Haverhill

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March 28, 2024

Enforcement and Compliance Assurance Division
U.S. EPA New England – Region 1 (Mail Code: 04-4)
5 Post Office Square
Boston, MA 02109-3912
Attn: Ms. Solanch S. Pastrana-Del Valle

Subject: City of Haverhill, MA NPDES Permit #MA 0101621
Consent Decree Submittal (Civil Action No. 16-11698-IT)
2023 Annual Combined Sewer Overflow Report

Dear Ms. Pastrana-Del Valle:

In accordance with Part I.F. 1 through 5 of the City of Haverhill's NPDES Permit and the Consent Decree item VII.M.51, we are providing this annual report for the 2023 calendar year.

If you require additional information, please call me at (978) 374-2382.

Sincerely,

Robert E. Ward
DPW Director

Enclosure

cc: Chief, Environmental Enforcement Section
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City of Haverhill

Department of Public Works
Wastewater Division

Annual Combined Sewer Overflow Report

Calendar Year 2023

NPDES Permit No. MA 0101621

Purpose

This report was prepared to meet the requirements of Part I, Section F (1 to 5) of the National Pollutant Discharge Elimination System (NDPES) Permit No. MA0101621 issued to the City of Haverhill by the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP). The permit authorizes the City to discharge stormwater/wastewater during wet weather from thirteen combined sewer overflow (CSO) outfalls located along the Merrimack and Little Rivers. The report also satisfies the requirements of Item VII.M.51 of the Consent Decree (Civil Action No. 16-11698-IT) between the United States Department of Justice, EPA, the Commonwealth of Massachusetts, and the City of Haverhill.

As required by the NPDES permit, this report includes:

- Locations of CSO outfalls
- A summary of activities and volumes
- Status and progress of CSO abatement work
- Contacts for additional information on CSO's and water quality
- Daily precipitation information, including total precipitation, peak intensity, and average intensity.
- Certification that monthly inspections were completed, results recorded, and records maintained.
- Information related to compliance with the Nine Minimum Controls (NMC)
- Information pertaining to each combined sewer overflow outfall including the monthly total volume discharged, the total duration of discharges for each month, and the monthly number of CSO discharge events.

The Consent Decree requires information related to each combined sewer overflow event for each outfall including date and time the overflow started and stopped, the volume of the overflow for each event, the amount of precipitation associated with each overflow event, the total volume discharged from each outfall for the year, and the total volume discharged for the year.

Certification Statement

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

Robert E. Ward
DPW Director
City of Haverhill

3/28/24
(date)

CSO Outfalls and Regulators

CSO discharges from the CSO outfalls are controlled by CSO regulator structures located upstream from the CSO outfalls. During dry weather, sanitary wastewater flow conveyed to CSO regulator structures is directed to the interceptor system and eventually to the WWTP for treatment. During wet weather events, the regulator structures divert the flow that exceeds the capacity of the downstream piping system from the collection system to a CSO outfall that discharges into the Little River or Merrimack River.

Haverhill currently has fifteen (15) CSO regulators/structures which are connected to thirteen active CSO outfalls. Of the thirteen (13) active outfalls, five (5) discharge to the Little River, and eight (8) discharge to the Merrimack River. As part of Haverhill's CSO abatement program, the City has closed thirteen CSO outfalls. Table 1 lists Haverhill's CSO outfalls and regulators along with their open or closed status and Figure 1 shows the outfall locations.

Two (2) CSO outfalls have two (2) regulator structures that discharge to them. High Street Diversion has regulator structures at Broadway and High Street, and Winter Street and Hale Street has regulator structures at Winter Street/Hale Street and Winter Street. Some of Haverhill's CSO outfalls and regulators also function as part of a flood protection system for the downtown area. Table 2 notes which outfalls and regulators are part of the flood control system.

During periods of high levels in the Merrimack River and Little River, five CSO regulator structures function as flood diversion structures. To provide flood protection and emergency relief to the collection system, sluice gates within the regulator structures close to divert flow from the collection system to the associated CSO outfall. Unless the city is under a river flood condition, these sluice gates remain fully open.

Table 1
CSO Outfalls and Regulators

NPDES Outfall ID	CSO Outfall Name	CSO Regulator Names (if more than 1)	Receiving Waters	Status
Upper Siphon System				
025	Beach Street		Merrimack River	Closed
024	Upper Siphon - Varnum Street		Merrimack River	Open
023	266 River Street		Merrimack River	Closed
022	Railroad Bridge		Merrimack River	Closed
Middle Siphon System				
021H	Winter Street and Hale Street	Winter Street at Hale Street (021H) Winter Street (021G)	Little River	Open
038	High Street Diversion	Broadway (037) High Street (038)	Little River	Open
021B	Emerson Street		Little River	Open
021E	Little River South (Locke Street South)		Little River	Closed
021M	Marginal Pump Station		Little River	Closed
021D	Little River North (Locke Street North)		Little River	Closed
021F	Center Barrel - Locke Street		Little River	Open
021A	Middle Siphon - Essex Street		Little River	Open
Lower Siphon System				
019	Main Street North		Merrimack River	Open
016	Fire Station		Merrimack River	Closed
040	Bethany Avenue		Merrimack River	Open
041	Chestnut Street		Merrimack River	Open
013	Lower Siphon - Buttonwoods Avenue		Merrimack River	Open
010	Boardman Street		Merrimack River	Closed
001	Bates Bridge		Merrimack River	Closed
Bradford System				
031	Front Street		Merrimack River	Closed
032	Bradford Avenue		Merrimack River	Open
033	South Prospect Street		Merrimack River	Closed
034	Middlesex Street		Merrimack River	Open
035	South Main Street		Merrimack River	Closed
036	Ferry Street		Merrimack River	Closed
039	South Webster St.	(042) Colby St./ Salem St.	Merrimack River	Open

FIGURE 1

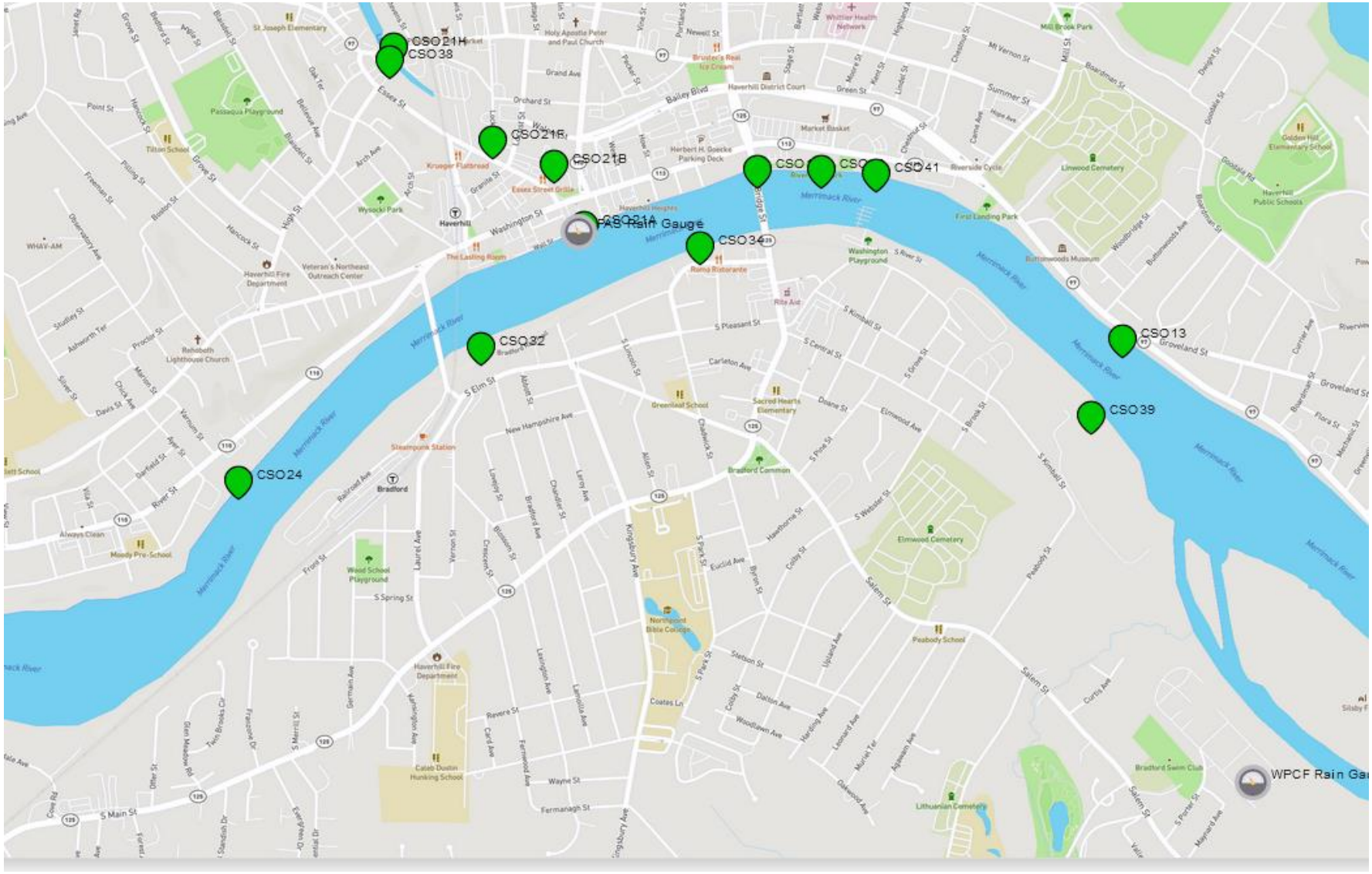
CSO21H
CSO38
CSO21E
CSO21B
CSO41
FAS Rain Gauge
CSO34
CSO32
CSO13
CSO39
CSO24
WPCF Rain Ga
Merrimack River
Haverhill
Bradford
Groveland St
S Main St

Table 2
CSO Outfalls and Regulators

Outfall ID	CSO Outfall Name	CSO Regulator Names (if more than 1)	CSO Monitoring and Volume Measurement Method
Upper Siphon System			
024	Upper Siphon –Varnum Street	Depth/Sluice Gate Opening - Orifice Equation	Depth/Sluice Gate Opening - Orifice Equation
Middle Siphon System			
021H	Winter Street and Hale Street (F)	Winter Street/Hale Street (021H) (F) Winter Street (021G) (F)	Depth at Weir Depth at Weir
038	High Street Diversion (F)	Broadway (037) (F) High Street (038) (F)	Depth at Weir Depth at Weir
021B	Emerson Street (F)		Depth at Weir
021F	Center Barrel - Locke Street		Depth at Weir
021A	Middle Siphon - Essex Street		Depth at Weir and Depth / Velocity in Outfall
Lower Siphon System			
019	Main Street North		Depth at Weir and Depth / Velocity in Outfall
040	Bethany Avenue		Depth at Weir and Depth / Velocity in Outfall
041	Chestnut Street		Depth at Weir and Depth / Velocity in Outfall
013	Lower Siphon – Buttonwoods Avenue		Depth/Sluice Gate Opening - Orifice Equation
Bradford System			
032	Bradford Avenue		Depth at Weir and Depth/Velocity in Outfall
034	Middlesex Street		Depth at Weir
039	South Webster Street	(042) Colby Street/ Salem Street	Depth at Weir and Depth/Velocity in Outfall

Note: (F) Indicates CSO regulators and outfalls used in the flood protection system.

CSO Discharge Monitoring

Since 2014, each of the City's CSO outfalls has been monitored by a depth measuring device at the weir and/or a depth/velocity meter in the CSO outfall pipe, as indicated in Table 2. All CSO regulators were monitored by a depth gauge located at the CSO weir (some are ultrasonic meters, and some have both ultrasonic and transducer gauge). Most of the CSO regulators also have a depth/velocity gauge in the CSO outfall (measuring the depth and velocity of the CSO flow through the outfall pipe).

The flow metering equipment is maintained by a contractor, Flow Assessment Services (FAS). FAS sends alert emails to Haverhill Wastewater Staff when CSOs start and stop. FAS is responsible for the analysis of the meter information to make sure accurate flow data is collected. Flow Data from FAS is sent to the City's Historian Database. Another third party contractor, Aquasight Inc, maintains the CSO Public website and will produce public notification emails when the Revised CSO Notification Plan is approved.

CSO flow computations at the CSO weir are estimated using a depth of flow over a weir calculation. The depth/velocity gauges utilize an area-velocity equation to estimate flow in the outfall pipe. In some cases, the depth/velocity meters could not be installed in the outfall pipe because flow measurements were hydraulically affected by river backwater conditions and/or downstream backwater gates (gravity flap gates).

As previously mentioned, two (2) CSO outfalls have two (2) regulators that share the outfall. To accurately record CSO volumes, flow is measured at each regulator structure. CSOs for the High Street Diversion (NPDES Outfall ID 038) outfall are measured and reported under Broadway 037 and the High Street 038 regulators. CSOs for the Winter Street and Hale Street (NPDES Outfall ID 021H) outfall are measured and reported under the Winter Street/Hale Street 21H and Winter Street 021G regulators.

CSO volumes at Upper and Lower Siphon outfalls are now calculated by the City using an orifice equation that reflects the typically surcharged (but variable) CSO gate opening. Each regulator has radar units record the depths in the influent sewer, downstream of the CSO gates (river conditions), and downstream of the flow inlet gate to the siphons (to evaluate the backwater condition of the Bradford Interceptor).

Working with CDM Smith, the City developed appropriate computations to calculate flow through the variable orifice sluice gate openings. The City uses these equations to calculate CSO volumes discharged at the Upper and Lower Siphon outfalls. CDM Smith added these flow calculations into the City's SCADA system in 2019. The City can now view real-time flows from Upper and Lower Siphons during storm events. The CSO gate positions are connected to the City's SCADA system. The CSO flow calculations are stored in HachWims Historian database that is queried to produce this annual report.

In November 2022, the City contracted with AutoMatech to acquire all Flow Assessment meter and rain gage data. In 2023 Automatech completed this task and the City finalized the HachWIMS CSO report. The City continued using an access program to verify the accuracy with the HachWIMS data and has concluded the report matches the Access Program. The City will use HachWIMS reporting software only in the next CSO annual report.

The City's CSO meters are a complex method to accurately record each CSO event. The City nor the City's vendor can guarantee 100% data communication between the meter and HachWims. The City can only report the available information. Errors or omissions will be documented to the best of our abilities.

April 26, 2023, the City's Historian database had a communication issue. This issue caused data from the City's Upper Siphon (CSO ID 24) and Lower Siphon (CSO ID 13) not to record data until May 3, 2023, at approximately 3:38 PM. The City's consultant Wright-Pierce and the City Water Treatment Manager diagnosed and fixed this problem.

2023 CSO Outfall Activations

Activation frequency and flow characteristics are measured by the FAS meters, as discussed above. FAS provides monthly and yearly flow data, including volume, from their meters. With the exception of the Upper and Lower Siphon Outfalls, FAS analyzes flow data on a monthly basis to assure that accurate flow

data is being measured and reported. For the Upper and Lower Siphons, the City uses the data downloaded from the SCADA system.

Table 3 summarizes the total CSO volume discharged and the number of activations for each outfall/regulator for 2023.

Table 3 CSO Summary by Regulator 2023

Outfall ID	CSO Name	Number of Activations	Total Volume (gals.)
13	Lower Siphon	10	22,141,637
19	Main Street North	3	667,646
021A	Middle Siphon	18	22,509,606
021B	Emerson Street	2	93,729
021F	Locke Street	45	12,147,753
021H	Winter/ Hale Street	27	7,002,737
24	Upper Siphon	11	13,867,626
32	Bradford Avenue	11	1,933,407
34	Middlesex Street	21	15,409,171
38	High Street	2	15,542
39	South Webster Street	14	390,449
40	Bethany Avenue	19	766,443
41	Chestnut Street	18	417,641
		Total	**97,363,387**

CSO volumes are dependent on rainfall amounts and intensity. During Calendar year 2022 the annual rainfall, at the Middle Siphon gauge, was 33.21 and the total CSO volume was 10.8 MG.

Appendix A shows the Date, rainfall, and CSO volumes for the days with CSO activations.

Appendix B provides information required by the City's NPDES permit, including monthly total flow, duration of overflow, and the number of discharges for the month.

Appendix C provides2023 CSO activation information required by the Consent Decree, including start and stop times, the amount of precipitation, and overflow volume.

2023 Precipitation

The City collects rain data using three (3) rain gauges: a tipping bucket rain gauge at the Wastewater Treatment Facility (WWTF) ASPW building, a NOAA supplied rain gage at the Lawrence Municipal airport and a tipping bucket rain gauge at the Marginal Pumping Station. The gauge at the Marginal Pumping Station is the closest gauge to eleven (11) of the CSO outfalls and their tributary areas. The other two (2) outfalls, 013 and 039, and their tributary areas are closer to the gauges at the WWTF.

The data from the tipping bucket rain gauge at the WWTF ASPW building, is connected to SCADA and HachWIMS and is automatically pulled into a report created by the City. This report summarizes total daily rain in inches and 15-minute peak rain intensities.

The tipping bucket rain gauge at the Marginal Pumping Station is owned and maintained by FAS. Rain data from this gauge, such as daily totals and 15-minute peak intensities, is transmitted to the FAS website where wastewater staff can view it at any time.

We are also including rain data from the nearest National Weather Station, which is located at the Lawrence Municipal Airport. The current location is elevation 149 feet, Latitude 42.7172° W, Longitude -71.1239° W.

The rainfall totals for 2023 for each gauge is shown in Table 4 along with annual average rainfall from the City's rainfall records. The 2023 monthly precipitation for January, March, May, June, July, August, and December, were significantly higher than the average for those months. The City's operator reported rain station was the **highest** on record since the city began recording totals in 1895.

Table 4 Annual Rainfall

Rain Gage Location	Total Annual Rain (in.)
Lawrence Municipal Airport National Weather Service	64.84
Tipping bucket rain gage at the Middle Siphon	58.50
Tipping bucket rain gage at the WWTF ASPW building	61.53
Operations staff rain gauge	64.78

Appendix D shows total daily rainfall (in inches), peak intensity (highest 15-minute sample multiplied by four to convert to inches per hour), storm duration, and average intensity. It should be noted that some storm durations continue overnight and into another day.

Haverhill's CSO Abatement Program

Since 2002, the city has been implementing its CSO Long Term Control Plan. Planning, design and construction has been completed for various projects aimed at reducing CSO Volumes and occurrences. To view the City's progress since 2002 please see the 2022 CSO Annual Report, available https://www.cityofhaverhill.com/departments/public_works_department/water_wastewater/wastewater/wastewater_collection_system/combined_sewer_overflows_(cso)/index.php

Locke Street Sewer Separation Project

Construction of the Locke Street Sewer Separation Project was completed in 2023, over $5.2-Million in funds spent.
. The project included:

- Montclair Road 750-feet of 8-inch PVC.
- Smiley Avenue 250-feet of 10-inch PVC.

- Manners Avenue 300-ft. 8-inch PVC
- Moore Street 450-ft. 18-inch PVC
- Maple Avenue 700-ft. 12-inch PVC
- Green Street 400-ft. 18-inch PVC
- Race Street 1,250-ft. 12-inch PVC
- River Street Drain Separation 220-feet 24-inch RCP

In 2023, the City continued to move forward with the preliminary design of the Locke Street Sewer Separation Project. The phase 1 design is complete and includes sewer separation with infiltration rehabilitation and upsizing the storm drains and outfalls for the 10-year, 24-hour design storm. The City is waiting for a grant of easement from MBTA railroad to begin Phase 1 construction. The City received an extension to begin construction of Phase 1 by June 30, 2025.

In June, the City completed a portion of Phase 1A Locke Street Sewer Separation project by including some storms drain and sewer separation work into the City's Phase III Water Main Project. The Water Main Replacement project is in the same corridor as the upcoming sewer separation phases. Existing drains have been replaced with a larger diameter pipe, necessary for future phases of sewer separation. This addition added more than $3 million to the project.

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Nine Minimum Controls (NMC)

The following is a summary of activities during the calendar year 2023 relating to compliance with the Nine Minimum Controls (NMC).

1. ***Proper operation and regular maintenance programs for the sewer system and CSO outfalls***

The City continued to use its Computerized Maintenance Management System (CMMS) CityWorks to track and manage the maintenance of their combined sewer system, including inspection and cleaning of sewers, drains, pumping stations, CSO regulators, and CSO outfalls.
Sewer segments with recurring problems are added on a preventative maintenance schedule in CityWorks.

The City continued to inspect its sewer pumping stations daily for stations with a flow greater than 100,000 gallons per day and weekly for all the other stations. The City completes preventive maintenance quarterly at each of the stations. Collection system personnel perform monthly inspections of the CSO regulators and outfalls. In addition, CSO regulators are monitored by flow meters that notify wastewater staff when activations occur.

2. ***Maximize the use of the collection system for storage***

The City's CSO regulators are controlled by weirs and by automatically controlled sluice gates at the Upper and Lower Siphon CSO structures. Weirs at the regulators have been raised periodically to reduce CSO discharges based on recommendations in the LTCPs. The City has closed thirteen (13) CSO outfalls, which effectively increases the use of the collection system for wet weather storage.

The automated real-time control system (instrumentation, depth monitoring, and modulated flow control

gates operated by automated programming) installed at the Upper and Lower Siphon CSO structures is designed to utilize the interceptor storage upstream of each regulator structure to allow more flow from the Middle CSO to be conveyed to the Bradford Interceptor, and ultimately to the WWTF, to maximize the use of interceptor storage for wet weather flows and to reduce CSO discharges. The City continued to fine-tune this real-time flow control system to optimize the use of the interceptor piping system for wet weather storage.

3. ***Review and modification of pretreatment program to assure CSO impacts are minimized***

The Industrial Pretreatment Program (IPP) was established to help minimize the impacts of discharges in the combined sewer system from non-domestic sources during wet weather events. The IPP Coordinator monitors significant industrial users (SIU) that discharge to the City's sewer system.

The City's sewer use ordinance prohibits any discharge to the collection system that may be detrimental to the wastewater treatment process or the receiving water. These regulations establish limits for pollutant loads that can be discharged to the sewer system. All industrial discharges to the City's sewer system are required to adhere to the requirements of the City's IPP Program. Inspections of these dischargers are performed by City staff.

The WWTP influent fats, oil, and grease (FOG) has decreased significantly since the improvements to its IPP program. Since FOG loadings have been reduced, WWTP staff have been able to maintain low secondary blanket levels and exceptional sludge settling.

The IPP Coordinator continues to maintain the FOG program via annual inspections. These inspections include checking pump out receipts of all grease traps and interceptors, inspecting and measuring FOG using a modified sludge judge in all the grease traps and interceptors, ensuring owners have the proper maintenance schedules and ensuring proper waste grease disposal. The City hired a contractor to inspect all food service establishments using the procedures and protocols established by the IPP Coordinator. These inspections continued through 2023. To date, FOG has significantly decreased in both the collection system and in the\ influent flow to the WWTP.

In 2018, the City hired Hoyle and Tanner to review and revise the City's Local Limits. A sampling plan was submitted to EPA and approved by EPA. The Local Limits study was completed by Hoyle and Tanner in June of 2021 and was submitted to the EPA. EPA has completed their review of the Local Limit Study and the City anticipates to present the study to Council for approval in the next reporting period

The City implemented a new permitting software (ViewPoint) for all business occupancy permits, site plan applications, and wastewater discharge permits. Wastewater employees (currently the Collection System Supervisor and Pretreatment Coordinator) review applications and issue permits as applicable. This system allows the City to improve tracking of wastewater discharged to the City's collection system.

4. ***Maximization of flow to the publicly owned treatment works (POTW) for treatment.***

The City continues to implement measures to maximize flow to the WWTP, including raising weirs and adding CSO control gates that will allow real-time control to reduce CSO discharges. WWTP staff prioritize the maintenance and repair of equipment at the plant and South Mill Street Pumping Station to maximize flow to the plant during wet weather. For example, staff monitor the influent pumps at South Mill Street Pumping Station, perform scheduled preventative maintenance, and perform any needed corrective maintenance on the pumps as a high priority.

As discussed in NMC #1, a contractor hired by the City cleaned and inspected the Middle Siphon Interceptor at Lock Street, the Middle Siphon, Upper Siphon, and the Bradford Interceptor and removed all debris and obstructions in the pipes. WWTP staff operate and maintain the plant process to ensure the plant is capable of maximizing wet weather flow and treatment during wet weather.

The city has implemented artificial intelligence software that assists operations with important process decisions that help maximize flow to the WWTP.

In 2023, the City along with its consultant Wright-Pierce, developed a secondary treatment/South Mill Pumping Station upgrade project evaluation. Maximizing flow to the treatment plant is considered with all upgrade recommendations. Piping replacement is planned for the station and the pump condition will be assessed. Total estimated construction cost for the project is approximately $58 million with more than $6 million in South Mill Pumping station upgrades.

5. ***Prohibition of CSOs during dry weather overflows***

Dry weather overflows (DWOs) from the CSO discharge outfalls are prohibited under the NPDES permit. Wastewater staff inspect all the CSO outfalls/regulators monthly. As discussed previously in this report, CSO regulators are continuously monitored. If there is a CSO activation during dry weather, collection system operators are dispatched to investigate and resolve the issue as quickly as possible. In2023there were no known dry weather overflows.

6. ***Control of solid material and floatable materials in CSOs***

Under the Wet Weather System Maximization/CSO Structure Modifications project, the City is maximizing its capture of wet weather flow for eventual treatment at the WWTP, which maximizes floatables control. The City has also raised weirs to capture more wet weather flow, and floatables in the first flush, during storm events.

As part of the Integrated LTCP, CDM Smith evaluated other potential solids and floatables controls options that could be implemented at the CSO regulators. It was determined that there are no cost-effective approaches to capturing solids and floatables at the City's CSO regulators for a variety of reasons including the constrained space within the regulators to install new screens, trash racks, or baffles, the lack of available land (most of the outfalls are situated directly on the river with no reasonable room for inline screens along the outfall pipe), and river/flow conditions that would preclude outfall technologies (like booms or netting systems).

The City relies on regular cleaning of catch basins and street sweeping near CSO regulators as a preventive measure for the reduction of grit and floatables to its combined system and receiving waters. The City is increasing the frequency of catch basin cleaning and street sweeping, which will improve its floatables capture.

In 2023, the City continued its catch basin cleaning program. An outside contractor cleaned approximately 2500 catch basins, and about 100 catch basins were cleaned in-house. The City removed approximately 400 tons of debris, some of which are floatables, at an approximate cost of $90,000. The City also uses its Vac-truck to clean debris from the sewer system and budgets $60,000 annually for street sweeping.

7. *Pollution prevention programs to reduce contaminants in CSOs*

Haverhill has adopted City ordinances that prohibit litter and debris from being deposited on the street and within the watershed areas. The City also performs regular cleaning of catch basins and street sweeping as a preventive measure for the reduction of pollutants into the combined system. Additionally, the FOG program already discussed in this document helps minimize pollutants in the City's CSOs.

The City has created brochures, including stormwater pollution prevention for residents, FOG education for residents, FOG education for businesses, pet waste education, and education about flushable wipes for residents. These brochures are located on the City's website and available to the public at multiple City-owned buildings. Flyers are also distributed to problem areas.

The City also holds household hazardous waste collection days twice a year, waste oil drop-offs once a month, curbside leaf/grass pickups twice a year, and electronics recycling twice a year. The City also operates a recycling and yard waste facility at the Highway garage.

8. *Public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts.*

The City maintains a CSO webpage on the City's website to provide information about CSOs to the public. The web page also has links to prior years CSO reports.

Within 2 hours of the discovery of a CSO occurrence, an email notification is sent to downstream communities, local Boards of Health, Harbor Masters, local drinking water authorities and any members of the public who subscribe to the notifications. Appendix D shows the current list of those notified within 2 hours of the discovery of a CSO occurrence.

Each of Haverhill's CSO outfalls has signage that identifies the CSO outfall in English and Spanish.

In 2023, the city submitted a revised CSO notification plan, which was reviewed by MaDEP. The Revised Notification Plan will be advertised for public comment in the next reporting period and will be made final. The updated plan includes a CSO Impact Study performed by CDM. The plan also features real time notifications and preliminary CSO volumes displayed on a map on the city's website. The CSO map can be viewed at the site below:
https://external.aquasight.io/bc4d3929-4468-4122-921f-e65b6b232476/cso-notification?selectedClient=chh_us&selectedCommunity=chh_ma_us

9. *Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls.*

In 2014, the City contracted with a flow metering company to install and maintain depth and depth/velocity meters at each of its CSO regulators. This program is discussed previously in this report. The flow monitoring program continued throughout 2023.

End of Report

APPENDIX A

APPENDIX A SUMMARY OF CSO ACTIVATIONS

							Upper Siphon		MIDDLE SIPHON SYSTEM					LOWER SIPHON SYSTEM				BRADFORD SYSTEM			
	Lawrence Airport Rain Gauge		Middle Siphon Rain Gauge		WWTF Rain Gauge			Upper Siphon	Middle Siphon	Emerson Street	Locke Street	Winter Hale Street	High Street	Lower Siphon	Main Street	Bethany Avenue	Chestnut Street	Bradford Avenue	Middlesex Street	South Webster	TOTAL
Date	Total Rain (in)	Peak Rain (in/hr)	Total Rain (in)	Peak Rain (in/hr)	Total Rain (in)	Peak Rain (in/hr)	Max Flow WWTF (mgd)	24	021A	021B	021F	021H	38	13	19	40	41	32	34	39	
1/12/2023	0.42	0.15	0.44	0.36	0.46	0.12	56.25		0	0	18,243		0		0	0	0	0	0	0	18,243
1/13/2023	0.16	0.06	0.14	0.24	0.2	0.08	60.44		0	0	2,288		0		0	0	0	0	0	0	2,288
1/25/2023	0.47	0.13	0.67	0.36	0.57	0.12	57.65		0	0	55,063		0		0	0	0	0	0	0	55,063
1/26/2023	0.68	0.21	0.72	0.36	0.86	0.16	63.74		33,965	0	363,823	434	0	36,151	0	0	0	0	35,240	0	469,613
3/14/2023	2.26	0.23	2.76	0.36	1.93	0.08	60.52		958,965	0	717,299		0	52,822	0	0	0	0	613,378	0	2,342,464
4/1/2023	0.51	0.15	0.58	0.6	0.82	0.08	61.09		0	0	50,187		0		0	0	0	0	0	0	50,187
4/23/2023	1.33	0.17	1.47	1.44	0.12	0.08	54.41		0	0	59,997	493	0		0	347	1,250	0	0	0	62,087
4/30/2023	2.09	0.45	3.15	1.8	0		63.58	1,096,734	2,703,691	0	1,062,816	695,274	0	2,737,739	0	29,816	20,285	187,316	2,005,983	48,465	10,588,119
5/1/2023	0.55	0.37	0.2	0.72	0		64.14	227,322	1,175,941	0	586,962	188,517	0	1,147,135	0	5,937	6,778	51,215	556,441	26,920	3,973,168
5/2/2023	0.49	0.12	0.31	0.24	0		54.6		0	0	2,302		0		0	0	0	0	0	0	2,302
5/20/2023	1.36	0.29	1.33	0.6	0.76	0.12	60.32		0	0	147,448		0		0	0	0	0	0	0	147,448
6/2/2023	0.31	0.18	0.49	0.72	0.35	0.08	58.88		0	0	47,892	5,941	0		0	0	0	0	0	0	53,833
6/10/2023	0.25	0.2	0.62	2.04	0		62.89		302,736	0	90,493	290,569	0		0	87,823	32,962	0	79,403	4,444	888,430
6/12/2023	0.13	0.13	0.36	1.2	0.02	0.04	16.31		0	0	37,622	64,993	0		0	5,236	1,128	0	2,889	0	111,868
6/14/2023	0.69	0.17	0.42	0.96	0		62.44		0	0	49,448		0		0	0	0	0	0	0	49,448
6/17/2023	0.89	0.19	1.07	0.48	0.05	0.04	65		0	0	103,806		0		0	0	0	0	0	0	103,806
6/26/2023	0.42	0.32	0.61	1.92	0.06	0.08	63.59	50,670	394,681	0	174,601	124,993	0	177,971	0	10,979	6,521	21,559	107,622	7,774	1,077,371
6/27/2023	0.62	0.61	0.53	1.92	0.16	0.44	58.72		333,851	0	128,233	127,639	0		0	11,101	13,889	11,535	40,399	7,465	674,112
6/28/2023	0.29	0.05	0.5	1.08	0.74	0.6	58.25		0	0	37,729		0		0	12,826	2,799	0	0	97	53,451
7/2/2023	0.76	0.18	1.08	0.96	1.22	0.32	63		43,747	0	145,566	73,132	0		0	0	0	0	6,170	0	268,615
7/3/2023	0.56	0.28	0.47	0.96	0.61	0.64	63.9		0	0	69,073	11,128	0		0	0	0	0	0	0	80,201
7/14/2023	0.67	0.42	0.43	1.2	0.58	0.36	61.5		0	0	59,802	25,764	0		0	5,736	3,153	0	2,948	0	97,403
7/16/2023	0.57	0.11	0.81	1.08	1.17	0.28	59.67		0	0	35,441	15,625	0		0	5,427	0	0	0	0	56,493
7/21/2023	1.49	0.86	0.89	3	1.06	0.88	65	12,809	320,007	0	225,285	200,333	0		1,264	48,149	29,094	0	120,031	6,330	963,302
7/29/2023	4.73	1.03	1.59	3.12	1.61	1.08	65		947,802	0	342,611	321,302	0		0	68,108	44,611	75,271	390,330	24,003	2,214,038
8/8/2023	6.35	2.06	4.62	3	4.2	0.88	65	6,469,774	8,167,160	93,597	3,729,063	2,564,510	15,108	7,975,776	586,111	212,354	103,361	1,128,924	6,052,056	117,962	37,215,756

APPENDIX A SUMMARY OF CSO ACTIVATIONS

							Upper Siphon		MIDDLE SIPHON SYSTEM					LOWER SIPHON SYSTEM				BRADFORD SYSTEM			
	Lawrence Airport Rain Gauge		Middle Siphon Rain Gauge		WWTF Rain Gauge			Upper Siphon	Middle Siphon	Emerson Street	Locke Street	Winter Hale Street	High Street	Lower Siphon	Main Street	Bethany Avenue	Chestnut Street	Bradford Avenue	Middlesex Street	South Webster	TOTAL
Date	Total Rain (in)	Peak Rain (in/hr)	Total Rain (in)	Peak Rain (in/hr)	Total Rain (in)	Peak Rain (in/hr)	Max Flow WWTF (mgd)	24	021A	021B	021F	021H	38	13	19	40	41	32	34	39	
8/10/2023	1.82	1.13	1.34	2.16	1.93	0.76	65	2,328,880	1,845,781	0	1,358,767	532,566	0	2,646,914	0	46,858	31,073	116,045	1,664,799	60,385	10,632,068
8/11/2023	.03	.03	.00	.00	.09	.08	65.00	446,266	0	0	0		0		0	0	0	0	0	0	446,266
8/15/2023	0.72	0.16	0.71	0.48	0.87	0.2	63.28		0	0	63,615		0		0	0	0	0	0	0	63,615
8/18/2023	1.86	1.45	1.36	2.52	2.4	1.56	65	1,234,191	1,652,733	0	350,118	485,333	0	4,005,753	80,271	112,712	79,413	279,990	1,600,760	54,257	9,935,531
8/24/2023	0.12	0.11	0.31	0.24	0.11	0.08	18.35		0	0	9,066		0		0	0	0	0	0	0	9,066
8/25/2023	1.15	0.24	0.65	0.48	1.08	0.16	62.13		0	0	25,809		0		0	0	0	0	0	0	25,809
8/29/2023	0.08	0.08	0.31	0.72	0.03	0.08	17.41		0	0	23,028		0		0	0	0	0	0	0	23,028
8/30/2023	0.55	0.14	0.64	2.88	0.86	0.44	65	161,277	271,837	132	153,406	287,740	434		0	54,663	15,236	3,267	32,813	6,292	987,097
9/8/2023	0.49	0.47	0.39	1.56	0.39	0.52	65		0	0	35,392	20,705	0		0	3,583	983	0	5,448	0	66,111
9/10/2023	0.29	0.12	0.38	0.24	0.41	0.12	42.96		0	0	976		0		0	0	0	0	0	0	976
9/11/2023	0.55	0.17	0.77	0.6	0.6	0.16	61.58		0	0	53,552		0		0	0	0	0	0	0	53,552
9/18/2023	2.69	0.55	3.02	1.32	2.56	0.28	65	1,281,223	1,627,424	0	602,257	339,260	0	1,888,662	0	25,618	15,372	14,438	613,823	10,854	6,418,931
9/19/2023	0.29	0.27	0.05	0.24	0.28	0.24	65		98,701	0	56,625	5,094	0		0	0	0	0	35,111	0	195,531
10/21/2023	1.18	0.33	1.09	0.36	1.09	0.12	59.69		0	0	19,319		0		0	0	0	0	0	0	19,319
11/22/2023	1.71	0.29	1.56	0.36	1.96	0.12	64.27		0	0	51,903	979	0		0	0	0	0	0	0	52,882
11/27/2023	0.44	0.19	0.37	0.36	0.52	0.12	58.1		0	0	21,396		0		0	0	0	0	0	0	21,396
12/10/2023	0.93	0.22	0.77	0.6	0.85	0.12	62.25		0	0	22,986	3,878	0		0	0	0	0	0	0	26,864
12/11/2023	1.52	0.31	1.34	0.6	1.74	0.16	64.89		124,646	0	216,448	35,646	0		0	0	0	0	70,635	0	447,375
12/17/2023	0.46	0.18	0.43	0.6	0.33	0.08	60.32		0	0	27,306	4,882	0		0	0	0	0	0	0	32,188
12/18/2023	3.04	0.66	1.82	2.16	2.35	0.08	65	558,480	1,505,938	0	712,691	576,007	0	1,472,714	0	19,170	9,733	43,847	1,372,892	15,201	6,286,673
								13,867,626	0 22,509,606	93,729	12,147,753	7,002,737	15,542	0 22,141,637	667,646	766,443	417,641	0 1,933,407	15,409,171	390,449	97,363,387
							Number of Activations for the Year	11	18	2	45	27	2	10	3	19	18	11	21	14	

APPENDIX B

APPENDIX B – CSO MONTHLY ACTIVATIONS

		UPPER SIPHON SYSTEM		MIDDLE SIPHON SYSTEM								LOWER SIPHON SYSTEM					BRADFORD SYSTEM		
							Outfall 21H		Outfall 38										
Monthly Parameters	Outfall#	024		021A	021B	021F	021G	21 H	037	038		013	019	040	041		032	034	039
	CSO Outfall Name	Upper Siphon		Middle Siphon	Emerson St.	Locke St	Winter St.	Winter St. Hale St.	Broadway	High St.		Lower Siphon	Main St. North	Bethany Ave.	Chestnut St.		Bradford Ave.	Middlesex St.	South Webster
	Latitude	42.76683934		42.77306431	42.77457	42.77514354		42.77745193		42.77723		42.77022981	42.7745168	42.7745118	42.7684245		42.7701213	42.7725814	42.7684245
	Longitude	71.09305991		71.07831599	71.083	71.08499858		71.08832429		71.08832		71.06418695	71.0763435	71.074243	71.0652587		71.085434	71.078323	71.0652587
	Receiving Water	Merrimack River		Little River	Little River	Little River	Little River	Little River	Little River	Little River		Merrimack River	Merrimack River	Merrimack River	Merrimack River		Merrimack River	Merrimack River	Merrimack River
January, 2023	Total Flow	-		33,965	-	439,417	-	434	-	-		36,151	-	-	-		-	35,240	-
	Total Hrs	0.00		0.42		7.83		0.17				0.25						0.42	
	# Events	-		1	-	4	-	1	-	-		1	-	-	-		-	1	
February, 2023	Total Flow	-		-	-	-	-	-	-	-		-	-	-	-		-	-	-
	Total Hrs	-																	
	# Events	-		-	-	-	-	-	-	-		-	-	-	-		-	-	-
March, 2023	Total Flow	-		958,965	-	717,299	-	-	-	-		52,822	-	-	-		-	613,378	-
	Total Hrs	-		3.83	-	6.17	-	-	-	-		2.50	-	-	-		-	3.83	-
	# Events	-		1	-	1	-	-	-	-		1	-	-	-		-	1	-
April, 2023	Total Flow	1,096,734		2,703,691	-	1,173,000	22,222	673,538	-	-		2,737,730	-	30,163	21,535		187,316	2,005,983	48,465
	Total Hrs	1.25		21.58	-	34.50	4.67	22.08	-	-		2.92	-	22.00	22.00		1.42	4.75	4.67
	# Events	1		1	-	3	1	2	-	-		1	-	2	2		1	1	1
May, 2023	Total Flow	227,322		1,175,941	-	736,712	2,069	186,451	-	-		1,147,135	-	5,937	6,778		51,215	556,441	26,920
	Total Hrs	0.58		1.58	-	10.92	0.08	0.75	-	-		0.58	-	0.25	0.25		0.33	1.25	0.67
	# Events	1		1	-	3	1	1	-	-		1	-	1	1		1	1	1

APPENDIX B – CSO MONTHLY ACTIVATIONS

		UPPER SIPHON SYSTEM		MIDDLE SIPHON SYSTEM								LOWER SIPHON SYSTEM					BRADFORD SYSTEM		
							Outfall 21H		Outfall 38										
Monthly Parameters	Outfall#	024		021A	021B	021F	021G	21 H	037	038		013	019	040	041		032	034	039
	CSO Outfall Name	Upper Siphon		Middle Siphon	Emerson St.	Locke St	Winter St.	Winter St. Hale St.	Broadway	High St.		Lower Siphon	Main St. North	Bethany Ave.	Chestnut St.		Bradford Ave.	Middlesex St.	South Webster
June, 2023	Total Flow	50,670		1,031,267	-	669,823	54,260	559,872	-	-		177,971	-	127,965	57,299		33,094	230,312	19,781
	Total Hrs	0.67		1.75	-	7.17	0.67	2.42	-	-		0.17	-	1.08	0.91		0.17	1.66	0.50
	# Events	1		3	-	8	4	5	-	-		1	-		5		2	4	4
July, 2023	Total Flow	12,809		1,311,556	-	877,778	9,194	638,090	-	-		-	1,264	127,420	76,858		75,271	519,479	30,333
	Total Hrs	0.17		5.75	-	15.00	4.66	6.50	-	-		-	0.08	4.74	4.66		4.50	5.66	4.83
	# Events	1		3	-	6	4	6	-	-		-	1	4	3		1	4	2
August, 2023	Total Flow	10,640,388		11,937,510	93,729	5,712,872	138,017	3,732,125	3,736	11,806		14,628,443	666,382	426,587	229,083		1,528,226	9,350,427	238,896
	Total Hrs	8.34		9.92	0.66	18.92	6.17	11.42	0.17	0.66		7.33	3.33	6.25	6.33		6.33	9.83	8.75
	# Events	5		4	2	8	4	4	1	2		3	2	4	4		4	4	4
September, 2023	Total Flow	1,281,223		1,726,125	-	748,802	18,941	346,118	-	-		1,888,662	-	29,201	16,354		14,438	654,382	10,854
	Total Hrs	4.83		4.08	-	14.91	0.33	5.67	-	-		2.42	-	0.58	0.58		0.33	4.08	0.50
	# Events	1		2	-	5	1	3		-		1	-	2	2		1	3	1
October, 2023	Total Flow	-		-	-	19,319	-	858	-	-		-	-	-	-		-	-	-
	Total Hrs	-		-	-	2.00	-	0.08	-			-	-	-	-		-	-	-
	# Events	-		-	-	1	-	1	-	-		-	-	-	-		-	-	-
November, 2023	Total Flow	-		-	-	73,299	-	979	-	-		-	-	-	-		-	-	-
	Total Hrs				-	3.92		0.08											
	# Events	-		-	-	2	-	1	-	-		-	-	-	-		-	-	-
December, 2023	Total Flow	558,480		1,630,583	-	979,431	2,944	617,469	-	-		1,472,714	-	19,170	9,733		43,847	1,443,528	15,201
	Total Hrs	4.42		7.83	-	20.42	0.17	16.25				4.58		0.17	0.08		0.17	7.58	0.42
	# Events	1		2	-	4	1		-	-		1	-	1	1		1	2	1

APPENDIX C

APPENDIX C CSO ACTIVATION PER STORM EVENT

							Lawrence Airport NOAA Rain Gauge				Marginal Pumping Station Rain Gauge				ASPW Rain Gauge			
DATE	CSO Outfall No.	CSO Outfall Name	Overflow Start	Overflow End	CSO Volume (gals.)	CSO Duration (hr.)	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)	"Rain Total (in.)"	"Peak Hour Depth Intensity (in./hr.)"	"Storm Duration (hr.)"	"Daily Avg. Intensity (in./hr.)"	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)
1/12/2023	021F	Locke St	01/12/2023 23:35	01/12/2023 23:50	18,243	0.25	0.42	0.15	6.00	0.07	0.44	0.36	3.25	0.14	0.46	0.12	5.25	0.09
			STORM	**TOTALS:**	**18,243**													
1/13/2023	021F	Locke St	01/13/2023 00:00	01/13/2023 00:00	2,288	0.08	0.16	0.06	5.00	0.03	0.14	0.24	1.00	0.14	0.20	0.08	2.75	0.07
			STORM	**TOTALS:**	**2,288**													
1/25/2023	021F	Locke St	01/25/2023 23:05	01/25/2023 23:55	55,063	0.83	0.47	0.13	5.00	0.09	0.67	0.36	3.42	0.20	0.57	0.12	5.00	0.11
			STORM	**TOTALS:**	**55,063**													
1/26/2023	13	LOWER SIPHON	01/26/2023 04:05	01/26/2023 04:20	36,151	0.25	0.68	0.21	7.00	0.10	0.72	0.36	4.75	0.15	0.86	0.16	6.75	0.13
1/26/2023	34	Middlesex St	01/26/2023 04:10	01/26/2023 04:35	35,240	0.42	0.68	0.21	7.00	0.10	0.72	0.36	4.75	0.15	0.86	0.16	6.75	0.13
1/26/2023	021A	Middle Siphon	01/26/2023 04:15	01/26/2023 04:40	33,965	0.42	0.68	0.21	7.00	0.10	0.72	0.36	4.75	0.15	0.86	0.16	6.75	0.13
1/26/2023	021F	Locke St	01/26/2023 00:00	01/26/2023 06:40	363,823	6.67	0.68	0.21	7.00	0.10	0.72	0.36	4.75	0.15	0.86	0.16	6.75	0.13
1/26/2023	021H	Winter St. Hale st	01/26/2023 03:55	01/26/2023 04:05	434	0.17	0.68	0.21	7.00	0.10	0.72	0.36	4.75	0.15	0.86	0.16	6.75	0.13
			STORM	**TOTALS:**	**469,613**													
3/14/2023	13	LOWER SIPHON	03/14/2023 06:50	03/14/2023 09:20	52,822	2.50	2.26	0.23	23.00	0.10	2.76	0.36	16.17	0.17	1.93	0.08	22.75	0.08
3/14/2023	34	Middlesex St	03/14/2023 05:45	03/14/2023 09:35	613,378	3.83	2.26	0.23	23.00	0.10	2.76	0.36	16.17	0.17	1.93	0.08	22.75	0.08
3/14/2023	021A	Middle Siphon	03/14/2023 05:50	03/14/2023 09:40	958,965	3.83	2.26	0.23	23.00	0.10	2.76	0.36	16.17	0.17	1.93	0.08	22.75	0.08
3/14/2023	021F	Locke St	03/14/2023 03:20	03/14/2023 09:30	717,299	6.17	2.26	0.23	23.00	0.10	2.76	0.36	16.17	0.17	1.93	0.08	22.75	0.08
			STORM	**TOTALS:**	**2,342,464**													
4/1/2023	021F	Locke St	04/01/2023 07:35	04/01/2023 12:05	50,187	4.50	0.51	0.15	7.00	0.07	0.58	0.60	3.58	0.16	0.82	0.08	12.25	0.07
			STORM	**TOTALS:**	**50,187**													
4/23/2023	40	Bethany Ave	04/23/2023 08:40	04/23/2023 08:40	347	0.08	1.33	0.17	20.00	0.07	1.47	1.44	8.25	0.18	0.12	0.08	2.25	0.05
4/23/2023	41	Chestnut St	04/23/2023 08:40	04/23/2023 08:40	1,250	0.08	1.33	0.17	20.00	0.07	1.47	1.44	8.25	0.18	0.12	0.08	2.25	0.05
4/23/2023	021F	Locke St	04/23/2023 08:25	04/23/2023 15:05	59,997	6.67	1.33	0.17	20.00	0.07	1.47	1.44	8.25	0.18	0.12	0.08	2.25	0.05
4/23/2023	021H	Winter St. Hale st	04/23/2023 08:30	04/23/2023 08:30	493	0.08	1.33	0.17	20.00	0.07	1.47	1.44	8.25	0.18	0.12	0.08	2.25	0.05
			STORM	**TOTALS:**	**62,087**													
4/30/2023	13	LOWER SIPHON	4/30/2023 21:00	4/30/2023 23:55	2,737,739	2.92	2.09	0.45	19.00	0.11	3.15	1.80	9.67	0.33				
4/30/2023	24	UPPER SIPHON	4/30/2023 22:40	4/30/2023 23:55	1,096,734	1.25	2.09	0.45	19.00	0.11	3.15	1.80	9.67	0.33				
4/30/2023	32	Bradford Ave	04/30/2023 22:30	04/30/2023 23:55	187,316	1.42	2.09	0.45	19.00	0.11	3.15	1.80	9.67	0.33				
4/30/2023	34	Middlesex St	04/30/2023 19:10	04/30/2023 23:55	2,005,983	4.75	2.09	0.45	19.00	0.11	3.15	1.80	9.67	0.33				
4/30/2023	39	South Webster	04/30/2023 19:15	04/30/2023 23:55	48,465	4.67	2.09	0.45	19.00	0.11	3.15	1.80	9.67	0.33				
4/30/2023	40	Bethany Ave	04/30/2023 02:00	04/30/2023 23:55	29,816	21.92	2.09	0.45	19.00	0.11	3.15	1.80	9.67	0.33				
4/30/2023	41	Chestnut St	04/30/2023 02:00	04/30/2023 23:55	20,285	21.92	2.09	0.45	19.00	0.11	3.15	1.80	9.67	0.33				
4/30/2023	021A	Middle Siphon	04/30/2023 02:20	04/30/2023 23:55	2,703,691	21.58	2.09	0.45	19.00	0.11	3.15	1.80	9.67	0.33				
4/30/2023	021F	Locke St	04/30/2023 00:35	04/30/2023 23:55	1,062,816	23.33	2.09	0.45	19.00	0.11	3.15	1.80	9.67	0.33				
4/30/2023	021H	Winter St. Hale st	04/30/2023 01:55	04/30/2023 23:55	695,274	22.00	2.09	0.45	19.00	0.11	3.15	1.80	9.67	0.33				

APPENDIX C CSO ACTIVATION PER STORM EVENT

							Lawrence Airport NOAA Rain Gauge				Marginal Pumping Station Rain Gauge				ASPW Rain Gauge			
DATE	CSO Outfall No.	CSO Outfall Name	Overflow Start	Overflow End	CSO Volume (gals.)	CSO Duration (hr.)	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)	"Rain Total (in.)"	"Peak Hour Depth Intensity (in./hr.)"	"Storm Duration (hr.)"	"Daily Avg. Intensity (in./hr.)"	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)
			STORM	**TOTALS:**	**10,588,119**													
5/1/2023	13	LOWER SIPHON	5/1/2023 0:00	5/1/2023 0:35	1,147,135	0.58	0.55	0.37	4.00	0.14	0.20	0.72	0.50	0.40				
5/1/2023	24	UPPER SIPHON	5/1/2023 0:00	5/1/2023 0:35	227,322	0.58	0.55	0.37	4.00	0.14	0.20	0.72	0.50	0.40				
5/1/2023	32	Bradford Ave	05/01/2023 00:00	05/01/2023 00:20	51,215	0.33	0.55	0.37	4.00	0.14	0.20	0.72	0.50	0.40				
5/1/2023	34	Middlesex St	05/01/2023 00:00	05/01/2023 01:15	556,441	1.25	0.55	0.37	4.00	0.14	0.20	0.72	0.50	0.40				
5/1/2023	39	South Webster	05/01/2023 00:00	05/01/2023 00:40	26,920	0.67	0.55	0.37	4.00	0.14	0.20	0.72	0.50	0.40				
5/1/2023	40	Bethany Ave	05/01/2023 00:00	05/01/2023 00:15	5,937	0.25	0.55	0.37	4.00	0.14	0.20	0.72	0.50	0.40				
5/1/2023	41	Chestnut St	05/01/2023 00:05	05/01/2023 00:20	6,778	0.25	0.55	0.37	4.00	0.14	0.20	0.72	0.50	0.40				
5/1/2023	021A	Middle Siphon	05/01/2023 00:00	05/01/2023 01:35	1,175,941	1.58	0.55	0.37	4.00	0.14	0.20	0.72	0.50	0.40				
5/1/2023	021F	Locke St	05/01/2023 00:00	05/01/2023 02:15	586,962	2.25	0.55	0.37	4.00	0.14	0.20	0.72	0.50	0.40				
5/1/2023	021H	Winter St. Hale st	05/01/2023 00:00	05/01/2023 00:45	188,517	0.75	0.55	0.37	4.00	0.14	0.20	0.72	0.50	0.40				
			STORM	**TOTALS:**	**3,973,169**													
5/2/2023	021F	Locke St	05/02/2023 17:45	05/02/2023 17:55	2,302	0.17	0.49	0.12	8.00	0.06	0.31	0.24	2.25	0.14				
			STORM	**TOTALS:**	**2,302**													
5/20/2023	021F	Locke St	05/20/2023 14:55	05/20/2023 23:25	147,448	8.50	1.36	0.29	11.00	0.12	1.33	0.60	6.83	0.19	0.76	0.12	8.50	0.09
			STORM	**TOTALS:**	**147,448**													
6/2/2023	021F	Locke St	06/02/2023 18:15	06/02/2023 18:35	47,892	0.33	0.31	0.18	3.00	0.10	0.49	0.72	2.00	0.25	0.35	0.08	3.75	0.09
6/2/2023	021H	Winter St. Hale st	06/02/2023 18:15	06/02/2023 18:20	5,941	0.08	0.31	0.18	3.00	0.10	0.49	0.72	2.00	0.25	0.35	0.08	3.75	0.09
			STORM	**TOTALS:**	**53,833**													
6/10/2023	34	Middlesex St	06/10/2023 13:05	06/10/2023 13:45	79,403	0.67	0.25	0.20	6.00	0.04	0.62	2.04	0.83	0.74			0.00	
6/10/2023	39	South Webster	06/10/2023 13:05	06/10/2023 13:20	4,444	0.25	0.25	0.20	6.00	0.04	0.62	2.04	0.83	0.74			0.00	
6/10/2023	40	Bethany Ave	06/10/2023 13:00	06/10/2023 13:15	87,823	0.25	0.25	0.20	6.00	0.04	0.62	2.04	0.83	0.74			0.00	
6/10/2023	41	Chestnut St	06/10/2023 13:00	06/10/2023 13:10	32,962	0.17	0.25	0.20	6.00	0.04	0.62	2.04	0.83	0.74			0.00	
6/10/2023	021A	Middle Siphon	06/10/2023 13:10	06/10/2023 13:50	302,736	0.67	0.25	0.20	6.00	0.04	0.62	2.04	0.83	0.74			0.00	
6/10/2023	021F	Locke St	06/10/2023 13:10	06/10/2023 13:50	90,493	0.67	0.25	0.20	6.00	0.04	0.62	2.04	0.83	0.74			0.00	
6/10/2023	021H	Winter St. Hale st	06/10/2023 13:00	06/10/2023 13:30	290,569	0.50	0.25	0.20	6.00	0.04	0.62	2.04	0.83	0.74			0.00	
			STORM	**TOTALS:**	**888,431**													
6/12/2023	34	Middlesex St	06/12/2023 23:15	06/12/2023 23:15	2,889	0.08	0.13	0.13	1.00	0.13	0.36	1.20	0.67	0.54	0.02	0.04	0.25	0.08
6/12/2023	40	Bethany Ave	06/12/2023 23:10	06/12/2023 23:15	5,236	0.08	0.13	0.13	1.00	0.13	0.36	1.20	0.67	0.54	0.02	0.04	0.25	0.08
6/12/2023	41	Chestnut St	06/12/2023 23:15	06/12/2023 23:15	1,128	0.08	0.13	0.13	1.00	0.13	0.36	1.20	0.67	0.54	0.02	0.04	0.25	0.08
6/12/2023	021F	Locke St	06/12/2023 23:15	06/12/2023 23:45	37,622	0.50	0.13	0.13	1.00	0.13	0.36	1.20	0.67	0.54	0.02	0.04	0.25	0.08
6/12/2023	021H	Winter St. Hale st	06/12/2023 23:15	06/12/2023 23:30	64,993	0.25	0.13	0.13	1.00	0.13	0.36	1.20	0.67	0.54	0.02	0.04	0.25	0.08
			STORM	**TOTALS:**	**111,868**													
6/14/2023	021F	Locke St	06/14/2023 18:50	06/14/2023 19:45	49,448	0.92	0.69	0.17	5.00	0.14	0.42	0.96	1.75	0.24			0.00	

APPENDIX C CSO ACTIVATION PER STORM EVENT

DATE	CSO Outfall No.	CSO Outfall Name	Overflow Start	Overflow End	CSO Volume (gals.)	CSO Duration (hr.)	Lawrence Airport NOAA Rain Gauge				Marginal Pumping Station Rain Gauge				ASPW Rain Gauge			
							Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)	"Rain Total (in.)"	"Peak Hour Depth Intensity (in./hr.)"	"Storm Duration (hr.)"	"Daily Avg. Intensity (in./hr.)"	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)
			STORM	**TOTALS:**	**49,448**													
6/17/2023	021F	Locke St	06/17/2023 13:15	06/17/2023 15:20	103,806	2.08	0.89	0.19	14.00	0.06	1.07	0.48	6.67	0.16	0.05	0.04	0.75	0.07
			STORM	**TOTALS:**	**103,806**													
6/26/2023	13	LOWER SIPHON	06/26/2023 17:20	06/26/2023 17:30	177,967	0.17	0.42	0.32	4.00	0.11	0.61	1.92	1.17	0.52	0.06	0.08	1.00	0.06
6/26/2023	24	UPPER SIPHON	06/26/2023 17:15	06/26/2023 17:55	50,671	0.67	0.42	0.32	4.00	0.11	0.61	1.92	1.17	0.52	0.06	0.08	1.00	0.06
6/26/2023	32	Bradford Ave	06/26/2023 16:15	06/26/2023 16:20	21,559	0.08	0.42	0.32	4.00	0.11	0.61	1.92	1.17	0.52	0.06	0.08	1.00	0.06
6/26/2023	34	Middlesex St	06/26/2023 16:15	06/26/2023 16:55	107,622	0.67	0.42	0.32	4.00	0.11	0.61	1.92	1.17	0.52	0.06	0.08	1.00	0.06
6/26/2023	39	South Webster	06/26/2023 16:15	06/26/2023 16:20	7,774	0.08	0.42	0.32	4.00	0.11	0.61	1.92	1.17	0.52	0.06	0.08	1.00	0.06
6/26/2023	40	Bethany Ave	06/26/2023 16:15	06/26/2023 16:20	10,979	0.08	0.42	0.32	4.00	0.11	0.61	1.92	1.17	0.52	0.06	0.08	1.00	0.06
6/26/2023	41	Chestnut St	06/26/2023 16:15	06/26/2023 16:20	6,521	0.08	0.42	0.32	4.00	0.11	0.61	1.92	1.17	0.52	0.06	0.08	1.00	0.06
6/26/2023	021A	Middle Siphon	06/26/2023 16:20	06/26/2023 17:05	394,681	0.75	0.42	0.32	4.00	0.11	0.61	1.92	1.17	0.52	0.06	0.08	1.00	0.06
6/26/2023	021F	Locke St	06/26/2023 15:45	06/26/2023 17:10	174,601	1.42	0.42	0.32	4.00	0.11	0.61	1.92	1.17	0.52	0.06	0.08	1.00	0.06
6/26/2023	021H	Winter St. Hale st	06/26/2023 15:45	06/26/2023 17:00	124,993	1.25	0.42	0.32	4.00	0.11	0.61	1.92	1.17	0.52	0.06	0.08	1.00	0.06
			STORM	**TOTALS:**	**1,077,367**													
6/27/2023	32	Bradford Ave	06/27/2023 03:30	06/27/2023 03:35	11,535	0.08	0.62	0.61	2.00	0.31	0.53	1.92	0.92	0.58	0.16	0.44	1.00	0.16
6/27/2023	34	Middlesex St	06/27/2023 03:30	06/27/2023 03:45	40,399	0.25	0.62	0.61	2.00	0.31	0.53	1.92	0.92	0.58	0.16	0.44	1.00	0.16
6/27/2023	39	South Webster	06/27/2023 03:30	06/27/2023 03:35	7,465	0.08	0.62	0.61	2.00	0.31	0.53	1.92	0.92	0.58	0.16	0.44	1.00	0.16
6/27/2023	40	Bethany Ave	06/27/2023 03:30	06/27/2023 03:35	11,101	0.08	0.62	0.61	2.00	0.31	0.53	1.92	0.92	0.58	0.16	0.44	1.00	0.16
6/27/2023	41	Chestnut St	06/27/2023 03:30	06/27/2023 03:35	13,889	0.08	0.62	0.61	2.00	0.31	0.53	1.92	0.92	0.58	0.16	0.44	1.00	0.16
6/27/2023	021A	Middle Siphon	06/27/2023 03:35	06/27/2023 03:55	333,851	0.33	0.62	0.61	2.00	0.31	0.53	1.92	0.92	0.58	0.16	0.44	1.00	0.16
6/27/2023	021F	Locke St	06/27/2023 03:30	06/27/2023 04:00	128,233	0.50	0.62	0.61	2.00	0.31	0.53	1.92	0.92	0.58	0.16	0.44	1.00	0.16
6/27/2023	021H	Winter St. Hale st	06/27/2023 03:30	06/27/2023 03:55	127,639	0.42	0.62	0.61	2.00	0.31	0.53	1.92	0.92	0.58	0.16	0.44	1.00	0.16
			STORM	**TOTALS:**	**674,111**													
6/28/2023	39	South Webster	06/28/2023 17:15	06/28/2023 17:15	97	0.08	0.29	0.05	7.00	0.04	0.50	1.08	1.75	0.29	0.74	0.60	4.25	0.17
6/28/2023	40	Bethany Ave	06/28/2023 17:15	06/28/2023 17:50	12,826	0.58	0.29	0.05	7.00	0.04	0.50	1.08	1.75	0.29	0.74	0.60	4.25	0.17
6/28/2023	41	Chestnut St	06/28/2023 17:20	06/28/2023 17:50	2,799	0.50	0.29	0.05	7.00	0.04	0.50	1.08	1.75	0.29	0.74	0.60	4.25	0.17
6/28/2023	021F	Locke St	06/28/2023 17:20	06/28/2023 18:05	37,729	0.75	0.29	0.05	7.00	0.04	0.50	1.08	1.75	0.29	0.74	0.60	4.25	0.17
			STORM	**TOTALS:**	**53,451**													
7/2/2023	34	Middlesex St	07/02/2023 15:25	07/02/2023 15:25	6,170	0.08	0.76	0.18	10.00	0.08	1.08	0.96	5.25	0.21	1.22	0.32	9.00	0.14
7/2/2023	021A	Middle Siphon	07/02/2023 15:25	07/02/2023 15:35	43,747	0.17	0.76	0.18	10.00	0.08	1.08	0.96	5.25	0.21	1.22	0.32	9.00	0.14
7/2/2023	021F	Locke St	07/02/2023 11:30	07/02/2023 15:45	145,566	4.25	0.76	0.18	10.00	0.08	1.08	0.96	5.25	0.21	1.22	0.32	9.00	0.14
7/2/2023	021H	Winter St. Hale st	07/02/2023 14:40	07/02/2023 15:35	73,132	0.92	0.76	0.18	10.00	0.08	1.08	0.96	5.25	0.21	1.22	0.32	9.00	0.14
			STORM	**TOTALS:**	**268,615**													
7/3/2023	021F	Locke St	07/03/2023 02:20	07/03/2023 02:50	69,073	0.50	0.56	0.28	8.00	0.07	0.47	0.96	2.67	0.18	0.61	0.64	4.50	0.14

APPENDIX C CSO ACTIVATION PER STORM EVENT

							Lawrence Airport NOAA Rain Gauge				Marginal Pumping Station Rain Gauge				ASPW Rain Gauge			
DATE	CSO Outfall No.	CSO Outfall Name	Overflow Start	Overflow End	CSO Volume (gals.)	CSO Duration (hr.)	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)	"Rain Total (in.)"	"Peak Hour Depth Intensity (in./hr.)"	"Storm Duration (hr.)"	"Daily Avg. Intensity (in./hr.)"	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)
7/3/2023	021H	Winter St. Hale st	07/03/2023 02:30	07/03/2023 02:40	11,128	0.17	0.56	0.28	8.00	0.07	0.47	0.96	2.67	0.18	0.61	0.64	4.50	0.14
			STORM	**TOTALS:**	**80,201**													
7/14/2023	34	Middlesex St	07/14/2023 12:00	07/14/2023 12:00	2,948	0.08	0.67	0.42	6.00	0.11	0.43	1.20	1.42	0.30	0.58	0.36	3.50	0.17
7/14/2023	40	Bethany Ave	07/14/2023 12:00	07/14/2023 12:00	5,736	0.08	0.67	0.42	6.00	0.11	0.43	1.20	1.42	0.30	0.58	0.36	3.50	0.17
7/14/2023	41	Chestnut St	07/14/2023 12:00	07/14/2023 12:00	3,153	0.08	0.67	0.42	6.00	0.11	0.43	1.20	1.42	0.30	0.58	0.36	3.50	0.17
7/14/2023	021F	Locke St	07/14/2023 11:55	07/14/2023 12:25	59,802	0.50	0.67	0.42	6.00	0.11	0.43	1.20	1.42	0.30	0.58	0.36	3.50	0.17
7/14/2023	021H	Winter St. Hale st	07/14/2023 12:00	07/14/2023 12:15	25,764	0.25	0.67	0.42	6.00	0.11	0.43	1.20	1.42	0.30	0.58	0.36	3.50	0.17
			STORM	**TOTALS:**	**97,403**													
7/16/2023	40	Bethany Ave	07/16/2023 11:00	07/16/2023 11:00	5,427	0.08	0.57	0.11	9.00	0.06	0.81	1.08	5.08	0.16	1.17	0.28	10.25	0.11
7/16/2023	021F	Locke St	07/16/2023 10:15	07/16/2023 11:20	35,441	1.08	0.57	0.11	9.00	0.06	0.81	1.08	5.08	0.16	1.17	0.28	10.25	0.11
7/16/2023	021H	Winter St. Hale st	07/16/2023 11:00	07/16/2023 11:10	15,625	0.17	0.57	0.11	9.00	0.06	0.81	1.08	5.08	0.16	1.17	0.28	10.25	0.11
			STORM	**TOTALS:**	**56,493**													
7/21/2023	19	Main St North	07/21/2023 17:25	07/21/2023 17:25	1,264	0.08	1.49	0.86	6.00	0.25	0.89	3.00	1.92	0.46	1.06	0.88	4.00	0.27
7/21/2023	24	UPPER SIPHON	07/21/2023 18:35	07/21/2023 18:45	12,809	0.17	1.49	0.86	6.00	0.25	0.89	3.00	1.92	0.46	1.06	0.88	4.00	0.27
7/21/2023	34	Middlesex St	07/21/2023 17:20	07/21/2023 18:00	120,031	0.67	1.49	0.86	6.00	0.25	0.89	3.00	1.92	0.46	1.06	0.88	4.00	0.27
7/21/2023	39	South Webster	07/21/2023 17:20	07/21/2023 17:35	6,330	0.25	1.49	0.86	6.00	0.25	0.89	3.00	1.92	0.46	1.06	0.88	4.00	0.27
7/21/2023	40	Bethany Ave	07/21/2023 17:15	07/21/2023 17:35	48,149	0.33	1.49	0.86	6.00	0.25	0.89	3.00	1.92	0.46	1.06	0.88	4.00	0.27
7/21/2023	41	Chestnut St	07/21/2023 17:15	07/21/2023 17:35	29,094	0.33	1.49	0.86	6.00	0.25	0.89	3.00	1.92	0.46	1.06	0.88	4.00	0.27
7/21/2023	021A	Middle Siphon	07/21/2023 17:20	07/21/2023 18:05	320,007	0.75	1.49	0.86	6.00	0.25	0.89	3.00	1.92	0.46	1.06	0.88	4.00	0.27
7/21/2023	021F	Locke St	07/21/2023 17:20	07/21/2023 21:10	225,285	3.83	1.49	0.86	6.00	0.25	0.89	3.00	1.92	0.46	1.06	0.88	4.00	0.27
7/21/2023	021H	Winter St. Hale st	07/21/2023 17:15	07/21/2023 17:45	200,333	0.50	1.49	0.86	6.00	0.25	0.89	3.00	1.92	0.46	1.06	0.88	4.00	0.27
			STORM	**TOTALS:**	**963,302**													
7/29/2023	32	Bradford Ave	07/29/2023 14:30	07/29/2023 19:00	75,271	4.50	4.73	1.03	7.00	0.68	1.59	3.12	2.42	0.66	1.61	1.08	4.25	0.38
7/29/2023	34	Middlesex St	07/29/2023 14:30	07/29/2023 19:20	390,330	4.83	4.73	1.03	7.00	0.68	1.59	3.12	2.42	0.66	1.61	1.08	4.25	0.38
7/29/2023	39	South Webster	07/29/2023 14:30	07/29/2023 19:05	24,003	4.58	4.73	1.03	7.00	0.68	1.59	3.12	2.42	0.66	1.61	1.08	4.25	0.38
7/29/2023	40	Bethany Ave	07/29/2023 14:30	07/29/2023 18:45	68,108	4.25	4.73	1.03	7.00	0.68	1.59	3.12	2.42	0.66	1.61	1.08	4.25	0.38
7/29/2023	41	Chestnut St	07/29/2023 14:30	07/29/2023 18:45	44,611	4.25	4.73	1.03	7.00	0.68	1.59	3.12	2.42	0.66	1.61	1.08	4.25	0.38
7/29/2023	021A	Middle Siphon	07/29/2023 14:35	07/29/2023 19:25	947,802	4.83	4.73	1.03	7.00	0.68	1.59	3.12	2.42	0.66	1.61	1.08	4.25	0.38
7/29/2023	021F	Locke St	07/29/2023 14:35	07/29/2023 19:25	342,611	4.83	4.73	1.03	7.00	0.68	1.59	3.12	2.42	0.66	1.61	1.08	4.25	0.38
7/29/2023	021H	Winter St. Hale st	07/29/2023 14:30	07/29/2023 19:10	321,302	4.67	4.73	1.03	7.00	0.68	1.59	3.12	2.42	0.66	1.61	1.08	4.25	0.38
			STORM	**TOTALS:**	**2,214,038**													
8/8/2023	13	LOWER SIPHON	8/8/2023 8:00	8/8/2023 12:30	7,975,776	4.50	6.35	2.06	12.00	0.53	4.62	3.00	5.17	0.89	4.20	0.88	7.50	0.56
8/8/2023	19	Main St North	08/08/2023 07:30	08/08/2023 10:35	586,111	3.08	6.35	2.06	12.00	0.53	4.62	3.00	5.17	0.89	4.20	0.88	7.50	0.56

APPENDIX C CSO ACTIVATION PER STORM EVENT

							Lawrence Airport NOAA Rain Gauge				Marginal Pumping Station Rain Gauge				ASPW Rain Gauge			
DATE	CSO Outfall No.	CSO Outfall Name	Overflow Start	Overflow End	CSO Volume (gals.)	CSO Duration (hr.)	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)	"Rain Total (in.)"	"Peak Hour Depth Intensity (in./hr.)"	"Storm Duration (hr.)"	"Daily Avg. Intensity (in./hr.)"	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)
8/8/2023	24	UPPER SIPHON	08/08/2023 07:50	08/08/2023 13:30	6,469,774	5.67	6.35	2.06	12.00	0.53	4.62	3.00	5.17	0.89	4.20	0.88	7.50	0.56
8/8/2023	32	Bradford Ave	08/08/2023 06:00	08/08/2023 11:00	1,128,924	5.00	6.35	2.06	12.00	0.53	4.62	3.00	5.17	0.89	4.20	0.88	7.50	0.56
8/8/2023	34	Middlesex St	08/08/2023 06:00	08/08/2023 12:00	6,052,056	6.00	6.35	2.06	12.00	0.53	4.62	3.00	5.17	0.89	4.20	0.88	7.50	0.56
8/8/2023	38	High St.	08/08/2023 09:40	08/08/2023 10:15	15,108	0.58	6.35	2.06	12.00	0.53	4.62	3.00	5.17	0.89	4.20	0.88	7.50	0.56
8/8/2023	39	South Webster	08/08/2023 06:00	08/08/2023 11:40	117,962	5.67	6.35	2.06	12.00	0.53	4.62	3.00	5.17	0.89	4.20	0.88	7.50	0.56
8/8/2023	40	Bethany Ave	08/08/2023 06:00	08/08/2023 10:50	212,354	4.83	6.35	2.06	12.00	0.53	4.62	3.00	5.17	0.89	4.20	0.88	7.50	0.56
8/8/2023	41	Chestnut St	08/08/2023 06:00	08/08/2023 10:50	103,361	4.83	6.35	2.06	12.00	0.53	4.62	3.00	5.17	0.89	4.20	0.88	7.50	0.56
8/8/2023	021A	Middle Siphon	08/08/2023 06:05	08/08/2023 12:15	8,167,160	6.17	6.35	2.06	12.00	0.53	4.62	3.00	5.17	0.89	4.20	0.88	7.50	0.56
8/8/2023	021B	Emerson Street	08/08/2023 09:45	08/08/2023 10:20	93,597	0.58	6.35	2.06	12.00	0.53	4.62	3.00	5.17	0.89	4.20	0.88	7.50	0.56
8/8/2023	021F	Locke St	08/08/2023 06:05	08/08/2023 14:40	3,729,063	8.58	6.35	2.06	12.00	0.53	4.62	3.00	5.17	0.89	4.20	0.88	7.50	0.56
8/8/2023	021H	Winter St. Hale st	08/08/2023 06:00	08/08/2023 14:30	2,564,510	8.50	6.35	2.06	12.00	0.53	4.62	3.00	5.17	0.89	4.20	0.88	7.50	0.56
			STORM	**TOTALS:**	**37,215,755**													
8/10/2023	13	LOWER SIPHON	08/10/2023 22:20	08/10/2023 23:55	2,646,914	1.58	1.82	1.13	4.00	0.46	1.34	2.16	2.58	0.52	1.93	0.76	2.50	0.77
8/10/2023	24	UPPER SIPHON	08/10/2023 22:35	08/10/2023 23:55	2,328,880	1.33	1.82	1.13	4.00	0.46	1.34	2.16	2.58	0.52	1.93	0.76	2.50	0.77
8/10/2023	32	Bradford Ave	08/10/2023 21:20	08/10/2023 22:00	116,045	0.67	1.82	1.13	4.00	0.46	1.34	2.16	2.58	0.52	1.93	0.76	2.50	0.77
8/10/2023	34	Middlesex St	08/10/2023 21:10	08/10/2023 23:00	1,664,799	1.83	1.82	1.13	4.00	0.46	1.34	2.16	2.58	0.52	1.93	0.76	2.50	0.77
8/10/2023	39	South Webster	08/10/2023 21:10	08/10/2023 22:50	60,385	1.67	1.82	1.13	4.00	0.46	1.34	2.16	2.58	0.52	1.93	0.76	2.50	0.77
8/10/2023	40	Bethany Ave	08/10/2023 21:10	08/10/2023 21:55	46,858	0.75	1.82	1.13	4.00	0.46	1.34	2.16	2.58	0.52	1.93	0.76	2.50	0.77
8/10/2023	41	Chestnut St	08/10/2023 21:10	08/10/2023 21:55	31,073	0.75	1.82	1.13	4.00	0.46	1.34	2.16	2.58	0.52	1.93	0.76	2.50	0.77
8/10/2023	021A	Middle Siphon	08/10/2023 21:15	08/10/2023 23:05	1,845,781	1.83	1.82	1.13	4.00	0.46	1.34	2.16	2.58	0.52	1.93	0.76	2.50	0.77
8/10/2023	021F	Locke St	08/10/2023 21:05	08/10/2023 23:40	1,358,767	2.58	1.82	1.13	4.00	0.46	1.34	2.16	2.58	0.52	1.93	0.76	2.50	0.77
8/10/2023	021H	Winter St. Hale st	08/10/2023 21:10	08/10/2023 22:30	532,566	1.33	1.82	1.13	4.00	0.46	1.34	2.16	2.58	0.52	1.93	0.76	2.50	0.77
			STORM	**TOTALS:**	**10,632,068**													
8/11/2023	24	UPPER SIPHON	08/11/2023 00:00	08/11/2023 00:20	446,266	0.33	0.03	0.03	1.00	0.03	0.00	0.00	0.00		0.09	0.08	1.00	0.09
			STORM	**TOTALS:**	**446,266**													
8/15/2023	021F	Locke St	08/15/2023 07:00	08/15/2023 09:45	63,615	2.75	0.72	0.16	9.00	0.08	0.71	0.48	4.67	0.15	0.87	0.20	7.50	0.12
			STORM	**TOTALS:**	**63,615**													
8/18/2023	13	LOWER SIPHON	08/18/2023 10:15	08/18/2023 11:40	4,005,753	1.42	1.86	1.45	6.00	0.31	1.36	2.52	2.25	0.60	2.40	1.56	3.75	0.64
8/18/2023	19	Main St North	08/18/2023 09:25	08/18/2023 09:40	80,271	0.25	1.86	1.45	6.00	0.31	1.36	2.52	2.25	0.60	2.40	1.56	3.75	0.64
8/18/2023	24	UPPER SIPHON	08/18/2023 10:15	08/18/2023 11:00	1,234,191	0.75	1.86	1.45	6.00	0.31	1.36	2.52	2.25	0.60	2.40	1.56	3.75	0.64
8/18/2023	32	Bradford Ave	08/18/2023 09:10	08/18/2023 09:45	279,990	0.58	1.86	1.45	6.00	0.31	1.36	2.52	2.25	0.60	2.40	1.56	3.75	0.64

APPENDIX C CSO ACTIVATION PER STORM EVENT

							Lawrence Airport NOAA Rain Gauge				Marginal Pumping Station Rain Gauge				ASPW Rain Gauge			
DATE	CSO Outfall No.	CSO Outfall Name	Overflow Start	Overflow End	CSO Volume (gals.)	CSO Duration (hr.)	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)	"Rain Total (in.)"	"Peak Hour Depth Intensity (in./hr.)"	"Storm Duration (hr.)"	"Daily Avg. Intensity (in./hr.)"	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)
8/18/2023	34	Middlesex St	08/18/2023 09:10	08/18/2023 10:50	1,600,760	1.67	1.86	1.45	6.00	0.31	1.36	2.52	2.25	0.60	2.40	1.56	3.75	0.64
8/18/2023	39	South Webster	08/18/2023 09:10	08/18/2023 10:30	54,257	1.33	1.86	1.45	6.00	0.31	1.36	2.52	2.25	0.60	2.40	1.56	3.75	0.64
8/18/2023	40	Bethany Ave	08/18/2023 09:10	08/18/2023 09:40	112,712	0.50	1.86	1.45	6.00	0.31	1.36	2.52	2.25	0.60	2.40	1.56	3.75	0.64
8/18/2023	41	Chestnut St	08/18/2023 09:10	08/18/2023 09:45	79,413	0.58	1.86	1.45	6.00	0.31	1.36	2.52	2.25	0.60	2.40	1.56	3.75	0.64
8/18/2023	021A	Middle Siphon	08/18/2023 09:15	08/18/2023 10:50	1,652,733	1.58	1.86	1.45	6.00	0.31	1.36	2.52	2.25	0.60	2.40	1.56	3.75	0.64
8/18/2023	021F	Locke St	08/18/2023 08:55	08/18/2023 10:20	350,118	1.42	1.86	1.45	6.00	0.31	1.36	2.52	2.25	0.60	2.40	1.56	3.75	0.64
8/18/2023	021H	Winter St. Hale st	08/18/2023 09:05	08/18/2023 10:10	485,333	1.08	1.86	1.45	6.00	0.31	1.36	2.52	2.25	0.60	2.40	1.56	3.75	0.64
			STORM	**TOTALS:**	**9,935,531**													
8/24/2023	021F	Locke St	08/24/2023 23:35	08/24/2023 23:55	9,066	0.33	0.12	0.11	2.00	0.06	0.31	0.24	1.75	0.18	0.11	0.08	1.25	0.09
			STORM	**TOTALS:**	**9,066**													
8/25/2023	021F	Locke St	08/25/2023 00:00	08/25/2023 02:00	25,809	2.00	1.15	0.24	16.00	0.07	0.65	0.48	4.00	0.16	1.08	0.16	9.75	0.11
			STORM	**TOTALS:**	**25,809**													
8/29/2023	021F	Locke St	08/29/2023 23:00	08/29/2023 23:40	23,028	0.67	0.08	0.08	1.00	0.08	0.31	0.72	1.00	0.31	0.03	0.08	0.50	0.06
			STORM	**TOTALS:**	**23,028**													
8/30/2023	24	UPPER SIPHON	8/30/2023 11:10	8/30/2023 11:25	161,277	0.25	0.55	0.14	10.00	0.06	0.64	2.88	1.67	0.38	0.86	0.44	6.25	0.14
8/30/2023	32	Bradford Ave	08/30/2023 10:10	08/30/2023 10:10	3,267	0.08	0.55	0.14	10.00	0.06	0.64	2.88	1.67	0.38	0.86	0.44	6.25	0.14
8/30/2023	34	Middlesex St	08/30/2023 10:00	08/30/2023 10:20	32,813	0.33	0.55	0.14	10.00	0.06	0.64	2.88	1.67	0.38	0.86	0.44	6.25	0.14
8/30/2023	38	High St.	08/30/2023 10:00	08/30/2023 10:00	434	0.08	0.55	0.14	10.00	0.06	0.64	2.88	1.67	0.38	0.86	0.44	6.25	0.14
8/30/2023	39	South Webster	08/30/2023 10:05	08/30/2023 10:10	6,292	0.08	0.55	0.14	10.00	0.06	0.64	2.88	1.67	0.38	0.86	0.44	6.25	0.14
8/30/2023	40	Bethany Ave	08/30/2023 10:00	08/30/2023 10:10	54,663	0.17	0.55	0.14	10.00	0.06	0.64	2.88	1.67	0.38	0.86	0.44	6.25	0.14
8/30/2023	41	Chestnut St	08/30/2023 10:00	08/30/2023 10:10	15,236	0.17	0.55	0.14	10.00	0.06	0.64	2.88	1.67	0.38	0.86	0.44	6.25	0.14
8/30/2023	021A	Middle Siphon	08/30/2023 10:05	08/30/2023 10:25	271,837	0.33	0.55	0.14	10.00	0.06	0.64	2.88	1.67	0.38	0.86	0.44	6.25	0.14
8/30/2023	021B	Emerson Street	08/30/2023 10:05	08/30/2023 10:05	132	0.08	0.55	0.14	10.00	0.06	0.64	2.88	1.67	0.38	0.86	0.44	6.25	0.14
8/30/2023	021F	Locke St	08/30/2023 10:00	08/30/2023 10:35	153,406	0.58	0.55	0.14	10.00	0.06	0.64	2.88	1.67	0.38	0.86	0.44	6.25	0.14
8/30/2023	021H	Winter St. Hale st	08/30/2023 10:00	08/30/2023 10:30	287,740	0.50	0.55	0.14	10.00	0.06	0.64	2.88	1.67	0.38	0.86	0.44	6.25	0.14
			STORM	**TOTALS:**	**987,096**													
9/8/2023	34	Middlesex St	09/08/2023 14:25	09/08/2023 14:25	5,448	0.08	0.49	0.47	2.00	0.25	0.39	1.56	0.75	0.52	0.39	0.52	1.50	0.26
9/8/2023	40	Bethany Ave	09/08/2023 14:25	09/08/2023 14:25	3,583	0.08	0.49	0.47	2.00	0.25	0.39	1.56	0.75	0.52	0.39	0.52	1.50	0.26
9/8/2023	41	Chestnut St	09/08/2023 14:25	09/08/2023 14:25	983	0.08	0.49	0.47	2.00	0.25	0.39	1.56	0.75	0.52	0.39	0.52	1.50	0.26
9/8/2023	021F	Locke St	09/08/2023 14:25	09/08/2023 14:45	35,392	0.33	0.49	0.47	2.00	0.25	0.39	1.56	0.75	0.52	0.39	0.52	1.50	0.26
9/8/2023	021H	Winter St. Hale st	09/08/2023 14:30	09/08/2023 14:40	20,705	0.17	0.49	0.47	2.00	0.25	0.39	1.56	0.75	0.52	0.39	0.52	1.50	0.26
			STORM	**TOTALS:**	**66,111**													
9/10/2023	021F	Locke St	09/10/2023 15:10	09/10/2023 15:10	976	0.08	0.29	0.12	6.00	0.05	0.38	0.24	2.75	0.14	0.41	0.12	4.25	0.10
			STORM	**TOTALS:**	**976**													

APPENDIX C CSO ACTIVATION PER STORM EVENT

							Lawrence Airport NOAA Rain Gauge				Marginal Pumping Station Rain Gauge				ASPW Rain Gauge			
DATE	CSO Outfall No.	CSO Outfall Name	Overflow Start	Overflow End	CSO Volume (gals.)	CSO Duration (hr.)	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)	"Rain Total (in.)"	"Peak Hour Depth Intensity (in./hr.)"	"Storm Duration (hr.)"	"Daily Avg. Intensity (in./hr.)"	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)
9/11/2023	021F	Locke St	09/11/2023 17:50	09/11/2023 20:05	53,552	2.25	0.55	0.17	9.00	0.06	0.77	0.60	4.50	0.17	0.60	0.16	5.25	0.11
			STORM	**TOTALS:**	**53,552**													
9/18/2023	13	LOWER SIPHON	09/18/2023 21:10	09/18/2023 23:35	1,888,662	2.42	2.69	0.55	17.00	0.16	3.02	1.32	12.75	0.24	2.56	0.28	14.75	0.17
9/18/2023	24	UPPER SIPHON	09/18/2023 19:00	09/18/2023 23:50	1,281,223	4.83	2.69	0.55	17.00	0.16	3.02	1.32	12.75	0.24	2.56	0.28	14.75	0.17
9/18/2023	32	Bradford Ave	09/18/2023 21:30	09/18/2023 21:50	14,438	0.33	2.69	0.55	17.00	0.16	3.02	1.32	12.75	0.24	2.56	0.28	14.75	0.17
9/18/2023	34	Middlesex St	09/18/2023 20:15	09/18/2023 23:55	613,823	3.67	2.69	0.55	17.00	0.16	3.02	1.32	12.75	0.24	2.56	0.28	14.75	0.17
9/18/2023	39	South Webster	09/18/2023 21:30	09/18/2023 22:00	10,854	0.50	2.69	0.55	17.00	0.16	3.02	1.32	12.75	0.24	2.56	0.28	14.75	0.17
9/18/2023	40	Bethany Ave	09/18/2023 21:25	09/18/2023 21:55	25,618	0.50	2.69	0.55	17.00	0.16	3.02	1.32	12.75	0.24	2.56	0.28	14.75	0.17
9/18/2023	41	Chestnut St	09/18/2023 21:25	09/18/2023 21:55	15,372	0.50	2.69	0.55	17.00	0.16	3.02	1.32	12.75	0.24	2.56	0.28	14.75	0.17
9/18/2023	021A	Middle Siphon	09/18/2023 20:20	09/18/2023 23:55	1,627,424	3.58	2.69	0.55	17.00	0.16	3.02	1.32	12.75	0.24	2.56	0.28	14.75	0.17
9/18/2023	021F	Locke St	09/18/2023 12:20	09/18/2023 23:55	602,257	11.58	2.69	0.55	17.00	0.16	3.02	1.32	12.75	0.24	2.56	0.28	14.75	0.17
9/18/2023	021H	Winter St. Hale st	09/18/2023 18:40	09/18/2023 23:55	339,260	5.25	2.69	0.55	17.00	0.16	3.02	1.32	12.75	0.24	2.56	0.28	14.75	0.17
			STORM	**TOTALS:**	**6,418,930**													
9/19/2023	34	Middlesex St	09/19/2023 00:00	09/19/2023 00:20	35,111	0.33	0.29	0.27	2.00	0.15	0.05	0.24	0.33	0.15	0.28	0.24	1.25	0.22
9/19/2023	021A	Middle Siphon	09/19/2023 00:00	09/19/2023 00:30	98,701	0.50	0.29	0.27	2.00	0.15	0.05	0.24	0.33	0.15	0.28	0.24	1.25	0.22
9/19/2023	021F	Locke St	09/19/2023 00:00	09/19/2023 00:40	56,625	0.67	0.29	0.27	2.00	0.15	0.05	0.24	0.33	0.15	0.28	0.24	1.25	0.22
9/19/2023	021H	Winter St. Hale st	09/19/2023 00:00	09/19/2023 00:15	5,094	0.25	0.29	0.27	2.00	0.15	0.05	0.24	0.33	0.15	0.28	0.24	1.25	0.22
			STORM	**TOTALS:**	**195,531**													
10/21/2023	021F	Locke St	10/21/2023 14:40	10/21/2023 16:40	19,319	2.00	1.18	0.33	16.00	0.07	1.09	0.36	6.83	0.16	1.09	0.12	9.50	0.11
			STORM	**TOTALS:**	**19,319**													
11/22/2023	021F	Locke St	11/22/2023 07:15	11/22/2023 10:50	51,903	3.58	1.71	0.29	15.00	0.11	1.56	0.36	10.67	0.15	1.96	0.12	15.00	0.13
11/22/2023	021H	Winter St. Hale st	11/22/2023 07:25	11/22/2023 07:30	979	0.08	1.71	0.29	15.00	0.11	1.56	0.36	10.67	0.15	1.96	0.12	15.00	0.13
			STORM	**TOTALS:**	**52,882**													
11/27/2023	021F	Locke St	11/27/2023 01:30	11/27/2023 01:50	21,396	0.33	0.44	0.19	6.00	0.07	0.37	0.36	2.25	0.16	0.52	0.12	4.75	0.11
			STORM	**TOTALS:**	**21,396**													
12/10/2023	021F	Locke St	12/10/2023 17:30	12/10/2023 18:05	22,986	0.58	0.93	0.22	7.00	0.13	0.77	0.60	4.08	0.19	0.85	0.12	7.50	0.11
12/10/2023	021H	Winter St. Hale st	12/10/2023 17:40	12/10/2023 23:55	3,878	6.25	0.93	0.22	7.00	0.13	0.77	0.60	4.08	0.19	0.85	0.12	7.50	0.11
			STORM	**TOTALS:**	**26,865**													
12/11/2023	34	Middlesex St	12/11/2023 03:20	12/11/2023 05:55	70,635	2.58	1.52	0.31	9.00	0.17	1.34	0.60	7.83	0.17	1.74	0.16	12.25	0.14
12/11/2023	021A	Middle Siphon	12/11/2023 03:20	12/11/2023 06:00	124,646	2.67	1.52	0.31	9.00	0.17	1.34	0.60	7.83	0.17	1.74	0.16	12.25	0.14
12/11/2023	021F	Locke St	12/11/2023 00:00	12/11/2023 07:15	216,448	7.25	1.52	0.31	9.00	0.17	1.34	0.60	7.83	0.17	1.74	0.16	12.25	0.14
12/11/2023	021H	Winter St. Hale st	12/11/2023 00:00	12/11/2023 03:30	35,646	3.50	1.52	0.31	9.00	0.17	1.34	0.60	7.83	0.17	1.74	0.16	12.25	0.14
			STORM	**TOTALS:**	**447,375**													
12/17/2023	021F	Locke St	12/17/2023 21:45	12/17/2023 22:35	27,306	0.83	0.46	0.18	6.00	0.08	0.43	0.60	2.58	0.17	0.33	0.08	4.75	0.07

APPENDIX C CSO ACTIVATION PER STORM EVENT																		
							Lawrence Airport NOAA Rain Gauge				Marginal Pumping Station Rain Gauge				ASPW Rain Gauge			
DATE	CSO Outfall No.	CSO Outfall Name	Overflow Start	Overflow End	CSO Volume (gals.)	CSO Duration (hr.)	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)	"Rain Total (in.)"	"Peak Hour Depth Intensity (in./hr.)"	"Storm Duration (hr.)"	"Daily Avg. Intensity (in./hr.)"	Rain Total (in.)	Peak Hour Depth Intensity (in./hr.)	Storm Duration (hr.)	Daily Avg. Intensity (in./hr.)
12/17/2023	021H	Winter St. Hale st	12/17/2023 22:25	12/17/2023 22:30	4,882	0.08	0.46	0.18	6.00	0.08	0.43	0.60	2.58	0.17	0.33	0.08	4.75	0.07
			STORM	**TOTALS:**	**32,188**													
12/18/2023	13	LOWER SIPHON	12/18/2023 12:15	12/18/2023 16:45	1,472,714	4.50	3.04	0.66	16.00	0.19	1.82	2.16	9.42	0.19	2.35	0.08	23.25	0.10
12/18/2023	24	UPPER SIPHON	12/18/2023 12:10	12/18/2023 16:35	558,483	4.42	3.04	0.66	16.00	0.19	1.82	2.16	9.42	0.19	2.35	0.08	23.25	0.10
12/18/2023	32	Bradford Ave	12/18/2023 12:20	12/18/2023 12:30	43,847	0.17	3.04	0.66	16.00	0.19	1.82	2.16	9.42	0.19	2.35	0.08	23.25	0.10
12/18/2023	34	Middlesex St	12/18/2023 12:15	12/18/2023 17:15	1,372,892	5.00	3.04	0.66	16.00	0.19	1.82	2.16	9.42	0.19	2.35	0.08	23.25	0.10
12/18/2023	39	South Webster	12/18/2023 12:20	12/18/2023 12:45	15,201	0.42	3.04	0.66	16.00	0.19	1.82	2.16	9.42	0.19	2.35	0.08	23.25	0.10
12/18/2023	40	Bethany Ave	12/18/2023 12:15	12/18/2023 12:25	19,170	0.17	3.04	0.66	16.00	0.19	1.82	2.16	9.42	0.19	2.35	0.08	23.25	0.10
12/18/2023	41	Chestnut St	12/18/2023 12:20	12/18/2023 12:25	9,733	0.08	3.04	0.66	16.00	0.19	1.82	2.16	9.42	0.19	2.35	0.08	23.25	0.10
12/18/2023	021A	Middle Siphon	12/18/2023 12:20	12/18/2023 17:30	1,505,938	5.17	3.04	0.66	16.00	0.19	1.82	2.16	9.42	0.19	2.35	0.08	23.25	0.10
12/18/2023	021F	Locke St	12/18/2023 06:05	12/18/2023 17:50	712,691	11.75	3.04	0.66	16.00	0.19	1.82	2.16	9.42	0.19	2.35	0.08	23.25	0.10
12/18/2023	021H	Winter St. Hale st	12/18/2023 10:30	12/18/2023 16:55	576,007	6.42	3.04	0.66	16.00	0.19	1.82	2.16	9.42	0.19	2.35	0.08	23.25	0.10
			STORM	**TOTALS:**	**6,286,676**													

APPENDIX D

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
1/1/2023	0.10	0.05	3.00	0.03	0.11	0.12	0.92	0.12	0.15	0.08	2.50	0.06
1/2/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
1/3/2023	0.33	0.06	11.00	0.03	0.40	0.12	0.28	0.12	0.58	0.08	6.75	0.06
1/4/2023	0.27	0.07	5.00	0.05	0.31	0.12	2.58	0.12	0.38	0.08	4.75	0.08
1/5/2023	0.14	0.05	7.00	0.02	0.18	0.12	1.50	0.12	0.30	0.08	5.00	0.06
1/6/2023	0.23	0.05	10.00	0.02	0.12	0.12	1.00	0.12	0.11	0.08	1.75	0.06
1/7/2023	0.00	0.00	0.00		0.16	0.12	1.33	0.12	0.21	0.08	3.75	0.06
1/8/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
1/9/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
1/10/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
1/11/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
1/12/2023	0.42	0.15	6.00	0.07	0.44	0.36	3.25	0.14	0.46	0.12	5.25	0.09
1/13/2023	0.16	0.06	5.00	0.03	0.14	0.24	1.00	0.14	0.20	0.08	2.75	0.07
1/14/2023	0.04	0.01	4.00	0.01	0.04	0.12	0.33	0.12	0.08	0.04	1.50	0.05
1/15/2023	0.10	0.03	6.00	0.02	0.00	0.00	0.00		0.00		0.00	
1/16/2023	0.10	0.03	5.00	0.02	0.07	0.12	0.58	0.12	0.13	0.08	2.25	0.06
1/17/2023	0.02	0.01	2.00	0.01	0.24	0.12	2.00	0.12	0.29	0.12	3.50	0.08
1/18/2023	0.02	0.02	1.00	0.02	0.00	0.00	0.00		0.00		0.00	
1/19/2023	0.39	0.13	8.00	0.05	0.31	0.12	2.58	0.12	0.28	0.08	4.75	0.06
1/20/2023	0.49	0.17	13.00	0.04	0.31	0.12	2.58	0.12	0.61	0.08	9.00	0.07

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
1/21/2023	0.00	0.00	0.00		0.01	0.12	0.08	0.12	0.00		0.00	
1/22/2023	0.28	0.09	5.00	0.06	0.03	0.12	0.25	0.12	0.02	0.04	0.25	0.08
1/23/2023	0.81	0.11	19.00	0.04	0.56	0.24	4.50	0.12	0.11	0.04	2.50	0.04
1/24/2023	0.00	0.00	0.00		0.34	0.24	2.67	0.13	0.54	0.08	6.25	0.09
1/25/2023	0.47	0.13	5.00	0.09	0.67	0.36	3.42	0.20	0.57	0.12	5.00	0.11
1/26/2023	0.68	0.21	7.00	0.10	0.72	0.36	4.75	0.15	0.86	0.16	6.75	0.13
1/27/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
1/28/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
1/29/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
1/30/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
1/31/2023	0.02	0.01	2.00	0.01	0.04	0.12	0.33	0.12	0.09	0.08	1.00	0.09
2/1/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
2/2/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
2/3/2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00
2/4/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
2/5/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
2/6/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
2/7/2023	0.02	0.02	1.00	0.02	0.00	0.00	0.00		0.00		0.00	
2/8/2023	0.00	0.00	0.00		0.01	0.12	0.08	0.12	0.04	0.08	0.50	0.08
2/9/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.01	0.04	0.25	0.04
2/10/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
2/11/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
2/12/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
2/13/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
2/14/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
2/15/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
2/16/2023	0.01	0.01	1.00	0.01	0.00	0.00	0.00		0.01	0.04	0.25	0.04
2/17/2023	0.23	0.11	6.00	0.04	0.17	0.48	1.08	0.16	0.32	0.28	2.25	0.14
2/18/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
2/19/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
2/20/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
2/21/2023	0.15	0.05	5.00	0.03	0.16	0.24	1.25	0.13	0.24	0.08	2.75	0.09
2/22/2023	0.25	0.12	4.00	0.06	0.00	0.00	0.00		0.01	0.04	0.25	0.04
2/23/2023	0.46	0.09	11.00	0.04	0.00	0.00	0.00		0.00		0.00	
2/24/2023	0.00	0.00	0.00		0.01	0.12	0.08	0.12	0.00		0.00	
2/25/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
2/26/2023	0.01	0.01	1.00	0.01	0.00	0.00	0.00		0.02	0.04	0.25	0.08
2/27/2023	0.00	0.00	0.00		0.23	0.24	1.75	0.13	0.24	0.12	2.50	0.10
2/28/2023	0.26	0.03	16.00	0.02	0.41	0.12	3.42	0.12	0.46	0.08	6.50	0.07
3/1/2023	0.00	0.00	0.00		0.14	0.12	1.17	0.12	0.03	0.08	0.25	0.12
3/2/2023	0.38	0.10	6.00	0.06	0.41	0.36	2.92	0.14	0.46	0.08	5.00	0.09
3/3/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
3/4/2023	0.71	0.13	15.00	0.05	0.77	0.24	5.92	0.13	0.61	0.08	6.75	0.09
3/5/2023	0.00	0.00	0.00		0.36	0.24	2.83	0.13	0.77	0.08	6.75	0.11

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
3/6/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
3/7/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
3/8/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
3/9/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
3/10/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
3/11/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
3/12/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
3/13/2023	0.23	0.07	8.00	0.03	0.30	0.12	2.50	0.12	0.31	0.08	4.75	0.07
3/14/2023	2.26	0.23	23.00	0.10	2.76	0.36	16.17	0.17	1.93	0.08	22.75	0.08
3/15/2023	0.01	0.01	1.00	0.01	0.48	0.24	3.92	0.12	1.38	0.08	19.75	0.07
3/16/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.77	0.08	13.75	0.06
3/17/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.15	0.08	2.75	0.05
3/18/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.03	0.08	0.50	0.06
3/19/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.04	0.04	0.75	0.05
3/20/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
3/21/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
3/22/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
3/23/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
3/24/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
3/25/2023	0.17	0.04	8.00	0.02	0.20	0.24	1.58	0.13	0.21	0.08	3.50	0.06
3/26/2023	0.03	0.02	2.00	0.02	0.02	0.12	0.17	0.12	0.07	0.04	1.75	0.04
3/27/2023	0.07	0.03	3.00	0.02	0.07	0.12	0.58	0.12	0.07	0.04	1.50	0.05

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
3/28/2023	0.12	0.04	5.00	0.02	0.09	0.12	0.75	0.12	0.16	0.08	2.50	0.06
3/29/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
3/30/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.03	0.08	0.25	0.12
3/31/2023	0.25	0.07	6.00	0.04	0.28	0.12	2.33	0.12	0.31	0.08	4.50	0.07
4/1/2023	0.51	0.15	7.00	0.07	0.58	0.60	3.58	0.16	0.82	0.08	12.25	0.07
4/2/2023	0.00	0.00	0.00		0.01	0.12	0.08	0.12	0.01	0.04	0.25	0.04
4/3/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
4/4/2023	0.06	0.04	2.00	0.03	0.04	0.12	0.33	0.12	0.09	0.08	1.50	0.06
4/5/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.01	0.04	0.25	0.04
4/6/2023	0.00	0.00	0.00		0.08	0.24	0.58	0.14	0.06	0.08	1.00	0.06
4/7/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
4/8/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
4/9/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
4/10/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
4/11/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
4/12/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
4/13/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
4/14/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
4/15/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
4/16/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
4/17/2023	0.06	0.03	3.00	0.02	0.09	0.24	0.67	0.14	0.12	0.08	2.25	0.05
4/18/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.01	0.04	0.25	0.04

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
4/19/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
4/20/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
4/21/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
4/22/2023	0.00	0.00	0.00		0.03	0.24	0.17	0.18	0.00		0.00	
4/23/2023	1.33	0.17	20.00	0.07	1.47	1.44	8.25	0.18	0.12	0.08	2.25	0.05
4/24/2023	0.02	0.01	2.00	0.01	0.03	0.12	0.25	0.12	0.20	0.08	3.75	0.05
4/25/2023	0.03	0.02	2.00	0.02	0.07	0.24	0.50	0.14	0.04	0.04	1.00	0.04
4/26/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.01	0.04	0.25	0.04
	0.00	0.00	0.00		0.00	0.00	0.00		0.00			
	0.00	0.00	0.00		0.00	0.00	0.00		0.00			
	0.10	0.03	5.00	0.02	0.19	0.24	1.50	0.13	0.00			
	2.09	0.45	19.00	0.11	3.15	1.80	9.67	0.33	0.00			
	0.55	0.37	4.00	0.14	0.20	0.72	0.50	0.40	0.00			
	0.49	0.12	8.00	0.06	0.31	0.24	2.25	0.14	0.00			
5/3/2023	0.04	0.02	3.00	0.01	0.06	0.12	0.50	0.12	0.20	0.68	1.25	0.16
5/4/2023	0.09	0.02	7.00	0.01	0.08	0.12	0.67	0.12	0.16	0.08	3.00	0.05
5/5/2023	0.04	0.02	2.00	0.02	0.05	0.12	0.42	0.12	0.04	0.04	1.00	0.04
5/6/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/7/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/8/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/9/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/10/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
5/11/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/12/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/13/2023	0.02	0.02	1.00	0.02	0.00	0.00	0.00		0.00		0.00	
5/14/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/15/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/16/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/17/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/18/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/19/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/20/2023	1.36	0.29	11.00	0.12	1.33	0.60	6.83	0.19	0.76	0.12	8.50	0.09
5/21/2023	0.16	0.15	2.00	0.08	0.00	0.00	0.00		0.69	0.08	10.50	0.07
5/22/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.03	0.08	0.25	0.12
5/23/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.03	0.08	0.25	0.12
5/24/2023	0.33	0.24	3.00	0.11	0.21	0.24	1.50	0.14	0.00		0.00	
5/25/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/26/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/27/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/28/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.03	0.04	0.50	0.06
5/29/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/30/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
5/31/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
6/1/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.03	0.04	0.25	0.12

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
6/2/2023	0.31	0.18	3.00	0.10	0.49	0.72	2.00	0.25	0.35	0.08	3.75	0.09
6/3/2023	0.09	0.04	4.00	0.02	0.09	0.12	0.75	0.12	0.11	0.08	2.25	0.05
6/4/2023	0.14	0.05	8.00	0.02	0.13	0.12	1.08	0.12	0.05	0.08	1.00	0.05
6/5/2023	0.23	0.05	9.00	0.03	0.27	0.36	2.08	0.13	0.21	0.08	4.25	0.05
6/6/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.04	0.08	0.25	0.16
6/7/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
6/8/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
6/9/2023	0.19	0.12	3.00	0.06	0.25	0.36	1.75	0.14	0.02	0.08	0.25	0.08
6/10/2023	0.25	0.20	6.00	0.04	0.62	2.04	0.83	0.74	0.00		0.00	
6/11/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.02	0.08	0.25	0.08
6/12/2023	0.13	0.13	1.00	0.13	0.36	1.20	0.67	0.54	0.02	0.04	0.25	0.08
6/13/2023	0.17	0.13	4.00	0.04	0.06	0.12	0.50	0.12	0.00		0.00	
6/14/2023	0.69	0.17	5.00	0.14	0.42	0.96	1.75	0.24	0.00		0.00	
6/15/2023	0.01	0.01	1.00	0.01	0.00	0.00	0.00		0.08	0.08	1.00	0.08
6/16/2023	0.01	0.01	1.00	0.01	0.03	0.24	0.17	0.18	0.03	0.04	0.50	0.06
6/17/2023	0.89	0.19	14.00	0.06	1.07	0.48	6.67	0.16	0.05	0.04	0.75	0.07
6/18/2023	0.03	0.02	2.00	0.02	0.09	0.36	0.50	0.18	1.00	0.08	11.25	0.09
6/19/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.46	0.08	8.50	0.05
6/20/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.20	0.08	3.00	0.07
6/21/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.12	0.08	2.25	0.05
6/22/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.07	0.08	1.25	0.06
6/23/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.05	0.08	1.00	0.05

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
6/24/2023	0.52	0.45	5.00	0.10	0.11	0.84	0.33	0.33	0.03	0.08	0.75	0.04
6/25/2023	0.28	0.28	1.00	0.28	0.05	0.24	0.33	0.15	0.07	0.08	0.75	0.09
6/26/2023	0.42	0.32	4.00	0.11	0.61	1.92	1.17	0.52	0.06	0.08	1.00	0.06
6/27/2023	0.62	0.61	2.00	0.31	0.53	1.92	0.92	0.58	0.16	0.44	1.00	0.16
6/28/2023	0.29	0.05	7.00	0.04	0.50	1.08	1.75	0.29	0.74	0.60	4.25	0.17
6/29/2023	0.00	0.00	0.00		0.04	0.36	0.17	0.24	0.00		0.00	
6/30/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
7/1/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
7/2/2023	0.76	0.18	10.00	0.08	1.08	0.96	5.25	0.21	1.22	0.32	9.00	0.14
7/3/2023	0.56	0.28	8.00	0.07	0.47	0.96	2.67	0.18	0.61	0.64	4.50	0.14
7/4/2023	0.14	0.06	4.00	0.04	0.12	0.12	1.00	0.12	0.15	0.08	2.25	0.07
7/5/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.03	0.04	0.25	0.12
7/6/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.03	0.04	0.50	0.06
7/7/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.02	0.04	0.50	0.04
7/8/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
7/9/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
7/10/2023	0.75	0.12	17.00	0.04	0.63	0.24	5.08	0.12	0.83	0.12	9.75	0.09
7/11/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.01	0.04	0.25	0.04
7/12/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.02	0.04	0.25	0.08
7/13/2023	0.00	0.00	0.00		0.02	0.12	0.17	0.12	0.02	0.04	0.25	0.08
7/14/2023	0.67	0.42	6.00	0.11	0.43	1.20	1.42	0.30	0.58	0.36	3.50	0.17
7/15/2023	0.05	0.05	1.00	0.05	0.03	0.12	0.25	0.12	0.04	0.08	0.50	0.08

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
7/16/2023	0.57	0.11	9.00	0.06	0.81	1.08	5.08	0.16	1.17	0.28	10.25	0.11
7/17/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.02	0.04	0.50	0.04
7/18/2023	0.08	0.07	2.00	0.04	0.11	0.60	0.50	0.22	0.10	0.08	1.00	0.10
7/19/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
7/20/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
7/21/2023	1.49	0.86	6.00	0.25	0.89	3.00	1.92	0.46	1.06	0.88	4.00	0.27
7/22/2023	0.00	0.00	0.00		0.01	0.12	0.08	0.12	0.00		0.00	
7/23/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
7/24/2023	0.00	0.00	0.00		0.04	0.48	0.08	0.48	0.04	0.08	0.25	0.16
7/25/2023	0.02	0.02	1.00	0.02	0.08	0.60	0.33	0.24	0.22	0.40	0.75	0.29
7/26/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.02	0.04	0.50	0.04
7/27/2023	0.20	0.05	4.00	0.05	0.01	0.12	0.08	0.12	0.05	0.04	1.00	0.05
7/28/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.02	0.04	0.25	0.08
7/29/2023	4.73	1.03	7.00	0.68	1.59	3.12	2.42	0.66	1.61	1.08	4.25	0.38
7/30/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
7/31/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/1/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/2/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/3/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/4/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/5/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/6/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
8/7/2023	0.01	0.01	1.00	0.01	0.02	0.12	0.17	0.12	0.05	0.08	0.50	0.10
8/8/2023	6.35	2.06	12.00	0.53	4.62	3.00	5.17	0.89	4.20	0.88	7.50	0.56
8/9/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/10/2023	1.82	1.13	4.00	0.46	1.34	2.16	2.58	0.52	1.93	0.76	2.50	0.77
8/11/2023	0.03	0.03	1.00	0.03	0.00	0.00	0.00		0.09	0.08	1.00	0.09
8/12/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/13/2023	0.00	0.00	0.00		0.04	0.24	0.17	0.24	0.00		0.00	
8/14/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/15/2023	0.72	0.16	9.00	0.08	0.71	0.48	4.67	0.15	0.87	0.20	7.50	0.12
8/16/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/17/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/18/2023	1.86	1.45	6.00	0.31	1.36	2.52	2.25	0.60	2.40	1.56	3.75	0.64
8/19/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/20/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/21/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/22/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/23/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
8/24/2023	0.12	0.11	2.00	0.06	0.31	0.24	1.75	0.18	0.11	0.08	1.25	0.09
8/25/2023	1.15	0.24	16.00	0.07	0.65	0.48	4.00	0.16	1.08	0.16	9.75	0.11
8/26/2023	0.08	0.08	1.00	0.08	0.00	0.00	0.00		0.00		0.00	
8/27/2023	0.09	0.09	1.00	0.09	0.06	0.24	0.33	0.18	0.08	0.08	1.00	0.08
8/28/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
8/29/2023	0.08	0.08	1.00	0.08	0.31	0.72	1.00	0.31	0.03	0.08	0.50	0.06
8/30/2023	0.55	0.14	10.00	0.06	0.64	2.88	1.67	0.38	0.86	0.44	6.25	0.14
8/31/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
9/1/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
9/2/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
9/3/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
9/4/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
9/5/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.02	0.04	0.50	0.04
9/6/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.02	0.04	0.25	0.08
9/7/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.02	0.04	0.50	0.04
9/8/2023	0.49	0.47	2.00	0.25	0.39	1.56	0.75	0.52	0.39	0.52	1.50	0.26
9/9/2023	0.03	0.03	1.00	0.03	0.01	0.12	0.08	0.12	0.07	0.08	1.00	0.07
9/10/2023	0.29	0.12	6.00	0.05	0.38	0.24	2.75	0.14	0.41	0.12	4.25	0.10
9/11/2023	0.55	0.17	9.00	0.06	0.77	0.60	4.50	0.17	0.60	0.16	5.25	0.11
9/12/2023	0.04	0.04	1.00	0.04	0.14	0.36	0.83	0.17	0.16	0.16	1.25	0.13
9/13/2023	0.33	0.15	6.00	0.06	0.15	0.24	1.17	0.13	0.30	0.08	4.25	0.07
9/14/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.03	0.08	0.25	0.12
9/15/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
9/16/2023	0.07	0.02	4.00	0.02	0.06	0.12	0.50	0.12	0.11	0.08	1.75	0.06
9/17/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
9/18/2023	2.69	0.55	17.00	0.16	3.02	1.32	12.75	0.24	2.56	0.28	14.75	0.17
9/19/2023	0.29	0.27	2.00	0.15	0.05	0.24	0.33	0.15	0.28	0.24	1.25	0.22

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
9/20/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
9/21/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
9/22/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
9/23/2023	0.03	0.01	3.00	0.01	0.01	0.12	0.08	0.12	0.04	0.08	0.75	0.05
9/24/2023	0.20	0.14	3.00	0.07	0.02	0.12	0.17	0.12	0.17	0.08	2.00	0.09
9/25/2023	0.13	0.02	9.00	0.01	0.05	0.12	0.42	0.12	0.10	0.08	1.75	0.06
9/26/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
9/27/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
9/28/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
9/29/2023	0.21	0.05	8.00	0.03	0.12	0.12	1.00	0.12	0.19	0.08	2.50	0.08
9/30/2023	0.01	0.01	1.00	0.01	0.01	0.12	0.08	0.12	0.01	0.04	0.25	0.04
10/1/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/2/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/3/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/4/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/5/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.01	0.04	0.25	0.04
10/6/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/7/2023	0.16	0.08	4.00	0.04	0.15	0.36	1.00	0.15	0.21	0.20	2.00	0.11
10/8/2023	0.06	0.04	2.00	0.03	0.00	0.00	0.00		0.03	0.04	0.75	0.04
10/9/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/10/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/11/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
10/12/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/13/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/14/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/15/2023	0.00	0.00	0.00		0.03	0.12	0.25	0.12	0.00		0.00	
10/16/2023	0.21	0.06	7.00	0.03	0.24	0.60	1.33	0.18	0.34	0.12	4.25	0.08
10/17/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.01	0.04	0.25	0.04
10/18/2023	0.00	0.00	0.00		0.01	0.12	0.08	0.12	0.01	0.04	0.25	0.04
10/19/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/20/2023	0.03	0.03	1.00	0.03	0.04	0.12	0.33	0.12	0.10	0.08	1.25	0.08
10/21/2023	1.18	0.33	16.00	0.07	1.09	0.36	6.83	0.16	1.09	0.12	9.50	0.11
10/22/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.03	0.08	0.25	0.12
10/23/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/24/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/25/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/26/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/27/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/28/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
10/29/2023	0.29	0.10	9.00	0.03	0.24	0.24	1.92	0.13	0.25	0.08	3.75	0.07
10/30/2023	0.59	0.07	17.00	0.03	0.59	0.24	4.75	0.12	0.84	0.08	12.50	0.07
10/31/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/1/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/2/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
11/3/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/4/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/5/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/6/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/7/2023	0.06	0.03	3.00	0.02	0.03	0.12	0.25	0.12	0.06	0.08	1.00	0.06
11/8/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/9/2023	0.32	0.11	10.00	0.03	0.20	0.12	1.67	0.12	0.39	0.08	4.75	0.08
11/10/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/11/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/12/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/13/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/14/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/15/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/16/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/17/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/18/2023	0.11	0.06	3.00	0.04	0.12	0.12	1.00	0.12	0.17	0.08	2.00	0.09
11/19/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/20/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/21/2023	0.03	0.03	1.00	0.03	0.02	0.12	0.17	0.12	0.02	0.04	0.50	0.04
11/22/2023	1.71	0.29	15.00	0.11	1.56	0.36	10.67	0.15	1.96	0.12	15.00	0.13
11/23/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/24/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
11/25/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/26/2023	0.01	0.01	1.00	0.01	0.00	0.00	0.00		0.01	0.04	0.25	0.04
11/27/2023	0.44	0.19	6.00	0.07	0.37	0.36	2.25	0.16	0.52	0.12	4.75	0.11
11/28/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/29/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
11/30/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
12/1/2023	0.13	0.03	5.00	0.03	0.13	0.12	1.08	0.12	0.16	0.08	3.00	0.05
12/2/2023	0.01	0.01	1.00	0.01	0.00	0.00	0.00		0.02	0.04	0.50	0.04
12/3/2023	0.81	0.12	16.00	0.05	0.86	0.24	6.75	0.13	1.02	0.08	12.50	0.08
12/4/2023	0.21	0.05	7.00	0.03	0.24	0.12	2.00	0.12	0.47	0.08	7.75	0.06
12/5/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
12/6/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
12/7/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
12/8/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
12/9/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
12/10/2023	0.93	0.22	7.00	0.13	0.77	0.60	4.08	0.19	0.85	0.12	7.50	0.11
12/11/2023	1.52	0.31	9.00	0.17	1.34	0.60	7.83	0.17	1.74	0.16	12.25	0.14
12/12/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
12/13/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
12/14/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
12/15/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
12/16/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	

APPENDIX D 2023 YEARLY RAINFALL DATA												
	Lawrence Airport				Middle Siphon Rain Gage				WWTF Rain Gage			
Date	Rain Total (in.)	Peak hour intensity (in/hr.)	Storm Duration (hours)	Daily Avg. Intensity (in/hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)	Rain Total (in.)	Peak Hour Intensity (in./hr.)	Storm Duration (hours)	Daily Avg. Intensity (in./hr.)
12/17/2023	0.46	0.18	6.00	0.08	0.43	0.60	2.58	0.17	0.33	0.08	4.75	0.07
12/18/2023	3.04	0.66	16.00	0.19	1.82	2.16	9.42	0.19	2.35	0.08	23.25	0.10
12/19/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.59	0.08	10.00	0.06
12/20/2023	0.11	0.11	1.00	0.11	0.00	0.00	0.00		0.00		0.00	
12/21/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
12/22/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
12/23/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
12/24/2023	0.04	0.02	3.00	0.01	0.02	0.12	0.17	0.12	0.04	0.04	0.75	0.05
12/25/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.00		0.00	
12/26/2023	0.00	0.00	0.00		0.01	0.12	0.08	0.12	0.00		0.00	
12/27/2023	0.04	0.02	3.00	0.01	0.01	0.12	0.08	0.12	0.05	0.04	0.75	0.07
12/28/2023	0.80	0.10	19.00	0.04	0.80	0.12	6.67	0.12	0.04	0.08	0.50	0.08
12/29/2023	0.05	0.01	5.00	0.01	0.04	0.12	0.33	0.12	0.22	0.08	3.75	0.06
12/30/2023	0.01	0.01	1.00	0.01	0.01	0.12	0.08	0.12	0.04	0.04	0.75	0.05
12/31/2023	0.00	0.00	0.00		0.00	0.00	0.00		0.46	0.08	8.50	0.05
	0.00		0.00				0.00		0.00			
Total	**64.84**				**58.50**				**61.53**			
Average	**0.18**	**0.06**	**2.27**	**0.07**	**0.16**	**0.19**	**0.81**	**0.19**	**0.17**	**0.13**	**1.64**	**0.09**
Maximum	**6.35**	**2.06**	**23.00**	**0.68**	**4.62**	**3.12**	**16.17**	**0.89**	**4.20**	**1.56**	**23.25**	**0.77**
Minimum		**0.00**	**0.00**	**0.00**		**0.00**	**0.00**	**0.00**		**0.04**		

APPENDIX E

CSO Notification List

APPENDIX E CSO NOTIFICATION LIST	
Name	**E-mail**
(jeff.kennedy@state.ma.us)	jeff.kennedy@state.ma.us
Aditya Pophale	Apophale@BrwnCald.com
Alba Gouldthrope	boardofhealth@townofnewbury.org
Alexandra Chandler	alexandra.chandler@gmail.com
Allana McOsker	ajmcosker@haverhillwater.com
Andrea Brouchu	abrochu@salisburyma.gov
Andrew Levine	alevine@cityofnewburyport.com
Ashley Belanger	ashleysteinmetz@yahoo.com
Becky Zawalski	becky@merrimack.org
Belinda Stansbury	belinda.stansbury@state.ma.us
Benjamin Stevens	bertram37@yahoo.com
Berni Angelo	BOH@townofmerrimac.com
Bethaley	bethaley@bu.edu
Bonnie Dufresne	bdufresne@cityofhaverhill.com
Brett Leavitt	bleavitt@GLSD.org
Brian Gross	brian.n.gross@gmail.com
btmwwtf@comcast.net	btmwwtf@comcast.net
Charles Eiras	eirascharles@gmail.com
Cheri R. Cousens	ccousens@glsd.org
Chris Pratt	cpratt@cityofnewburyport.com
Christopher Hood	CHood@CityofNewburyport.com
Colin Stokes	cstokes@grovelandma.com
Connor Sullivan	Connor_Sullivan1@student.uml.edu
Corinn Flaherty	corinnbritt@gmail.com
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David Bevilacqua	davebevil@aol.com
David Roach	dave.roach@state.ma.us
Deb Ketchen	ketchend@amesburyma.gov
Denise LaRose	dlarose39@gmail.com
Diane Regan	diane.regan@mass.gov
Eileen Hurley	boh@townofmerrimac.com
Elizabeth A. Kudarauskas	Kudarauskas.beth@epa.gov
Evan Walsh	ewalsh@lowellma.gov
Executive Director	executivedirector@merrimack.org
Florence Cenci	florence.cenci@mass.gov
Gary Field	fieldg@amesburyma.gov

APPENDIX E CSO NOTIFICATION LIST	
Name	**E-mail**
gingrich171@gmail.com	gingrich171@gmail.com
Gordon Sims	gordonsims@gmail.com
Gregg Coyle	gcoyle@lowellma.gov
harbormaster@newburypolice.com	harbormaster@newburypolice.com
Healthagent@townofmerrimac.com	Healthagent@townofmerrimac.com
Heather McMann	heather@mcmann.net
Heidi Zisch	heidi.zisch@state.ma.us
I. Bensten	lbentsen@grovelandma.com
Isaiah Lewis	ilewis@haverhillwater.com
J. Haggs	jhaggs100@gmail.com
James Conte	jconte@haverhillwater.com
Jamie Tuccolo	JTuccolo@CityofNewburyport.com
Janice Reagan	rtcomp@comcast.net
Jay Wallace	jwallace444@gmail.com
Jeff Kennedy	jeff.kennedy@state.ma.us
Jeff Mason	masonj@amesburyma.gov
Jeff Yeastedt	jeffyeastedt@comcast.net
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