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Fitchburg

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February 28, 2021

U.S. Environmental Protection Agency
Water Enforcement
OES4-SMR
5 Post Office Square, Suite 100
Boston, MA 02109-3912

Re: CSOs Monitoring & Overflow Report
February 1, 2020 to January 31, 2021 Reporting Period
Consent Decree, VII. REMEDIAL MEASURES, Paragraphs 32 & 33

Dear Sir or Madam:

In accordance with Section VII, Paragraphs 32 and 33 of the Consent Decree (Decree) signed by Fitchburg's Mayor on June 1, 2012, this submission provides an Annual Summary of CSOs Monitoring, Overflows Reporting, and Inspection Certification of CSO Outfalls Report on the City's compliance with requirements of the Decree (as described by Paragraphs 32 and 33). In addition, weir wall adjustments at CSO locations and dry-weather CSO's will be discussed. The report covers the period from February 1, 2020 to January 31, 2021.

Monitoring Sites

The City of Fitchburg has maintained a total of 11 CSO Regulator Sites, all of which are metered.

The Collections Team of the City's Wastewater Division continued to monitor meters throughout the city during the reporting period, and also monitored the City's 148 remaining combination manholes with tell-tale blocks for the United States Environmental Protection (US EPA) and Massachusetts Department of Environmental Protection (MassDEP) reporting purposes. During the reporting period, the City monitored regulators with ADS Environmental, Inc. Triton+ (Triton) flow meters, the latest meter offered by ADS. The City has had on-call agreement with ADS to assist the City in troubleshooting problematic meters, installing meters in difficult sites, or for training purposes. The Contract has expired, however the City's Purchasing Department has instructed the Wastewater Division to continue using ADS until a new contract can be issued. The City maintains two ADS "Rain Alert III" rain gauges, one at the Summer Street Fire Station, and one at the DPW Building. In December 2018, the City also installed an ADS "Echo" level sensor in CSO Regulator 045. The "Echo" sensor is ultrasonic, with no equipment in the flow. The sensor allows the City to monitor the water level in the regulator chamber to help determine when an overflow over the weir wall is occurring. The City used the "Echo" sensor during reporting period to calculate overflow volumes from the regulator using a simplified weir equation. The City also maintained down looking sensors at CSOs 041 and

076, to give increased accuracy during overflow events. These sites are calculated as a simplified weir equation, and manning's equation, respectively.

During the reporting period, the City had flow meters located at all of its remaining open overflow regulators. This report discusses the overflows recorded at each site, issues that occurred during the reporting period, and proposed future metering changes. The City experienced some data quality and meter downtime issues during the year, which prompted the City to have ADS visit all the sites in the City to conduct maintenance and repairs multiple times throughout the reporting period.

As stated above, the City maintains two ADS RainAlert III rain gauges, one at DPW and one on the Summer Street Fire Station. The rain gauges logged a total of 41.86-inches of rainfall during the reporting period.

In order to most accurately calculate CSO volumes, a variety of methods were used. The City has worked closely with ADS to determine the most accurate way to calculate overflow volume, as CSO volume is notoriously difficult to obtain due to vastly different hydraulics at each CSO, and differing rain events. The City is frequently reviewing data and methods to calculate overflow volume, and revising calculation methods as appropriate. Some of the City's CSO sites were calculated using a "silt-method". With this method, if the incoming pipe is large, and the crown of the pipe is above the weir wall elevation, a "silt-level" is set on the flow meter to match the weir wall elevation. Any flow that that is recorded over this elevation is a CSO. Other sites were calculated using a velocity vs. depth relationship. Plotting the data on a scattergraph, and using ADS' "Iso-Q" lines, the maximum amount of flow that passes through the regulator prior to an overflow can be interpolated. This flow rate is then subtracted from the total flow rate, resulting in the CSO volume.

At other sites, a more traditional method of using a weir wall equation or Manning's Equation in Excel were used. Manning's Equation for open channel flow was used when a depth of water was known at an overflow pipe. The broad-crested rectangular weir equation was utilized when known depths overtopped weir walls. At CSO-64, an "orifice equation" was used, as the discharge location is a small opening into a much larger diameter pipe, and the chamber itself is susceptible to surcharge.

Summary of Results

Table 1 includes the summary of overflows. The flow meters logged 128 overflow events totaling 13,182,854 gallons. Additional data shown in Table 1 includes notes regarding the operational status of the meter.

Table 2 contains annual rainfall data. Daily total, average intensity, peak hour intensity and duration of storm are provided.

Table 3 contains the meters' overflow detail. Overflow event dates, calculated gallons of overflow and duration of overflow are all provided. Daily rainfall is also provided for the reviewer's convenience.

Discussion of CSO Sites

CSO 004 - Cleghorn Street at Oak Hill Road

CSO 004 Highlights
4 Overflow Events
17,393 gal. Overflow
0.67 hr. Duration
88% Meter Coverage
System type: Combined

CSO-004 is a regulator manhole consisting of a 55″ x 36″ combined brick influent pipe, a 12″ sanitary effluent pipe, and a 55″ x 36″ brick overflow pipe. A brick weir wall directs all flow to the 12″ sanitary pipe. When this regulator does overflow, the 12″ sanitary becomes inundated and water overtops the weir wall. Overflows discharge to the Nashua River. Further sewer separation upstream is required to close this regulator. The downstream pipe may also need to be upsized as it flows close to half full during dry weather. A volume for one event was missed due to a data drop. Occasionally as the sensors age, data can be 'dropped' during large events. After a few dropped events, the City investigates and replaces the $1,700 sensor if necessary. An ADS "down looking" sensor will likely be placed in this structure in the next reporting period for increased monitoring and calculation of a weir equation.

CSO 007 – Cushing Street at Riverfront Park

CSO 007 Highlights
2 Overflow Events
Unknown gal. Overflow
Unknown Duration
94% Meter Coverage
System Type: Separate

CSO-007 consists of a regulator manhole that includes two influent pipes (a 16″ from Laurel Street and a 12″ from South Street), two 8″ effluent pipes to a 45″ interceptor, and an 18″ overflow core in the side of the chamber. The volume and duration of the 2 overflow events were not registered by the flow meter, however this regulator is slated for closure in 2020, as part of the ongoing CSO-7, 11, 39, 48 Combined Sewer Separation Project.

CSO 010 – Main Street at River Street

CSO 010 Highlights
17 Overflow Events
1,006,000 gal. Overflow
4.75 hr. Duration
76% Meter Coverage
System type: Combined

CSO-010 consists of a regulator manhole with a 15″ influent pipe, 12″ effluent pipe and a 15″ overflow pipe discharge, with a weir wall between the overflow pipe and dry-weather flow. A significant amount of combined sewer upstream overwhelms the 12″ effluent pipe during intense rainfall causing weir wall overtopping. With a large number of combined sewer areas upstream that contribute to this regulator, the City plans to complete closure of this regulator around 2025, in accordance with the Wastewater Management Plan submitted during the reporting period. A few events in the beginning of the period were missed due to meter communication issues.

CSO 032 – 543 Main Street at Post Office

CSO 032 Highlights
21 Overflow Events
291,000 gal Overflow
24.91 hr. Duration
90% Meter Coverage
System Type: Combined

The CSO-032 regulator contains an 18″ combined influent pipe, an 8″ sanitary throttle discharge pipe, and an 18″ overflow to the drainage system. Due to a number of combined pipes upstream of this regulator, the 8″ throttle pipe becomes overwhelmed during heavy rainfall events and overflows to the drainage system via a small weir wall. Meter communication issues were experienced sporadically throughout the period. With a large number of combined sewers upstream that contribute to this regulator, the City plans to complete closure of this regulator around 2025, in accordance with the City's Wastewater Management Plan.

CSO 039 – Water Street at Walnut Street

CSO-039 is a regulator manhole that consists of a 20″ influent, an 8″ effluent and an 18″ overflow.

CSO 039 Highlights
26 Overflow Events
6,640,000 gal. Overflow
83.83 hr. Duration
97% Meter Coverage
System Type: Combined

This regulator has been problematic in the past due to poor configuration which leads to blockages in the regulator. The regulator is also a large contributor to the City's annual CSO volume. The regulator is slated for closure in 2020 as part of the ongoing CSO-7, 11, 39, 48 Combined Sewer Separation Project.

CSO 041 – Benson Street at Falulah Street

CSO-041 consists of a regulator manhole with a 12″ influent, a 10″ effluent, and an 18″ overflow. In past reporting periods, the City has experienced periodic overflows at this location. The contributing area to the regulator is fully separated, which correlates to high inflow in the contributing collection system. During the metering period, the data analysis by the City's engineering consultant revealed that high inflow is an issue in this portion of the City's sewer system. A minimum of 4 catch basins have been confirmed to tie into the sanitary system in the upstream basin. During the SSES Phase II study of this area, it was determined that the base flow pipe is undersized, and will need to be upsized in order close the overflow. An ultrasonic down-looking level sensor is used in at this regulator to provide more reliable overflow data using a weir method for calculating overflow.

CSO 041 Highlights
2 Overflow Events
5,764 gal. Overflow
0.42 Hr. Duration
92% Meter Coverage
System Type: Separated

CSO 045 – Main Street at Oliver/Putnam Street

Regulator CSO-045 consists of a chamber with numerous inlets and outlets, and adjacent catch basins tied into the chamber. The basic construction of the chamber consists of a 30″ diameter drain on one edge of the chamber, a sewer line on the adjacent edge (12″ dia. inlet, 15″ dia. outlet), with a weir wall between the drain and sewer. In addition, there is a 26″ x 39″ inlet sewer that bridges the drain and discharges to the sewer side of the chamber. Overflows consist of flow topping the weir wall, bridge sewer, and also a 26″ x 39″ overflow outlet line. Both weir walls in the chamber are within an inch of each other in overflow elevation. With a large number of combined sewer areas upstream that contribute to this regulator, the City plans to complete closure of this regulator around 2025, in accordance with the Wastewater Management Plan (WMP) submitted during the reporting period. During the reporting period, the City used an ADS "Echo" ultrasonic sensor to the chamber to calculate overflow monitoring via a weir equation.

CSO 045 Highlights
30 Overflow Events
2,075,522 gal. Overflow
28.42 Hr. Duration
100% Meter Coverage
System Type: Combined

CSO 048 – 85 Water Street at Market Basket

CSO-048 consists of an 18″ influent pipe, an 8″ throttle and an 18″ overflow.

CSO 048 Highlights
0 Overflow Events
0 gal. Overflow
0 Hr. Duration
98% Meter Coverage
System Type: Separated

Construction for closure of this regulator will be completed in Spring 2020. There are no known areas of combined sewer that lead to this regulator. Few overflow events have occurred at this location during the 7 years the regulator has been monitored. The events that have occurred are of a relatively low volume, and a low height over the weir wall, therefore closing of the regulator should add minimal additional flow to the main interceptor sewer. The separation of a combination manhole upstream is suspected to have contributed to a reduction in overflows at the site.

CSO 064 – Water Street Easement Grit Chamber

CSO-064 is located within a former grit/siphon chamber on the trunk sewer. Upstream of the regulator, the sewer is 48″ diameter and downstream it is 30″ diameter, creating a bottleneck. The opening of the overflow is currently a partially plugged outlet pipe, which essentially creates a weir wall, with approximately a 15″ diameter opening. In order to fully close this regulator, additional sewer separation work and inflow removal will be required upstream. Approximately 60% of the collection system is located upstream of this location.

CSO 064 Highlights
15 Overflow Events
2,988,435 gal. Overflow
21.83 Hr. Duration
93% Meter Coverage
System Type: Combined/Separated

During the reporting period, the City's Capacity Assessment Report was submitted to the EPA and the MassDEP for review. During the capacity assessment, hydraulic model runs confirmed that upsizing the trunk sewer downstream of the regulator will allow for closure of the regulator. In accordance with the City's submitted WMP, the regulator is slated for closure in 2030.

CSO 076 – Birch Street at Heywood Street

The CSO-076 regulator manhole consists of a 10″ influent, 10″ effluent, and a 12″ overflow.

CSO 076 Highlights
4 Overflow Events
29,042 gal. Overflow
.67 Hr. Duration
93% Meter Coverage
System Type: Separated

The contributing collection system area to CSO-076 contains areas of high infiltration, and sewers of poor construction, which leads to large quantity of suspected infiltration. In addition, the base flow pipe is undersized. It is anticipated that inflow and infiltration removal upstream will reduce the amount of overflows at this location. There is no known combined sewer upstream of this regulator.

Due to unreliability of having the flow sensor in the overflow pipe, the City replaced the sensor with an ultrasonic down looking sensor to monitor surcharge height in the manhole, in order to use a manning's equation to calculate overflow volume. It has been apparent that this change has provided greater accuracy in overflow reporting.

CSO 083 – Main Street at Prichard Street

The regulator manhole consists of a 12" x 18" brick combined sewer for an inlet, a 15" VC effluent pipe, and a 12" overflow. The City plans to install a down looking sensor in this regulator, in order to provide more reliable overflow readings.

CSO 083 Highlights
7 Overflow Events
129,598 gal. Overflow
1.25 Hr. Duration
91% Meter Coverage
System Type: Combined

About half of the upstream contribution area is combined sewer, constructed in the late 1800s to early 1900s. With a large number of combined sewer areas upstream that contribute to this regulator, the City plans to complete closure of this regulator around 2025, in accordance with the Wastewater Management Plan submitted during the reporting period.

Weir Wall Elevation Adjustments and Regulator Closures

No weir wall adjustments were made during the reporting year, as we believe that we have likely maximized the existing capacity in the collection system based on surcharge heights within regulator manholes without causing customer back-ups. In addition, the City has a 10-year plan to close all the remaining regulators in accordance with the CWMP, minimizing the need to perform wide-spread weir wall adjustments. Nonetheless, the City will specifically look at modifying weir walls in CSO-10, CSO-4, and CSO-32 during the next reporting period, as these weirs in particular may be able to be slightly raised.

Dry Weather Overflows

Dry weather overflows are associated with blockages that occur in the sanitary system and cause an overflow either over a weir wall or through a relief pipe in a combination manhole or a regulator manhole. The City experienced no dry-weather overflows during the reporting period.

If you have any questions regarding this report, please contact the Fitchburg Sewer System Manager, Anthony W. Maressa, P.E., at 978-829-1916, or the undersigned.

Very Truly Yours,

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Jeffrey A. Murawski, P.E.
Fitchburg DPW Deputy Commissioner of Wastewater

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Jeffrey A. Murawski, P.E.
Fitchburg DPW Deputy Commissioner of Wastewater