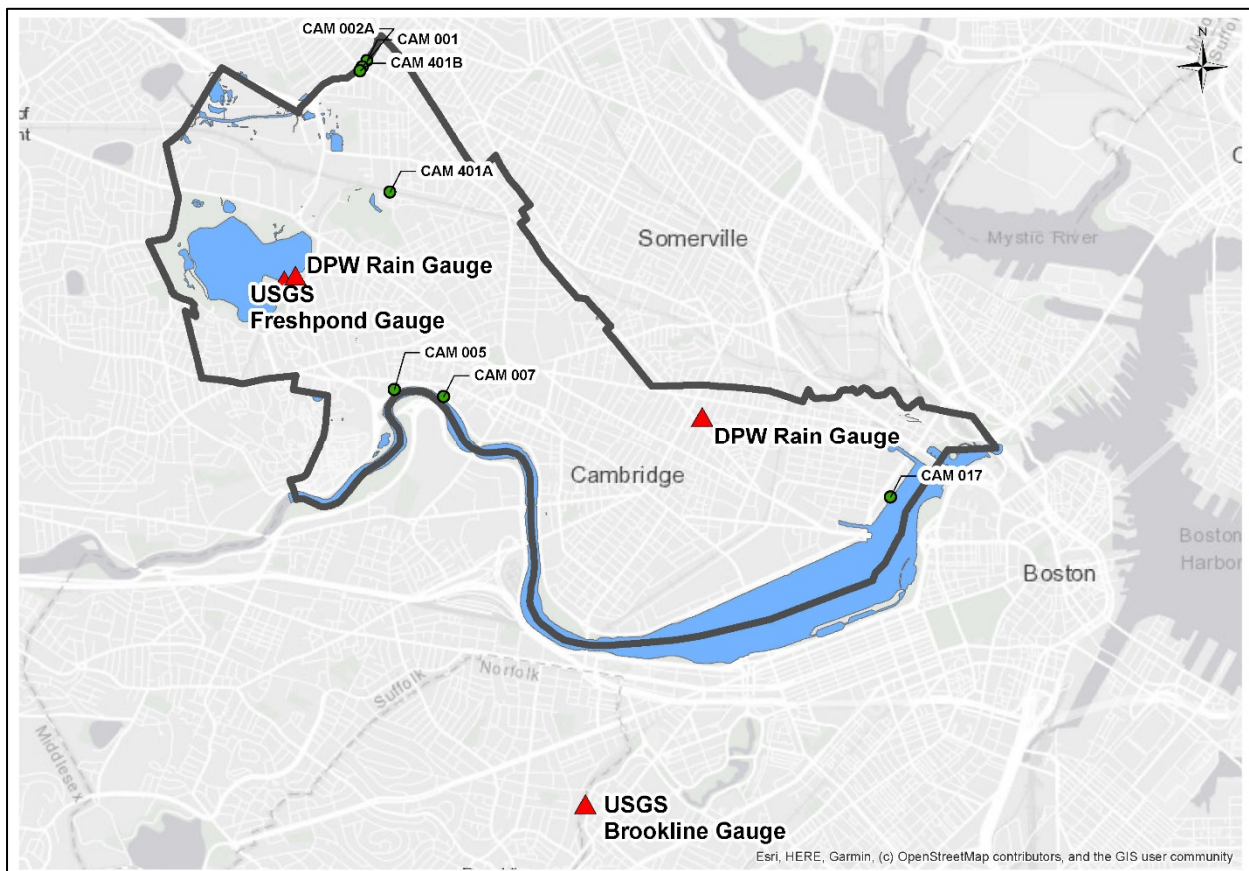
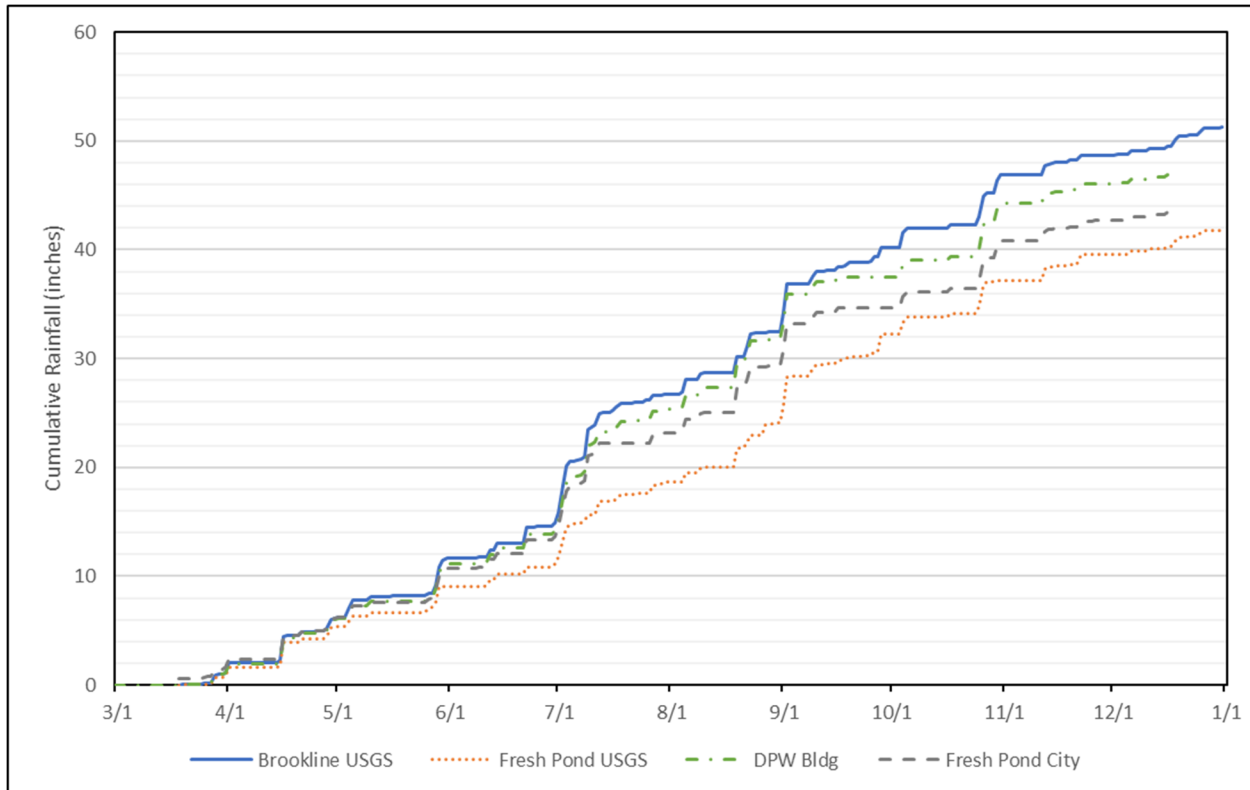


Figure 8 shows the cumulative rainfall measured at each of the rain gauges in and around Cambridge. As shown in the figure, the City and USGS gauges at Fresh Pond were observed to significantly under-report rainfall when compared to the other data sources. Under-reporting at the USGS gauge is consistent with observations from previous years.

Figure 8 – March to December 2021 Rainfall From Gauges in and Around Cambridge



The Cambridge DPW gauge was used as the primary source for rainfall data with missing dates filled in from the USGS Brookline gauge to create a composite year-long rainfall series for 2021. Because both of the Fresh Pond gauges appeared to under-report rainfall, the Brookline gauge was used to fill in days when the DPW gauge was not functional. The two Fresh Pond gauges are not included in any further comparisons. The composite DPW/Brookline rainfall, referred to as ‘Hybrid’ in this Report, was validated by comparing to the observed rainfall time series from the USGS Brookline and Fresh Pond gauges. Comparison was also made to the typical year rainfall to assess any similarities or differences in the rainfall distribution and patterns.

Figure 9 shows the MWRA Typical Year rainfall plotted alongside the rainfall recorded by various sites in 2021.

Figure 9 – Typical Year Rainfall Versus 2021 Rainfall

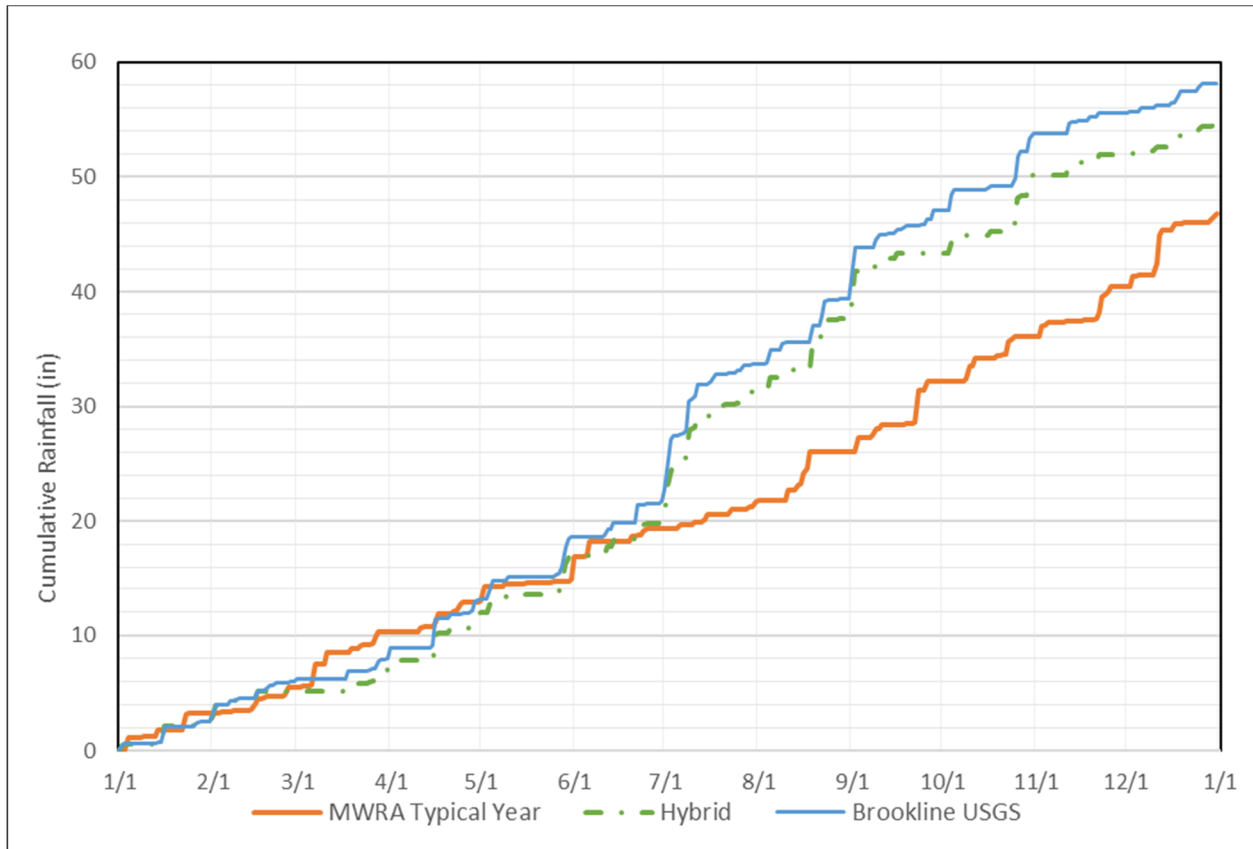


Figure 10 is a map of the 20-year average precipitation in the Northeast United States, indicating that the average total precipitation for the City of Cambridge from 1991 to 2020 is between 45 and 50 inches. The total observed precipitation in 2021 was almost 8 inches more than both the average annual precipitation and the total precipitation in the typical year. The Northeast Regional Climate Center (NRCC) reported 2021 to be the 8th wettest year on record since 1895 for the State of Massachusetts and July 2021 was the wettest month on record. This rainfall anomaly for the 2021 reporting year is discussed in detail towards the end of this section.

Figure 10 – Twenty Year Average Rainfall in the Northeast US

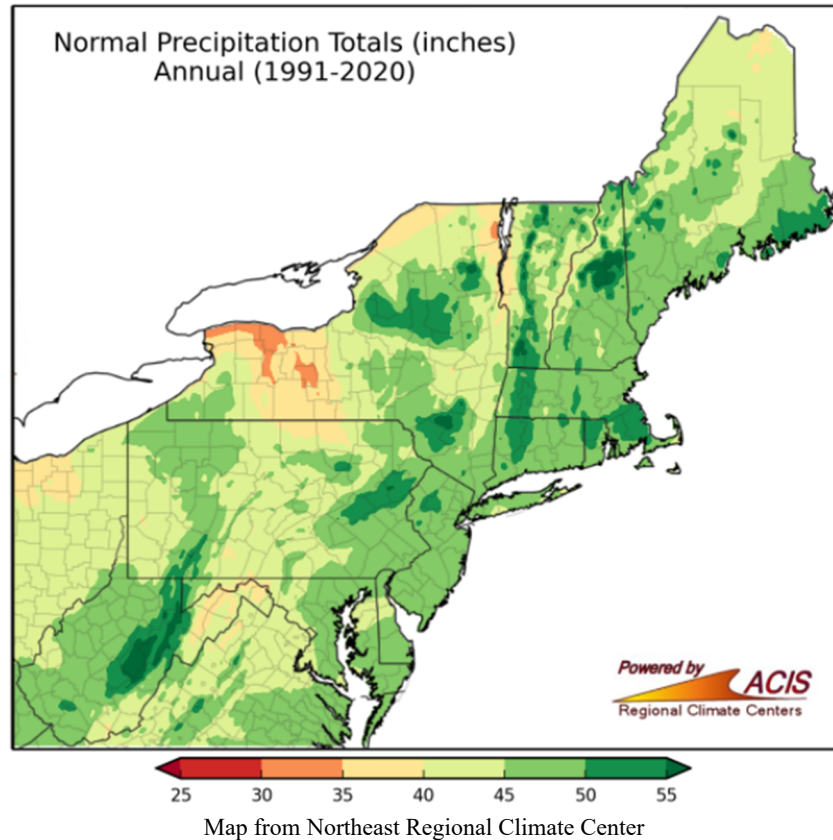


Table 3 and **Table 4** present a comparison of storm frequency and rainfall amounts within various ranges for 2021 compared to the MWRA Typical Year. The number of storms were counted assuming an inter-event time greater than or equal to six hours. The 2021 rainfall series recorded fewer storms than the Typical Year, but more storms had total rainfall depths greater than 2 inches.

The Hybrid series had 6 storms in the ≥ 2.0 -inch range, with a total volume of 16.58 inches, compared to 3 storms totaling 8.91 inches for the typical year series in the same range. These larger storms account for a majority of the variance in the total annual depth of precipitation between the typical year and observed time series. The number of typical year storms in the 0.5-to-1.0-inch and 1.0-to-2.0-inch range were similar to that observed in the hybrid series. The typical year records more storms with depth lesser than 0.50 inches when compared to the hybrid series, though these smaller storms result in a small variance of about 1.5 inches in the total depth of precipitation.

Table 3 – Frequency of Rainfall Events per Storm Depth Range

Rainfall Series	Total Rainfall (inches)	Total Number of Storms	Number of Storms by Depth				
			<0.25 inch	0.25 to 0.50 inch	0.5 to 1.0 inch	1.0 to 2.0 inches	>=2.0 inches
Typical Year	46.83	118	70	17	17	11	3
Brookline	58.16	116	66	17	15	11	7
DPW ¹	47.54	81	40	11	15	9	6
Hybrid ²	54.46	99	50	14	18	11	6

¹ DPW gauge was operational between 2/28/2021-12/17/2021
² Hybrid time series is a combination of DPW and Brookline rainfall

Table 4 – Annual Rainfall Depth Distribution per Storm Depth Range

Rainfall Series	Total Rainfall (inches)	Total Number of Storms	Total Rainfall Amount For Depth Range				
			<0.25 inch	0.25 to 0.50 inch	0.5 to 1.0 inch	1.0 to 2.0 inches	>=2.0 inches
Typical Year	46.83	118	4.52	6.33	12.01	15.06	8.91
Brookline	58.16	116	5.47	5.82	11.42	15.06	20.39
DPW ¹	47.54	81	3.50	3.72	11.30	12.44	16.58
Hybrid ²	54.46	99	4.38	4.70	13.46	15.34	16.58

¹ DPW gauge was operational between 2/28/2021-12/17/2021
² Hybrid time series is a combination of DPW and Brookline rainfall

Table 5 and **Figure 11** present the distribution of the total depth of storms by percentage. The MWRA Typical Year has most events with rainfall amounts in the 0.5-1.0-inch and 1.0-2.0-inch ranges, the latter accounting for about 32% of overall depth. The 2021 hybrid series has about 30% of overall depth in the >=2.0-inch range which is significantly higher than the Typical Year for that same category.

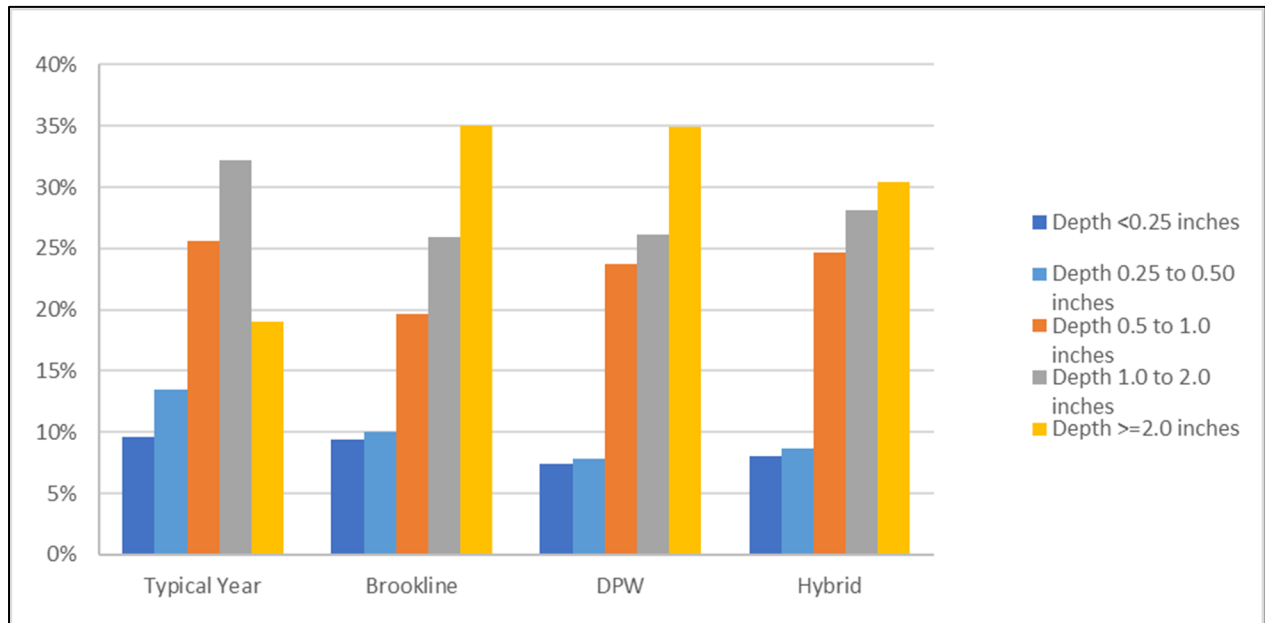
This variability in the 2021 series indicates that significant deviations are expected when comparing CSO performance to the MWRA Typical Year.

Table 5 – Percent of Annual Rainfall Depth per Storm Depth Range

Rainfall Series	Total Rainfall (inches)	Total Number of Storms	Depth of Storms by Percentage				
			<0.25 inch	0.25 to 0.50 inch	0.5 to 1.0 inch	1.0 to 2.0 inches	>=2.0 inches
Typical Year	46.83	118	9.65%	13.52%	25.65%	32.16%	19.03%
Brookline	58.16	116	9.41%	10.01%	19.64%	25.89%	35.06%
DPW ¹	47.54	81	7.36%	7.82%	23.77%	26.17%	34.88%
Hybrid ²	54.46	99	8.04%	8.63%	24.72%	28.17%	30.44%

¹ DPW gauge was operational between 2/28/2021-12/17/2021
² Hybrid time series is a combination of DPW and Brookline rainfall

Figure 11 – Frequency Comparison of Total Rainfall Depth Distribution by Percentage



In addition to overall rainfall totals, CSO performance is also a function of storm intensity. **Table 6** presents the distribution of storms by peak intensity for 2021 and for the MWRA Typical Year.

Table 6 – Number of Storm Events at Selected Ranges of Peak Intensity

Rainfall Series	No. of Storms	Total Rainfall	Number of Peak Intensity				
			0.01 to 0.10 in/hr	0.10 to 0.25 in/hr	0.25 to 0.50 in/hr	0.50 to 1.0 in/hr	> 1.0 in/hr
Typical Year	118	46.83	60	27	16	10	5
Brookline	116	58.16	72	23	11	8	2
DPW ¹	81	47.54	21	25	19	9	7
Hybrid ²	99	54.46	29	34	20	9	7

¹. DPW gauge was operational between 2/28/2021-12/17/2021
². Hybrid time series is a combination of DPW and Brookline rainfall

Table 7 presents the average and peak intensities for storms greater than 1 inch in depth and **Table 8** presents the same metrics for storm events with a peak intensity greater than 0.45 in/hr. As shown in **Table 7**, the MWRA Typical year includes fourteen storm events with a total depth of over one inch whereas the 2021 Hybrid series includes seventeen events in the same category.

By comparing peak intensity distributions, the 2021 Hybrid series has four additional storms of peak intensity greater than 0.45 in/hr compared to the MWRA Typical Year. The highest peak intensity observed during the Typical Year is 1.72 in/hr during the September 9th (Typical Year) event. The 2021 rainfall included two events, July 27th and August 19th, where the peak intensity surpassed the intensity for the September 9th event in the Typical Year. Additionally, the duration of storms in the 2021 hybrid series with intensity over 1 in/hr was higher than for the Typical Year.

Table 7 Comparison of Storms With More Than 1 inch of Rainfall, Typical Year vs 2021

Rainfall Series	No. of Storms	Date	Duration (h)	Total Rainfall (in)	Peak Int (in/h)
Typical year	14	12/11/1992	39.5	3.88	0.24
		9/22/1992	22.0	2.79	0.65
		5/31/1992	29.3	2.24	0.48
		3/6/1992	34.0	1.89	0.22
		11/21/1992	34.8	1.88	0.36
		8/17/1992	25.5	1.81	0.80
		1/23/1992	16.0	1.36	0.40
		6/5/1992	17.3	1.34	1.00
		9/3/1992	12.3	1.19	0.68
		10/23/1992	3.0	1.18	1.08
		1/4/1992	20.8	1.15	0.48
		5/2/1992	5.5	1.14	1.32
		8/15/1992	38.5	1.10	0.28
		4/16/1992	30.0	1.02	0.28
Hybrid	17	9/1/2021	16.7	4.14	1.08
		7/1/2021	17.3	3.11	1.56
		7/8/2021	21.7	2.44	0.93
		4/15/2021	39.3	2.38	0.30
		5/28/2021	19.7	2.3	0.30
		8/19/2021	5.3	2.21	2.01
		10/25/2021	12.3	1.73	1.41
		10/30/2021	27.7	1.73	0.75
		7/3/2021	21	1.67	0.36
		10/3/2021	27.7	1.59	0.39
		2/1/2021	20.7	1.48	0.18
		1/16/2021	10.7	1.42	0.36
		8/4/2021	24.3	1.25	0.36
		6/22/2021	6.3	1.24	1.32
8/23/2021	8.3	1.2	0.57		
9/9/2021	13	1.03	0.60		
7/12/2021	6.7	1	0.66		

Table 8 Comparison of Storms with Peak Intensities Greater than 0.45 in/hr

Rainfall Series	No. of Storms	Date	Duration (hours)	Peak Int (in/h)	Total Rainfall (in)
Typical Year	13	9/9/1992	0.5	1.72	0.57
		5/2/1992	5.5	1.32	1.14
		8/11/1992	10.5	1.24	0.87
		10/23/1992	3.0	1.08	1.18
		6/5/1992	17.3	1.00	1.34
		7/11/1992	0.5	0.84	0.22
		8/17/1992	25.5	0.80	1.81
		10/10/1992	5.3	0.72	0.65
		10/10/1992	6.5	0.68	0.65
		9/3/1992	12.3	0.68	1.19
		7/31/1992	18.8	0.68	0.59
		9/22/1992	22.0	0.65	2.79
		7/29/1992	0.5	0.64	0.2
Hybrid	17	8/19/2021	5.30	2.01	2.21
		7/27/2021	2.70	1.83	0.72
		7/1/2021	17.30	1.56	3.11
		10/25/2021	12.30	1.41	1.73
		6/22/2021	6.30	1.32	1.24
		8/22/2021	13.00	1.20	0.84
		9/1/2021	16.70	1.08	4.14
		7/8/2021	21.70	0.93	2.44
		7/29/2021	6.70	0.75	0.28
		10/30/2021	27.70	0.75	1.73
		7/12/2021	6.70	0.66	1.00
		7/18/2021	13.00	0.63	0.60
		9/9/2021	13.00	0.60	1.03
		8/23/2021	8.30	0.57	1.20
		9/16/2021	3.00	0.57	0.39
		3/28/2021	12.30	0.54	0.65
		8/9/2021	10.00	0.48	0.66

2021 Rainfall Summary

2021 had significantly more overall rainfall with higher-intensity events when compared to normal precipitation years. The Northeast Regional Climate Center (NRCC) reported 2021 to be the 8th wettest year on record since 1895 for the State of Massachusetts, with July 2021 being the wettest July on record. The observed precipitation in the summer of 2021 for the region was almost 200% of the normal average precipitation, a departure of about 11 inches, as shown in **Figure 12** and **Figure 13**.

Figure 12 – Percent of Normal Precipitation in Massachusetts (July-Sept 2021)

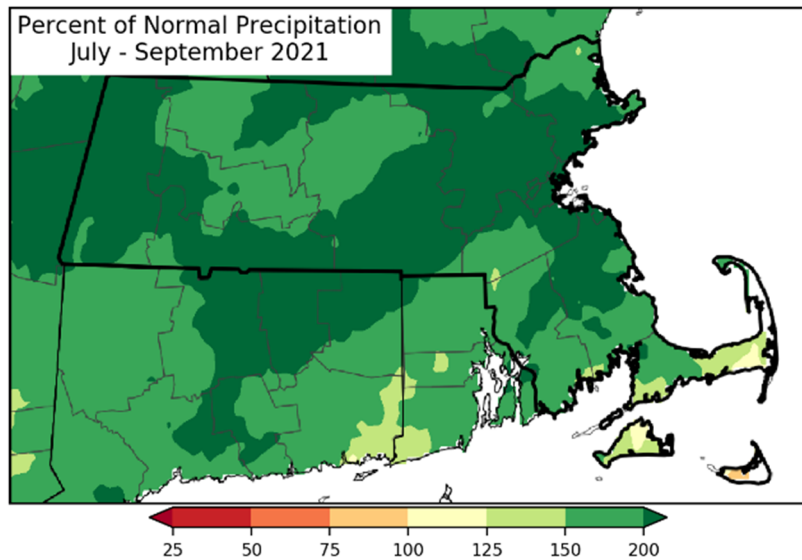


Figure 13 – Three-Month Rainfall Departure (July-Sept 2021)

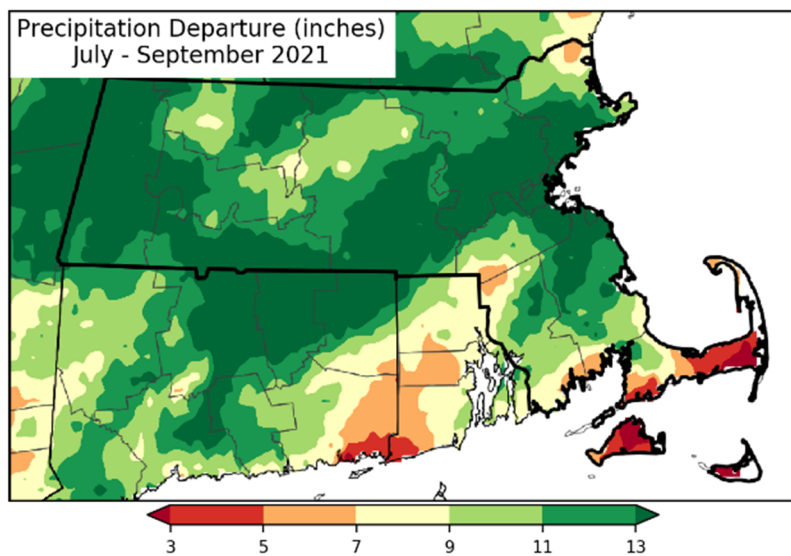


Figure 14 shows the cumulative rainfall for July through September 2021 plotted alongside the same months in the MWRA Typical Year. The total rainfall observed in this period in 2021 was 23.5 inches, which is approximately 11 inches higher than 12.8 inches during the same months in the Typical Year. Several of the large storm events in this period also had high peak intensities. These included four tropical storm systems and remnants from hurricanes, most notably hurricane Ida which brought over 4 inches of rain to the Boston area on September 1-2, 2021. Consequently, the storm events in these summer months are expected to result in several CSO occurrences with volumes significantly higher than those observed in previous years. Conversely, as shown in the Figure, the 2020 cumulative rainfall for the same period was approximately 7 inches lower than the Typical Year and fewer CSOs occurred as a result.

Figure 14 – Cumulative Rainfall, July-September 2021

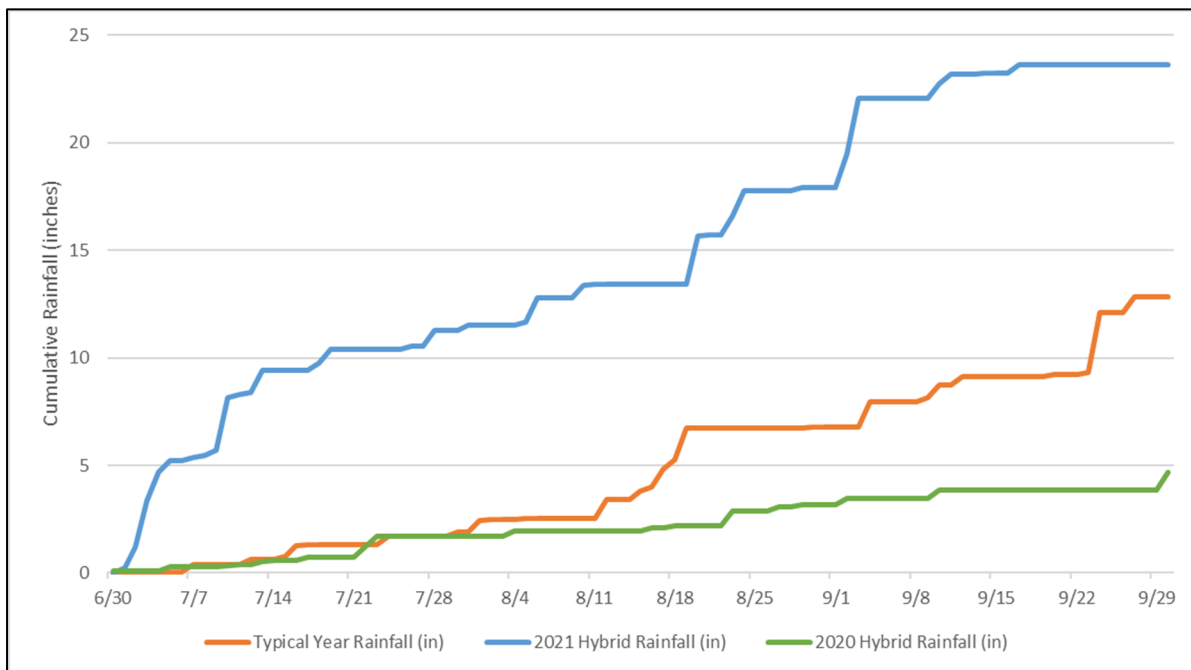
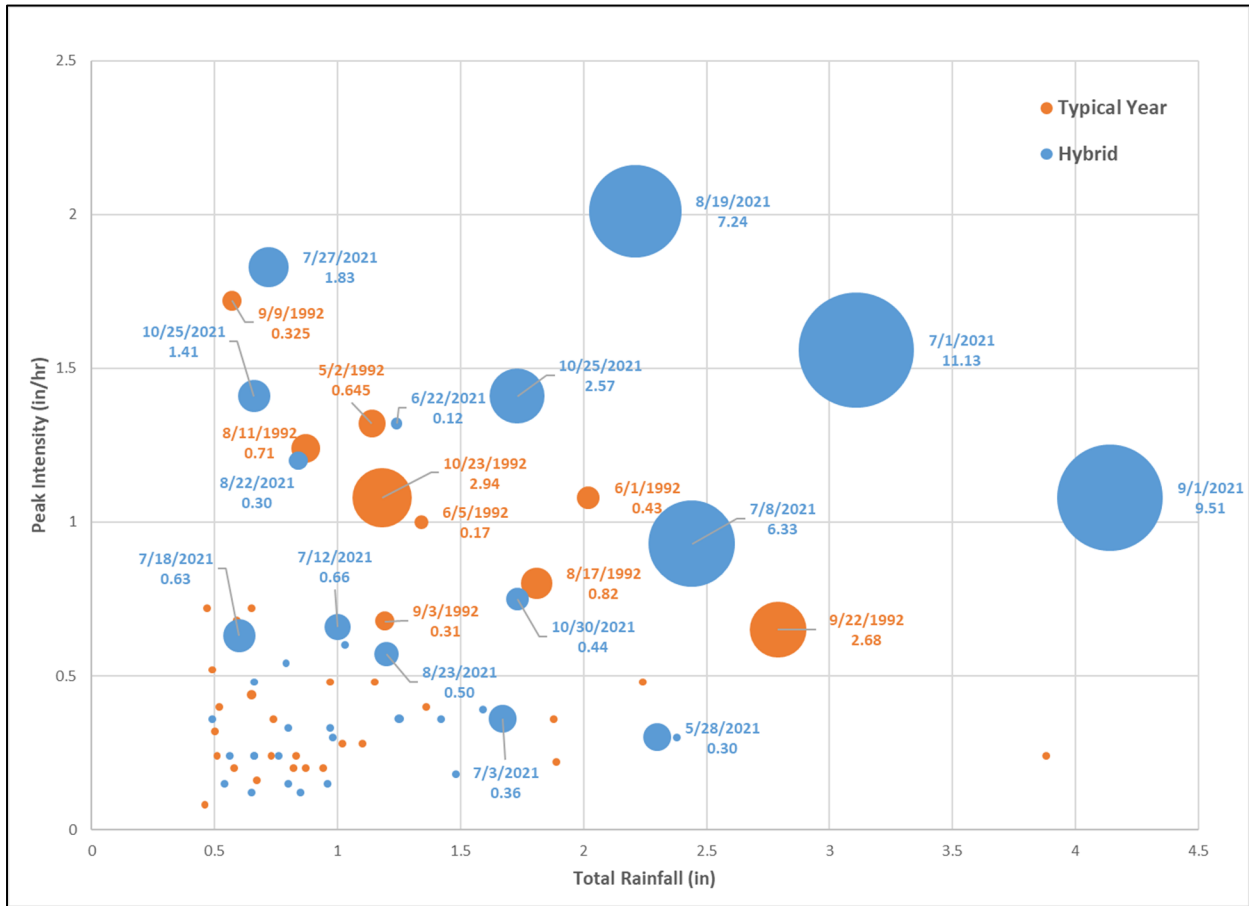


Figure 15 shows the Typical Year and 2021 storm events plotted on an intensity-depth scatter chart for all storms with a total depth above 0.45 inches. The size of the bubbles for individual events are scaled to the total CSO spill volume. All storm events with a CSO occurrence are labelled with the date and the corresponding CSO spill volume across all regulators in the system—both in the Charles River and the Alewife Brook. The scatter chart shows several events observed in 2021 that are outliers in both total depth and peak rainfall intensity when compared to the Typical Year events. The summer months saw four tropical systems (remnants from hurricanes) resulting in heavy rainfall over the Boston area. The events occurring on July 1-2, July 9 (Elsa), August 19 (Fred), and September 1-2 (Ida), 2021 account for over 47 MG of spill volume. These four events together account for over 90% of the total CSO spill volume in 2021. As evident from the scatter chart below, the events occurring in the summer of 2021 are clear outliers when compared to the distribution of other events of the year and all events recorded in the Typical Year. As a result, a significant variance in the annual CSO spill count and total CSO volume is expected compared to previous years and the Typical Year.

Figure 15 – Intensity Versus Depth Scatter Chart- Typical Year and 2021 Storm Events



3.3 Summary of 2021 CSO Activations

This section provides an overview of the total CSO spill counts and the corresponding spill volumes for all CSO regulators in 2021. The 2021 CSO spill counts and volumes are shown in **Table 9**, with a comparison to those simulated for the MWRA Typical Year.

The CSO spill occurrences and volumes presented herein are the result of detailed analyses of flow and level metering data from multiple sources, river stage data, MWRA operating data, feedback from City maintenance staff on potential metering discrepancies, and results of hydraulic modeling completed after the wet-weather events took place. In many cases, these occurrences and volumes are different than what was reported on the City’s website. The City is required to publicly report estimated CSO spill volumes within 5 days of a spill occurrence. Due to the short reporting timeframe, these estimates are calculated using the best information available at the time and are often subject to change. A comparison of spill volumes reported on the City’s website to the volumes listed in this report are included in Appendix IV. Where significant deviations are shown, an explanation for the deviation is provided.

Table 9 – 2021 CSO Results Summary

Outfall	2021 Modeled CSO Spills	Volume (MG)	2021 Metered CSO Spills	Meter Type (Threshold)	City Modeled TY Results 2021 System Conditions		LTCP Requirements	
					Activations	Volume (MG)	Activations	Volume (MG)
ALEWIFE BROOK								
CAM 001	4	0.20	5	Outfall Meter (Depth, Vel > 0)	1	0.02	5	0.19
CAM 002	0	0.00	0	Level Sensor (Depth > 9.78')	0	0.00	4	0.69
CAM 401A	<i>12</i>	21.70	18	Smartcover (Depth > 2.17')	10	5.70	5	1.61
CAM 401B	5	1.59	7	Level Sensor (Depth > 5.47')	7	1.27	7	2.15
Total	21	23.49	30		18	6.99	21	4.64
CHARLES RIVER								
CAM 005	8	3.34	<i>11</i>	Area Velocity Sensor (Depth, Velocity>0)	4	0.47	3	0.84
CAM 007	3	3.91	<i>4</i>	Area Velocity Sensor (Depth, Velocity >0)	0	0.00	1	0.03
CAM 017	5	13.00	6	Inclinometer, Area Velocity Sensor (Inclinometer triggered, or Velocity across bending weir>0)	2	1.75	1	0.45
Total	16	20.25	21		6	2.22	5	1.32

Note: Values in italics are for information and reference only

As detailed in Section 3.2, there was almost 11 inches more rainfall in 2021 than for the MWRA Typical Year. Much of that additional rain occurred at higher intensities and individual event depths, particularly from July through September. As a result, a significant variance in CSO spill count and volume is expected in 2021 compared to the Typical Year. It is important to consider 2021 as a rainfall anomaly when comparing CSO results to the Typical Year and LTCP goals.

3.3.1 Alewife Brook CSO Results

The four active CSO outfalls along Alewife Brook spilled a total of twenty-seven times in 2021 resulting in 23.49 MG of CSO volume.

CAM 001

Model results for the 2021 rainfall indicated four CSO spills at CAM001 with a total volume of 0.20 MG.

The City's metering data indicated one additional spill, occurring on July 27, 2021. This additional spill can likely be attributed to the spatial variability of the high intensity July 27th rainfall event. Such storms tend to have localized intensity variations and can have significant spatial variation in rainfall totals. Since the model assumes uniform rainfall over the entire City, this likely caused the model to underestimate the wet weather response at the CAM001 regulator.

Model results indicate the MWRA Typical Year would generate one spill with a volume of 0.02 MG at CAM001. The LTCP requirements for CAM001 are five spills with a total volume of 0.19 MG, so model results indicate CAM001 is in compliance with the LTCP.

CAM 002

Model results for the 2021 rainfall indicated no spills at CAM002. This was validated by the City's metering data, which also did not indicate any CSO spills at the regulator. Model results also indicate the MWRA Typical Year would not generate any spills, which is less than the LTCP requirement of four spills and 0.69 MG. Therefore, CAM002 is in compliance with the LTCP.

CAM 401A

As discussed in Section 3.1.2, there are inconsistencies in the base flow level at the CAM401A regulator. The City will be installing flow meters in the CAM401A contributing area in 2022 and collected data will be used for additional model calibration. This additional data should help improve representation of flow conditions at the regulator and increase confidence in simulation results. Until additional metering data is collected, however, any adjustments to the hydraulic model to reflect a change in base flow will over-predict spill volumes for some events and under-predict spill volumes for other events. This appears to be the case in 2021, where modeled versus metered results were inconsistently higher for some events lower for others. The City will also continue to check and recalibrate the sensors throughout 2022 to rule out sensor errors as a possibility for the base flow variations.

Model results for the 2021 rainfall indicated twelve CSO spills at CAM401A. Due to the modeling inconsistencies described in the preceding paragraph, CSO spill occurrences and volume based on metering data is being reported for CAM401A in 2021; eighteen spills with a total volume of 21.70 million gallons. As noted, the City is undergoing efforts to resolve the modeling inconsistencies described.

In July 2021, data from a flow meter at the CAM 401A flap gate became available to use for validation of CSO events. This additional data was used for 2021 and will continue to be utilized to validate future activations.

Model results also indicate the MWRA Typical Year would result in ten spills for a total volume of 5.70 MG. This exceeds the LTCP requirement of five spills and 1.61 MG. This also exceeds what was listed in the 2020 CSO report.

As discussed in the 2020 Annual Report, it was thought the model was over-predicting overflow occurrences due to represented sediment in the pipe downstream from the regulator. When the City removed that sediment in 2020, it was assumed that CSO occurrences would decrease as a result. That assumption was presented in the 2020 Report as a reduction in CSO occurrences for the Typical Year. However, as described in Section 3.1.2, the City will explore additional influences on the base flow level in 2022 with metering and field investigation. As such, this 2021 Report presents CSO occurrences at CAM401A that are closer to those presented in years prior to 2020.

CAM 401B

Model results for the 2021 rainfall indicated five CSO spills at CAM401B with a total volume of 1.59 MG. The City's metering data indicated two additional short-duration spills, for a total of seven. Similar to CAM001, these additional spills can be attributed to the spatial variability of intense rainfall events, resulting in underestimation of the wet weather response in the model.

Model results also indicate the MWRA Typical Year would result in seven spills with a total spill volume of 1.27 MG, which is in compliance with the LTCP requirement of 2.15 MG. This is a slight increase in what was reported in the 2020 CSO report, likely due to multiple model updates completed in 2021, including the MWRA network and Alewife Brook outfalls.

The City will be installing flow meters in the CAM401B contributing area in 2022 and collected data will be used for additional model calibration. In conjunction with the calibration efforts for CAM401A, metering and model calibration at CAM401B should help improve representation of flow conditions at the regulator and increase confidence in simulation results.

3.3.2 Charles River CSO Results

The three active CSO outfalls on the Charles River spilled a total of seventeen times in 2021 resulting in a CSO volume of 20.25 MG.

CAM 005

Model results for the 2021 rainfall indicated eight CSO spills at CAM005 with a total volume of 3.34 MG. The City's metering data indicated eleven spills.

As discussed in Section 3.1.2, the modeled CSO spill count and volumes at the CAM005 regulator are influenced by water levels in the MWRA interceptor. Model representation of the CAM005 regulator will also be verified with updated field information as part of the City's model calibration efforts in 2022.

Model results also indicate the MWRA Typical Year would result in seven spills with a total volume of 0.66 MG. This exceeds the LTCP requirement of 3 spills but is below the required volume of 0.84MG.

CAM 007

Model results for the 2021 rainfall indicated three CSO spills at CAM007 with a total volume of 3.91 MG. The City's metering data indicated one additional spill, occurring on July 9th. Model results for that event indicated water level in the regulator rising to just a few inches under the spill threshold on July 9th.

As discussed in Section 3.1.2, the modeled CSO spill count and volumes at the CAM007 regulator are influenced by water levels in the MWRA interceptor and operation of MWRA's Cottage Farm CSO Facility. Model representation of the CAM007 regulator will be verified with updated field information as a part of the City's model calibration efforts in 2022.

Model results also indicate the MWRA Typical Year would result in no spills at CAM007, which meets the LTCP requirements.

CAM 017

As discussed in Section 3.1.2, metering data used for hydraulic model recalibration of the Cambridgeport neighborhood in 2021 suggests that more stormwater runoff is being generated in the neighborhood than was indicated in previous modeling results. In wet-weather flow conditions, water backflows from the Cambridgeport area through the City network into the CAM017 service area, resulting in increased CSO occurrences and volumes at CAM017. However, it is possible that recent recalibration efforts may now be over-simulating flow contributions to the CAM017 system and that further investigation into the system may now be needed. In addition, the observed CSO spill count and volumes at the CAM017 regulator are influenced by the operation of MWRA's Prison Point CSO Facility, particularly during large events such as those that occurred in summer of 2021.

Model results for the 2021 rainfall indicated five CSO spills at CAM017. Due to the modeling inconsistencies described in the preceding paragraph, CSO spill occurrences and volume based on metering data is being reported for CAM17 in 2021; 6 spill occurrences with a total volume of 13.00 million gallons.

As noted, the City will be installing flow meters in the CAM017 contributing area in 2022 and collected data will be used for additional model calibration. Metering and model calibration should help improve representation of flow conditions in the interconnected pipe networks upstream from the CAM017 regulator and increase confidence in simulation results. The City will also work with MWRA to obtain an updated model representation of the Prison Point CSO Facility.

Model results also indicate the MWRA Typical Year would result in 2 spills at CAM017 with a total volume of 1.75 MG. This exceeds the LTCP requirements of 1 spill with a volume of 0.45 MG and is higher than what was listed in the 2020 CSO report.

3.4 Coordination with MWRA

The City will continue to coordinate with MWRA to routinely exchange information on changes in the regional and City collection systems so that both parties are informed of existing conditions in infrastructure and simulation in hydraulic models. MWRA metering data, where available, will continue to be used to supplement City metering data for hydraulic model validation. Where variability between the City and MWRA meters are observed, the two entities will continue to coordinate and validate the results.

Pump operations and system optimization at key MWRA facilities is critical to the performance of multiple City CSO outfalls. In particular, operation of the MWRA CSO Facilities can vary greatly in response to an event. The City will work with MWRA and the City of Somerville to create a “unified” hydraulic model of the City and regional facilities so that a common representation of these facilities will be used by all three parties for assessing performance during the MWRA Typical Year. In the MWRA report titled Task 5.4 Water Quality Alternatives Assessment dated December 22, 2021, there are significant changes in CSO volumes listed for the 2019 and 2021 conditions at CAM401A and the Cottage Farm CSO Facility (MWR201). These changes indicate that MWRA has recently updated their hydraulic model and this latest representation will be included in the City’s model.

After completing model updates and recalibration of the CAM401A/B and CAM017 tributary areas, the City will share its updated hydraulic model with MWRA. This will help establish a common representation of the City’s collection system in the MWRA’s region model.

The City of Cambridge, City of Somerville, and MWRA are each developing individual CSO Control Plans to build upon the current MWRA CSO Long-Term Control Plan. While the City is developing a Control Plan focused on the CSO outfalls that the City owns and operates, regional collaboration with MWRA, Somerville, MassDEP, EPA and the public will continue throughout the Control Plan development. This collaboration will produce a unified hydraulic model of the three collection systems to evaluate local and regional CSO reduction measures, an updated Typical Year, and facilitate discussion on interconnected portions of each system.

4. Status of CSO Abatement Projects

4.1 Project Updates

The City of Cambridge continues to implement abatement projects to remove stormwater from its combined sewer system, however continued sewer separation is dependent upon cost effective strategies to manage water quality from stormwater discharges, in particular from Phosphorous. This may include expanding areas that are partially separated, in which a portion of the stormwater continues to discharge to the sewer system for treatment. As an example, the partial separation of the service areas tributary to the Endicott and Talbot outfalls has been shown to reduce CSO spill volumes at MWRA’s Cottage Farm CSO Facility while allowing the capture and treatment of over 85 percent of the urban stormwater runoff from these areas.

5. Modifications to Nine Minimum Controls Plan

The Nine Minimum Controls Plan (NMCP) was substantially 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. These Public Notification requirements were further updated to reflect changes in current permit requirements. These enhancements were summarized in **Table 10**.

Table 10 – Enhancements to the Nine Minimum Controls Plan

Control Measure	Proposed Enhancement
1. Proper Operation and Regular Maintenance Programs	<ul style="list-style-type: none"> • Adherence to detailed "Good Housekeeping Manual" to provide specific guidance and protocols for major DPW tasks • Development and utilization of routine inspection forms and work order system • Update of infrastructure assets and nomenclature • Update of DPW organizational structure and budget figures
2. Maximization of Storage in the Collection System	<ul style="list-style-type: none"> • Update database of existing key regulator components • Establish procedure for documentation of purpose and benefits to any future modifications to existing structures
3. Review and Modification of Pretreatment Requirements	<ul style="list-style-type: none"> • Adherence to recently developed Wastewater and Stormwater Use Regulations, inspection frequencies and enforcement activities
4. Maximization of Flow to POTW	<ul style="list-style-type: none"> • Maintain updated inventory of CSO capital projects; • Continue funding for annual cleaning and remedial repair and reconstruction contracts

Control Measure	Proposed Enhancement
5. Prohibition Elimination of Dry Weather Discharges	<ul style="list-style-type: none"> • The City is unaware of any dry weather discharges from CSO outfalls
6. Control of Solid and Floatable Materials in CSOs	<ul style="list-style-type: none"> • Continue to maintain devices that control discharge of floatables at all CSO outfalls. • Continue to require compliance with new City Wastewater and Stormwater Use Regulations
7. Pollution Prevention Programs to Reduce Contaminants in CSOs	<ul style="list-style-type: none"> • Adherence to "Good Housekeeping Manual" guidance and protocols to reduce the City's contribution of contaminants to stormwater; • Adherence to City of Cambridge Integrated Pest Management plan to reduce contributions of pesticides, fungicides, herbicides and fertilizer to run-off; • Continue aggressive recycling, street sweeping and household hazardous waste collections and management • Continue with public education and outreach activities • Continue to require compliance with new City Wastewater and Stormwater Use Regulations
8. Public Notification	<ul style="list-style-type: none"> • Public Notification procedure updated per variance requirements beginning in 2021. Public Notification procedures will be further updated to comply with 314 CMR 16.0
9. Metering to Characterize CSO Impacts and Efficacy of CSO Controls	<ul style="list-style-type: none"> • On a regulator site-specific basis, use revised weir equations and parameters and/or hydraulic models and analysis to estimate effluent volumes released during CSO events

APPENDIX I
2021 PRECIPITATION DATA

2021 Annual CSO Report
 2021 Daily Rainfall Data
 Hybrid Rainfall (Cambridge DPW Rain Gauge and USGS Brookline Rain Gauge)

Date	Rainfall (in)	Average Intensity (in/hr)	Peak Intensity (in/hr)
1/1/22	0.08	0.00	0.12
1/2/22	0.46	0.02	0.15
1/3/22	0.08	0.00	0.09
1/4/22	0.00	0.00	0.00
1/5/22	0.00	0.00	0.00
1/6/22	0.00	0.00	0.00
1/7/22	0.00	0.00	0.00
1/8/22	0.00	0.00	0.00
1/9/22	0.00	0.00	0.00
1/10/22	0.00	0.00	0.00
1/11/22	0.00	0.00	0.00
1/12/22	0.00	0.00	0.00
1/13/22	0.00	0.00	0.00
1/14/22	0.10	0.00	0.03
1/15/22	0.00	0.00	0.00
1/16/22	1.42	0.06	0.36
1/17/22	0.00	0.00	0.00
1/18/22	0.00	0.00	0.00
1/19/22	0.00	0.00	0.00
1/20/22	0.00	0.00	0.00
1/21/22	0.00	0.00	0.00
1/22/22	0.00	0.00	0.00
1/23/22	0.00	0.00	0.00
1/24/22	0.00	0.00	0.00
1/25/22	0.00	0.00	0.00
1/26/22	0.09	0.00	0.06
1/27/22	0.22	0.01	0.06
1/28/22	0.05	0.00	0.03
1/29/22	0.00	0.00	0.00
1/30/22	0.00	0.00	0.00
1/31/22	0.00	0.00	0.00
Total	2.50		

2021 Annual CSO Report
 2021 Daily Rainfall Data
 Hybrid Rainfall (Cambridge DPW Rain Gauge and USGS Brookline Rain Gauge)

Date	Rainfall (in)	Average Intensity (in/hr)	Peak Intensity (in/hr)
2/1/22	0.60	0.03	0.12
2/2/22	0.88	0.04	0.18
2/3/22	0.00	0.00	0.00
2/4/22	0.00	0.00	0.00
2/5/22	0.00	0.00	0.00
2/6/22	0.00	0.00	0.00
2/7/22	0.33	0.01	0.12
2/8/22	0.01	0.00	0.03
2/9/22	0.15	0.01	0.09
2/10/22	0.09	0.00	0.12
2/11/22	0.00	0.00	0.00
2/12/22	0.00	0.00	0.00
2/13/22	0.00	0.00	0.00
2/14/22	0.00	0.00	0.00
2/15/22	0.03	0.00	0.03
2/16/22	0.63	0.03	0.24
2/17/22	0.00	0.00	0.00
2/18/22	0.00	0.00	0.00
2/19/22	0.00	0.00	0.00
2/20/22	0.00	0.00	0.00
2/21/22	0.00	0.00	0.00
2/22/22	0.00	0.00	0.00
2/23/22	0.00	0.00	0.00
2/24/22	0.00	0.00	0.00
2/25/22	0.00	0.00	0.00
2/26/22	0.00	0.00	0.00
2/27/22	0.00	0.00	0.00
2/28/22	0.00	0.00	0.00
Total	2.72		

2021 Annual CSO Report
 2021 Daily Rainfall Data
 Hybrid Rainfall (Cambridge DPW Rain Gauge and USGS Brookline Rain Gauge)

Date	Rainfall (in)	Average Intensity (in/hr)	Peak Intensity (in/hr)
3/1/22	0.00	0.00	0.00
3/2/22	0.00	0.00	0.00
3/3/22	0.00	0.00	0.00
3/4/22	0.00	0.00	0.00
3/5/22	0.00	0.00	0.00
3/6/22	0.00	0.00	0.00
3/7/22	0.00	0.00	0.00
3/8/22	0.00	0.00	0.00
3/9/22	0.00	0.00	0.00
3/10/22	0.00	0.00	0.00
3/11/22	0.00	0.00	0.00
3/12/22	0.00	0.00	0.00
3/13/22	0.00	0.00	0.00
3/14/22	0.00	0.00	0.00
3/15/22	0.00	0.00	0.00
3/16/22	0.00	0.00	0.00
3/17/22	0.00	0.00	0.00
3/18/22	0.64	0.03	0.12
3/19/22	0.01	0.00	0.03
3/20/22	0.00	0.00	0.00
3/21/22	0.00	0.00	0.00
3/22/22	0.00	0.00	0.00
3/23/22	0.00	0.00	0.00
3/24/22	0.00	0.00	0.00
3/25/22	0.14	0.01	0.09
3/26/22	0.03	0.00	0.09
3/27/22	0.00	0.00	0.00
3/28/22	0.74	0.03	0.54
3/29/22	0.05	0.00	0.06
3/30/22	0.00	0.00	0.00
3/31/22	0.15	0.01	0.18
Total	1.76		

2021 Annual CSO Report
 2021 Daily Rainfall Data
 Hybrid Rainfall (Cambridge DPW Rain Gauge and USGS Brookline Rain Gauge)

Date	Rainfall (in)	Average Intensity (in/hr)	Peak Intensity (in/hr)
4/1/22	0.83	0.03	0.30
4/2/22	0.00	0.00	0.00
4/3/22	0.00	0.00	0.00
4/4/22	0.00	0.00	0.00
4/5/22	0.00	0.00	0.00
4/6/22	0.00	0.00	0.00
4/7/22	0.00	0.00	0.00
4/8/22	0.00	0.00	0.00
4/9/22	0.00	0.00	0.00
4/10/22	0.00	0.00	0.00
4/11/22	0.00	0.00	0.00
4/12/22	0.02	0.00	0.03
4/13/22	0.00	0.00	0.00
4/14/22	0.00	0.00	0.00
4/15/22	0.18	0.01	0.09
4/16/22	2.13	0.09	0.30
4/17/22	0.07	0.00	0.03
4/18/22	0.00	0.00	0.00
4/19/22	0.00	0.00	0.00
4/20/22	0.00	0.00	0.00
4/21/22	0.38	0.02	0.30
4/22/22	0.00	0.00	0.00
4/23/22	0.00	0.00	0.00
4/24/22	0.00	0.00	0.00
4/25/22	0.08	0.00	0.03
4/26/22	0.00	0.00	0.00
4/27/22	0.00	0.00	0.00
4/28/22	0.21	0.01	0.21
4/29/22	0.92	0.04	0.33
4/30/22	0.11	0.00	0.09
Total	4.93		

2021 Annual CSO Report
 2021 Daily Rainfall Data
 Hybrid Rainfall (Cambridge DPW Rain Gauge and USGS Brookline Rain Gauge)

Date	Rainfall (in)	Average Intensity (in/hr)	Peak Intensity (in/hr)
5/1/22	0.09	0.00	0.09
5/2/22	0.00	0.00	0.00
5/3/22	0.00	0.00	0.00
5/4/22	0.66	0.03	0.24
5/5/22	0.50	0.02	0.30
5/6/22	0.01	0.00	0.03
5/7/22	0.00	0.00	0.00
5/8/22	0.00	0.00	0.00
5/9/22	0.00	0.00	0.00
5/10/22	0.34	0.01	0.15
5/11/22	0.00	0.00	0.00
5/12/22	0.00	0.00	0.00
5/13/22	0.00	0.00	0.00
5/14/22	0.00	0.00	0.00
5/15/22	0.00	0.00	0.00
5/16/22	0.00	0.00	0.00
5/17/22	0.00	0.00	0.00
5/18/22	0.00	0.00	0.00
5/19/22	0.00	0.00	0.00
5/20/22	0.00	0.00	0.00
5/21/22	0.00	0.00	0.00
5/22/22	0.00	0.00	0.00
5/23/22	0.00	0.00	0.00
5/24/22	0.00	0.00	0.00
5/25/22	0.00	0.00	0.00
5/26/22	0.32	0.01	0.30
5/27/22	0.06	0.00	0.09
5/28/22	0.86	0.04	0.30
5/29/22	1.44	0.06	0.27
5/30/22	0.68	0.03	0.12
5/31/22	0.17	0.01	0.09
Total	5.13		

2021 Annual CSO Report
 2021 Daily Rainfall Data
 Hybrid Rainfall (Cambridge DPW Rain Gauge and USGS Brookline Rain Gauge)

Date	Rainfall (in)	Average Intensity (in/hr)	Peak Intensity (in/hr)
6/1/22	0.00	0.00	0.00
6/2/22	0.00	0.00	0.00
6/3/22	0.00	0.00	0.00
6/4/22	0.00	0.00	0.00
6/5/22	0.00	0.00	0.00
6/6/22	0.00	0.00	0.00
6/7/22	0.00	0.00	0.00
6/8/22	0.00	0.00	0.00
6/9/22	0.04	0.00	0.03
6/10/22	0.00	0.00	0.00
6/11/22	0.09	0.00	0.09
6/12/22	0.67	0.03	0.24
6/13/22	0.00	0.00	0.00
6/14/22	0.56	0.02	0.24
6/15/22	0.05	0.00	0.12
6/16/22	0.00	0.00	0.00
6/17/22	0.00	0.00	0.00
6/18/22	0.00	0.00	0.00
6/19/22	0.00	0.00	0.00
6/20/22	0.00	0.00	0.00
6/21/22	0.00	0.00	0.00
6/22/22	1.24	0.05	1.32
6/23/22	0.00	0.00	0.00
6/24/22	0.00	0.00	0.00
6/25/22	0.05	0.00	0.03
6/26/22	0.00	0.00	0.00
6/27/22	0.00	0.00	0.00
6/28/22	0.00	0.00	0.00
6/29/22	0.00	0.00	0.00
6/30/22	0.25	0.01	0.21
Total	2.95		

2021 Annual CSO Report
 2021 Daily Rainfall Data
 Hybrid Rainfall (Cambridge DPW Rain Gauge and USGS Brookline Rain Gauge)

Date	Rainfall (in)	Average Intensity (in/hr)	Peak Intensity (in/hr)
7/1/22	0.96	0.04	0.45
7/2/22	2.16	0.09	1.56
7/3/22	1.33	0.06	0.36
7/4/22	0.50	0.02	0.21
7/5/22	0.03	0.00	0.03
7/6/22	0.13	0.01	0.18
7/7/22	0.08	0.00	0.12
7/8/22	0.28	0.01	0.33
7/9/22	2.44	0.10	0.93
7/10/22	0.12	0.01	0.15
7/11/22	0.12	0.01	0.30
7/12/22	1.00	0.04	0.66
7/13/22	0.01	0.00	0.03
7/14/22	0.00	0.00	0.00
7/15/22	0.00	0.00	0.00
7/16/22	0.00	0.00	0.00
7/17/22	0.36	0.02	0.36
7/18/22	0.60	0.03	0.63
7/19/22	0.00	0.00	0.00
7/20/22	0.00	0.00	0.00
7/21/22	0.01	0.00	0.03
7/22/22	0.02	0.00	0.03
7/23/22	0.00	0.00	0.00
7/24/22	0.00	0.00	0.00
7/25/22	0.13	0.01	0.33
7/26/22	0.00	0.00	0.00
7/27/22	0.72	0.03	1.83
7/28/22	0.00	0.00	0.00
7/29/22	0.03	0.00	0.06
7/30/22	0.25	0.01	0.75
7/31/22	0.00	0.00	0.00
Total	11.28		

2021 Annual CSO Report
 2021 Daily Rainfall Data
 Hybrid Rainfall (Cambridge DPW Rain Gauge and USGS Brookline Rain Gauge)

Date	Rainfall (in)	Average Intensity (in/hr)	Peak Intensity (in/hr)
8/1/22	0.00	0.00	0.00
8/2/22	0.00	0.00	0.00
8/3/22	0.00	0.00	0.00
8/4/22	0.12	0.01	0.15
8/5/22	1.13	0.05	0.36
8/6/22	0.00	0.00	0.00
8/7/22	0.00	0.00	0.00
8/8/22	0.00	0.00	0.00
8/9/22	0.59	0.02	0.48
8/10/22	0.07	0.00	0.09
8/11/22	0.00	0.00	0.00
8/12/22	0.00	0.00	0.00
8/13/22	0.00	0.00	0.00
8/14/22	0.00	0.00	0.00
8/15/22	0.00	0.00	0.00
8/16/22	0.00	0.00	0.00
8/17/22	0.00	0.00	0.00
8/18/22	0.00	0.00	0.00
8/19/22	2.21	0.09	2.01
8/20/22	0.08	0.00	0.12
8/21/22	0.00	0.00	0.00
8/22/22	0.84	0.04	1.20
8/23/22	1.18	0.05	0.57
8/24/22	0.02	0.00	0.03
8/25/22	0.00	0.00	0.00
8/26/22	0.00	0.00	0.00
8/27/22	0.00	0.00	0.00
8/28/22	0.12	0.01	0.18
8/29/22	0.02	0.00	0.06
8/30/22	0.00	0.00	0.00
8/31/22	0.00	0.00	0.00
Total	6.38		

2021 Annual CSO Report
 2021 Daily Rainfall Data
 Hybrid Rainfall (Cambridge DPW Rain Gauge and USGS Brookline Rain Gauge)

Date	Rainfall (in)	Average Intensity (in/hr)	Peak Intensity (in/hr)
9/1/22	1.56	0.07	0.78
9/2/22	2.58	0.11	1.08
9/3/22	0.00	0.00	0.00
9/4/22	0.00	0.00	0.00
9/5/22	0.00	0.00	0.00
9/6/22	0.00	0.00	0.00
9/7/22	0.00	0.00	0.00
9/8/22	0.00	0.00	0.00
9/9/22	0.68	0.03	0.21
9/10/22	0.43	0.02	0.60
9/11/22	0.00	0.00	0.00
9/12/22	0.00	0.00	0.00
9/13/22	0.05	0.00	0.06
9/14/22	0.00	0.00	0.00
9/15/22	0.00	0.00	0.00
9/16/22	0.39	0.02	0.57
9/17/22	0.00	0.00	0.00
9/18/22	0.00	0.00	0.00
9/19/22	0.00	0.00	0.00
9/20/22	0.00	0.00	0.00
9/21/22	0.00	0.00	0.00
9/22/22	0.00	0.00	0.00
9/23/22	0.00	0.00	0.00
9/24/22	0.00	0.00	0.00
9/25/22	0.00	0.00	0.00
9/26/22	0.00	0.00	0.00
9/27/22	0.00	0.00	0.00
9/28/22	0.00	0.00	0.00
9/29/22	0.00	0.00	0.00
9/30/22	0.01	0.00	0.03
Total	5.70		

2021 Annual CSO Report
 2021 Daily Rainfall Data
 Hybrid Rainfall (Cambridge DPW Rain Gauge and USGS Brookline Rain Gauge)

Date	Rainfall (in)	Average Intensity (in/hr)	Peak Intensity (in/hr)
10/1/22	0.00	0.00	0.00
10/2/22	0.00	0.00	0.00
10/3/22	0.04	0.00	0.09
10/4/22	1.07	0.04	0.27
10/5/22	0.48	0.02	0.39
10/6/22	0.00	0.00	0.00
10/7/22	0.00	0.00	0.00
10/8/22	0.00	0.00	0.00
10/9/22	0.00	0.00	0.00
10/10/22	0.00	0.00	0.00
10/11/22	0.00	0.00	0.00
10/12/22	0.00	0.00	0.00
10/13/22	0.00	0.00	0.00
10/14/22	0.00	0.00	0.00
10/15/22	0.00	0.00	0.00
10/16/22	0.01	0.00	0.03
10/17/22	0.27	0.01	0.21
10/18/22	0.00	0.00	0.00
10/19/22	0.00	0.00	0.00
10/20/22	0.00	0.00	0.00
10/21/22	0.00	0.00	0.00
10/22/22	0.00	0.00	0.00
10/23/22	0.00	0.00	0.00
10/24/22	0.00	0.00	0.00
10/25/22	0.67	0.03	0.27
10/26/22	2.25	0.09	1.41
10/27/22	0.27	0.01	0.09
10/28/22	0.00	0.00	0.00
10/29/22	0.00	0.00	0.00
10/30/22	1.16	0.05	0.75
10/31/22	0.58	0.02	0.33
Total	6.80		

2021 Annual CSO Report
 2021 Daily Rainfall Data
 Hybrid Rainfall (Cambridge DPW Rain Gauge and USGS Brookline Rain Gauge)

Date	Rainfall (in)	Average Intensity (in/hr)	Peak Intensity (in/hr)
11/1/22	0.00	0.00	0.00
11/2/22	0.00	0.00	0.00
11/3/22	0.00	0.00	0.00
11/4/22	0.00	0.00	0.00
11/5/22	0.00	0.00	0.00
11/6/22	0.00	0.00	0.00
11/7/22	0.00	0.00	0.00
11/8/22	0.00	0.00	0.00
11/9/22	0.00	0.00	0.00
11/10/22	0.00	0.00	0.00
11/11/22	0.00	0.00	0.00
11/12/22	0.80	0.03	0.33
11/13/22	0.15	0.01	0.21
11/14/22	0.03	0.00	0.09
11/15/22	0.09	0.00	0.09
11/16/22	0.00	0.00	0.00
11/17/22	0.00	0.00	0.00
11/18/22	0.00	0.00	0.00
11/19/22	0.20	0.01	0.09
11/20/22	0.00	0.00	0.00
11/21/22	0.00	0.00	0.00
11/22/22	0.49	0.02	0.36
11/23/22	0.00	0.00	0.00
11/24/22	0.00	0.00	0.00
11/25/22	0.00	0.00	0.00
11/26/22	0.05	0.00	0.03
11/27/22	0.01	0.00	0.03
11/28/22	0.00	0.00	0.00
11/29/22	0.00	0.00	0.00
11/30/22	0.00	0.00	0.00
Total	1.82		

2021 Annual CSO Report
 2021 Daily Rainfall Data
 Hybrid Rainfall (Cambridge DPW Rain Gauge and USGS Brookline Rain Gauge)

Date	Rainfall (in)	Average Intensity (in/hr)	Peak Intensity (in/hr)
12/1/22	0.00	0.00	0.00
12/2/22	0.05	0.00	0.12
12/3/22	0.00	0.00	0.00
12/4/22	0.00	0.00	0.00
12/5/22	0.00	0.00	0.00
12/6/22	0.30	0.01	0.36
12/7/22	0.00	0.00	0.00
12/8/22	0.00	0.00	0.00
12/9/22	0.00	0.00	0.00
12/10/22	0.00	0.00	0.00
12/11/22	0.24	0.01	0.15
12/12/22	0.02	0.00	0.03
12/13/22	0.00	0.00	0.00
12/14/22	0.00	0.00	0.00
12/15/22	0.01	0.00	0.03
12/16/22	0.17	0.01	0.12
12/17/22	0.00	0.00	0.00
12/18/22	0.56	0.02	0.15
12/19/22	0.40	0.02	0.12
12/20/22	0.00	0.00	0.00
12/21/22	0.00	0.00	0.00
12/22/22	0.09	0.00	0.12
12/23/22	0.00	0.00	0.00
12/24/22	0.00	0.00	0.00
12/25/22	0.33	0.01	0.15
12/26/22	0.24	0.01	0.18
12/27/22	0.00	0.00	0.00
12/28/22	0.02	0.00	0.03
12/29/22	0.00	0.00	0.00
12/30/22	0.05	0.00	0.03
12/31/22	0.01	0.00	0.03
Total	2.49		

APPENDIX II

MONTHLY CSO ACTIVATIONS

2021 Daily Rainfall and Combined Sewer Overflow Volumes

Date	Rainfall	Alewife Brook				Charles River		
		CAM001	CAM002	CAM401A*	CAM401B	CAM005	CAM007	CAM017*
	Hybrid (CDPW+USGS Brookline) in	Foch St. @ Alewife Brook Pkwy. MG	Mass. Ave. @ Alewife Brook Pkwy. MG	Sherman St. @ B&M Railroad MG	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy MG	Lowell St. @ Mt. Auburn St. MG	Memorial Dr. @ Hawthorne St. MG	Edwin Land Blvd. @ Binney St. MG
1/1/2021	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/2/2021	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/3/2021	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/4/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/5/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/6/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/7/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/8/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/9/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/10/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/11/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/12/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/13/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/14/2021	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/15/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/16/2021	1.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/17/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/18/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/19/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/20/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/21/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/22/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/23/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/24/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/25/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/26/2021	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/27/2021	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/28/2021	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/29/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/30/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/31/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00

* CSO Volumes for CAM401A and CAM017 are calculated from meter data

2021 Daily Rainfall and Combined Sewer Overflow Volumes

Date	Rainfall	Alewife Brook				Charles River		
		CAM001	CAM002	CAM401A*	CAM401B	CAM005	CAM007	CAM017*
	Hybrid (CDPW+USGS Brookline) in	Foch St. @ Alewife Brook Pkwy. MG	Mass. Ave. @ Alewife Brook Pkwy. MG	Sherman St. @ B&M Railroad MG	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy MG	Lowell St. @ Mt. Auburn St. MG	Memorial Dr. @ Hawthorne St. MG	Edwin Land Blvd. @ Binney St. MG
2/1/2021	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/2/2021	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/3/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/4/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/5/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/6/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/7/2021	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/8/2021	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/9/2021	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/10/2021	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/11/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/12/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/13/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/14/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/15/2021	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/16/2021	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/17/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/18/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/19/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/20/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/21/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/22/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/23/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/24/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/25/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/26/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/27/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/28/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	2.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00

* CSO Volumes for CAM401A and CAM017 are calculated from meter data

2021 Daily Rainfall and Combined Sewer Overflow Volumes

Date	Rainfall	Alewife Brook				Charles River		
		CAM001	CAM002	CAM401A*	CAM401B	CAM005	CAM007	CAM017*
	Hybrid (CDPW+USGS Brookline) in	Foch St. @ Alewife Brook Pkwy. MG	Mass. Ave. @ Alewife Brook Pkwy. MG	Sherman St. @ B&M Railroad MG	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy MG	Lowell St. @ Mt. Auburn St. MG	Memorial Dr. @ Hawthorne St. MG	Edwin Land Blvd. @ Binney St. MG
3/1/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/2/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/3/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/4/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/5/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/6/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/7/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/8/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/9/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/10/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/11/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/12/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/13/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/14/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/15/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/16/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/17/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/18/2021	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/19/2021	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/20/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/21/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/22/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/23/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/24/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/25/2021	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/26/2021	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/27/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/28/2021	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/29/2021	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/30/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/31/2021	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	1.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00

* CSO Volumes for CAM401A and CAM017 are calculated from meter data

2021 Daily Rainfall and Combined Sewer Overflow Volumes

Date	Rainfall	Alewife Brook				Charles River		
		CAM001	CAM002	CAM401A*	CAM401B	CAM005	CAM007	CAM017*
	Hybrid (CDPW+USGS Brookline) in	Foch St. @ Alewife Brook Pkwy. MG	Mass. Ave. @ Alewife Brook Pkwy. MG	Sherman St. @ B&M Railroad MG	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy MG	Lowell St. @ Mt. Auburn St. MG	Memorial Dr. @ Hawthorne St. MG	Edwin Land Blvd. @ Binney St. MG
4/1/2021	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/2/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/3/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/4/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/5/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/6/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/7/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/8/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/9/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/10/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/11/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/12/2021	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/13/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/14/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/15/2021	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/16/2021	2.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/17/2021	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/18/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/19/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/20/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/21/2021	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/22/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/23/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/24/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/25/2021	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/26/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/27/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/28/2021	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/29/2021	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/30/2021	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	4.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00

* CSO Volumes for CAM401A and CAM017 are calculated from meter data

2021 Daily Rainfall and Combined Sewer Overflow Volumes

Date	Rainfall	Alewife Brook				Charles River		
		CAM001	CAM002	CAM401A*	CAM401B	CAM005	CAM007	CAM017*
	Hybrid (CDPW+USGS Brookline) in	Foch St. @ Alewife Brook Pkwy. MG	Mass. Ave. @ Alewife Brook Pkwy. MG	Sherman St. @ B&M Railroad MG	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy MG	Lowell St. @ Mt. Auburn St. MG	Memorial Dr. @ Hawthorne St. MG	Edwin Land Blvd. @ Binney St. MG
5/1/2021	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/2/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/3/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/4/2021	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/5/2021	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/6/2021	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/7/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/8/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/9/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/10/2021	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/11/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/12/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/13/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/14/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/15/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/16/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/17/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/18/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/19/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/20/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/21/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/22/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/23/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/24/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/25/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/26/2021	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/27/2021	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/28/2021	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/29/2021	1.44	0.00	0.00	0.65	0.00	0.00	0.00	0.00
5/30/2021	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/31/2021	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	5.13	0.00	0.00	0.65	0.00	0.00	0.00	0.00

* CSO Volumes for CAM401A and CAM017 are calculated from meter data

2021 Daily Rainfall and Combined Sewer Overflow Volumes

Date	Rainfall	Alewife Brook				Charles River		
		CAM001	CAM002	CAM401A*	CAM401B	CAM005	CAM007	CAM017*
	Hybrid (CDPW+USGS Brookline) in	Foch St. @ Alewife Brook Pkwy. MG	Mass. Ave. @ Alewife Brook Pkwy. MG	Sherman St. @ B&M Railroad MG	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy MG	Lowell St. @ Mt. Auburn St. MG	Memorial Dr. @ Hawthorne St. MG	Edwin Land Blvd. @ Binney St. MG
6/1/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/2/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/3/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/4/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/5/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/6/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/7/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/8/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/9/2021	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/10/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/11/2021	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/12/2021	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/13/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/14/2021	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/15/2021	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/16/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/17/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/18/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/19/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/20/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/21/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/22/2021	1.24	0.00	0.00	0.00	0.00	0.07	0.00	0.05
6/23/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/24/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/25/2021	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/26/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/27/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/28/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/29/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/30/2021	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	2.95	0.00	0.00	0.00	0.00	0.07	0.00	0.05

* CSO Volumes for CAM401A and CAM017 are calculated from meter data

2021 Daily Rainfall and Combined Sewer Overflow Volumes

Date	Rainfall	Alewife Brook				Charles River		
		CAM001	CAM002	CAM401A*	CAM401B	CAM005	CAM007	CAM017*
	Hybrid (CDPW+USGS Brookline) in	Foch St. @ Alewife Brook Pkwy. MG	Mass. Ave. @ Alewife Brook Pkwy. MG	Sherman St. @ B&M Railroad MG	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy MG	Lowell St. @ Mt. Auburn St. MG	Memorial Dr. @ Hawthorne St. MG	Edwin Land Blvd. @ Binney St. MG
7/1/2021	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/2/2021	2.16	0.08	0.00	4.83	0.50	1.16	1.65	2.91
7/3/2021	1.33	0.00	0.00	0.67	0.00	0.00	0.00	0.00
7/4/2021	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/5/2021	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/6/2021	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/7/2021	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/8/2021	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/9/2021	2.44	0.00	0.00	2.76	0.17	0.09	0.00	3.31
7/10/2021	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/11/2021	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/12/2021	1.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00
7/13/2021	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/14/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/15/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/16/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/17/2021	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/18/2021	0.60	0.00	0.00	0.91	0.00	0.00	0.00	0.00
7/19/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/20/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/21/2021	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/22/2021	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/23/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/24/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/25/2021	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/26/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/27/2021	0.72	0.00	0.00	1.30	0.00	0.06	0.00	0.00
7/28/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/29/2021	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/30/2021	0.25	0.00	0.00	0.08	0.00	0.00	0.00	0.00
7/31/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	11.28	0.08	0.00	11.12	0.67	1.31	1.65	6.22

* CSO Volumes for CAM401A and CAM017 are calculated from meter data

2021 Daily Rainfall and Combined Sewer Overflow Volumes

Date	Rainfall	Alewife Brook				Charles River		
		CAM001	CAM002	CAM401A*	CAM401B	CAM005	CAM007	CAM017*
	Hybrid (CDPW+USGS Brookline) in	Foch St. @ Alewife Brook Pkwy. MG	Mass. Ave. @ Alewife Brook Pkwy. MG	Sherman St. @ B&M Railroad MG	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy MG	Lowell St. @ Mt. Auburn St. MG	Memorial Dr. @ Hawthorne St. MG	Edwin Land Blvd. @ Binney St. MG
8/1/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/2/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/3/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/4/2021	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/5/2021	1.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/6/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/7/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/8/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/9/2021	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/10/2021	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/11/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/12/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/13/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/14/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/15/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/16/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/17/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/18/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/19/2021	2.21	0.08	0.00	1.30	0.47	1.12	1.57	2.70
8/20/2021	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/21/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/22/2021	0.84	0.00	0.00	0.27	0.00	0.02	0.00	0.00
8/23/2021	1.18	0.00	0.00	0.21	0.00	0.00	0.00	0.00
8/24/2021	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/25/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/26/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/27/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/28/2021	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/29/2021	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/30/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/31/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	6.38	0.08	0.00	1.78	0.47	1.14	1.57	2.70

* CSO Volumes for CAM401A and CAM017 are calculated from meter data

2021 Daily Rainfall and Combined Sewer Overflow Volumes

Date	Rainfall	Alewife Brook				Charles River		
		CAM001	CAM002	CAM401A*	CAM401B	CAM005	CAM007	CAM017*
	Hybrid (CDPW+USGS Brookline) in	Foch St. @ Alewife Brook Pkwy. MG	Mass. Ave. @ Alewife Brook Pkwy. MG	Sherman St. @ B&M Railroad MG	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy MG	Lowell St. @ Mt. Auburn St. MG	Memorial Dr. @ Hawthorne St. MG	Edwin Land Blvd. @ Binney St. MG
9/1/2021	1.56	0.00	0.00	4.19	0.00	0.00	0.00	0.00
9/2/2021	2.58	0.03	0.00	0.00	0.39	0.72	0.69	3.49
9/3/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/4/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/5/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/6/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/7/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/8/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/9/2021	0.68	0.01	0.00	0.00	0.00	0.00	0.00	0.00
9/10/2021	0.43	0.00	0.00	0.32	0.00	0.00	0.00	0.00
9/11/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/12/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/13/2021	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/14/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/15/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/16/2021	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/17/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/18/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/19/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/20/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/21/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/22/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/23/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/24/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/25/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/26/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/27/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/28/2021	0.00	0.00	0.00	1.25	0.00	0.00	0.00	0.00
9/29/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/30/2021	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	5.70	0.04	0.00	5.76	0.39	0.72	0.69	3.49

* CSO Volumes for CAM401A and CAM017 are calculated from meter data

2021 Daily Rainfall and Combined Sewer Overflow Volumes

Date	Rainfall	Alewife Brook				Charles River		
		CAM001	CAM002	CAM401A*	CAM401B	CAM005	CAM007	CAM017*
	Hybrid (CDPW+USGS Brookline) in	Foch St. @ Alewife Brook Pkwy. MG	Mass. Ave. @ Alewife Brook Pkwy. MG	Sherman St. @ B&M Railroad MG	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy MG	Lowell St. @ Mt. Auburn St. MG	Memorial Dr. @ Hawthorne St. MG	Edwin Land Blvd. @ Binney St. MG
10/1/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/2/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/3/2021	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/4/2021	1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/5/2021	0.48	0.00	0.00	0.07	0.00	0.00	0.00	0.00
10/6/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/7/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/8/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/9/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/10/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/11/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/12/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/13/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/14/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/15/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/16/2021	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/17/2021	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/18/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/19/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/20/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/21/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/22/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/23/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/24/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/25/2021	0.67	0.00	0.00	0.86	0.00	0.00	0.00	0.00
10/26/2021	2.25	0.00	0.00	1.01	0.06	0.10	0.00	0.54
10/27/2021	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/28/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/29/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/30/2021	1.16	0.00	0.00	0.44	0.00	0.00	0.00	0.00
10/31/2021	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	6.80	0.00	0.00	2.38	0.06	0.10	0.00	0.54

* CSO Volumes for CAM401A and CAM017 are calculated from meter data

2021 Daily Rainfall and Combined Sewer Overflow Volumes

Date	Rainfall	Alewife Brook				Charles River		
		CAM001	CAM002	CAM401A*	CAM401B	CAM005	CAM007	CAM017*
	Hybrid (CDPW+USGS Brookline) in	Foch St. @ Alewife Brook Pkwy. MG	Mass. Ave. @ Alewife Brook Pkwy. MG	Sherman St. @ B&M Railroad MG	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy MG	Lowell St. @ Mt. Auburn St. MG	Memorial Dr. @ Hawthorne St. MG	Edwin Land Blvd. @ Binney St. MG
11/1/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/2/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/3/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/4/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/5/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/6/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/7/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/8/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/9/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/10/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/11/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/12/2021	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/13/2021	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/14/2021	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/15/2021	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/16/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/17/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/18/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/19/2021	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/20/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/21/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/22/2021	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/23/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/24/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/25/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/26/2021	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/27/2021	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/28/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/29/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/30/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	1.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00

* CSO Volumes for CAM401A and CAM017 are calculated from meter data

2021 Daily Rainfall and Combined Sewer Overflow Volumes

Date	Rainfall	Alewife Brook				Charles River		
		CAM001	CAM002	CAM401A*	CAM401B	CAM005	CAM007	CAM017*
	Hybrid (CDPW+USGS Brookline) in	Foch St. @ Alewife Brook Pkwy. MG	Mass. Ave. @ Alewife Brook Pkwy. MG	Sherman St. @ B&M Railroad MG	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy MG	Lowell St. @ Mt. Auburn St. MG	Memorial Dr. @ Hawthorne St. MG	Edwin Land Blvd. @ Binney St. MG
12/1/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/2/2021	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/3/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/4/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/5/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/6/2021	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/7/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/8/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/9/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/10/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/11/2021	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/12/2021	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/13/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/14/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/15/2021	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/16/2021	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/17/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/18/2021	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/19/2021	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/20/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/21/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/22/2021	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/23/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/24/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/25/2021	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/26/2021	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/27/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/28/2021	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/29/2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/30/2021	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/31/2021	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	2.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Year	54.46	0.20	0.00	21.69	1.59	3.34	3.91	13.00

* CSO Volumes for CAM401A and CAM017 are calculated from meter data

APPENDIX III

CSO NOTIFICATIONS

COMBINED SEWER OVERFLOW REPORTING

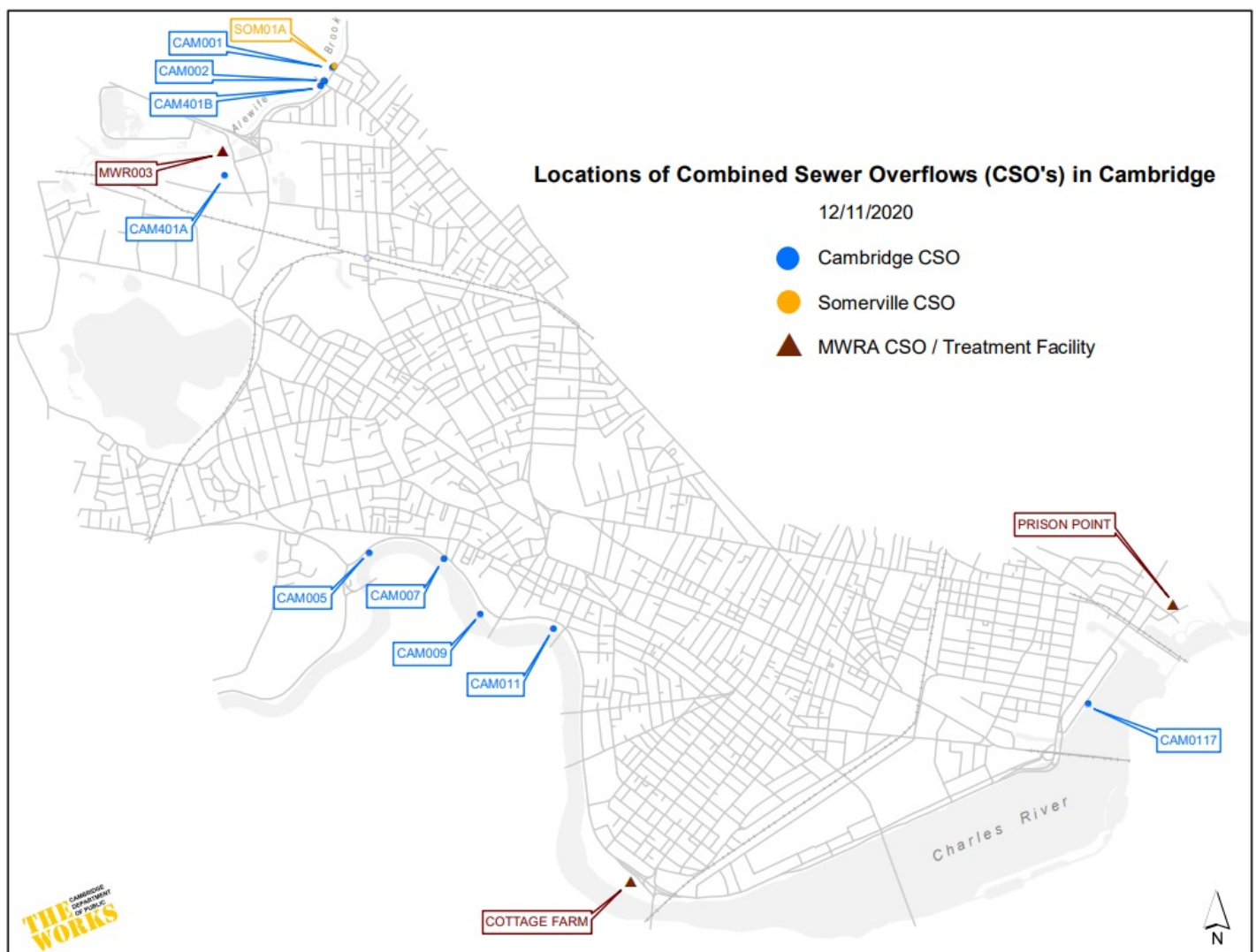
Cambridge Combined Sewer Overflow (CSO) Reporting

A combined sewer overflow (CSO) occurs when a large storm overwhelms the combined sewerage system causing rainwater to mix with wastewater and discharge to a nearby water body. This relief measure prevents sewage backups into homes and businesses. Cambridge owns combined sewer outfalls that discharge to the Charles River and Alewife Brook. When a CSO occurs at a Cambridge-owned outfall, there will be a notification displayed in the table below.

The Massachusetts Water Resource Authority ([MWRA](#)) and the cities of [Boston](#), [Chelsea](#) and [Somerville](#) manage their own combined sewer outfalls, including CSO reporting. These communities must be contacted directly for information regarding their CSO discharges. To see where all CSO outfalls are located, download this [MWRA map](#) of MWRA and community CSO sites.

Public health officials recommend avoiding contact with water bodies during rainstorms and for 48 hours afterwards, as there may be increased health risks due to bacteria or other pollutants associated with urban stormwater runoff and CSO discharges. To see what Cambridge is doing to address pollutants from stormwater runoff please visit our [stormwater management](#) website and learn how you can also help reduce stormwater pollution.

[Subscribe to Cambridge CSO discharge notification alerts.](#)



To view a full-size version of this map, [click here](#).

Description of CSO Locations and Potentially Affected Areas

CAM001: Alewife Brook, discharges downstream of Massachusetts Ave Bridge across from Murry Hill Road.

CAM002: Alewife Brook, discharges downstream of Massachusetts Ave Bridge

CAM401A: Alewife Brook, discharges upstream of the confluence with the Little River and upstream of the Route 2 Bridge.

CAM401B: Alewife Brook, discharges upstream of the Massachusetts Ave Bridge.

CAM005: Charles River, discharges downstream of the Eliot Bridge across from Mount Auburn Hospital.

CAM007: Charles River, discharges downstream of the Eliot Bridge across from Hawthorne Street.

CAM009: Charles River, discharges upstream of the Anderson Bridge (temporarily closed).

CAM011: Charles River, discharges upstream of the Weeks Footbridge (temporarily closed).

CAM017: Charles River, discharges downstream of the Longfellow Bridge across from Front Park.

Note: The CSO discharge table below provides details of recent discharges. Data for CSOs is preliminary and subject to change. Discharge duration and volume are estimates and are subject to calculation limitations, including meter data reliability unmonitored downstream conditions such as river level, and MWRA system operations. See the following links for information on past CSO [annual reporting](#) and yearly [CSO discharge summaries](#). Annual reporting data for 2021 will be published by April 30, 2022.

Event Date	CSO Number	Outfall Location	Potentially Affected Area	Start Time	Stop Time	Duration	Volume (million gallons)	Event Rainfall (inches)
01.17.2022	CAM401A	Alewife Brook	Upstream of the confluence with the Little River and upstream of the Route 2 Bridge	7:40 am - No activation	No Spill	No Spill	No Spill	0.98"
11.12.2021	CAM401A	Alewife Brook	Upstream of the confluence with the Little River and upstream of the Route 2 Bridge	4:05 pm	4:50 pm	45 minutes	0.06	1.07"
10.30.2021	CAM401B	Alewife Brook	Upstream of the Mass Ave Bridge	7:24 pm	7:39 pm	15 minutes	< 0.001	1.63"
10.30.2021	CAM005	Charles River	Downstream of the Eliot Bridge, across from Mount	7:20 pm	7:50 pm	30 minutes	0.02	1.63"

			Auburn Hospital					
10.30.2021	CAM001	Alewife Brook	Downstream of the Massachusetts Ave Bridge across from Murray Hill Road	7:17 pm	7:22 pm	5 minutes	< 0.001	1.63"
10.30.2021	CAM401A	Alewife Brook	Upstream of the confluence with the Little River and upstream of the Route 2 Bridge	7:05 pm	8:20 pm	75 minutes	0.23	1.63"
10.26.2021	CAM401B	Alewife Brook	Upstream of the Mass Ave Bridge	7:09 am	7:39 am	30 minutes	0.27	1.43"
10.26.2021	CAM001	Alewife Brook	Downstream of the Massachusetts Ave Bridge across from Murray Hill Road	7:02 am	7:17 am	15 minutes	0.01	1.43"
10.26.2021	CAM017	Charles River	Downstream of the Longfellow Bridge, across from Front Park	6:05 am	6:35 am	30 minutes	0.54	1.43"
10.26.2021	CAM401A	Alewife Brook	Upstream of the confluence with the Little River and upstream of the Route 2 Bridge	6:35 am	8:05 am	90 minutes	0.70	1.43"
10.05.2021	CAM001	Alewife Brook	Downstream of the Massachusetts Ave Bridge across from Murry Hill Road	2:45 am - No Activation	No Spill	No Spill	No Spill	1.64"
10.05.2021	CAM401A	Alewife Brook	Upstream of the confluence	12:50 am - No	No Spill	No Spill	No Spill	1.64"

			with the Little River and upstream of the Route 2 Bridge	Activation				
09.28.2021	CAM005	Charles River	Downstream of the Eliot Bridge, across from Mount Auburn Hospital	11:40 am (11:45 am)	8:00 pm	495 minutes	0.28	1.60"
09.28.2021	CAM401A	Alewife Brook	Upstream of the confluence with the Little River and upstream of the Route 2 Bridge	10:35 am	8:00 pm	565 minutes	1.10	1.60"
09.10.2021	CAM005	Charles River	Downstream of the Eliot Bridge, across from Mount Auburn Hospital	1:16 am - No Activation	No Spill	No Spill	No Spill	0,96"
09.10.2021	CAM401A	Alewife Brook	Upstream of the confluence of the Little River and upstream of the Route 2 Bridge	1:04 am	3:29 am	145 minutes	0.10	0.96"
09.02.2021	CAM007	Charles River	Downstream of the Eliot Bridge, across from Hawthorne Street	3:05 am	5:15 am	130 minutes	0.47	4.25"
09.02.2021	CAM001	Alewife Brook	Downstream of Mass Ave Bridge, across from Murry Hill Road	2:45 am	5:45 am	180 minutes	0.06	4.25"
09.02.2021	CAM017	Charles River	Downstream of the Longfellow Bridge, across from Front Park	1:35 am	5:15 am	220 minutes	4.43	4.25"

09.02.2021	CAM005	Charles River	Downstream of the Eliot Bridge, across from Mount Auburn Hospital	12:07 am	6:00 am	353 minutes	0.29	4.25"
09.02.2021	CAM401B	Alewife Brook	Upstream of the Mass Ave Bridge	12:15 am	7:30 am	435 minutes	0.18	4.25"
09.01.2021	CAM401A	Alewife Brook	Upstream of the confluence of the Little River and upstream of the Route 2 Bridge	7:00 pm	6:45 am	705 minutes	2.95	4.25"
09.01.2021	CAM001	Alewife Brook	Downstream of Mass Ave Bridge, across from Murry Hill Road	11:26 pm - no activation	see 09.02.2021	see 09.02.2021	see 09.02.2021"	4.25"
08.22.2021	CAM005	Charles River	Downstream of the Eliot Bridge, across from Mount Auburn Hospital	9:25 am	9:40 am	15 minutes	0.02	0.89"
08.22.2021	CAM401B	Alewife Brook	Upstream of the Mass Ave Bridge	9:20 am	9:45 am	15 minutes	0.004	0.89"
08.22.2021	CAM401A	Alewife Brook	Upstream of the confluence of the Little River and upstream of the Route 2 Bridge	9:05 am	9:45 am	40 minutes	0.29	0.89"
08.19.2021	CAM007	Charles River	Downstream of Eliot Bridge, across from Hawthorne Street	12:35 pm	1:15 pm	40 minutes	0.20	1.72"
08.19.2021	CAM001	Alewife Brook	Downstream of Mass Ave Bridge, across	12:05 pm	12:50 pm	45 minutes	0.43	1.72"

			from Murry Hill Road					
08.19.2021	CAM005	Charles River	Downstream of the Eliot Bridge, across from Mount Auburn Hospital	12:00 pm	1:15 pm	75 minutes	0.10	1.72"
08.19.2021	CAM401B	Alewife Brook	Upstream of the Mass Ave Bridge	11:45 am	1:30 pm	135 minutes	0.55	1.72"
08.19.2021	CAM401A	Alewife Brook	Upstream of the confluence with the Little River and upstream of the Route 2 Bridge	11:00 am	1:30 pm	150 minutes	1.13	1.72"
08.19.2021	CAM017	Charles River	Downstream of the Longfellow Bridge, across from Front Park	11:00 am	12:30 pm	90 minutes	2.43	1.72"
07.27.2021	CAM001	Alewife Brook	Downstream of Mass Ave Bridge, across from Murry Hill Road	No Spill	No Spill	No Spill	No Spill	0.74"
07.27.2021	CAM005	Charles River	Downstream of the Eliot Bridge, across from Mount Auburn Hospital	7:50 pm	8:20 pm	30 minutes	0.04	0.74"
07.27.2021	CAM401B	Alewife Brook	Upstream of Mass Ave Bridge	7:51 pm	8:20 pm	30 minutes	0.08	0.74"
07.27.2021	CAM401A	Alewife Brook	Confluence of Little River, upstream of Mass Ave Bridge	7:45 pm	8:15 pm	30 minutes	0.24	0.74"
07.18.2021	CAM005	Charles River	Downstream of the Eliot Bridge, across	5:15 am	5:30 am	15 minutes	0.02	0.34"

			from Mount Auburn Hospital					
07.18.2021	CAM401A	Alewife Brook	Confluence of Little River, upstream of Mass Ave Bridge	5:11 am	5:45 am	34 minutes	0.75	0.34"
07.18.2021	CAM007	Charles River	Downstream of the Eliot Bridge, across from Hawthorne Street	5:00 am	5:30 am	30 minutes	0.24	0.34"
07.12.2021	CAM005	Charles River	Downstream of Eliot Bridge, across from Mount Auburn Hospital	8:30 am	9:00 am	30 minutes	0.02	1.05"
07.12.2021	CAM401A	Alewife Brook	Confluence of Little River, upstream of Mass Ave Bridge	7:45 am	10:45 am	3 hours	1.72	1.05"
07.09.2021	CAM401A	Alewife Brook	Confluence of Little River, upstream of Mass Ave Bridge	12:45 pm	2:13 pm	1.5 hours	0.44	2.53"
07.09.2021	CAM007	Charles River	Downstream of Eliot Bridge across from Hawthorne Street	12:10 pm	1:20 pm	1.2 hours	0.68	2.53"
07.09.2021	CAM005	Charles River	Downstream of Eliot Bridge across from Mount Auburn Hospital	11:30 am	12:15 pm	0,75 hours	0.18	2.53"
07.09.2021	CAM017	Charles River	Downstream of Longfellow Bridge, across from Front Park	10:15 am	1:30 pm	3.25 hours	3.31	2.53"
07.09.2021	CAM401B	Alewife	Upstream of	11:30 am	2:50 pm	3.33 hours	0.57	2.53"

		Brook	Mass Ave Bridge					
07.03.2021	CAM401A	Alewife Brook	Confluence of Little River, upstream of Mass Ave Bridge	9:37 pm	9:42 pm	5 minutes	0.07	1.39"
07.03.2021	CAM001	Alewife Brook	Downstream of Mass Ave Bridge, across from Murry Hill Road	Data Unavailable	Data Unavailable	Data Unavailable	Data Unavailable	1.39"
07.02.2021	CAM401B	Alewife Brook	Upstream of Mass Ave Bridge	2:00 am	3:30 am	1.5 hours	0.473	2..23"
07.02.2021	CAM007	Charles River	Downstream of Eliot Bridge	2:08 am	3:20 am	1.2 hours	0.038	2.23"
07.02.2021	CAM401A	Alewife Brook	Confluence of Little River, Upstream of Mass Ave Bridge	1:29 am	3:30 am	2.0 hours	0.81	2.23"
07.02.2021	CAM001	Alewife Brook	Downstream of Mass Ave Bridge, across from Murry Hill Road	Data Unavailable	Data Unavailable	Data Unavailable	Data Unavailable	2.23"
07.02.2021	CAM005	Charles River	Downstream of Elliot Bridge, across from Mount Auburn Hospital	2:15 am	3:52 am	1.62 hours	2.27	2.23"
07.02.2021	CAM017	Charles River	Downstream of Longfellow Bridge, across from Front Park	12:30 am	2:30 am	2.0 hours	2.91	2.23"

APPENDIX IV

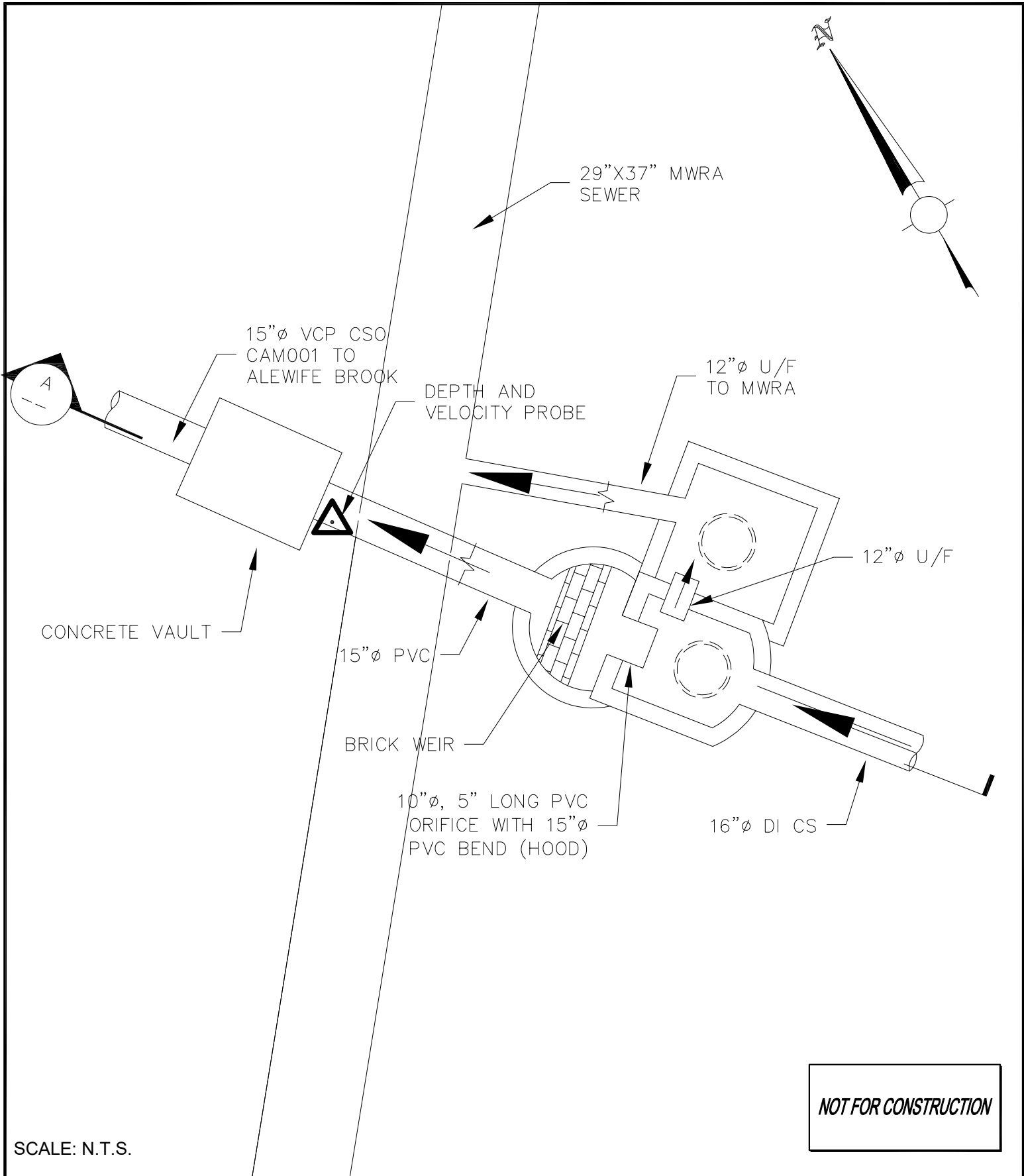
INITIALLY REPORTED AND FINAL CALCULATED CSO VOLUMES

Outfall	Calculated From Final Meter Data			CDPW Website Reporting, Calculated From Preliminary Data			Comments
	Date	VOLUME (MG)	Sensor Used	Date	VOLUME (MG)	Sensor Used	
CAM001	4/16/2021		CDPW Outfall Sensor	7/2/2021	-	CDPW Outfall Sensor SCADA output, Smartcover	Calculated data based on updated sensor readings and validation with additional data available.
	7/2/2021	0.02		7/3/2021	-		
	7/9/2021	0.02		7/9/2021	-		
	7/27/2021	0.08		7/27/2021	-		
	8/19/2021	0.02		8/19/2021	0.43		
	9/2/2021	0.06		9/2/2021	0.06		
	10/5/2021			10/5/2021	-		
	10/26/2021			10/26/2021	0.01		
	10/30/2021			10/30/2021			
	Total:	0.20		Total:	0.50		
CAM002	0	0.00	CDPW Level Sensor	-	0	CDPW Level Sensor	
CAM401A	5/29/2021	0.65	Smartcover Level Sensor	5/29/2021	-	Smartcover Level Sensor	-Initial reporting was based on preliminary data available at the time of reporting. -Field investigation by the City indicated location of sensor to at a different location in the regulator structure than previously identified. This resulted in a lower threshold for overflows than used for the initial reporting. As a result, final spill volumes are higher than initially reported.
	7/2/2021	4.83		7/2/2021	0.81		
	7/3/2021	0.67		7/3/2021	0.07		
	7/9/2021	2.76		7/9/2021	0.44		
	7/12/2021	0.57		7/12/2021	1.72		
	7/18/2021	0.91		7/18/2021	0.75		
	7/27/2021	1.30		7/27/2021	0.24		
	7/30/2021	0.08		7/30/2021	-		
	8/19/2021	1.30		8/19/2021	1.13		
	8/22/2021	0.27		8/22/2021	0.29		
	8/23/2021	0.21		8/23/2021	-		
	9/1/2021	4.19		9/1/2021	2.95		
	9/10/2021	0.32		9/10/2021	0.10		
	9/28/2021	1.25		9/28/2021	1.10		
	10/5/2021	0.07		10/5/2021	-		
	10/25/2021	0.86		10/25/2021	-		
10/26/2021	1.01	10/26/2021	0.70				
10/30/2021	0.44	10/30/2021	0.23				
11/12/2021		11/12/2021	0.06				
	Total:	21.70		Total:	10.59		
CAM401B	7/2/2021	0.47	CDPW Level Sensor	7/2/2021	0.47	CDPW Level Sensor	-Difference in volumes is a result of changing the calculation methodology. The updated methodology is consistent with additional data that became available and was used to validate overflow occurrences.
	7/9/2021	0.85		7/9/2021	0.57		
	7/27/2021	0.10		7/27/2021	0.08		
	8/19/2021	0.55		8/19/2021	0.55		
	8/22/2021	0.01		8/22/2021	0.01		
	9/2/2021	1.82		9/2/2021	0.18		
	10/26/2021	0.29		10/26/2021	0.27		
	10/30/2021			10/30/2021			
	Total:	4.09		Total:	2.13		

CAM005	7/2/2021	1.89	CDPW Regulator Sensor	7/2/2021	2.27	CDPW Level Sensor- SCADA Output	Difference in volume is a result of adjustments to calculations based on updated sensor readings and validation with additional data available. For 2022, use Flowlink data to calculate spill volumes.
	7/9/2021	0.79		7/9/2021	0.18		
	7/12/2021	0.02		7/12/2021	0.02		
	7/18/2021	0.02		7/18/2021	0.02		
	7/27/2021	0.22		7/27/2021	0.04		
	8/19/2021	0.07		8/19/2021	0.10		
	8/22/2021	0.12		8/22/2021	0.02		
	9/2/2021	1.66		9/2/2021	0.29		
	9/10/2021			9/10/2021	-		
	9/28/2021	0.05		9/28/2021	0.28		
	10/26/2021	0.01		10/26/2021	-		
	10/30/2021	0.12		10/30/2021	0.02		
	Total	4.97		Total	3.24		
CAM007	7/2/2021	2.96	CDPW Regulator Sensor	7/2/2021	0.04	Smartcover Level Sensor	Difference in volume is a result of adjustments to calculations based on updated sensor data. For 2022, volumes will be calculated from CDPW sensor data.
	7/9/2021	1.03		7/9/2021	0.68		
	7/18/2021			7/18/2021	0.24		
	8/19/2021	0.66		8/19/2021	0.20		
	9/2/2021	1.50		9/2/2021	0.47		
		Total		6.15			
CAM017	6/22/2021	0.05	ADS Flow Meters	6/22/2021	-	ADS Flow Meters	
	7/2/2021	2.91		7/2/2021	2.91		
	7/9/2021	3.31		7/9/2021	3.31		
	8/19/2021	2.70		8/19/2021	2.43		
	9/2/2021	3.49		9/2/2021	4.43		
	10/26/2021	0.54		10/26/2021	0.54		
		Total		13.00			

APPENDIX V

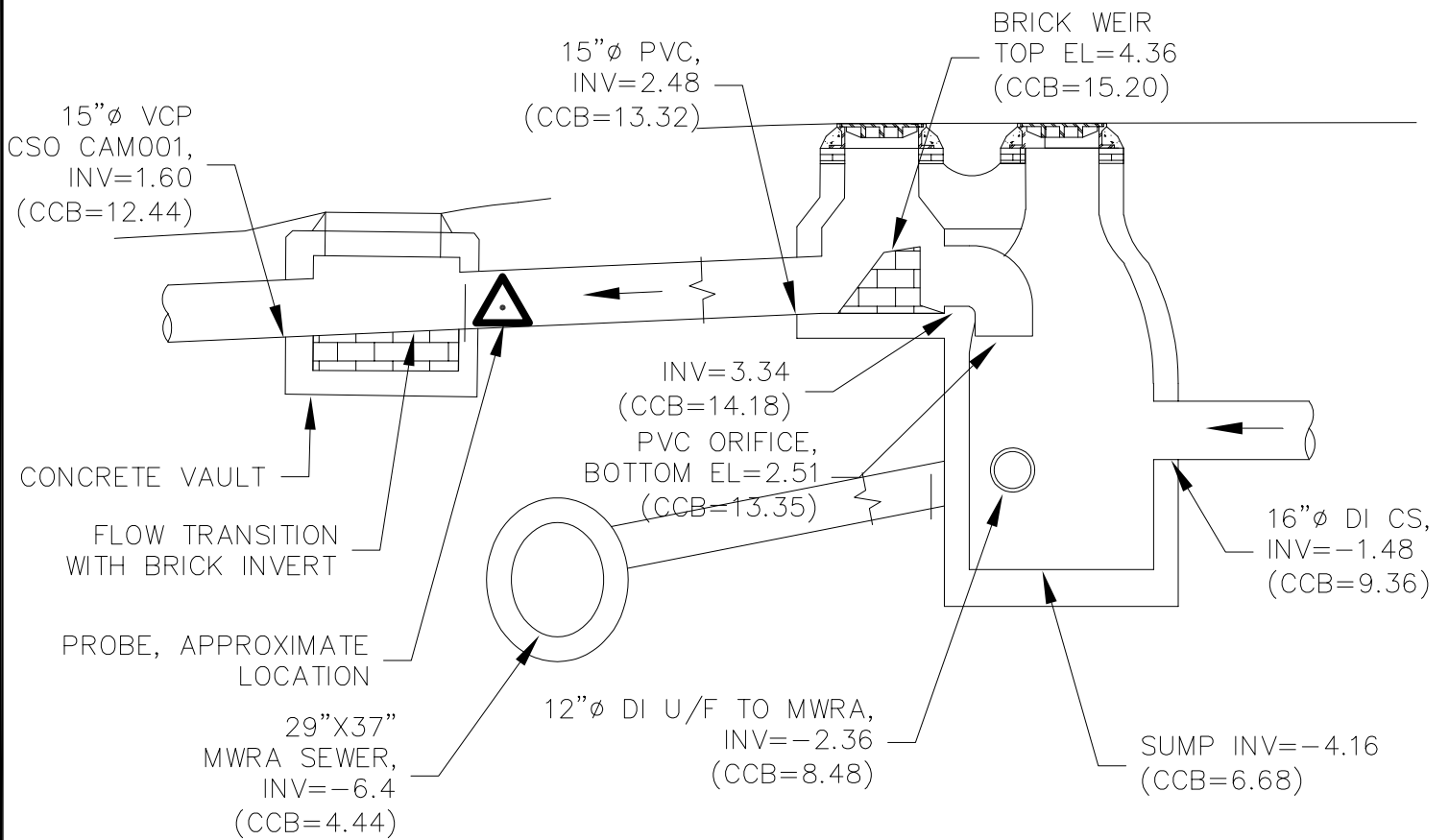
PLAN AND PROFILE SCHEMATICS OF CSO REGULATORS



SCALE: N.T.S.

NOT FOR CONSTRUCTION

**CSO REGULATOR STRUCTURE
CAM001 PLAN**



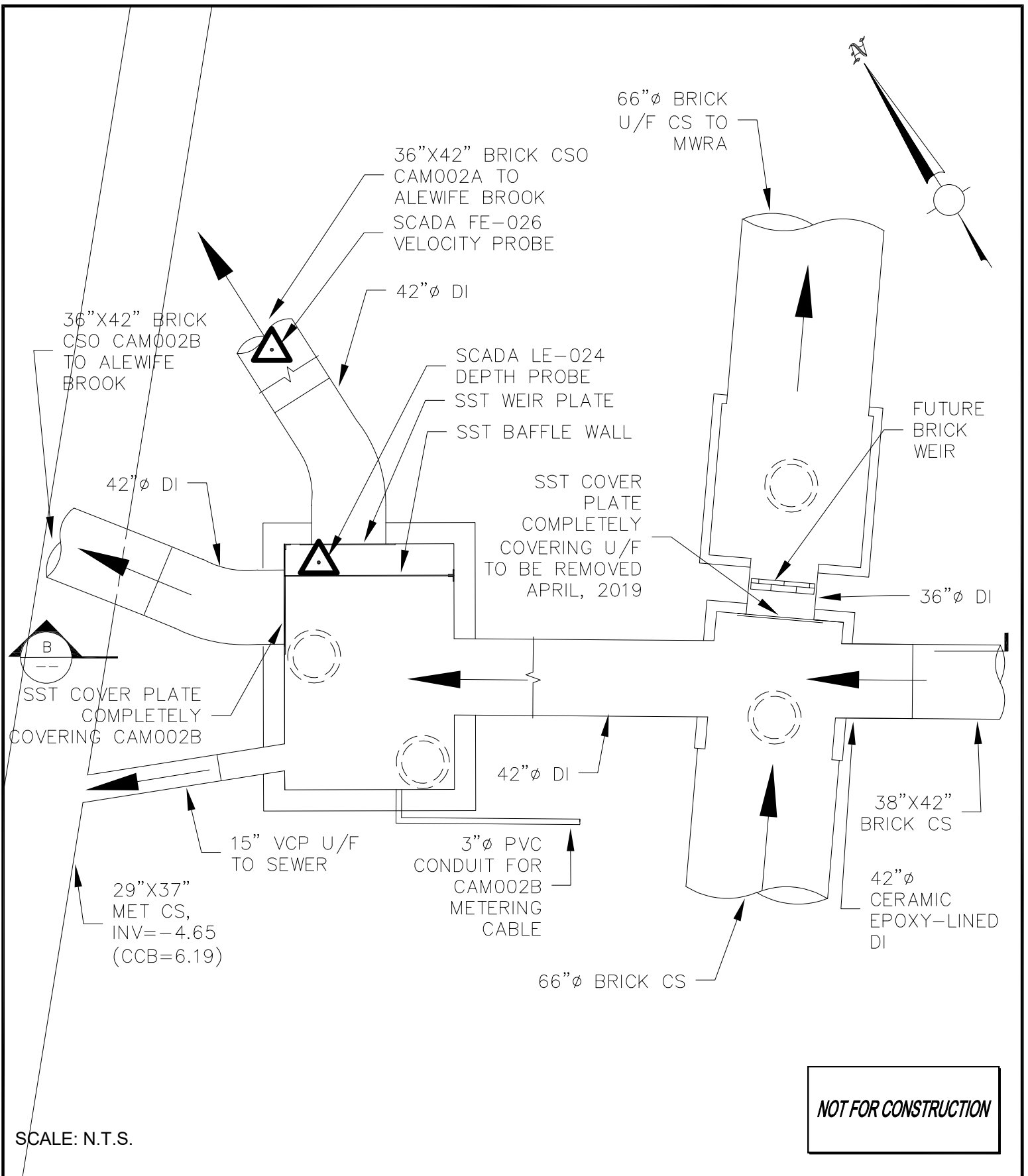
SECTION



NOT FOR CONSTRUCTION

SCALE: N.T.S.

CSO REGULATOR STRUCTURE CAM001 PROFILE



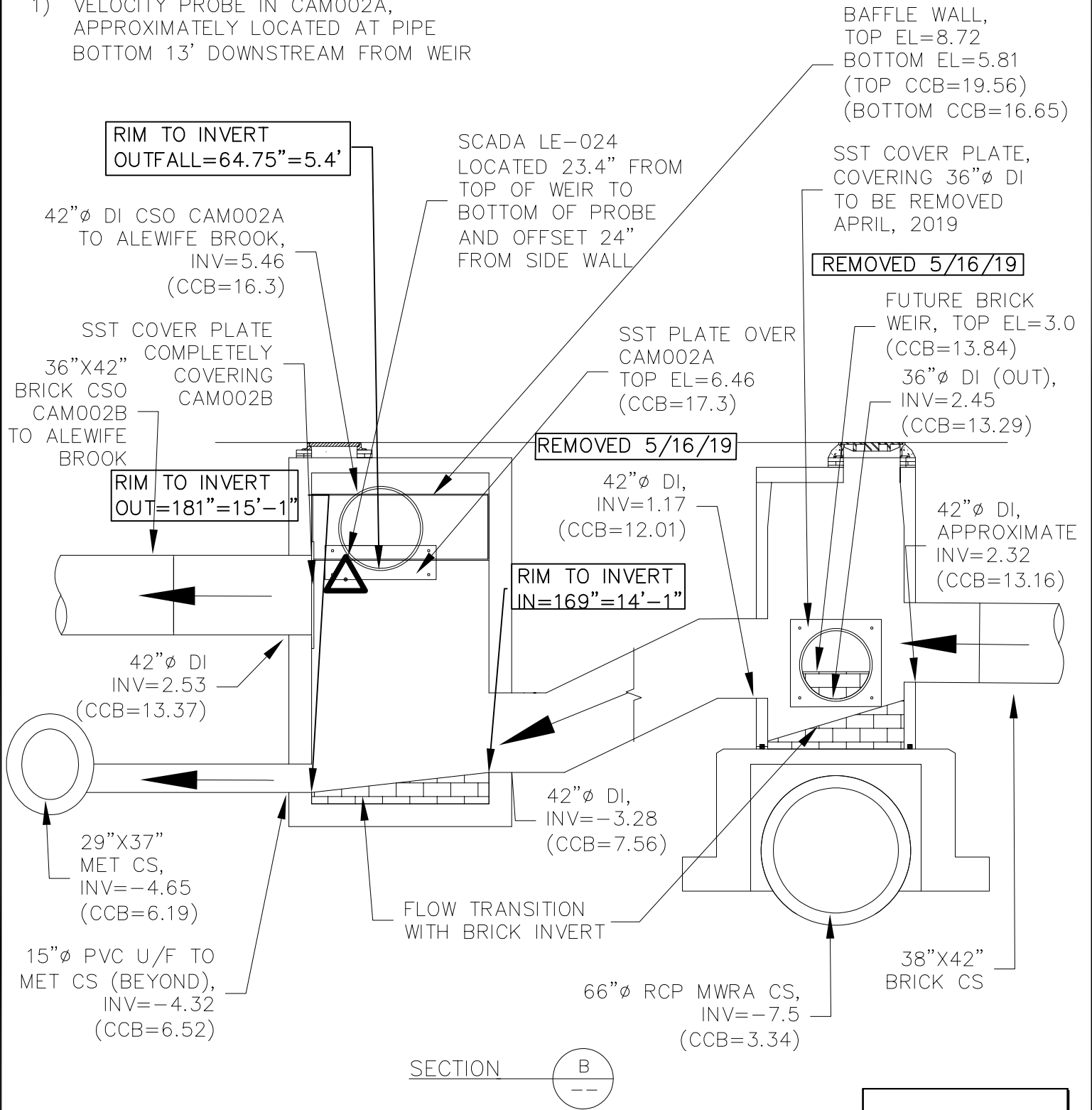
SCALE: N.T.S.

NOT FOR CONSTRUCTION

CSO REGULATOR STRUCTURE CAM002 PLAN

NOTES:

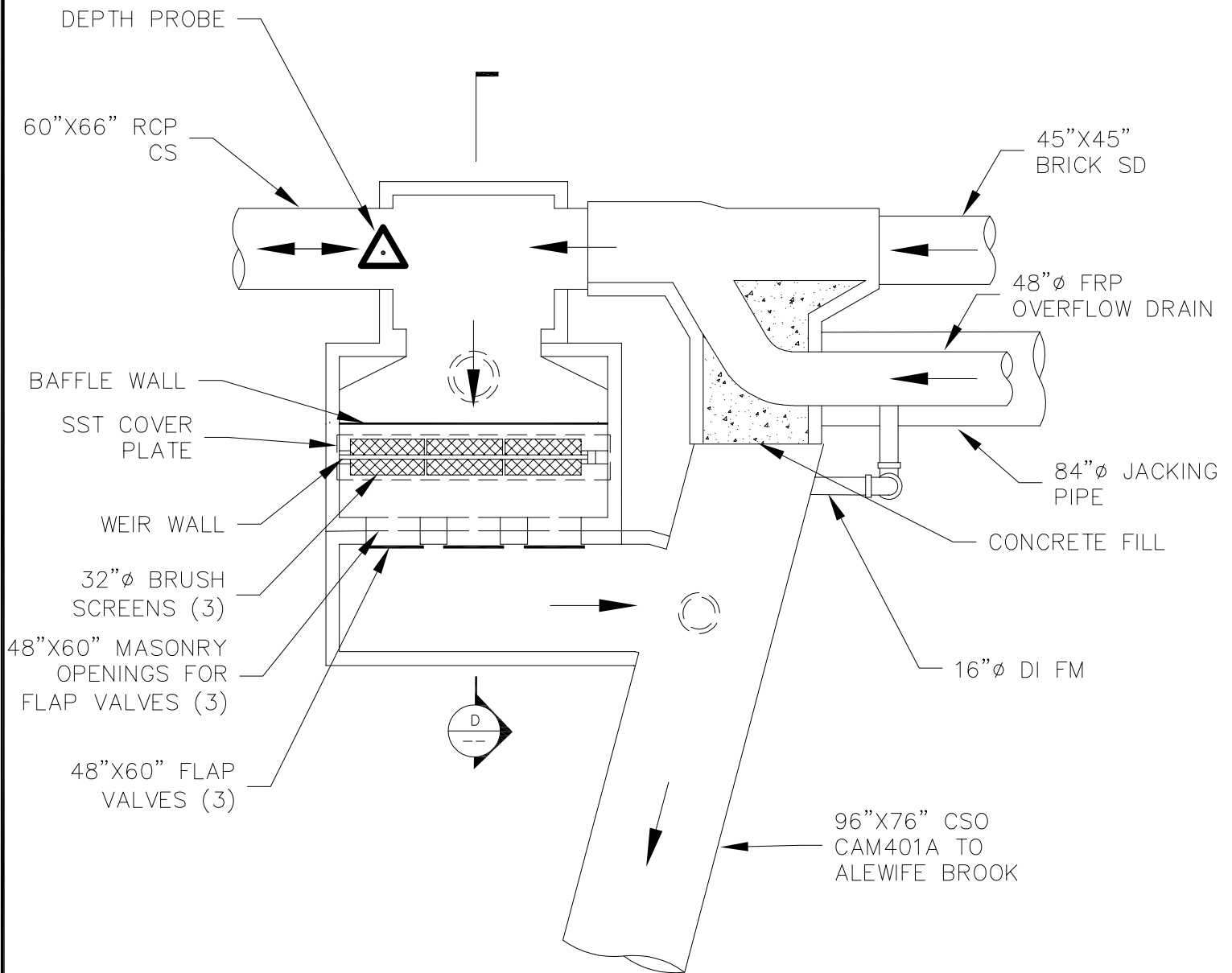
- 1) VELOCITY PROBE IN CAM002A, APPROXIMATELY LOCATED AT PIPE BOTTOM 13' DOWNSTREAM FROM WEIR



NOT FOR CONSTRUCTION

SCALE: N.T.S.

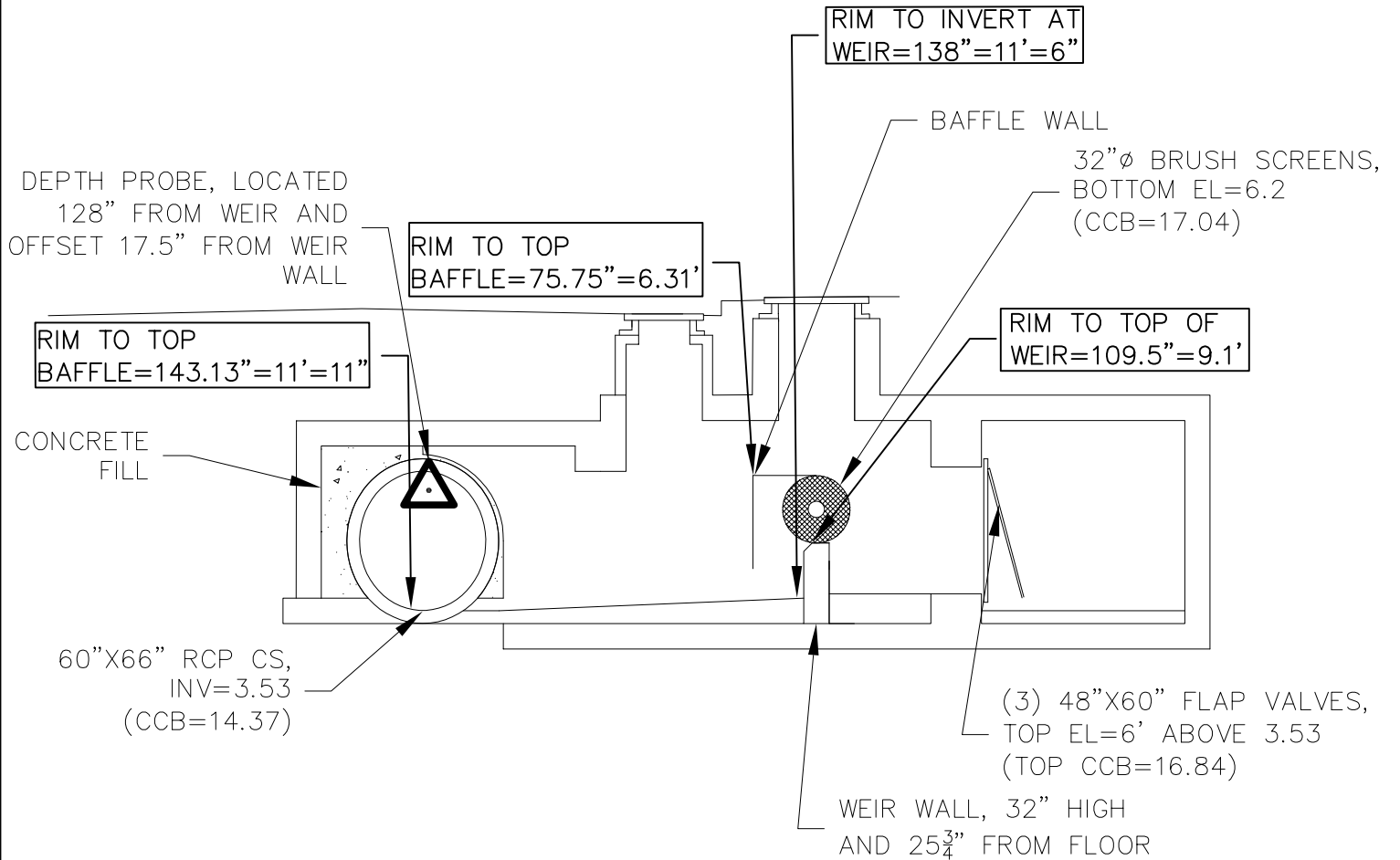
**CSO REGULATOR STRUCTURE
CAM002 PROFILE**



SCALE: N.T.S.

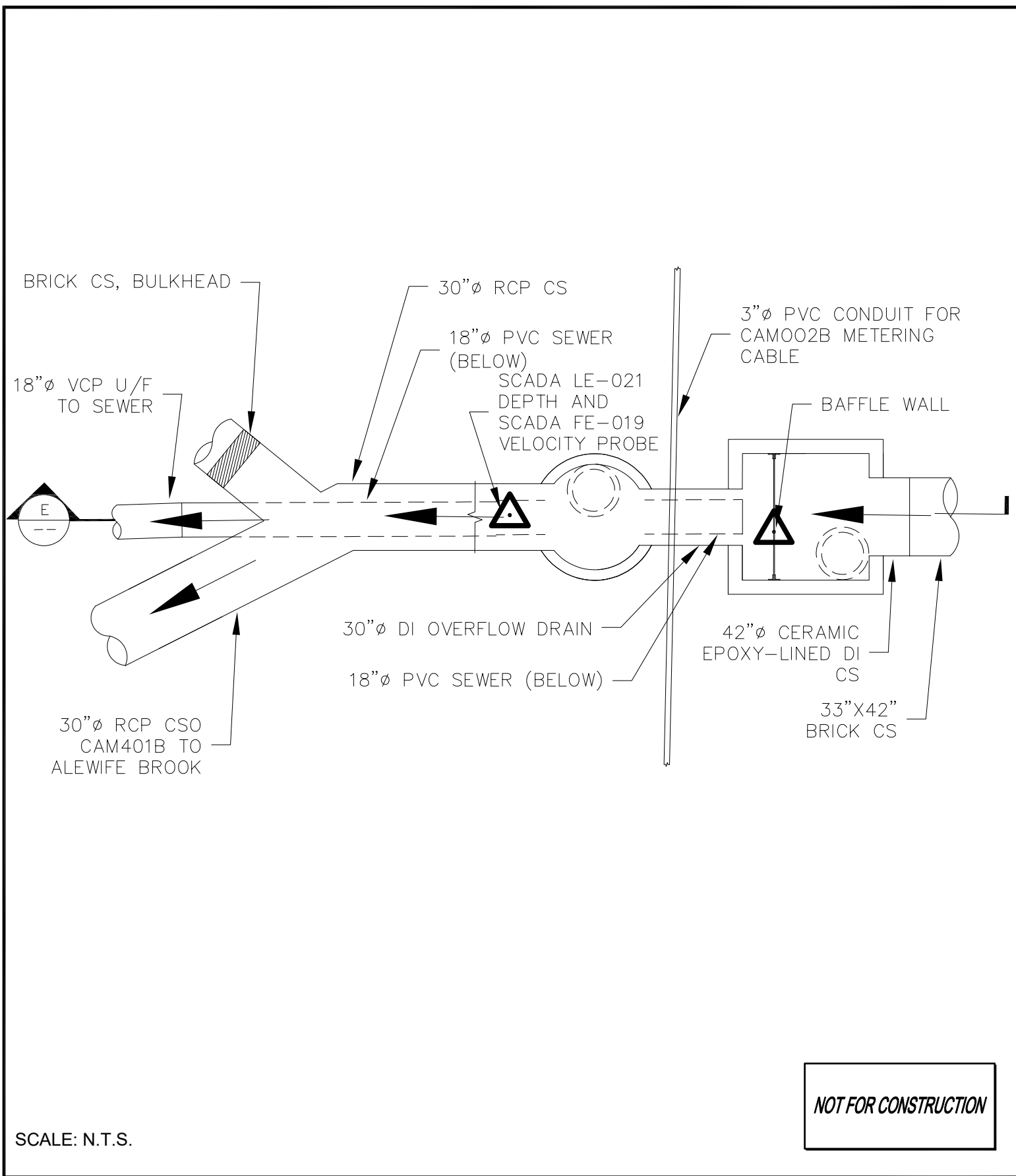
NOT FOR CONSTRUCTION

**CSO REGULATOR STRUCTURE
CAM0401A PLAN**

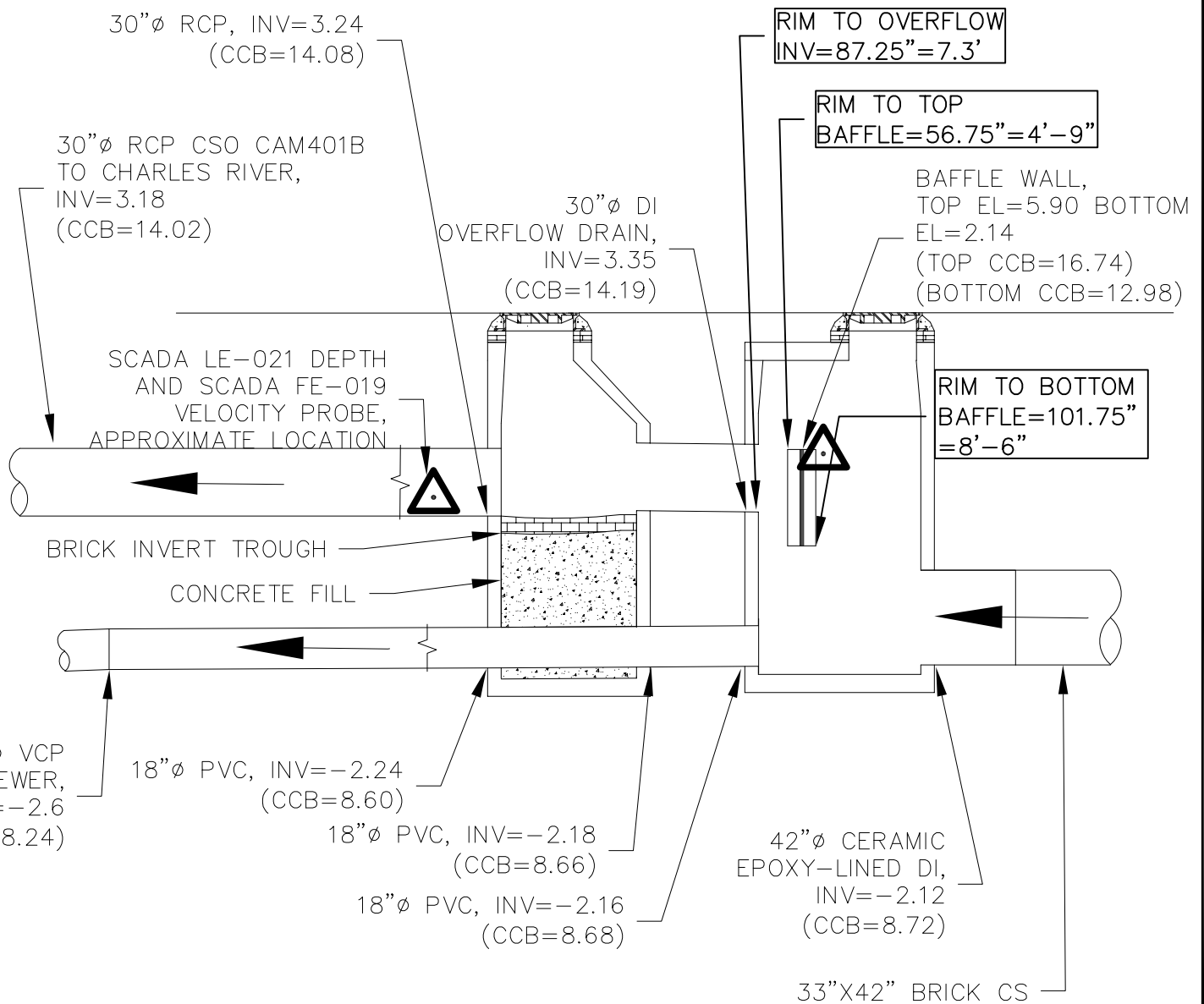


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**CSO REGULATOR STRUCTURE
CAM401A PROFILE**



**CSO REGULATOR STRUCTURE
CAM401B PLAN**

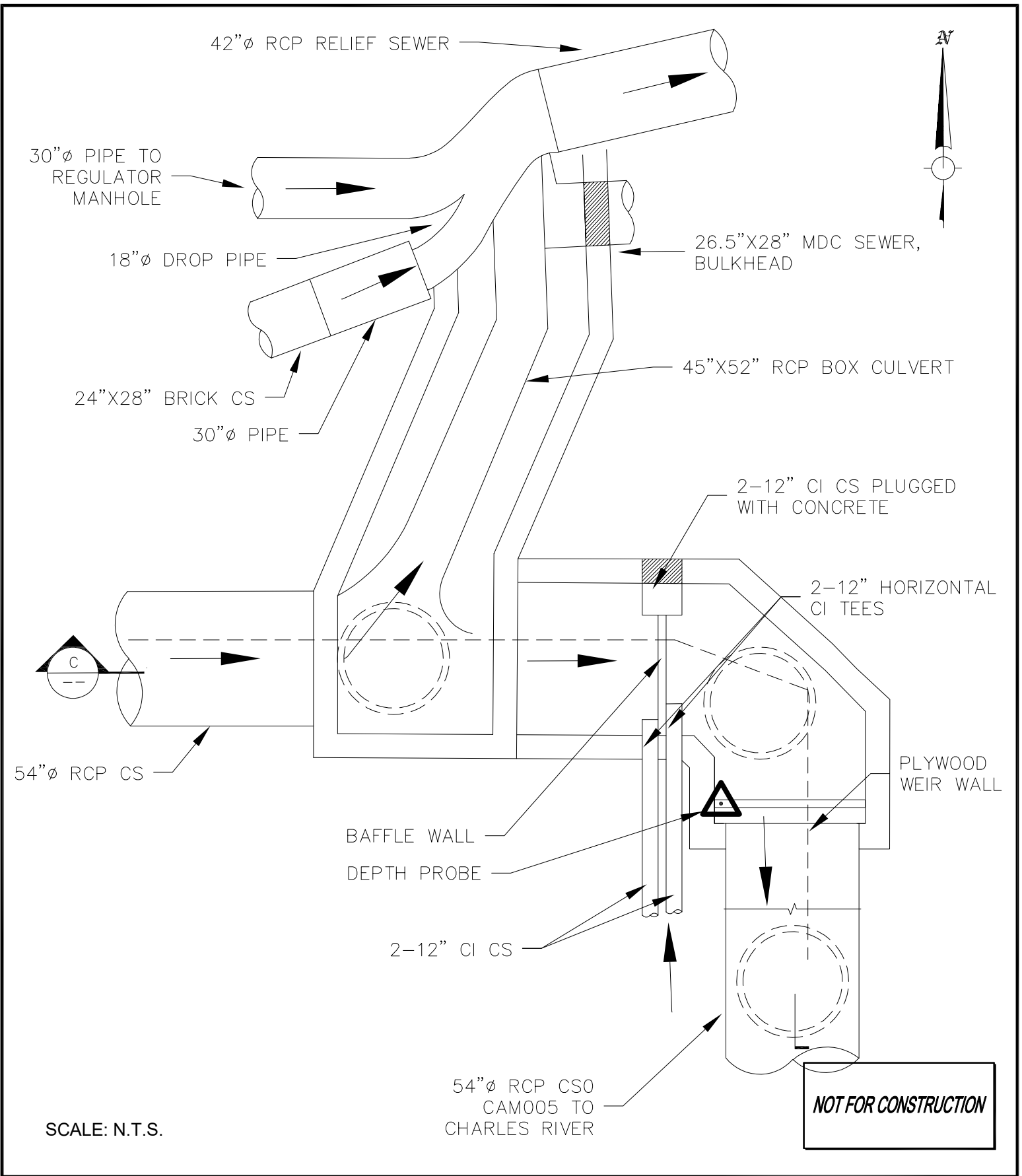


SECTION 

NOT FOR CONSTRUCTION

SCALE: N.T.S.

**CSO REGULATOR STRUCTURE
CAM401B PROFILE**



CSO REGULATOR STRUCTURE CAM005 PLAN

MH"A"RIM EL=
122.67" (MDC)

RIM TO WEIR TOP
MH"A"=171.25"=14.27'

RIM TO INVERT
MH"H'=211.75"=17'-8"

BAFFLE WALL,
BOTTOM EL=13.22
(CCB=24.06)

PLYWOOD WEIR WALL,
TOP EL=14.82*
BOTTOM EL=10.94*
(TOP CCB=25.66)
(BOTTOM CCB=21.78)

DEPTH PROBE,
LOCATED ON
WEIR WALL,
23.2" BELOW
TOP OF WEIR
WALL AND 5"
FROM WALL OF
CAM005

52"X45"RCP
BOX CULVERT

54"Ø RCP CS,
INV=10.94*
(CCB= 21.78)

54"Ø RCP CS,
INV=10.94*
(CCB=21.78)

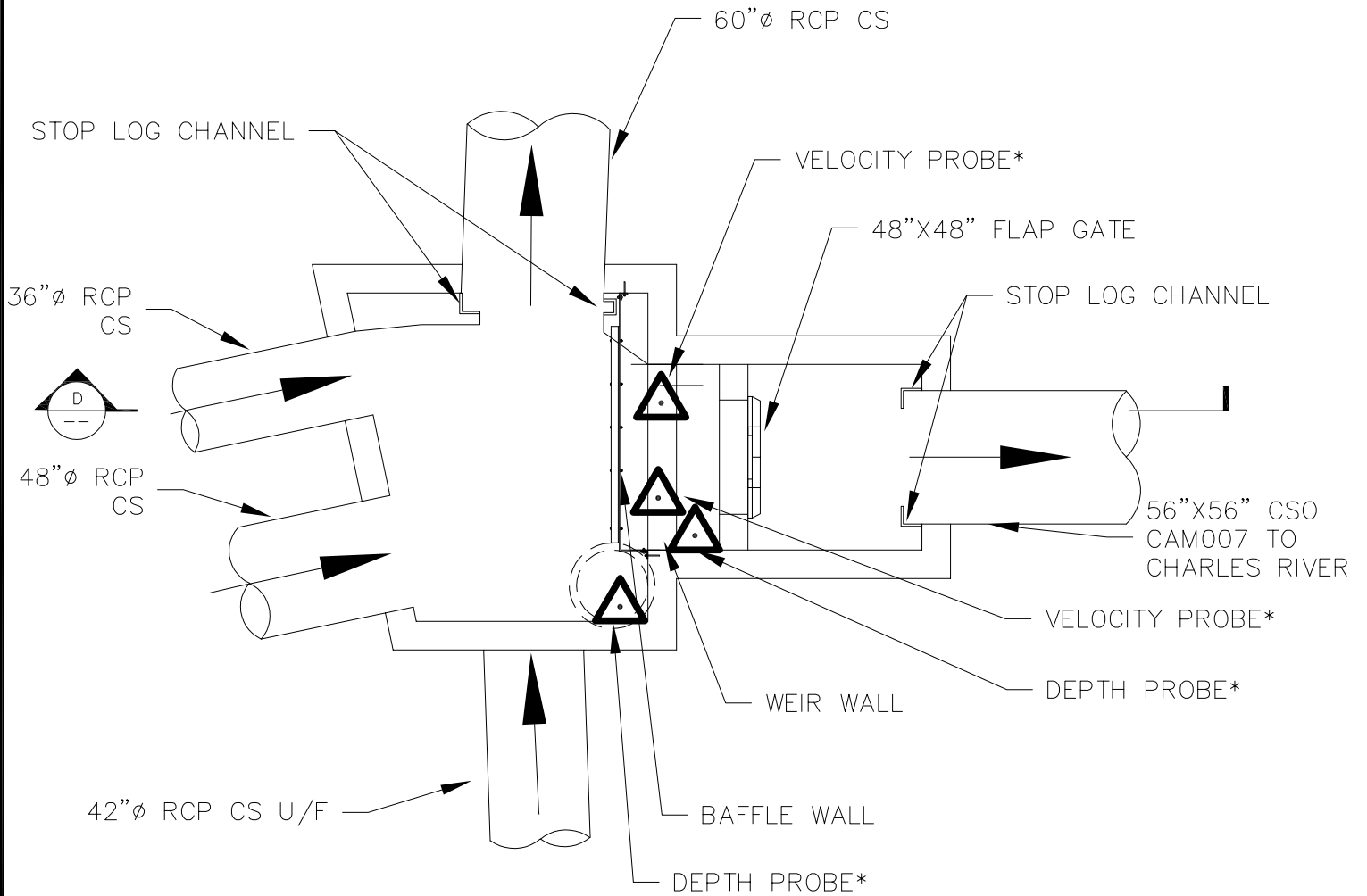
SECTION



NOT FOR CONSTRUCTION

SCALE: N.T.S.

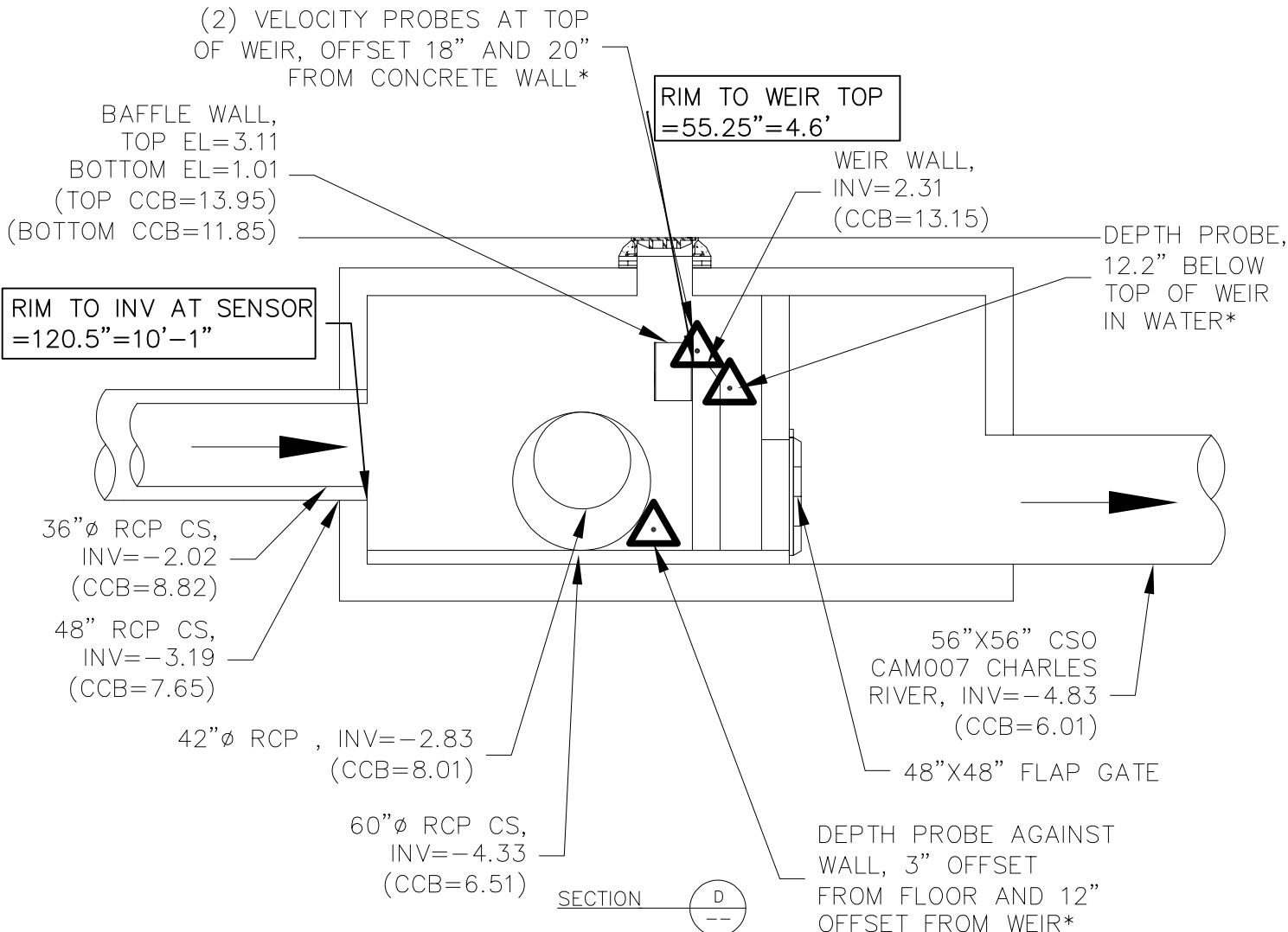
CSO REGULATOR STRUCTURE CAM005 PROFILE



NOT FOR CONSTRUCTION

SCALE: N.T.S.

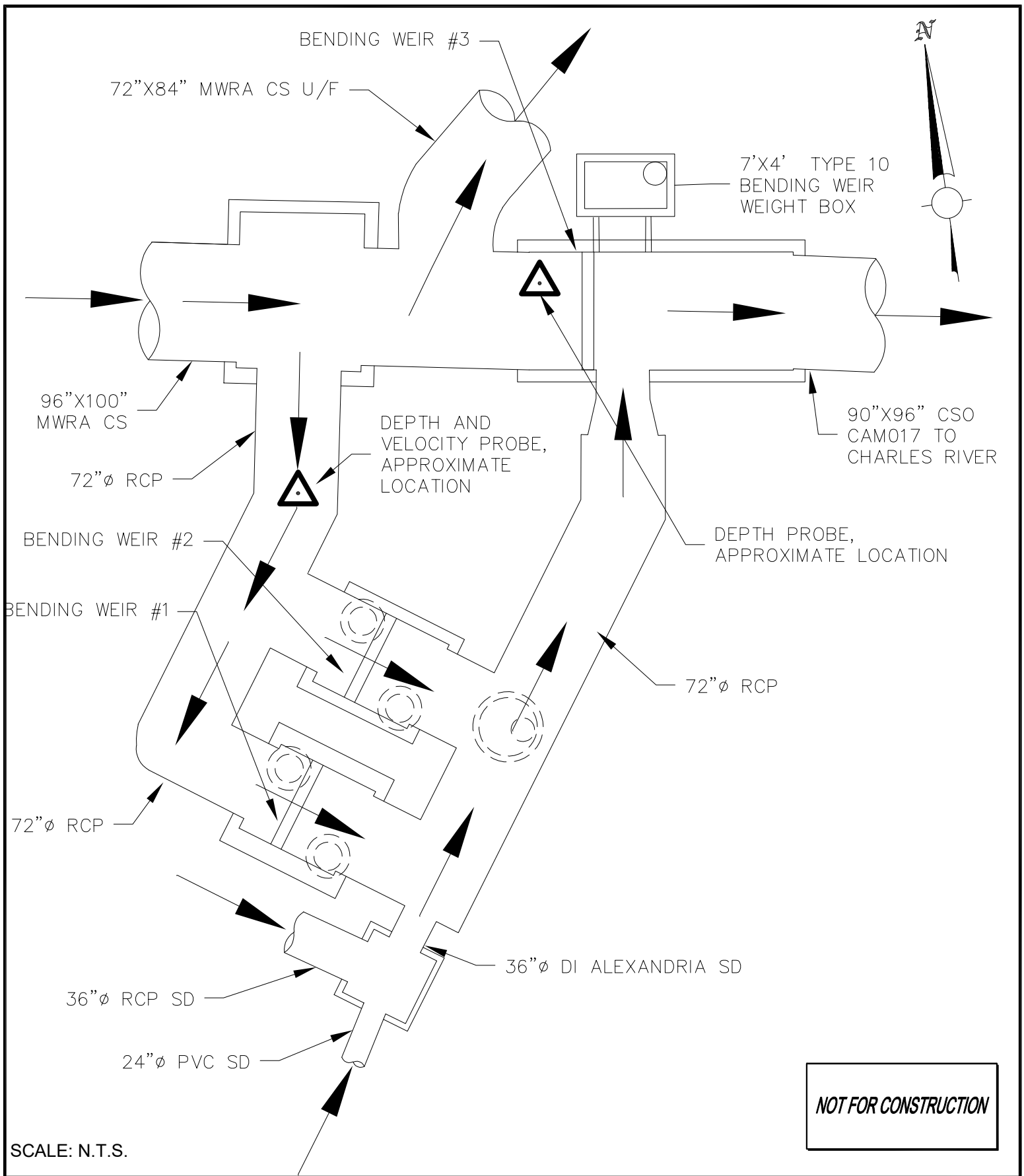
CSO REGULATOR STRUCTURE CAM007 PLAN



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SCALE: N.T.S.

**CSO REGULATOR STRUCTURE
CAM007 PROFILE**



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SCALE: N.T.S.

**CSO REGULATOR STRUCTURE
CAM017 PLAN**