Water/Wastewater Commission

Meeting AGENDA
Wednesday – October 15th, 2025
5:00 p.m.

Legislative Building, City Hall Campus
700 Main St.
Fitchburg, MA 01420

This meeting will be open to the public, including a virtual option. For any member of the public that wish to participate remotely, they are invited to participate in the meeting via the Zoom webinar of October 15, 2025 at 5:00 PM Eastern Time.

Register in advance for the Public Comment/Hearing portion of the agenda by going to:

https://us02web.zoom.us/webinar/register/WN_kNbAvJHvRxOyCsEdeguOyA

After registering, you will receive a confirmation email containing information about logging in to join the webinar.

OPPORTUNITIES FOR THE PUBLIC TO SPEAK DURING A WATER/WASTEWATER COMMISSION MEETING:

1. **Public Forum:** The Chairman will ask if anyone in the audience wishes to speak on any matter appearing on the agenda. If you wish to address the Commission, you must stand and be recognized and follow these rules before speaking.

   - State your name and the community you reside in.
   - Approach the center table and either sit or stand. This allows you to be seen and clearly heard by everyone in attendance.
   - You may speak only on items appearing on the agenda for no more than (2) minutes.

2. Review minutes from May 21st & June 18th, 2025 Commission Meetings.

3. **Water/Sewer Liens** – update

4. **Water Division**
    - Main St. Water Main Replacement Project – update
    - Water St. MassDOT Bridge Project – update on related water system work
    - Meetinghouse Gatehouse Rehabilitation Project – update
    - Mare Meadow Pump Station Rehabilitation Project – update
    - Current Drought Advisory and Reservoir Levels

5. **Wastewater Division**
    - CSO 010, 032, 045 & 083 project updates
    - Westminster Street/Depot Road Capacity limitations (document attached)
    - 0 Princeton Rd petition presented to City Council
    - Staffing updates;
        - Treatment Plant
        - DCWW (letter attached)
        - Greif Termination letter (attached)

6. **Other Business**
    - The Water/Wastewater Commission will next meet at 5:00 pm on Wednesday **November 19, 2025** at the Legislative Building, City Hall Campus 700 Main St. Fitchburg Ma.

    - Adjourn

Mark McNamara
Deputy Commissioner of Wastewater & Sewer
City of Fitchburg – DPW Wastewater Division
301 Broad Street
City of Fitchburg, Ma 01420
mmcnamara@fitchburgma.gov

September 08, 2025

Nick Erickson
Commissioner of Public Works & City Engineer
Department of Public Works
301 Broad Street
City of Fitchburg, MA 01420

Subject: Notice of Retirement – Deputy Commissioner of Wastewater & Sewer

Dear Nick,

I am writing to formally submit my notice of retirement as Deputy Commissioner of Wastewater & Sewer for the City of Fitchburg, effective **January 16, 2026**, as I will be retiring from public service.

After 36 years of dedicated public service—21 years with the Commonwealth of Massachusetts Department of Correction and the past 15 years with the City of Fitchburg—this moment comes with deep gratitude and reflection. I am sincerely thankful for the opportunity to have contributed to the department's mission and to work alongside such talented and committed professionals.

Together, we've made significant strides in protecting public health and the environment through innovative and effective wastewater management. From successfully implementing the 2012 Consent Decree to building strong, collaborative relationships with MADEP and USEPA, the progress we've achieved is something I will always be proud of.

As Plant Superintendent, I worked with a great team at the East Plant to complete key projects like the 2012 CEPT Project, the 2016 Secondary System Upgrades, the COVID-19 Pandemic, the 2024 Lab and Office improvements, and navigating numerous staffing challenges.

These efforts have significantly enhanced our treatment capacity and, more importantly, improved effluent quality—achievements that reflect the expertise, dedication, and resilience of our entire team.

In my role as Deputy Commissioner, I've also been proud to see key progress on our CSO initiatives:

- **CSO 007** – Completed

- **CSO 010** – $13,700,000 – Completed
- **CSO 032** – $26,290,000 – Commenced
- **CSO 045 & 083** – Preparing to go out to bid (est. $29,930,000)

As I prepare to step into retirement, I carry immense pride in what we've accomplished and deep appreciation for the journey we've shared. It has been an honor to serve the City of Fitchburg and its residents, and I leave with full confidence in the department's continued success.

I remain committed to ensuring a smooth transition and am available to support the department however I can during this time. Please don't hesitate to reach out if I can assist with the handover process.

Thank you again for the support, collaboration, and trust over the years. It has truly been an honor to serve in this role.

Warm regards,
Mark McNamara

October 7, 2025

VIA ELECTRONIC MAIL AND FEDERAL EXPRESS

Mark McNamera
Deputy Commissioner and Acting Superintendent of Wastewater
DPW-Wastewater Division - City of Fitchburg, Massachusetts
718 Main Street
Fitchburg, MA 01420

Nicholas Ericson
Commissioner of Public Works
City of Fitchburg, Massachusetts
718 Main Street
Fitchburg, MA 01420

Re: Notice of Termination

Dear Mark and Nick:

Reference is made to that certain Agreement for Wastewater Treatment and Disposal (as amended, modified or supplemented from time to time pursuant to its terms, the "**Agreement**"), dated on or around 2001, by and between The Newark Group, Inc. ("**we**", "**us**" or "**our**") and City of Fitchburg, Massachusetts ("**you**" or "**your**").

Pursuant to Section 7.1 of the Agreement, this letter serves as written notice of our decision to terminate the Agreement, effective as of sixty (60) days from the date of this letter.

We have enjoyed the opportunity to do business with you and wish you future success. Please direct any questions to Andrew Peek, Vice President, Manufacturing at a andrew.peek@greif.com.

With kind regards,

The Newark Group, Inc.

DocuSigned by:
Andrew Peek
F7F204739B944FF...

Andrew Peek
Vice President, Manufacturing

Weston & Sampson

westonandsampson.com

427 Main Street, Suite 400
Worcester, MA 01608
tel: 508.762.1676

REPORT

February 2024

CITY OF
Fitchburg
MASSACHUSETTS

Depot and Westminster Street Capacity Evaluation

Table of Contents

February 27, 2024

427 Main Street, Suite 400, Worcester, MA 01608
Tel: 508.762.1676

Mark McNamara
DPW Deputy Commissioner of Wastewater
City of Fitchburg
301 Broad Street
Fitchburg, Massachusetts 01420

Re: **Depot and Westminster Street Wastewater Capacity Evaluation**

Dear Mark:

Weston & Sampson is pleased to submit the following letter report for the Depot and Westminster Street Wastewater Capacity Evaluation. This report presents a summary of field investigations and our analysis of the available capacity of the sewer on Depot Street and the interceptor sewers on Westminster Street, immediately downstream of Depot Street.

BACKGROUND

In September 2022, a developer approached the City of Fitchburg regarding a proposed 35 duplex development on Franklin Road, with a proposed wastewater flow of approximately 23,100 gallons per day (gpd). The proposed development would introduce sewer flow to the existing sewer in Franklin Road, west of Depot Street, where flow would be conveyed down Depot Street to the 24-inch sewer interceptor in Westminster Street. A map of the area is provided in Figure 1. Due to the proposed increase in sewer flow following completion of the proposed development, and concerns regarding potential wet weather peak events in the project area, the City requested the services of Weston & Sampson to review the downstream area for any potential capacity restrictions or existing conditions that could result in surcharging of flow in the area.

PROJECT AREA OVERVIEW

The proposed development on Franklin Road is located to the west of Depot Street and would connect to the existing sewer system upstream of sewer manhole (SMH) 03618 (located behind 631 Franklin Road). Downstream of SMH 03618, sewer flow is conveyed through Depot Street to the City's 24-inch sewer interceptor in Westminster Street at SMH 00631 via a 10-inch pipe located on the Depot Street Bridge over the North Nashua River. The following streets are tributary to the sewer pipe in Depot Street at this location:

- Depot Street (Built in 1919)
- Burma Road (Built in 1986)
- Fairmount Street (Depot Street to House #441) (Built in 1924)
- Newtonville Avenue (Fairmount Street to Reingold Avenue) (Built in 1955)
- Leroy Street (Built in 1955)
- Pershing Street (Leroy Street to Reingold Avenue) (Built in 1965)
- Hannigan Court and York Avenue (Depot Street to Reingold Avenue) (Built in 1922)
- Liberty Circle (1990)
- Appleton Circle (Built in 1920)
- Billotta Way (Built in 2005)
- Constitution Drive (Built in 2008)
- Revolution Drive (Built in 2008)
- Patriot Road (Built in 2008)
- Franklin Road (House #459 to House #659) (Built in 1941, 1964, and 1986)
- Michael Street (Built in 1948)
- Southwick Street (Built in 1949)
- Great Oak Road
- Acorn Avenue
- Mountain Laurel Lane
- Green Briar Road
- Oak Leaf Road

A map of the tributary area is provided in Figure 1. The majority of the sewers in these streets were constructed before 1955 and are vitrified clay (VC) pipe. Newer pipes installed in the project area are polyvinyl chloride (PVC) pipe.

An estimated 412 residences contribute wastewater flow to the tributary area, including an estimated 223 homes, 71 residential units from the Chamberlain Hill Condominium Development, and 118 residential units from the Oak Ridge Condominium Development. The tributary area also includes the Reingold Elementary School and may include a force main discharge from D.A.H. Logistics Corp.

There are seven (7) remaining known combination manholes in the tributary area. During rainfall events, these manholes may introduce stormwater flow into the wastewater collection system. These combination manholes are shown on Figure 1.

The City's Sewer Ordinance has regulations in relation to the addition of new sewer flows in excess of 15,000 gpd or greater, where the applicant for the sewer connection/extension is required to identify and remove Inflow & Infiltration (I/I) at a rate of 4 gallons of I/I removal for each additional new gallon of wastewater proposed to be discharged to the system (Chapter 147, Section 32.B.). Since the proposed Franklin Road Development has a proposed average daily flow of 23,100 gpd, the development will be subject to this requirement and will be required to remove a total of approximately 92,400 gpd of I/I from the existing sewer system.

PREVIOUS INVESTIGATIONS

The City has previously conducted investigations in the tributary area and the interceptor pipes downstream of the tributary area. These investigations are summarized in the following sections.

Combination Manhole Inspections

In 2019, the City conducted a Combination Manhole Separation Program to develop preliminary design plans for the separation of combination manholes in the City that have shown signs of transference. As part of the Program, topside manhole inspections were conducted at 150 combination manholes across the City, eight (8) of which are located within the tributary area to the Depot Street sewer. Seven (7) of these eight (8) combination manholes have a history of transference between the sewer and drain. A summary of these manholes is provided below:

Street	Manhole Asset ID	CMH Number	Overflows
Appleton Circle	03301	301	3
	03299	10	3
	03298	9	2
	03297	11	2
Southwick Street	03439	351	0
Leroy Street	03380	89*	4
Newtonville Avenue	03377	90	4
Fairmount Street	03379	59	5

*Separated on December 2, 2022

Since seven (7) of the eight (8) manholes had a history of transference, these manholes are locations where inflow has historically been introduced into the wastewater collection system during rain events. Combination Manhole 89 on Leroy Street has been converted to a sewer manhole, leaving six (6) of the seven (7) remaining combination manholes with a history of transference in the tributary area. It should be noted that, the current total remaining number of combination manholes in the City has been reduced to 100.

City Closed-Circuit-Television (CCTV) Inspections

The City has been conducting CCTV inspections across the City since 2013, as required under their 2012 Consent Decree. CCTV inspection of the tributary area to Depot Street, called Asset Area 23, was completed in 2014. Of the 124 sewer pipes in the project area, the City attempted 94 inspections. A map of the sewers that were inspected is shown in Figure 2. Most of the sewers not inspected were PVC sewers built in 2008, but there are four (4) uninspected 6-inch VC sewer pipes built in 1950 in Franklin Road and behind houses along Franklin Road.

Sewer Interceptor Inspections

In 2019, as part of the City's ongoing Sewer System Evaluation Survey (SSES) efforts, the City conducted sewer interceptor investigations of pipes in Westminster Street, both upstream and downstream of the Depot Street intersection. During the investigations, significant debris build-up was observed in the sewer interceptor directly adjacent to the Depot Street intersection. The approximate cross-sectional area of the pipes reduced due to the debris build-up, as recorded in 2019, is provided in the table below. In total, an estimated 29 cubic yards (cy) of debris was observed in these pipes.

Asset ID	Location	Sonar Length (LF)	Debris (CY)	Diameter (in)	Average Debris		Maximum Debris	
					Depth (in)	% of X-S Area	Depth (in)	% of X-S Area
00683-00684	Westminster Street	333	11.89	24	8.0	29%	10.5	42%
00684-00631	Westminster Street	355	7.67	24	6.0	20%	7.5	27%
00631-00604	Westminster Street	240	5.33	24	6.0	20%	7.2	25%
00604-00630	Westminster Street	127	1.0	24	3.0	7%	5.0	15%
00630-00601	Westminster Street	123	0.9	24	3.0	7%	6.2	20%
00601-00642	River Street	164	2.3	24	4.0	11%	6.8	23%

During the 2019 inspections, severe structural defects were observed in sewer 00631-00604, including two holes in the pipe. Further pipe degradation at these two locations could create collapses and blockages that would impact residents in the tributary area.

In addition, multiple manholes were observed with moderate to high flow levels, on Westminster Street near Depot Street. It is assumed that the debris in the upstream and downstream sewers caused the high wastewater level in the manholes. These manholes are identified in the table below:

Manhole	Location	Invert Depth (feet)	Depth to Water Level (feet)	Percent of Pipe Flow (%)	Pipe Diameter (inches)
00631	Westminster Street	15.3	13.7	86%	24
00684	Westminster Street	11.7	10.8	44%	24
00683	Westminster Street	13.2	11.9	69%	24

A map of the inspected interceptor sewers is shown in Figure 2.

2022 INVESTIGATIONS

Following City review of the proposed sewer extension and additional flow from the proposed Franklin Road Development, the following supplemental tasks were identified as actions required to determine the available capacity of the tributary area:

- Flow metering on Depot Street and in the upstream and downstream sections of the sewer interceptor on Westminster Street.
- Cleaning and inspection of sewer interceptor from SMH 00683 to 00642 on Westminster Street.
- Trenchless cured in place pipe lining of the upstream and downstream pipe segments of the sewer interceptor on Westminster Street where Depot Street connects (SMH 00684 to 00604).
- Cured in place pipe lining on Depot Street in pipe segments from SMH 03402 to 00631.
- 4 to 1 infiltration/inflow (I/I) identification and removal of the proposed design flows
- Separation of 7 remaining combination manholes upstream of the development.
- Trench repair of critical defects on Depot Street.

To help facilitate the review of the available capacity of the tributary area, the City performed the cleaning and inspection of interceptor sewers, flow metering, and structural repairs on Depot Street during Fall 2022.

Cleaning and Television Inspections

In advance of flow metering the project area, National Water Main Cleaning Company (NWMCC) conducted cleaning and television inspections on the six (6) sewer pipes identified with debris during the 2019 interceptor inspections. Approximately 29 cubic yards of debris was identified in these pipes in 2019. Inspections and cleaning under this project were conducted between October 3rd and October 13th, 2022. Following the cleaning, the wastewater flow level in the manholes was observed to decrease significantly. Results and locations of the television inspections are shown in Table 1 and Figure 3. Defect code definitions and pipe material definitions in relation to Table 1 are provided in Appendices A and B.

The television inspections identified significant pipe degradation locations with missing wall material in sewers 00684-00631 and 00631-00604, as well as a suspect hole in pipe 00684-00631. The suspect hole may be a poorly cut service and should be investigated further prior to rehabilitation.

Flow Metering

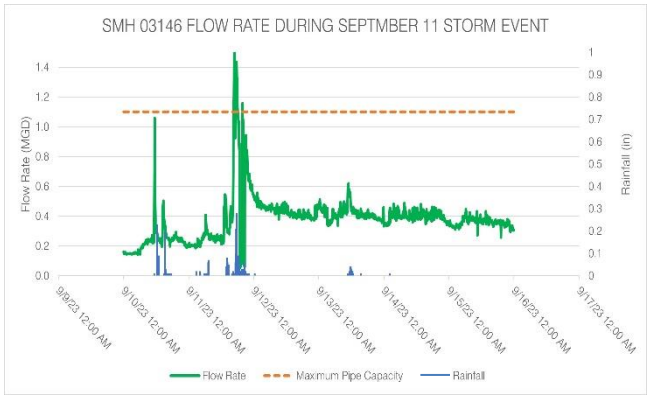
On October 19, 2022, ADS Environmental Services installed three (3) flow meters to determine the existing wastewater flow in the tributary area and document significant wastewater flow increases during wet weather events. The meters were installed in the following locations:

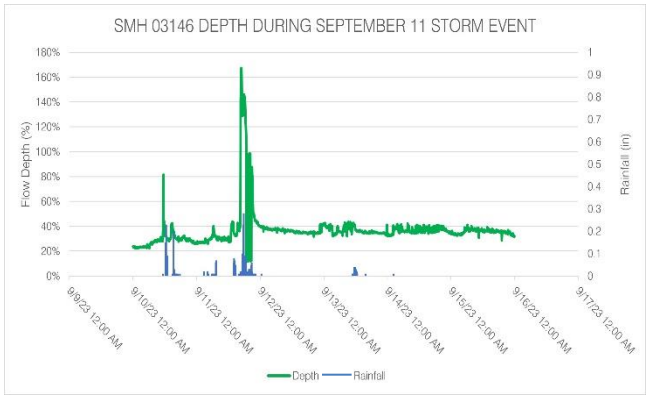
- SMH-00684 outside 85 Westminster Street (Upstream of the Depot Street sewer's connection to the interceptor on Westminster Street)
- SMH-03146 on Depot Street south of North Nashua River Bridge (Depot Street sewer)
- SMH-00630 near of intersection of River and Westminster Streets (Downstream of Depot Street sewer)

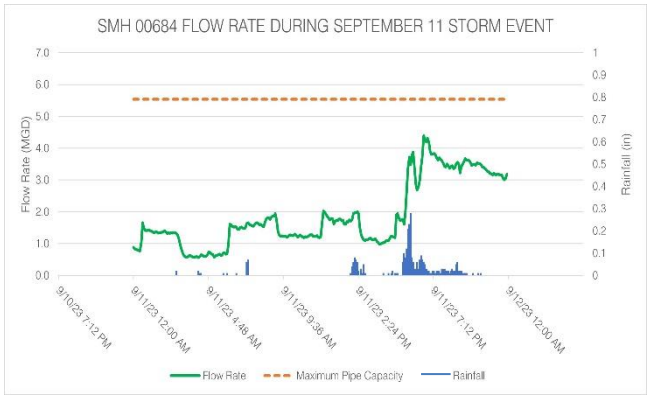
A map of the meter locations is shown in Figure 3. During the flow metering timeframe of October 19th, 2022 and January 11th, 2024, two (2) major storm events resulted in the most significant increases in wastewater flow. Flow Meters 03146 and 00684 observed the largest increase in flow on September 11th, 2023, while Flow Meter 00630 observed the largest increase in flow on July 16th, 2023, as shown in the table on the following page:

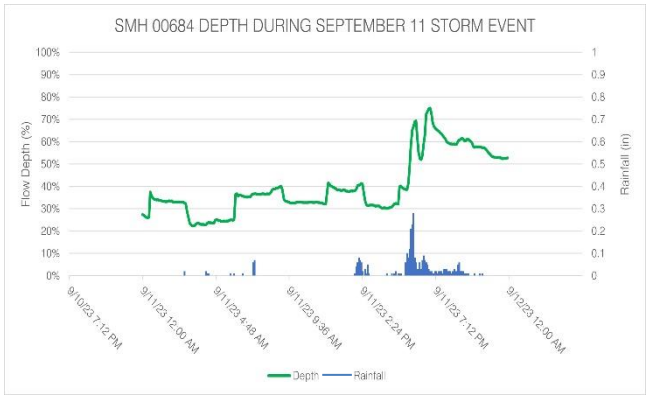
Date	Duration (hr)	Rainfall (in)	Average Rainfall Intensity (in/hr)	Peak Rainfall Intensity (in/hr)	Flow Meter Location with the Largest Increase in Flow
July 16th, 2023	7.42	2.92	0.39	1.70	00630
September 11th, 2023	8.33	2.93	0.35	1.37	03146 and 00684

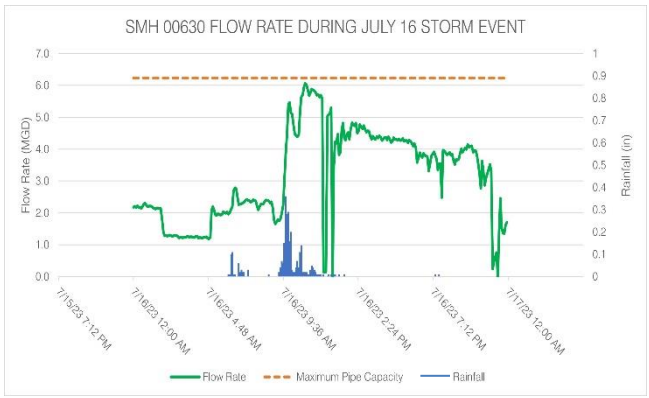
The most significant increase in flow rate at each meter and the associated rainfall events are shown in the following graphs:

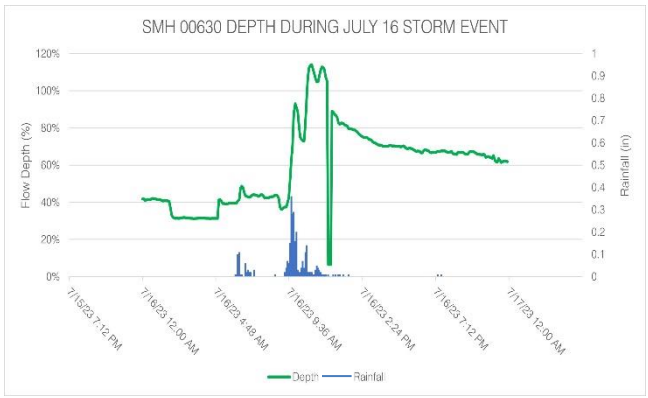












The most significant readings observed during these storm events were the depth and flow rate in SMH-03146 on Depot Street. During the September 11th, 2023 rain event, pipe flows were recorded well above 100% capacity. The significant inflow that occurred on Depot Street may be due to the seven (7) remaining combination manholes upstream. It should be noted that the sudden isolated dips in flow rate and depth in SMH 03146 and SMH 00630 may be erroneous readings. Graphs of wastewater flow during major storms event are provided in Appendix C.

City Repairs

During the review of the City's existing CCTV footage of the 10-inch VC pipe 03402-03434 on Depot Street, hinge fractures and 5% pipe ovality were observed. Pipe degradation at this location in the future could result in eventual failure and backups into homes. As a result, the City conducted a dig repair of the deformity with in-house staff on October 20th, 2022. The location of this repair is shown on Figure 3.

CAPACITY EVALUATION

In order for the Franklin Road Development to move forward in the City, the estimated available capacity of the sewers on Depot Street and Westminster Street had to be reviewed using the data from the flow metering performed between October 19th, 2022 and January 11th, 2024. As part of the capacity review, areas with the least capacity were identified as locations of critical concern. These locations would be the most prone to capacity restrictions that would impact the ability of the Franklin Road Development to connect to the system. The table below highlights the pipes with capacity limitations/restrictions within, or immediately downstream of, the tributary area.

Location	Asset ID	Diameter (in)	Material	Slope	Capacity (MGD)	Estimated Average Daily Flow (MGD)*
Depot Street	03434-03146	10	VC	0.006	1.10	0.167
Depot Street	03146-03145	10	VC	0.006	1.10	0.167
Westminster Street	00631-00604	24	RC	0.0024	6.23	1.197
Westminster Street	00604-00630	24	BRICK/RC	0.0024	6.23	1.197
Westminster Street	00630-00601	24	BRICK/RC	0.0024	6.23	1.197

*Average Daily Flow was estimated through the flow metering period of October 19th, 2022 through January 11th, 2024 during a period of dry weather between November 19th, 2022 and November 26th, 2022.

The average daily flow values require an adjustment to a peak hourly rate in order to account for variable peak flows that might occur within the tributary area. As a result, the average daily flow values were peaked in accordance with the *TR-16 Guides for the Design of Wastewater Treatment Works*, which provides a peaking factor for various flow rates. However, it should be noted that recorded peak flows exceeded TR-16 peaked flows and were therefore used for evaluation of available capacity. This is likely the result of I/I sources located upstream of these pipes. The table below documents these flow rates for the pipes with capacity limitations/restrictions in the tributary area:

Location	Asset ID	Est. Pipe Capacity (MGD)	Av. Daily Flow (MGD)	TR-16 Peaking Factor**	TR-16 Peak Flow (MGD)	Recorded Peak Flow (MGD)*	Est. Avail. Capacity (MGD)	Est. Avail. Capacity (%)
Depot Street	03434-03146	1.10	0.167	5.0	0.835	1.508	-0.408	-37.1%
Depot Street	03146-03145	1.10	0.167	5.0	0.835	1.508	-0.408	-37.1%
Westminster Street	00631-00604	6.23	1.197	3.6	4.301	6.055	0.175	2.8%
Westminster Street	00604-00630	6.23	1.197	3.6	4.301	6.055	0.175	2.8%
Westminster Street	00630-00601	6.23	1.197	3.6	4.301	6.055	0.175	2.8%

*Peak wastewater flow observed during the flow metering period occurred during the 7/16/23 and 9/11/2023 storm events
**Peaking factor based on the peak maximum day value for the recorded average daily flow.

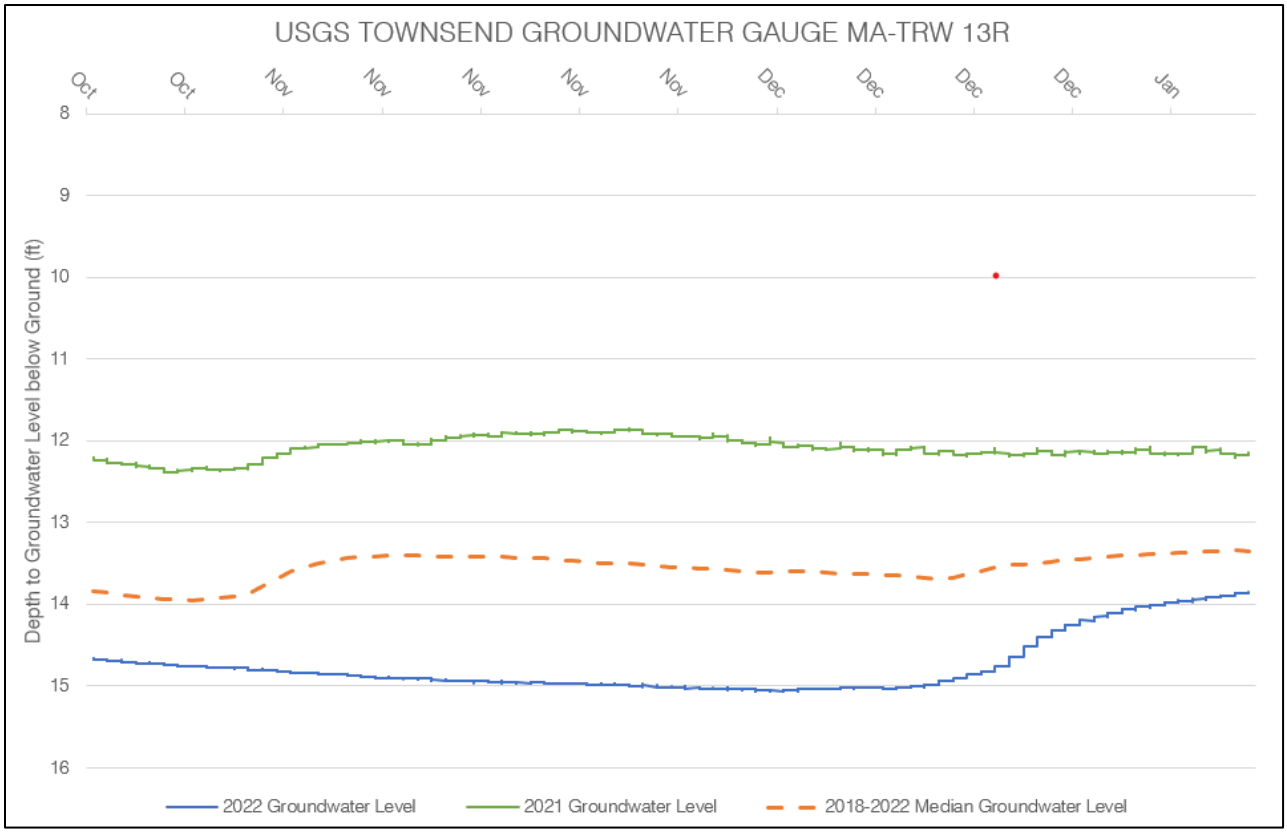
As shown in the table above, reported flows exceeded available pipe capacities on Depot Street and flow levels observed exceeded pipe diameters during these storm events, indicating that pipes in the system do not currently have any available capacity to handle additional flows from the proposed development.

Estimated pipe capacities for major pipes throughout the tributary area are provided in Table 2. Pipe information was gathered using the City's record drawings and was not field verified. It is recommended that City field verify pipe materials, sizes, and slopes prior to the construction of the Franklin Road Development. In addition, it was determined during a review of record drawings that the sewers on Franklin Road between SMH-03618 and SMH 03385 are 6-inch pipes acting as a shared sewer lateral for multiple buildings and are located outside of the right-of-way. It is recommended that the City require the proposed Franklin Road Development to connect to the manhole at the intersection of Depot Street and Franklin Road (SMH 03385) with a minimum 8-inch sewer to avoid maintaining undersized sewer pipes with limited access points downstream of the new development.

It should be noted that the period of November 19th, 2022 and November 26th, 2022 was preceded by a one-month period with 3.58 inches of rainfall. Before October, the City was under drought conditions. Following the rainfall in October/November an increase in average daily flow from 0.132 MGD to 0.167 MGD was observed in SMH-3146. This is indicative of infiltration being present in the tributary area.

Available Groundwater Data

The United States Geological Survey has numerous groundwater gauges throughout the country. The nearest groundwater gauge to Fitchburg is located in Townsend, Massachusetts. Although not directly applicable to the tributary area in Fitchburg, the Townsend groundwater gauge provides a general understanding of groundwater trends in the region. The graph below identifies the groundwater level recorded at the USGS Townsend groundwater gauge during 2021, 2022, and the 2018-2022 median groundwater level.



As shown in the graph above, the 2022 groundwater level for much of the study period was at least a foot lower than the median groundwater level measured between 2018 and 2022. As a result, the flow metering conducted may not represent the typical groundwater infiltration that the tributary area may see.

Franklin Road Development Flows

According to correspondence with the developer's engineer, the proposed Franklin Road Development will consist of 35 duplexes with 2-3 bedroom units. The total estimated Title 5 Maximum Day Flow for the proposed development is 23,100 gallons per day (gpd). Typically, Title 5 flows are designated as Maximum Day Flows. Average Daily Flows are generally two thirds of the Title 5 Maximum Day Flows. Therefore, the total average daily flow would be approximately 15,400 gpd for the proposed development. Using TR-16's *Ratio of Extreme Flow to Average Daily Flow* a conservative interpolated factor of 8 was used to calculate the Peak on Maximum Day Flow. Applying this peaking factor to the Average Daily Flow yields a Peak on Maximum Day Flow of 123,200 gpd. This information is presented in the table below:

Location	Average Daily Flow (gpd)	Maximum Daily Flow (gpd)	TR-16 Peaking Factor	Peak on Maximum Day Flow (gpd)
Proposed Franklin Road Development	15,400	23,100	8	123,200

Following the completion of the proposed Franklin Road Development, the City can anticipate an additional 0.123 MGD of flow in Depot Street and Westminster Street on a peak maximum wastewater day. This increase can be seen in the table below.

Location	Asset ID	Est. Pipe Capacity (MGD)	Recorded Peak Observed Flow (MGD)	Prop. Add. TR-16 Peak Max Day Flow (MGD)	Total Combined Est. Peak Flow (MGD)	Est. Avail. Capacity (MGD)	Est. Avail. Capacity (%)
Depot Street	03434-03146	1.10	1.508	0.123	1.631	-0.531	-48.3%
Depot Street	03146-03145	1.10	1.508	0.123	1.631	-0.531	-48.3%
Westminster Street	00631-00604	6.23	6.055	0.123	6.178	0.052	0.8%
Westminster Street	00604-00630	6.23	6.055	0.123	6.178	0.052	0.8%
Westminster Street	00630-00601	6.23	6.055	0.123	6.178	0.052	0.8%

Based on the results shown in the table above, the Franklin Road Development is expected to reduce capacity in sewers in which flows already exceed capacity during peak storm events. Sewer pipes observed flow rates greater than the projected TR-16 peaked maximum daily flow rate during the storm events.

SUMMARY AND RECOMMENDATIONS

The capacity evaluation of the Depot Street and Westminster Street Tributary Area identified that existing sewer flows in the area exceeded capacity during storm events and surcharge the system. The additional wastewater flow introduced from the proposed 35 duplexes would further exacerbate these issues. Significant wet weather events may exceed the TR-16 peaked wastewater flow rate and the capacity of the sewer on Depot Street and is likely due to known inflow sources in the tributary area.

Based on the proposed flows, the developer will be required to comply with a 4 to 1 I/I removal applicable through the City's Sewer Ordinance (Chapter 147, Section 32.B.). This would require the developer to remove approximately 92,400 gpd of I/I from the system. The 4 to 1 I/I removal should be performed in the tributary area to Depot Street and Westminster Street, as the removal would reduce the risk of significant wet weather events having a negative impact on residents, the sewer system, and the environment in the tributary area through sanitary sewer overflows and backups. It should be noted that the 92,400 gpd I/I mitigation is less than the calculated peak max day flow of 123,200 gpd.

In order to identify I/I in the tributary area, the City will need to conduct a SSES in the tributary area, including flow isolation, manhole inspections, smoke testing, CCTV inspections, and building inspections. In total, the estimated investigation cost is provided below:

Flow Isolation (21,250 LF)	$14,000
Manhole Inspections (122 manholes)	$28,000
Smoke Testing (21,250 LF)	$21,500
CCTV Inspections (21,250 LF)	$46,700
Building Inspections (270 buildings)	$35,600
Subtotal	$145,800
Engineering and Contingency (25%)	$36,450
Total	**$182,250**

Following the conclusion of the SSES work, rehabilitation work will be required to remove identified I/I. As previously mentioned, the developer would be required to remove approximately 92,400 gpd of the identified I/I. Since the inspections have not been completed to date, the estimated total quantity of I/I, and the extent of I/I rehabilitation required is currently unknown. It is also recommended that structural cured-in-place lining is conducted on the inspected sewer interceptor pipes on Westminster Street to prevent further pipe degradation that could result in pipe failure.

The seven (7) remaining combined manholes in the tributary area are also likely sources of significant inflow during wet weather events. As a result, it is critical that these manholes are separated prior to the completion of the Franklin Road Development. Costs for separation of six (6) of the seven (7) combination manholes were provided to the City in April 2021 as part of their Combination Manhole Separation Program, and updated costs are provided below:

Street	Manhole Asset ID	CMH Number	Separation Cost
Appleton Circle	03301	301	$4,100
	03299	10	$5,300
	03298	9	$5,300
	03297	11	$68,100
Southwick Street	03439	351	Unknown*
Newtonville Avenue	03377	90	$76,800
Fairmount Street	03379	59	
Subtotal			$159,600
Engineering and Contingency (30%)			$47,880
Total			**$207,480***

*Does not include CMH 351 separation located on Southwick Street.

Weston & Sampson recommends that I/I identification and removal and the closure of the combination manholes in the tributary area be conducted prior to the completion of the development. Upon completion of the I/I reduction and closure of the combination manholes, sewer capacities on Depot Street and along the interceptor should be reexamined following large rain events to verify the I/I removal was successful and determine whether the system will be able to accommodate proposed flows from the development. We recommend that flow meters be added in the area and monitored during peak rainfall following the separation work.

Weston & Sampson wishes to thank you and the members of the Wastewater Division and Engineering Division for the assistance provided while completing this project. We are available to meet with you at your earliest convenience to discuss this letter report. If you have any questions, please do not hesitate to contact me at (978) 573-4084.

Sincerely,

WESTON & SAMPSON ENGINEERS, INC.

Frank Occhipinti, PE
Vice President

FIGURES

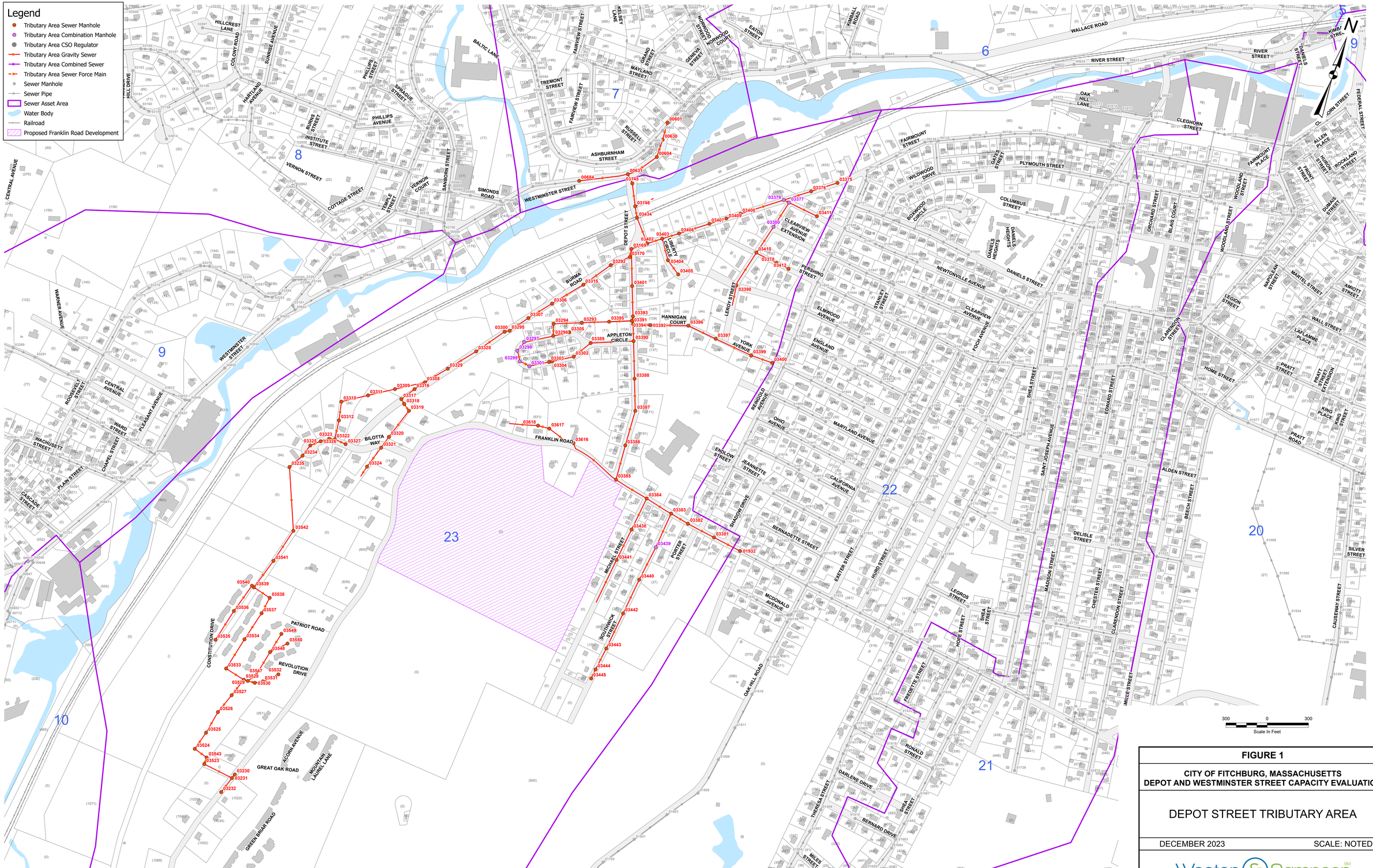


FIGURE 1

CITY OF FITCHBURG, MASSACHUSETTS
DEPOT AND WESTMINSTER STREET CAPACITY EVALUATION

DEPOT STREET TRIBUTARY AREA

DECEMBER 2023 SCALE: NOTED

Weston & Sampson℠

Legend
- Tributary Area Combination Manhole
- Tributary Area Sewer Manhole
- Complete Inspected in 2019
- Tributary Area Force Main
- Tributary Area Gravity Sewer
- Complete Inspection by City in 2014
- Interceptor Inspected in 2019
- Incomplete Inspection by City in 2014
- Sewer Manhole
- Sewer Pipe
- Sewer Asset Area
- Water Body
- Railroad
- Proposed Franklin Road Development

N

250 0 250
Scale In Feet

FIGURE 2

CITY OF FITCHBURG MASSACHUSETTS
DEPOT AND WESTMINSTER STREET CAPACITY EVALUATION

PREVIOUS INSPECTIONS IN ASSET AREA 23

DECEMBER 2023 SCALE: NOTED

Weston & Sampson SM

Legend

- Tributary Area Combination Manhole
- Tributary Area Sewer Manhole
- Flow Meter Location
- Sewer Manhole
- Tributary Area Force Main
- Tributary Area Gravity Sewer
- Cleaned and Inspected Sewer
- Sewer Pipe
- Point Repair
- Sewer Asset Area
- Water Body
- Railroad

N

Point Repair Conducted by City

100 0 100
Scale In Feet

FIGURE 3

CITY OF FITCHBURG, MASSACHUSETTS
DEPOT AND WESTMINSTER STREET CAPACITY EVALUATION

2022 INVESTIGATIONS

DECEMBER 2023 SCALE: NOTED

Weston & Sampson SM

TABLES

TABLE 1
TELEVISION INSPECTION SUMMARY

DEPOT AND WESTMINSTER STREET CAPACITY EVALUATION

CITY OF FITCHBURG, MASSACHUSETTS

Location	Pipe Segment	Upstream Manhole	Downstream Manhole	Camera Direction	Pipe Material	Pipe Diameter	Pipe Length	TV Pipe Length	Total Infiltration
WESTMINSTER ST	00683-00684	00683	00684	D	RCP	24	340	340	0

Footage	Defect Code	Defect	Clock From	Clock To	Continuous	Infil. Rate (gpd)	%	Defect Comments
000	AMH	ACCESS POINT MANHOLE				0		SMH 00683
000	MWL	MISCELLANEOUS WATER LEVEL				0	15	
005	SRI	SURFACE DAMAGE ROUGHNESS INCREASED	08	04	S01	0		
019	TB	TAP BREAK-IN/HAMMER	10			0		
047	TB	TAP BREAK-IN/HAMMER	10			0		
092	TB	TAP BREAK-IN/HAMMER	10			0		
111	TBD	TAP BREAK-IN/HAMMER DEFECTIVE	10			0		DEFECTIVE CAP
162	TB	TAP BREAK-IN/HAMMER	10			0		
212	TB	TAP BREAK-IN/HAMMER	10			0		
259	TB	TAP BREAK-IN/HAMMER	10			0		
303	TBD	TAP BREAK-IN/HAMMER DEFECTIVE	10			0		HALF CUT SERVICE
336	SRI	SURFACE DAMAGE ROUGHNESS INCREASED	08	04	F01	0		
340	AMH	ACCESS POINT MANHOLE				0		SMH 00684

Location	Pipe Segment	Upstream Manhole	Downstream Manhole	Camera Direction	Pipe Material	Pipe Diameter	Pipe Length	TV Pipe Length	Total Infiltration
WESTMINSTER ST	00684-00631	00684	00631	D	RCP	24	359	359	720

Footage	Defect Code	Defect	Clock From	Clock To	Continuous	Infil. Rate (gpd)	%	Defect Comments
000	AMH	ACCESS POINT MANHOLE				0		SMH 00684
000	MWL	MISCELLANEOUS WATER LEVEL				0	10	
005	SRI	SURFACE DAMAGE ROUGHNESS INCREASED	08	04	S02	0		
011	CL	CRACK LONGITUDINAL	04			0		
011	IWB	INFILTRATION WEEPER BARREL	04	05		144		
024	CL	CRACK LONGITUDINAL	04			0		
024	IWB	INFILTRATION WEEPER BARREL	04	05		144		
043	SSS	SURFACE DAMAGE SURFACE SPALLING	09	10		0		
047	SSS	SURFACE DAMAGE SURFACE SPALLING	01	03		0		
066	FL	FRACTURE LONGITUDINAL	04			0		
066	IWB	INFILTRATION WEEPER BARREL	04			0		
090	HVV	HOLE VOID VISIBLE	02			0		POTENTIAL SERVICE
099	TBI	TAP BREAK-IN INTRUDING	02			0		
130	TB	TAP BREAK-IN/HAMMER	10			0		
150	FL	FRACTURE LONGITUDINAL	08		S03	0		
150	IWB	INFILTRATION WEEPER BARREL	08			144		
153	FL	FRACTURE LONGITUDINAL	08		F03	0		
153	IWB	INFILTRATION WEEPER BARREL	08			144		
178	TB	TAP BREAK-IN/HAMMER	02			0		
295	SAP	SURFACE DAMAGE AGGREGATE PROJECTING	11	01	S04	0		
305	DSZ	DEPOSITS SETTLED OTHER	06			0	10	CEMENT BLOCK
310	RPP	POINT REPAIR PATCH	03			0		BRICK
319	SAP	SURFACE DAMAGE AGGREGATE PROJECTING	12		F04	0		
319	SAV	SURFACE DAMAGE AGGREGATE VISIBLE	08	04	S05	0		
319	SRI	SURFACE DAMAGE ROUGHNESS INCREASED	08	04	F02	0		
334	RPP	POINT REPAIR PATCH	03			0		BRICK
341	IWB	INFILTRATION WEEPER BARREL	08			144		
341	SMW	SURFACE DAMAGE MISSING WALL	09			0		

Location	Pipe Segment	Upstream Manhole	Downstream Manhole	Camera Direction	Pipe Material	Pipe Diameter	Pipe Length	TV Pipe Length	Total Infiltration
WESTMINSTER ST	00684-00631	00684	00631	D	RCP	24	359	359	720

Footage	Defect Code	Defect	Clock From	Clock To	Continuous	Infil. Rate (gpd)	%	Defect Comments
353	SAV	SURFACE DAMAGE AGGREGATE VISIBLE	08	04	F05	0		
359	AMH	ACCESS POINT MANHOLE				0		SMH 00631

Location	Pipe Segment	Upstream Manhole	Downstream Manhole	Camera Direction	Pipe Material	Pipe Diameter	Pipe Length	TV Pipe Length	Total Infiltration
WESTMINSTER ST	00631-00604	00631	00604	D	RCP	24	247	247	288

Footage	Defect Code	Defect	Clock From	Clock To	Continuous	Infil. Rate (gpd)	%	Defect Comments
000	AMH	ACCESS POINT MANHOLE				0		SMH 00631
000	MWL	MISCELLANEOUS WATER LEVEL				0	15	
003	SAP	SURFACE DAMAGE AGGREGATE PROJECTING	08	04	S01	0		
079	TB	TAP BREAK-IN/HAMMER	02			0		
080	IWB	INFILTRATION WEEPER BARREL	08			144		
080	SMW	SURFACE DAMAGE MISSING WALL	08			0		
093	TB	TAP BREAK-IN/HAMMER	02			0		
110	SMW	SURFACE DAMAGE MISSING WALL	09			0		
123	TBD	TAP BREAK-IN/HAMMER DEFECTIVE	02			0		PARTIALLY OPEN TAP
162	TBD	TAP BREAK-IN/HAMMER DEFECTIVE	10			0		PARTIALLY OPEN TAP
201	IWB	INFILTRATION WEEPER BARREL	09			144		
201	SAP	SURFACE DAMAGE AGGREGATE PROJECTING	09			0		
203	TBA	TAP BREAK-IN ACTIVITY	03			0		
243	SAP	SURFACE DAMAGE AGGREGATE PROJECTING	08	04	F01	0		
247	AMH	ACCESS POINT MANHOLE				0		SMH 00604

Location	Pipe Segment	Upstream Manhole	Downstream Manhole	Camera Direction	Pipe Material	Pipe Diameter	Pipe Length	TV Pipe Length	Total Infiltration
WESTMINSTER ST	00604-00630	00604	00630	D	BR	24	132	132	0

Footage	Defect Code	Defect	Clock From	Clock To	Continuous	Infil. Rate (gpd)	%	Defect Comments
000	AMH	ACCESS POINT MANHOLE				0		SMH 00604
000	MWL	MISCELLANEOUS WATER LEVEL				0	25	
009	LL	LINE LEFT				0	22	
132	AMH	ACCESS POINT MANHOLE				0		SMH 00630

Location	Pipe Segment	Upstream Manhole	Downstream Manhole	Camera Direction	Pipe Material	Pipe Diameter	Pipe Length	TV Pipe Length	Total Infiltration
WESTMINSTER ST	00630-00601	00630	00601	D	BR	24	130	130	0

Footage	Defect Code	Defect	Clock From	Clock To	Continuous	Infil. Rate (gpd)	%	Defect Comments
000	AMH	ACCESS POINT MANHOLE				0		SMH 00630
000	MWL	MISCELLANEOUS WATER LEVEL				0	20	
054	MMC	MISCELLANEOUS MATERIAL CHANGE				0		RCP
054	SRI	SURFACE DAMAGE ROUGHNESS INCREASED	08	04	S01	0		
058	CL	CRACK LONGITUDINAL	09			0		
058	IWB	INFILTRATION WEEPER BARREL	09			0		
063	SAV	SURFACE DAMAGE AGGREGATE VISIBLE	11	01	S02	0		
075	SAV	SURFACE DAMAGE AGGREGATE VISIBLE	11	01	F02	0		
083	MMC	MISCELLANEOUS MATERIAL CHANGE				0		HALF BRICK
083	SRI	SURFACE DAMAGE ROUGHNESS INCREASED	08	04	F01	0		
130	AMH	ACCESS POINT MANHOLE				0		SMH 00601

TOTAL

Total Pipe Length **1,208**

Total TV Pipe Length **1,208**

Total Infiltration **1,008**

TABLE 2
HYDRAULIC CAPACITY OF SEWERS

Weston & Sampson℠	DEPOT STREET CAPACITY ASSESSMENT	DATE: DECEMBER 8, 2023	PAGE: 1 OF 2 BY: MHH CHKD. BY: PMC

MH	To MH	Pipe Material	Material Roughness (N)	1.49 / n	Diameter (inches)	Area (sf)	Wetted Perim. (P) (ft)	Hydr. Radius (R)	$R^{2/3}$ (ft)	$AR^{2/3}$	Slope (S)	$S^{1/2}$	Velocity (V) (ft/s)	Velocity Head (V^2) / 2g	Q (cfs)	Q (MGD)
03145	00631	VC	0.013	114.62	10	0.545	2.618	0.208	0.351	0.19168	0.0846	0.291	11.72	2.13	6.390	4.131
03146	03145	VC	0.013	114.62	10	0.545	2.618	0.208	0.351	0.19168	0.006	0.077	3.12	0.15	1.702	1.100
03434	03146	VC	0.013	114.62	10	0.545	2.618	0.208	0.351	0.19168	0.006	0.077	3.12	0.15	1.702	1.100
03402	03434	VC	0.013	114.62	10	0.545	2.618	0.208	0.351	0.19168	0.023	0.152	6.11	0.58	3.332	2.154
03169	03402	VC	0.013	114.62	8	0.349	2.094	0.167	0.303	0.10572	0.06	0.245	8.50	1.12	2.968	1.919
03401	03169	VC	0.013	114.62	8	0.349	2.094	0.167	0.303	0.10572	0.075	0.274	9.51	1.40	3.318	2.145
03393	03401	VC	0.013	114.62	8	0.349	2.094	0.167	0.303	0.10572	0.075	0.274	9.51	1.40	3.318	2.145
03391	03393	VC	0.013	114.62	8	0.349	2.094	0.167	0.303	0.10572	0.075	0.274	9.51	1.40	3.318	2.145
03390	03391	VC	0.013	114.62	8	0.349	2.094	0.167	0.303	0.10572	0.07125	0.267	9.27	1.33	3.234	2.091
03388	03390	VC	0.013	114.62	8	0.349	2.094	0.167	0.303	0.10572	0.055	0.235	8.14	1.03	2.842	1.837
03387	03388	VC	0.013	114.62	8	0.349	2.094	0.167	0.303	0.10572	0.055	0.235	8.14	1.03	2.842	1.837
03386	03387	VC	0.013	114.62	8	0.349	2.094	0.167	0.303	0.10572	0.04	0.200	6.94	0.75	2.423	1.566
03385	03386	VC	0.013	114.62	8	0.349	2.094	0.167	0.303	0.10572	0.045	0.212	7.36	0.84	2.570	1.661
03616	03385	VC	0.013	114.62	6	0.196	1.571	0.125	0.250	0.04909	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
03617	03616	VC	0.013	114.62	6	0.196	1.571	0.125	0.25	0.04909	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
03618	03617	VC	0.013	114.62	6	0.196	1.571	0.125	0.25	0.04909	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
AEP	03618	VC	0.013	114.62	6	0.196	1.571	0.125	0.25	0.04909	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN

$Q = (1.49/N) * A * R^{2/3} * S^{1/2}$

area = $a = \frac{\pi D^2}{4}$

wetted perimeter= $P = \pi D$

hydraulic radius = $R = \frac{a}{p}$

TABLE 2
HYDRAULIC CAPACITY OF SEWERS

Weston & Sampson SM	WESTMINSTER STREET CAPACITY ASSESSMENT	DATE: DECEMBER 8, 2023	PAGE: 2 OF 2 BY: MHH CHKD. BY: PMC

MH	To MH	Pipe Material	Material Roughness (N)	1.49 / n	Diameter (inches)	Area (sf)	Wetted Perim. (P) (ft)	Hydr. Radius (R)	$R^{2/3}$ (ft)	$AR^{2/3}$	Slope (S)	$S^{1/2}$	Velocity (V) (ft/s)	Velocity Head (V^2) / 2g	Q (cfs)	Q (MGD)
00631	00604	RC	0.015	99.33	24	3.142	6.283	0.500	0.630	1.97908	0.0024	0.049	3.07	0.15	9.631	6.226
00604	00630	BRICK/RC	0.015	99.33	24	3.142	6.283	0.500	0.630	1.97908	0.0024	0.049	3.07	0.15	9.631	6.226
00630	00601	BRICK/RC	0.015	99.33	24	3.142	6.283	0.500	0.630	1.97908	0.0024	0.049	3.07	0.15	9.631	6.226
00601	00642	BRICK/RC	0.015	99.33	24	3.142	6.283	0.500	0.630	1.97908	0.0027	0.052	3.25	0.16	10.215	6.603
00642	00644	RC	0.015	99.33	24	3.142	6.283	0.500	0.630	1.97908	0.0029	0.054	3.37	0.18	10.587	6.843

$Q = (1.49/N) * A * R^{2/3} * S^{1/2}$

area = $a = \frac{\pi D^2}{4}$

wetted perimeter= $P = \pi D$

hydraulic radius = $R = \frac{a}{p}$

APPENDIX A

Defect Code Definitions

APPENDIX A
DEFECT CODE DEFINITIONS

DEPOT AND WESTMINSTER STREET CAPACITY EVALUATION

CITY OF FITCHBURG, MASSACHUSETTS

Defect Code	Defect Code Definition
ACB	Access Point Catch Basin
ACOH	Access Point Cleanout House
ACOM	Access Point Cleanout Mainline
ACOP	Access Point Cleanout Propertyline
ADP	Access Point Discharge Point
AEP	Access Point End of Pipe
AJB	Access Point Junction Box
AM	Access Point Meter
AMH	Access Point Manhole
AOC	Access Point Special Chamber
ATC	Access Point Tee Connection
AWA	Access Point Wastewater Access Device
AWW	Access Point Wet Well
AZ	Access Point Other
B	Broken
BSV	Broken Soil Visible
BVV	Broken Void Visible
CC	Crack Circumferential
CH2	Crack Longitudinal Hinge, 2
CH3	Crack Longitudinal Hinge, 3
CH4	Crack Longitudinal Hinge, 4
CL	Crack Longitudinal
CM	Crack Multiple
CS	Crack Spiral
DAE	Deposits Attached Encrustation
DAGS	Deposits Attached Grease
DAR	Deposits Attached Ragging
DAZ	Deposits Attached Other

Defect Code	Defect Code Definition
DB	Displaced Brick
DFBI	Deformed Flexible Bulging Inverse Curvature
DFBR	Deformed Flexible Bulging Round
DFC	Deformed Flexible Creasing
DFE	Deformed Flexible Elliptical
DI	Brickwork Dropped Invert
DNF	Deposits Ingress Fine
DNGV	Deposits Ingress Gravel
DNZ	Deposits Ingress Other
DR	Deformed Rigid
DSC	Deposits Settled Hard/Compacted
DSF	Deposits Settled Fine
DSGV	Deposits Settled Gravel
DSZ	Deposits Settled Other
DTBI	Deformed Brick Bulging Inverse Curvature
DTBR	Deformed Brick Bulging Round
FC	Fracture Circumferential
FH2	Fracture Longitudinal Hinge, 2
FH3	Fracture Longitudinal Hinge, 3
FH4	Fracture Longitudinal Hinge, 4
FL	Fracture Longitudinal
FM	Fracture Multiple
FS	Fracture Spiral
GRT	Grout at a Location
GTFJ	Grout Test Fail Joint
GTFL	Grout Test Fail Lateral
GTPJ	Grout Test Pass Joint
GTPL	Grout Test Pass Lateral
GTUJ	Grout Test Unable to Test Joint
GTUL	Grout Test Unable to Test Lateral
H	Hole
HSV	Hole Soil Visible
HVV	Hole Void Visible

Defect Code	Defect Code Definition
ID	Infiltration Dripper
IDB	Infiltration Dripper Barrel
IDC	Infiltration Dripper Connection
IDJ	Infiltration Dripper Joint
IDL	Infiltration Dripper Lateral
IG	Infiltration Gusher
IGB	Infiltration Gusher Barrel
IGC	Infiltration Gusher Connection
IGJ	Infiltration Gusher Joint
IGL	Infiltration Gusher Lateral
IR	Infiltration Runner
IRB	Infiltration Runner Barrel
IRC	Infiltration Runner Connection
IRJ	Infiltration Runner Joint
IRL	Infiltration Runner Lateral
IS	Infiltration Stain
ISB	Infiltration Stain Barrel
ISC	Infiltration Stain Connection
ISGT	Intruding Sealing Material Grout
ISJ	Infiltration Stain Joint
ISL	Infiltration Stain Lateral
ISSR	Intruding Sealing Material Sealing Ring
ISSRB	Intruding Sealing Material Sealing Ring Broken
ISSRH	Intruding Sealing Material Sealing Ring Hanging
ISSRL	Intruding Sealing Material Sealing Ring Loose
ISZ	Intruding Sealing Material Other
IW	Infiltration Weeper
IWB	Infiltration Weeper Barrel
IWC	Infiltration Weeper Connection
IWJ	Infiltration Weeper Joint
IWL	Infiltration Weeper Lateral
JAL	Joint Angular Large
JAM	Joint Angular Medium

Defect Code	Defect Code Definition
JAS	Joint Angular Small
JOL	Joint Offset Large
JOLD	Joint Offset Large Defective
JOM	Joint Offset Medium
JOMD	Joint Offset Medium Defective
JOS	Joint Offset Small
JOSD	Joint Offset Small Defective
JSL	Joint Separated Large
JSM	Joint Separated Medium
JSS	Joint Separated Small
LD	Line Down
LFAC	Lining Feature Abandoned Connection
LFAS	Lining Feature Annular Space
LFB	Lining Feature Blistered
LFCS	Lining Feature Service Cut Shifted
LFD	Lining Feature Detached
LFDC	Lining Feature Discoloration
LFDE	Lining Feature Defective End
LFDL	Lining Feature Delaminating
LFOC	Lining Feature Overcut Service
LFRS	Lining Feature Resin Slug
LFUC	Lining Feature Undercut Service
LFW	Lining Feature Wrinkled
LFZ	Lining Feature Other
LL	Line Left
LLD	Line Left Down
LLU	Line Left Up
LR	Line Right
LRD	Line Right Down
LRU	Line Right Up
LU	Line Up
MB	Missing Brick
MCU	Miscellaneous Camera Underwater

Defect Code	Defect Code Definition
MGO	Miscellaneous General Observation
MGP	Miscellaneous General Photo
MJL	Miscellaneous Pipe Joint Length Change
MLC	Miscellaneous Lining Change
MMC	Miscellaneous Material Change
MML	Missing Mortar Large
MMM	Missing Mortar Medium
MMS	Missing Mortar Small
MSA	Miscellaneous Abandoned Survey
MSC	Miscellaneous Shape/Size Change
MWL	Miscellaneous Water Level
MWLS	Miscellaneous Water Level Sag
MWM	Miscellaneous Water Mark
MYN	Miscellaneous Dye Test Not Visible
MYV	Miscellaneous Dye Test Visible
OBB	Obstruction Brick or Masonry
OBC	Obstruction Thru Connection
OBI	Obstruction Intruding Through Wall
OBJ	Obstruction Wedged In The Joint
OBM	Obstruction Pipe Material in Invert
OBN	Obstruction Construction Debris
OBP	Obstruction External Pipe or Cable
OBR	Obstruction Rocks
OBS	Obstruction Built Into Structure
OBZ	Obstruction Other
RBB	Roots Ball Barrel
RBC	Roots Ball Connection
RBJ	Roots Ball Joint
RBL	Roots Ball Lateral
RFB	Roots Fine Barrel
RFC	Roots Fine Connection
RFJ	Roots Fine Joint
RFL	Roots Fine Lateral

Defect Code	Defect Code Definition
RMB	Roots Medium Barrel
RMC	Roots Medium Connection
RMJ	Roots Medium Joint
RML	Roots Medium Lateral
RPL	Point Repair Liner
RPLD	Point Repair Liner Defective
RPP	Point Repair Patch
RPPD	Point Repair Patch Patch Defective
RPR	Point Repair Replacement
RPRD	Point Repair Replacement Defective
RPZ	Point Repair Other
RPZD	Point Repair Other Defective
RTB	Roots Tap Barrel
RTC	Roots Tap Connection
RTJ	Roots Tap Joint
RTL	Roots Tap Lateral
SAM	Surface Damage Aggregate Missing
SAP	Surface Damage Aggregate Projecting
SAV	Surface Damage Aggregate Visible
SCP	Surface Damage Corrosion
SMW	Surface Damage Missing Wall
SRC	Surface Damage Reinforcement Corroded
SRI	Surface Damage Roughness Increased
SRP	Surface Damage Reinforcement Projecting
SRV	Surface Damage Reinforcement Visible
SSC	Surface Spalling of Damage Coating
SSS	Surface Damage Surface Spalling
SZ	Surface Damage Other
TB	Tap Break-in/Hammer
TBA	Tap Break-in Activity
TBB	Tap Break-in Abandoned
TBC	Tap Break-in Capped
TBD	Tap Break-in/Hammer Defective

Defect Code	Defect Code Definition
TBI	Tap Break-in Intruding
TF	Tap Factory
TFA	Tap Factory Activity
TFB	Tap Factory Abandoned
TFC	Tap Factory Capped
TFD	Tap Factory Defective
TFI	Tap Factory Intruding
TR	Tap Rehabilitated
TRA	Tap Rehabilitated Activity
TRB	Tap Rehabilitated Abandoned
TRC	Tap Rehabilitated Capped
TRD	Tap Rehabilitated Defective
TRI	Tap Rehabilitated Intruding
TS	Tap Saddle
TSA	Tap Saddle Activity
TSB	Tap Saddle Abandoned
TSC	Tap Saddle Capped
TSD	Tap Saddle Defective
TSI	Tap Saddle Intruding
VC	Vermin Cockroach
VR	Vermin Rat
VZ	Vermin Other
WFC	Weld Feature Circumferential
WFL	Weld Feature Longitudinal
WFM	Weld Feature Multiple
WFS	Weld Feature Spiral
WFZ	Weld Feature Other
X	Collapse

APPENDIX B

Pipe Material Definitions

APPENDIX B
PIPE MATERIAL DEFINITIONS

DEPOT AND WESTMINSTER STREET CAPACITY EVALUATION

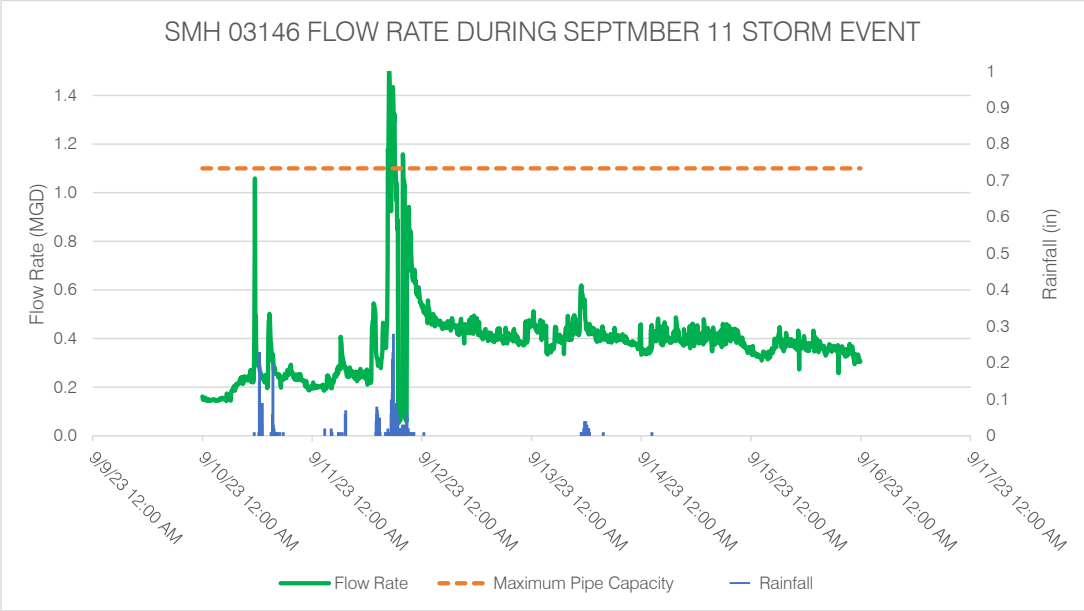
CITY OF FITCHBURG, MASSACHUSETTS

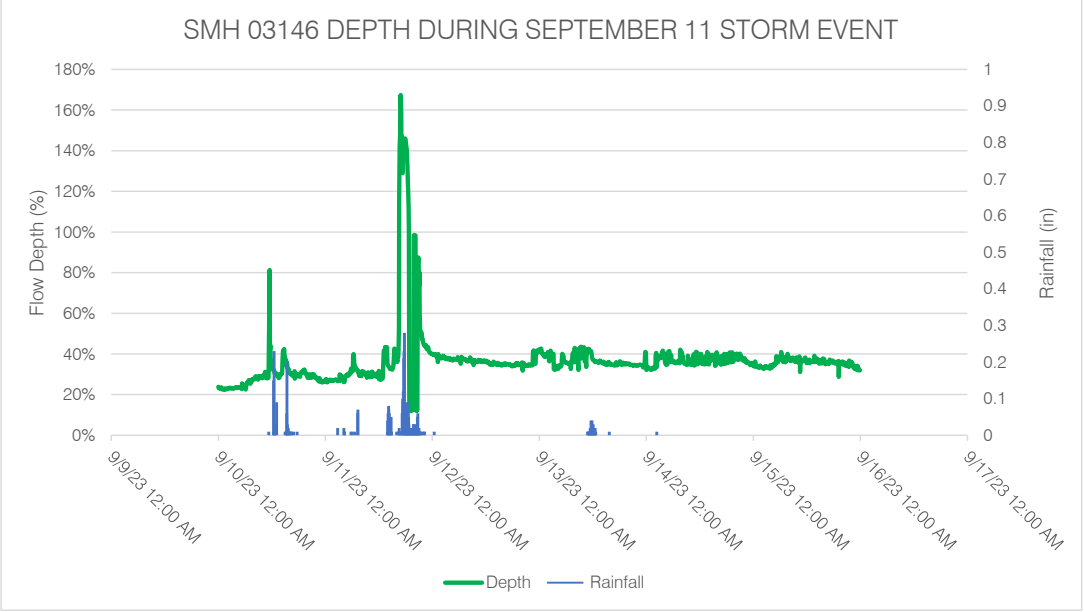
Material Code	Material Code Definition
ABS	Acrylonitrile Butadiene Styrene
AC	Asbestos Cement
BR	Brick
CAS	Cast Iron
CLC	Clay-lined Concrete Pipe
CMP	Corrugated Metal Pipe
CP	Concrete Pipe (non-reinforced)
CSB	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
CT	Clay Tile (not vitrified clay)
DIP	Ductile Iron Pipe
FRP	Fiberglass Reinforced Pipe
OB	Pitch Fiber (Orangeburg)
PCCP	Pre-stressed Concrete Cylinder Pipe
PCP	Polymer Concrete Pipe
PE	Polyethylene
PP	Polypropylene
PSC	Plastic/Steel Composite
PVC	Polyvinyl Chloride
RCP	Reinforced Concrete Pipe
RPM	Reinforced Plastic Pipe (Truss Pipe)
SB	Segmented Block
SP	Steel Pipe
VCP	Vitrified Clay Pipe
WD	Wood
XXX	Not Known
ZZZ	Other

APPENDIX C

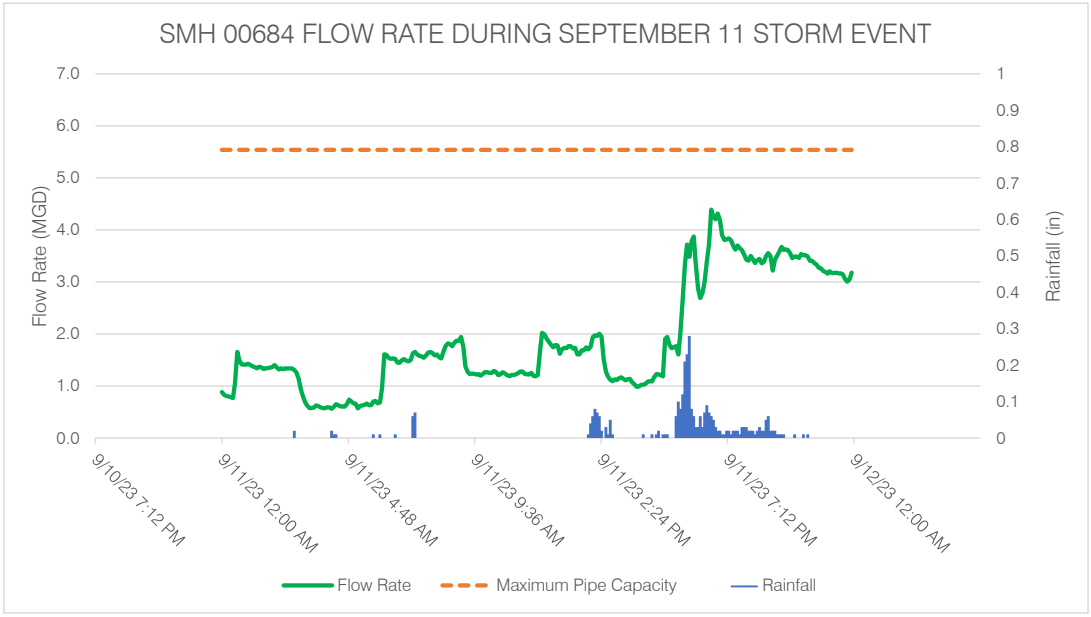
Storm Event Metering Data

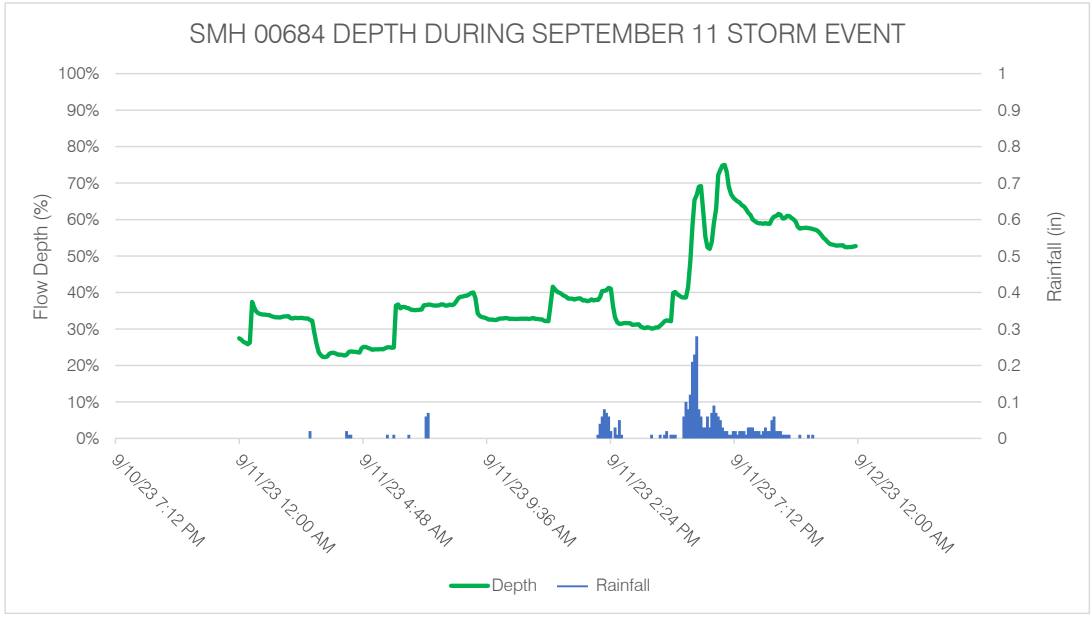
APPENDIX C
STORM EVENT METERING DATA
SEPTEMBER 22-23 STORM EVENT



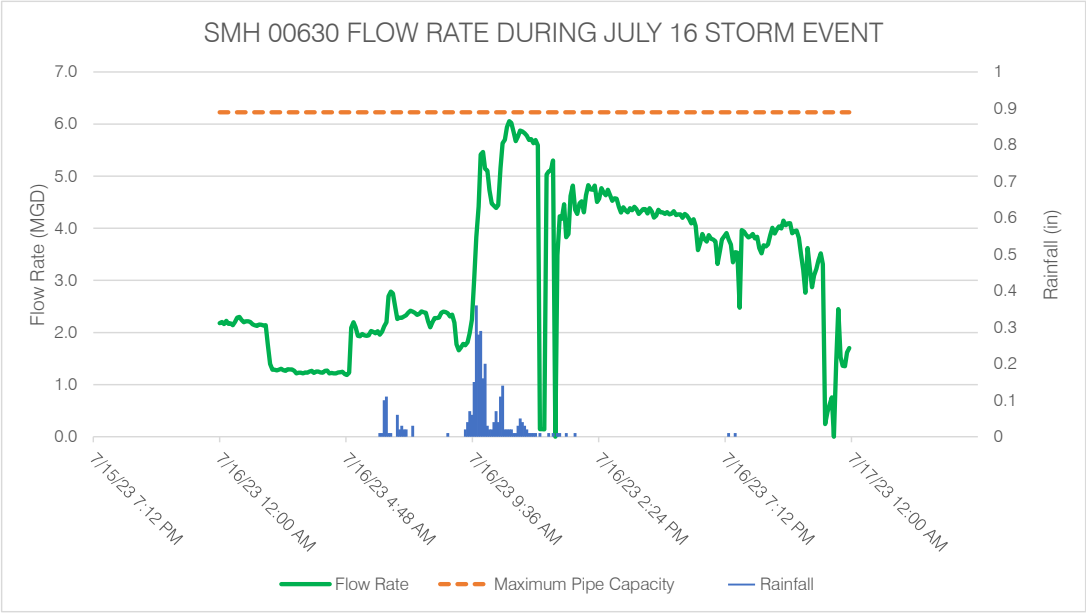


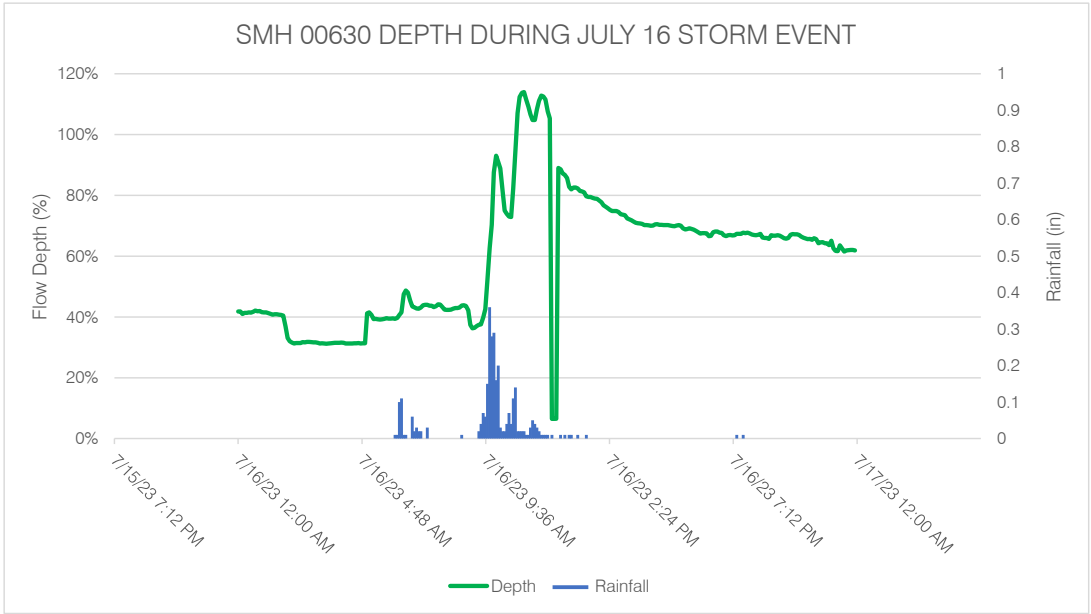
APPENDIX C
STORM EVENT METERING DATA
SEPTEMBER 22-23 STORM EVENT



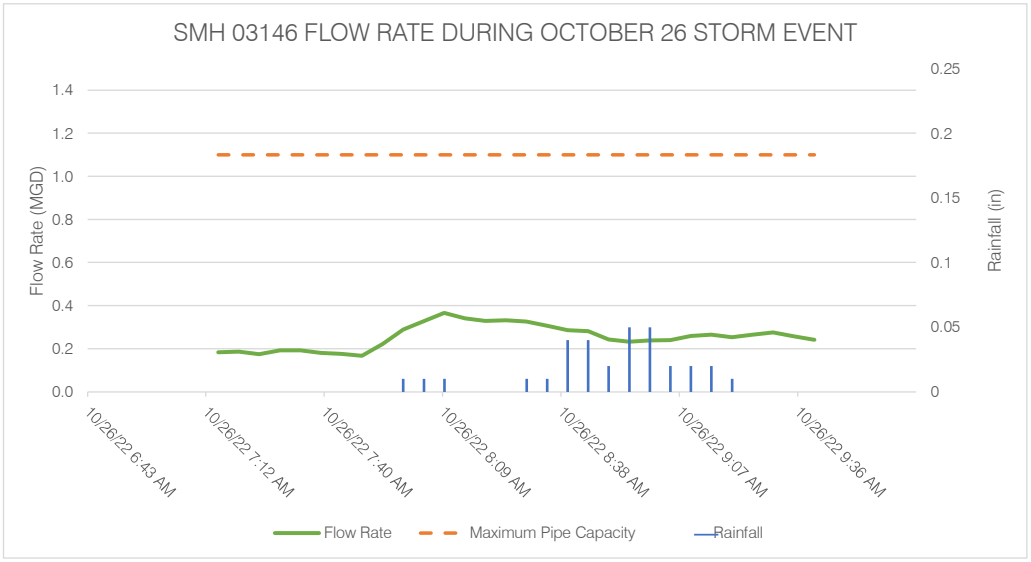


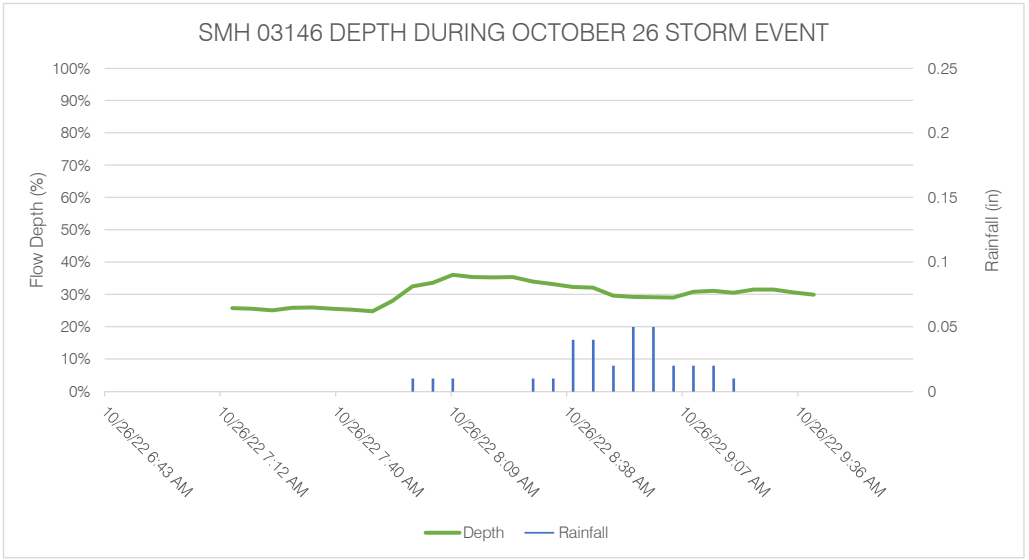
APPENDIX C
STORM EVENT METERING DATA
SEPTEMBER 22-23 STORM EVENT



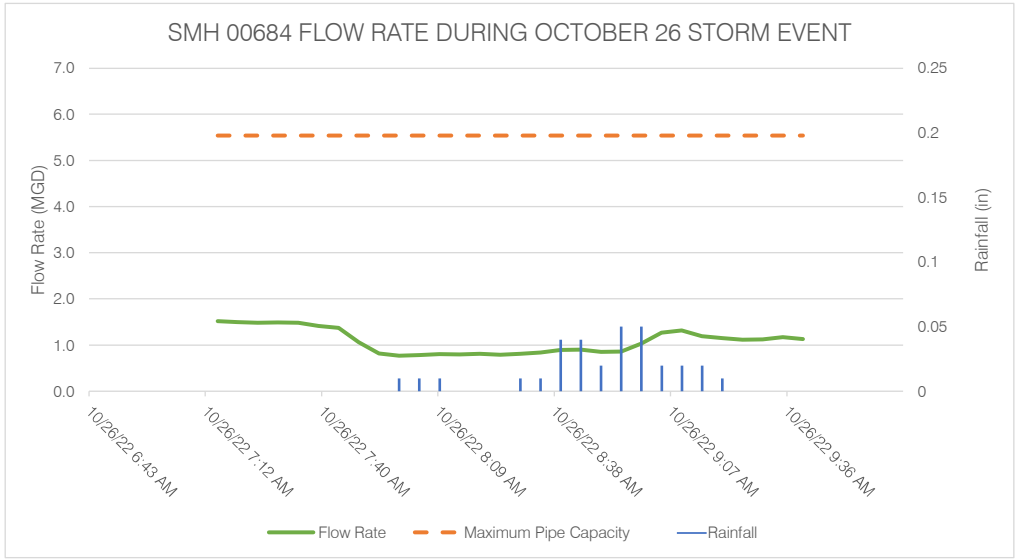


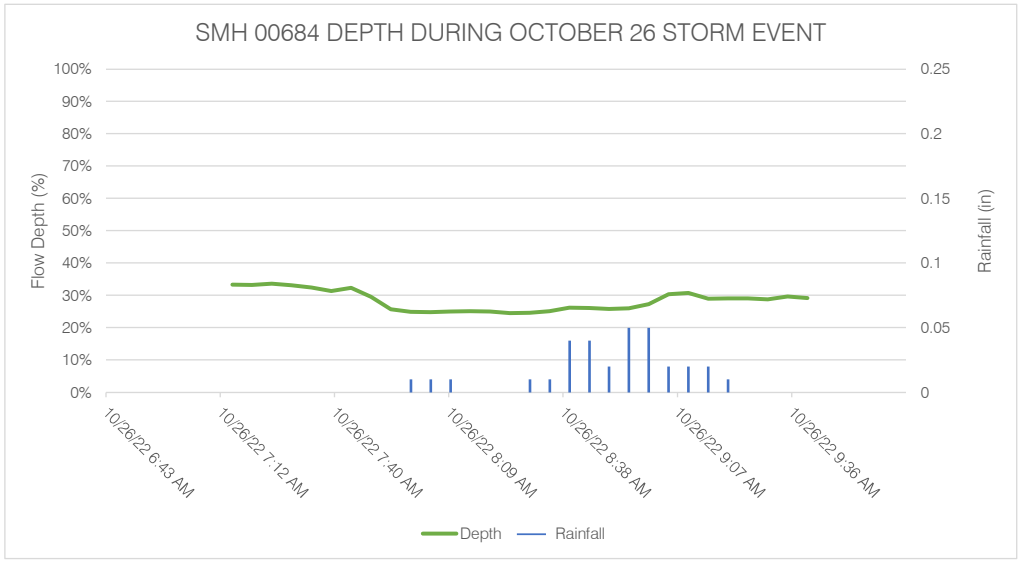
APPENDIX C
STORM EVENT METERING DATA
OCTOBER 26 STORM EVENT



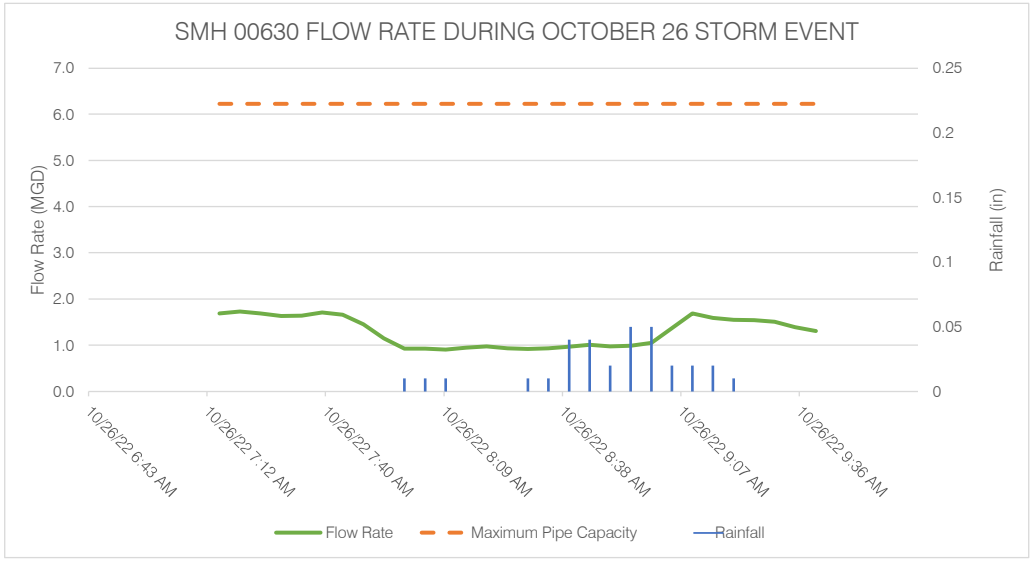


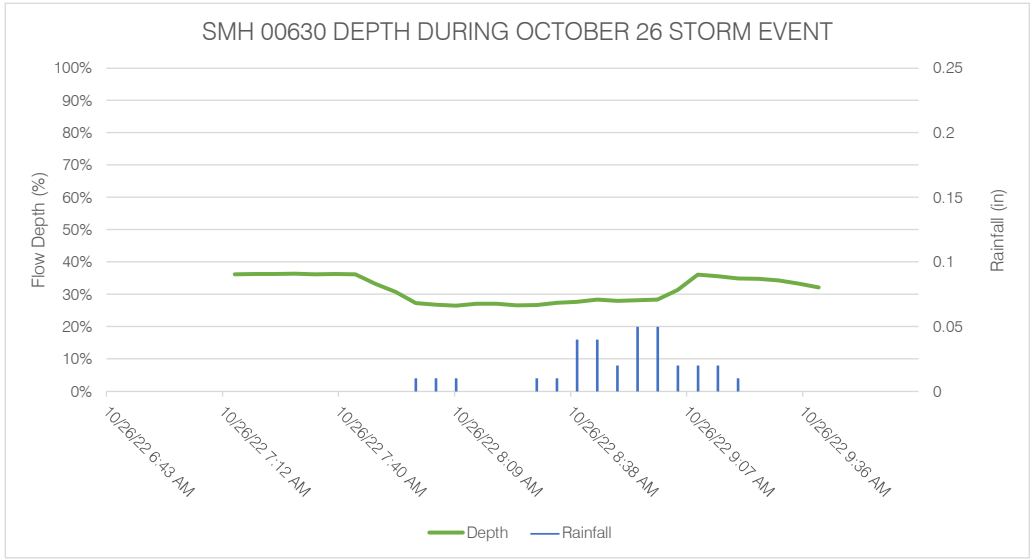
APPENDIX C
STORM EVENT METERING DATA
OCTOBER 26 STORM EVENT



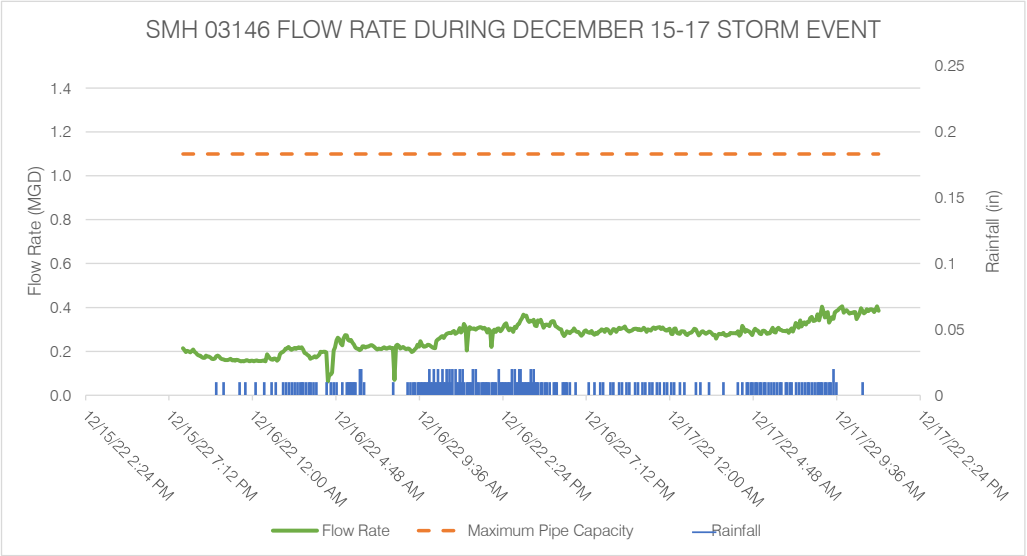


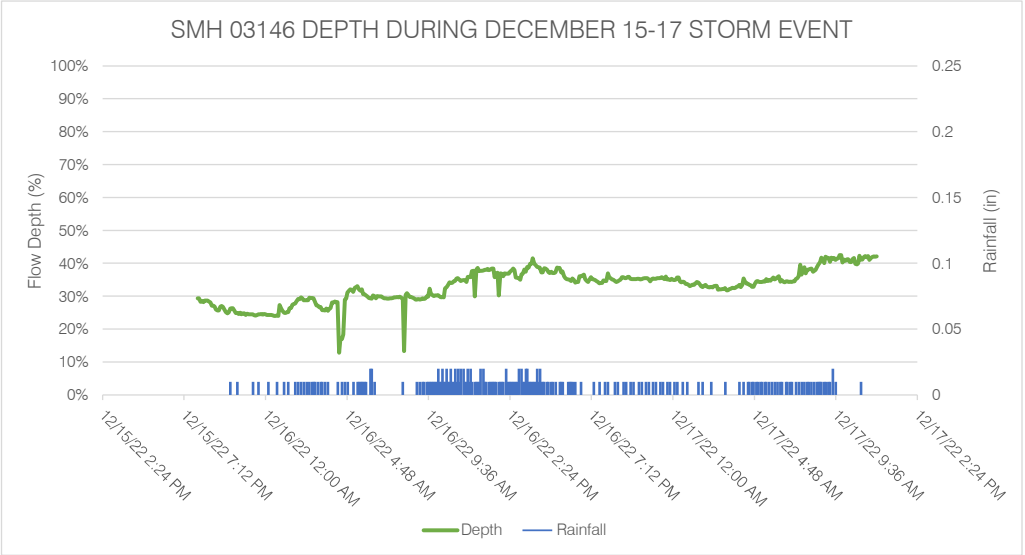
APPENDIX C
STORM EVENT METERING DATA
OCTOBER 26 STORM EVENT



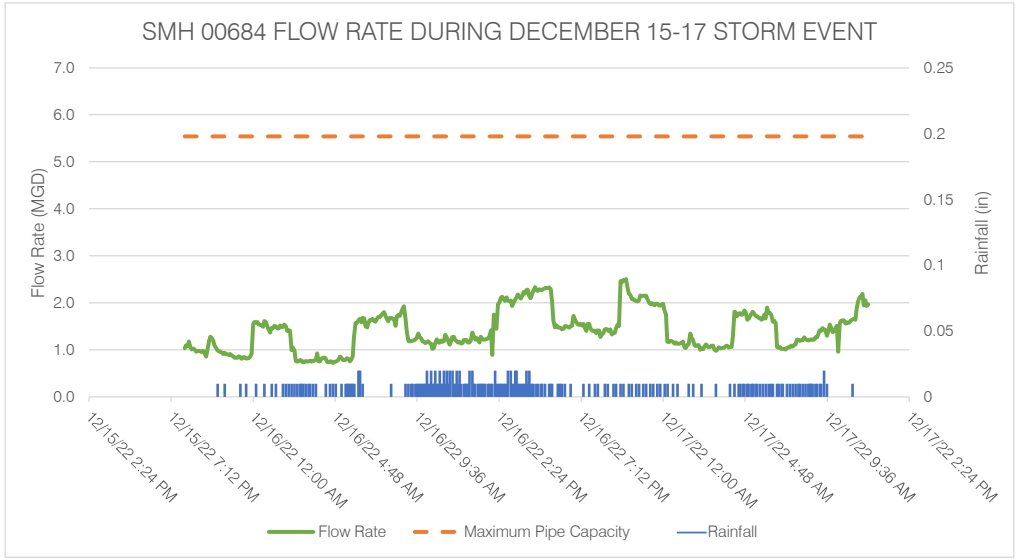


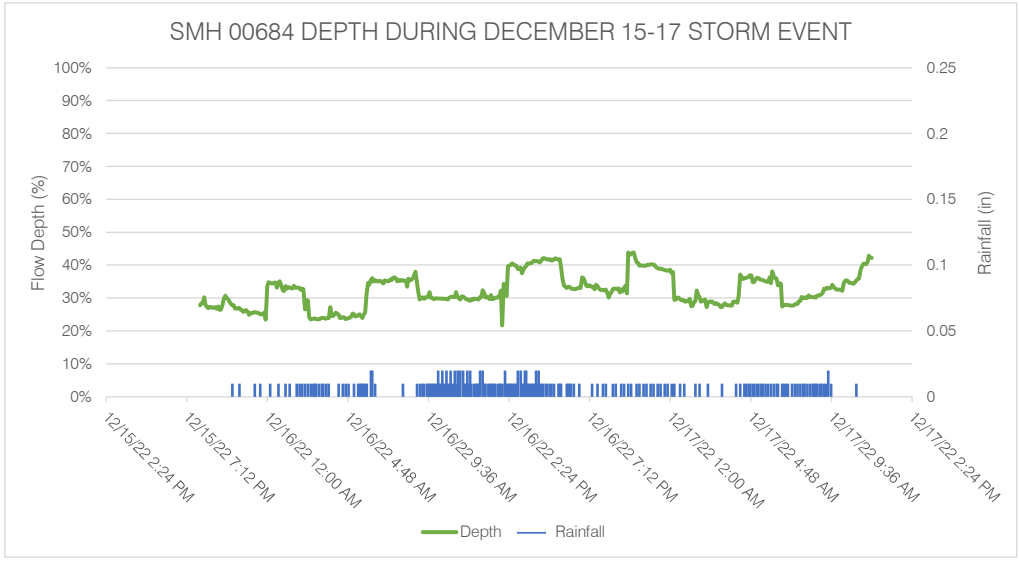
APPENDIX C
STORM EVENT METERING DATA
DECEMBER 15-17 STORM EVENT



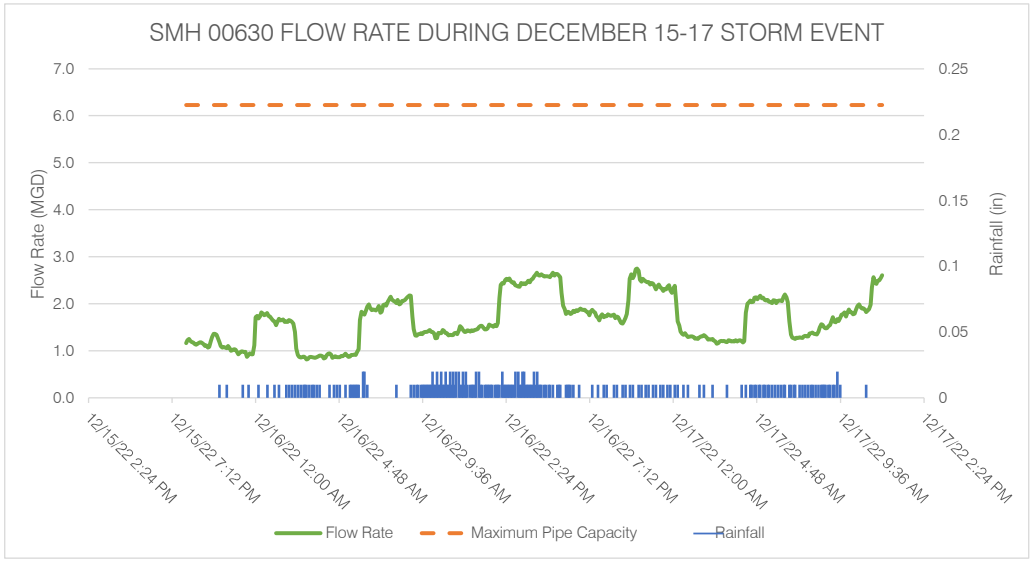


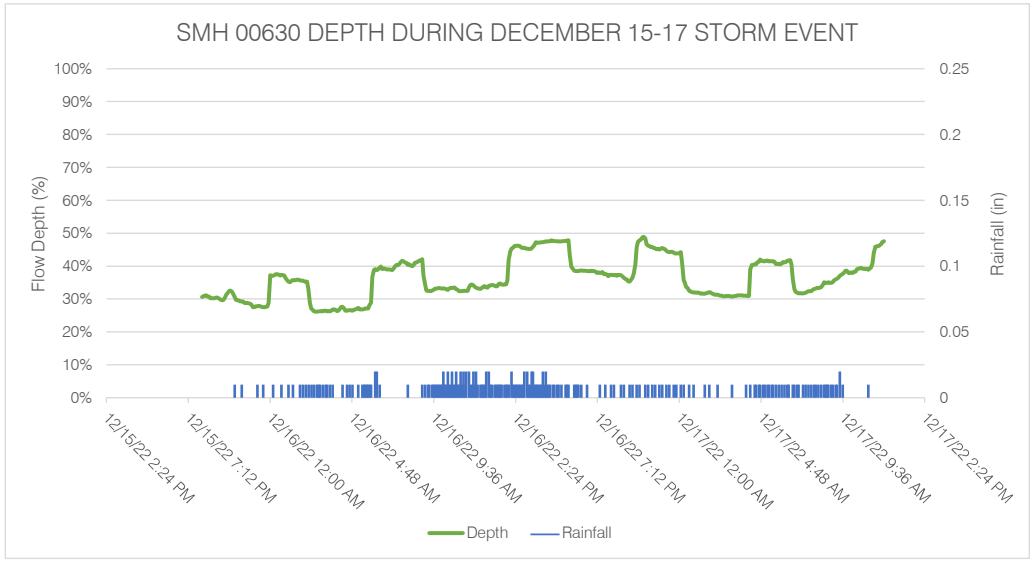
APPENDIX C
STORM EVENT METERING DATA
DECEMBER 15-17 STORM EVENT



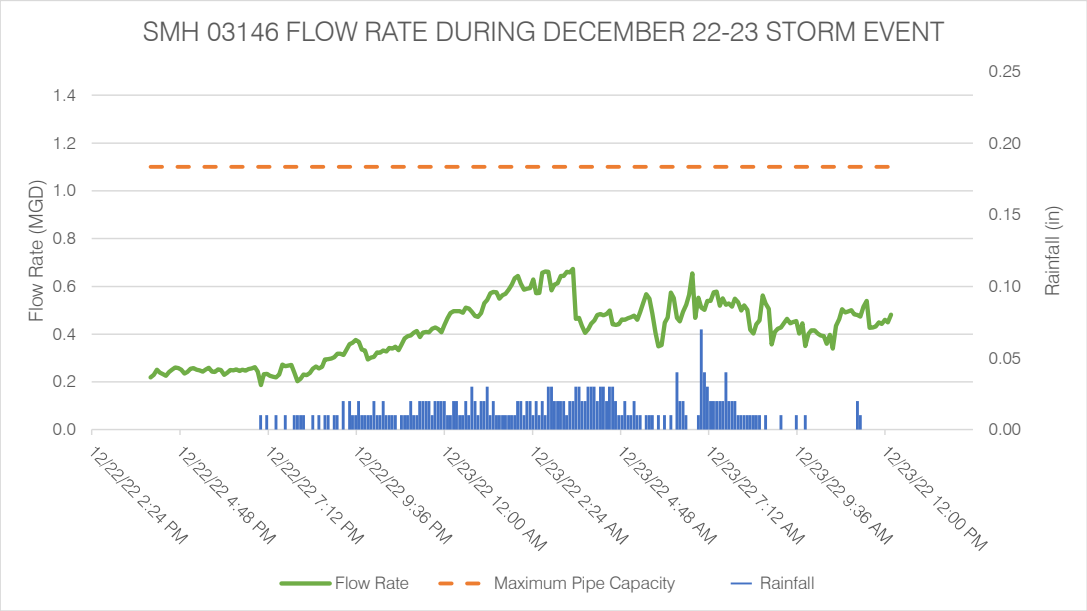


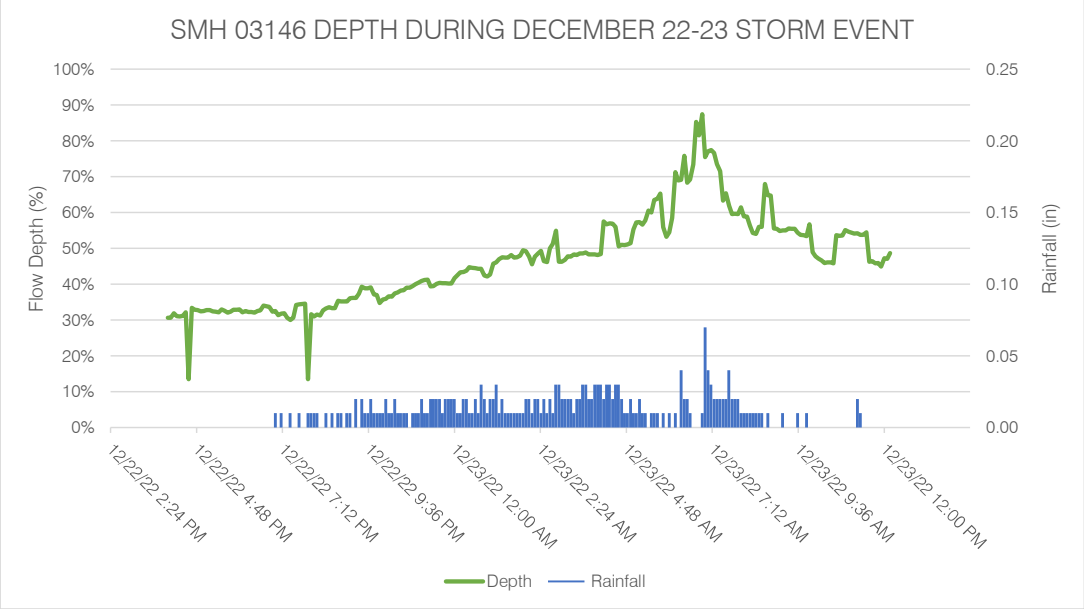
APPENDIX C
STORM EVENT METERING DATA
DECEMBER 15-17 STORM EVENT



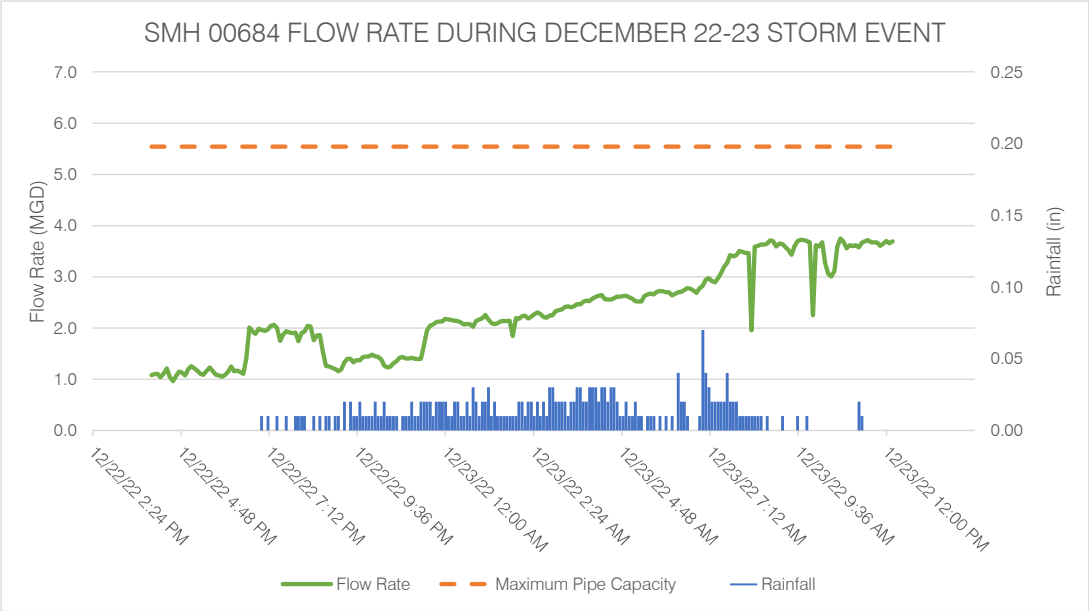


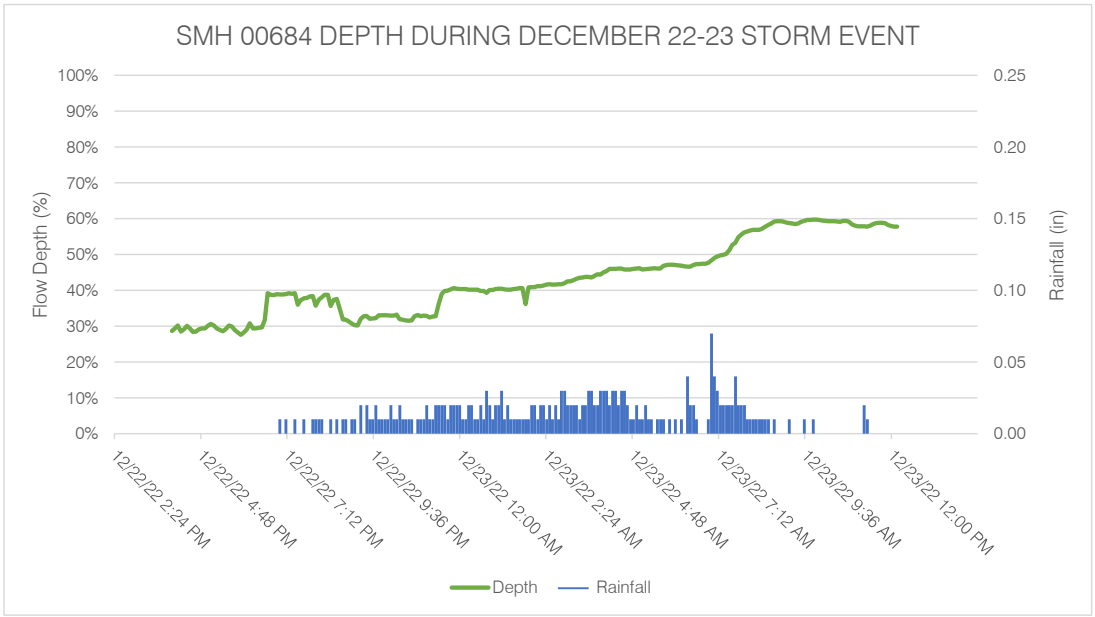
APPENDIX C
STORM EVENT METERING DATA
DECEMBER 22-23 STORM EVENT





APPENDIX C
STORM EVENT METERING DATA
DECEMBER 22-23 STORM EVENT





APPENDIX C
STORM EVENT METERING DATA
DECEMBER 22-23 STORM EVENT