City of Baltimore

Department of Public Works

Modified Consent Decree

Collection System Operations and Maintenance Annual Report

Sanitary Sewer Overflow Consent Decree

Civil Action No. JFM-02-1524

July 1, 2019 to June 30, 2020

Prepared by:

Office of Asset Management

October 2020

Bernard C. "Jack" Young
Mayor

BALTIMORE CITY
DPW
DEPARTMENT OF PUBLIC WORKS

MATTHEW W. GARBARK
ACTING DIRECTOR

Table of Contents

List of Tables

List of Figures

Executive Summary

On October 6, 2017, the City of Baltimore (City) entered into a Modified Consent Decree (MCD with the United States Environmental Protection Agency (EPA), the State of Maryland Department of the Environment (MDE) and the Department of Justice (DOJ). The objective of Paragraph 13 of the CD is to "implement a maintenance program for the Collection System, including its gravity sewer lines, force mains, Pumping Stations and other appurtenances (*e.g.*, manholes, pressure sewers, inverted siphons, meter vaults), to provide for the proper operation and maintenance of equipment while minimizing failures, malfunctions, and line blockages due to the lack of adequate preventative care." This report details the progress of the Collection System Operations and Maintenance (O&M) activities undertaken by the City. This is the fourteenth annual update report since implementation of the O&M plan in 2006. This report provides a fiscal year (FY) comparative analysis of O&M operations carried out by the City of Baltimore with an emphasis on activities during FY 2020.

The requirements for the Annual Report are specified in Paragraph 13 of the Consent Decree, which reads as follows:

"After implementation of the maintenance program required under Paragraph 13, Baltimore shall submit an annual report to EPA and MDE providing:

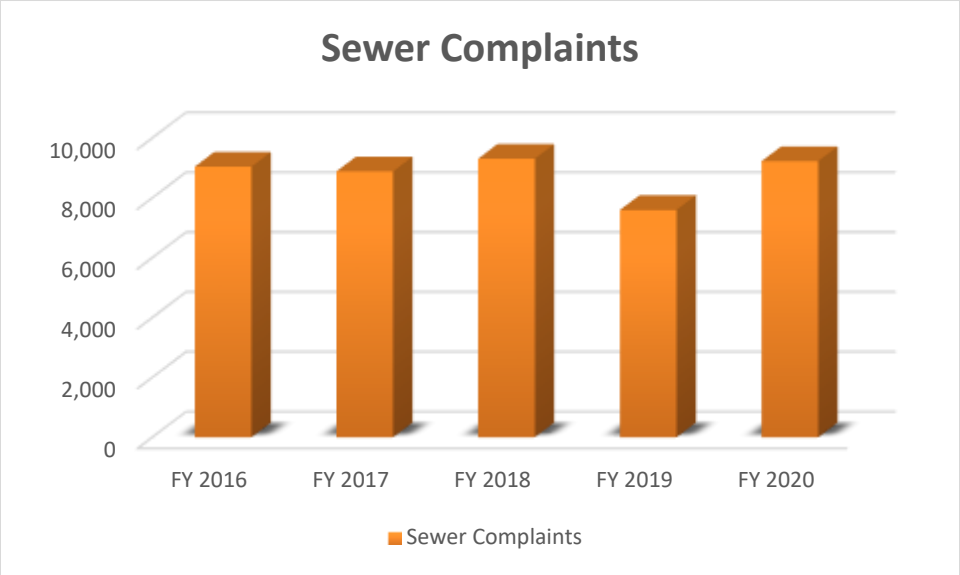
i. A list of complaints related to the Collection System.
ii. A list of completed work orders for the calendar year.
iii. A list of outstanding work orders.
iv. Current preventive maintenance (PM) schedules.
v. A list of tests performed of new sewer installations and rehabilitations.
vi. An evaluation of the efficacy of the grease control program.
vii. An evaluation of the efficacy of the root control program.
viii. An updated list of known locations where Baltimore does not have ready physical and/or legal access to the Collection System."

During FY-2020 (July 01, 2019 to June 30, 2020), the number of sewer-related complaints increased by 31.15%, which can be attributed to the fact FY2020 experienced a few more rain events with high intensity short duration than previous reporting period. Table ES-1 below compares the sewer related complaints over the past five fiscal years.

During this period, there were 9,227 sewer-related complaints reported in the Cityworks work order management system. In response to these complaints, 9,527 work orders were generated. In some cases, the generation of multiple work orders of different types was required to resolve a single complaint. In addition to the sewer-related complaints reported by customers, there were 11,990 work orders generated for preventive maintenance activities (*e.g.* sewer cleaning, FOG abatement, point repair, lateral inspection, etc). Therefore, the total number of sewer work orders generated during the reporting period was 21,517.

Table ES-1: Sewer Related Complaints Comparison

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Sewer Complaints	9,041	8,883	9,311	7,595	9,227



Activities within the City to reduce mainline chokes and repeat dry weather sanitary sewer overflows (DWOs) are tracked in the tables below. Table ES-2 shows a decrease in mainline choke work orders from FY19, while Table ES-3 shows a slight increase in the number of repeat DWOs, but a significant decrease in DWO volume compared to FY19. SSO root cause analysis uses information from the preceding 24-month period to determine if it is a repeat event. Over the past several years, the City has enhanced data and data-tracking software (*e.g.* custom applications, improved GIS data) and user training for the tracking of work orders and associated volumes of repeat SSOs.

Key accomplishments during the reporting period include the following:

- Under the Preventive Maintenance Cleaning Program, 267,821 linear feet of pipe 6-in diameter to 27-in diameter sewer were cleaned. In addition, 62,391 linear feet of pipe were treated with chemical to abate grease.
- The City conducted over 211,753 feet of CCTV inspections.
- Approximately 115,496 linear feet of sewer pipe have been rehabilitated, replaced, or installed during the reporting period through various projects and programs.
- The Root Control Program chemically treated approximately 227,223 linear feet of pipe.

The City inspected Food Service Establishments (FSEs) as part of the Fats, Oils and Grease (FOG) Program to minimize the amount of FOG discharged to the sanitary sewer system. During the reporting period 1,835 FSE inspections (1,613 FSEs inspected) were completed for Program compliance, as well as educating FSE managers and staff about appropriate grease-handling practices. Because any FSE can be inspected more than once (initial and follow ups), the number of total inspections can exceed the

number of FSEs inspected (as shown in the numbers above 1,835 inspections vs. 1,613 FSEs)

Table ES-2: Mainline Choke Work Orders Comparison

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Mainline Chokes	604	537	585	558	537

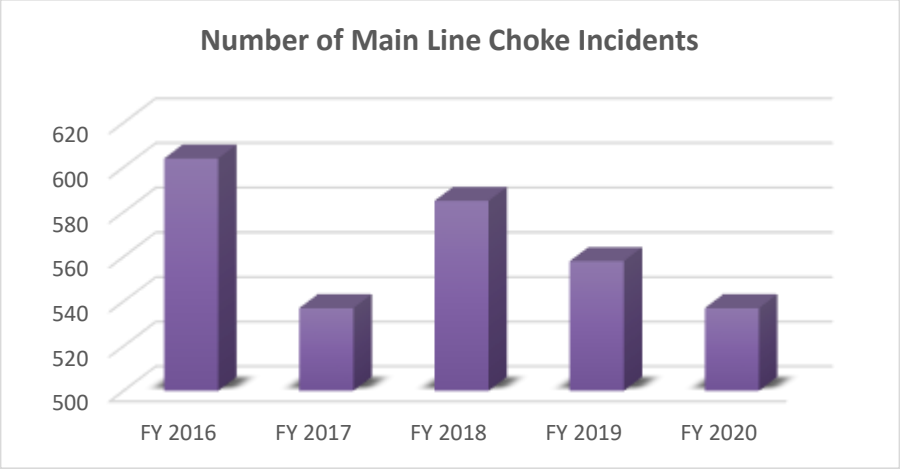
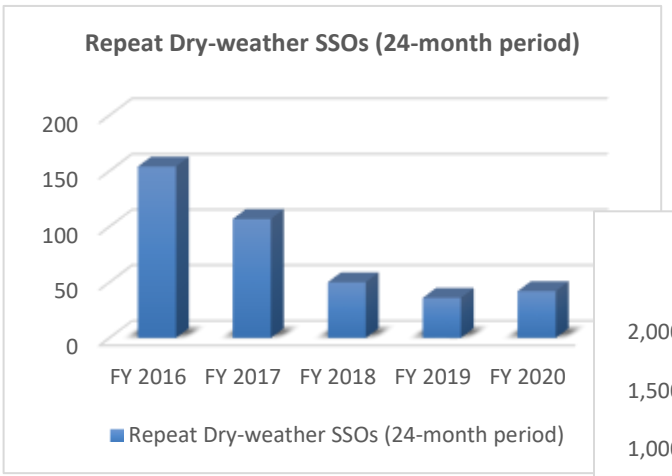
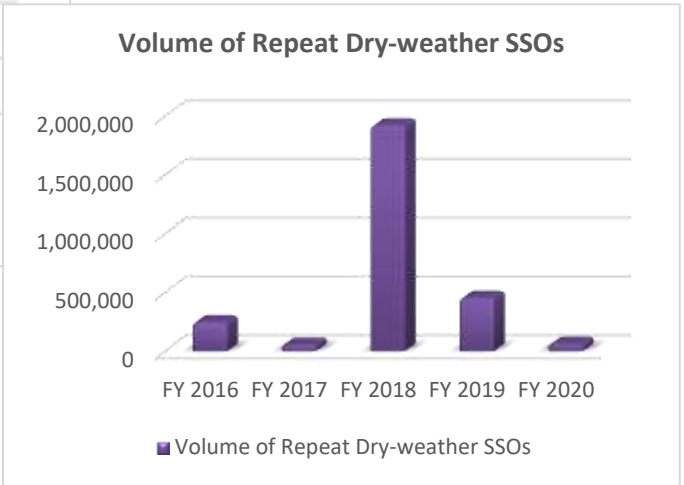


Table ES-3: Repeat Dry Weather SSOs Comparison

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Repeat Dry-weather SSOs (24-month period)	154	107	50	36	42
Volume of Repeat Dry-weather SSOs	248,935	54,374	1,923,759	455,536	63,862





SECTION 1 – Introduction

This Annual Report, the fourteenth since the implementation of the Operations and Maintenance (O&M) plan, provides an update on the progress of remedial measures required by the Consent Decree and an analysis of the impact of O&M activities conducted from July 1, 2019 to June 30, 2020 (FY 2020).

The requirements for the Annual Report are specified in Paragraph 13 of the Consent Decree, which reads as follows:

"After implementation of the maintenance program required under Paragraph 13, Baltimore shall submit an annual report to EPA and MDE providing:

i. A list of complaints related to the Collection System;

ii. A list of completed work orders for the calendar year;

iii. A list of outstanding work orders;

iv. Current preventive maintenance schedules (task description, location, frequency), description of changes made to the schedules during the calendar year.

v. A list of tests performed of new sewer installations and rehabilitations (location, date, description of new installation and/or rehabilitation);

vi. An evaluation of the efficacy of the grease control program (summary of grease-related blockages identified, corrective action taken, preventive action taken, monthly rate of grease-related blockages and (if available) comparison of current and previous year performance, list of referrals to pretreatment staff, identification of remaining persistent and chronic blockage areas);

vii. An evaluation of the efficacy of the root control program (summary of root-related blockages identified, corrective action taken, preventive action taken, monthly rate of root-related blockages and (if available) comparison of current and previous year performance, identification of remaining persistent and chronic blockage areas); and

viii. An updated list of known locations where Baltimore does not have ready physical and/or legal access to the Collection System and the strategies Baltimore is employing to improve and secure such access to the Collection System."

Elements of the O&M Program Include:

- Sewer inspections (CCTV)
- Sewer cleaning
- Sewer repairs, replacement, and rehabilitation
- Root control
- Grease abatement by chemical treatment
- Fats, Oils and Grease (FOG) Program (*e.g.* Food Service Establishment inspections)
- Limited Access Areas

During FY 2020, the City of Baltimore continued to grow and strengthen the Office of Asset Management (OAM), which strives to prioritize the renewal of aging infrastructure, justify infrastructure investments, provide transparency of the true cost of operating a utility system, and effectively manage limited resources. The OAM utilizes a strategic approach to the process of planning, maintaining, and operating physical assets to optimize the service life of these assets at the most appropriate cost and an acceptable level of risk, all while delivering an acceptable level of service. Currently, the OAM focuses on developing and implementing asset management programs for the collection system.

To evaluate the effectiveness of new and existing preventive maintenance programs, the OAM tracks Key Performance Indicators (KPIs). Tracking KPIs drives internal progress and provides transparent reporting to internal and external stakeholders. In the long term, tracking key metrics will allow the Department of Public Works (DPW) to better communicate the level of service provided to stakeholders and help foster greater understanding of the relationships between capital investment, rates, financial planning, and risk.

SECTION 2 – Complaints

2.1 Customer Complaints

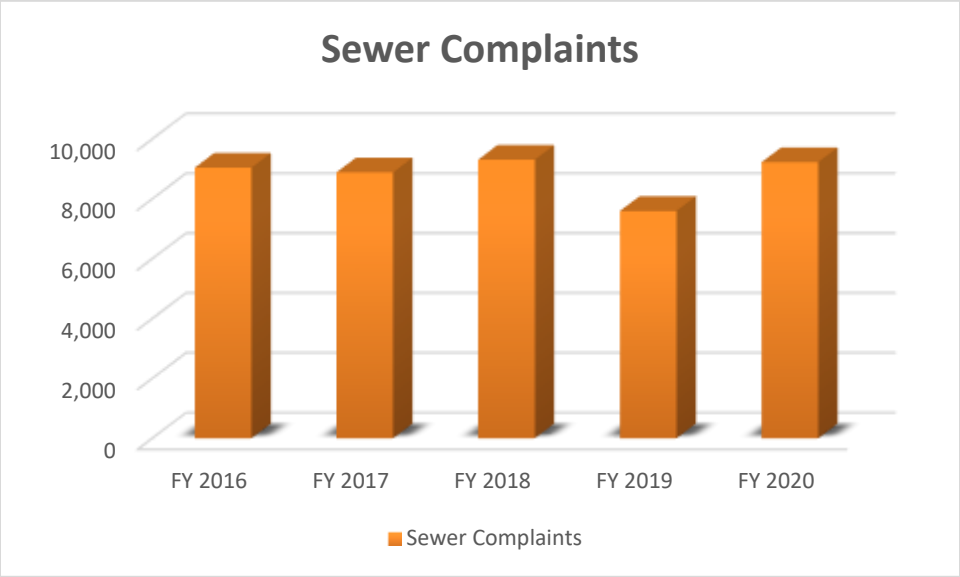
The City of Baltimore's Control One Emergency Dispatch operation is a central call system which is available via phone (311) 24 hours a day, seven days a week for Baltimore City residents to report sewer-related complaints. This service is also available online 24 hours a day, seven days a week, as well as by mobile application. Each complaint in the 311 system is given a Customer Service Request (CSR) number so it can be tracked from the moment it enters the system until it is abated.

When a sewer related complaint is entered into the 311 system, it is forwarded by an automated transaction to the Computerized Maintenance Management System (CMMS) (Cityworks). Once a DPW Utility Investigator has investigated the complaint and a determination of corrective requirements is made, a work order is generated, and the appropriate type of crew is assigned to perform the work. After completion of the work, the status of that work order is updated in Cityworks. There can be instances when multiple complaints in the 311 system are made by citizens for the same problem. In such cases, all complaints are forwarded to Cityworks, but work orders are generated only for unique problems that need to be resolved.

There were 9,227 sewer related complaints logged into Cityworks during the reporting period. From these complaints, 9,527 (reactive) work orders were generated; there are more work orders than sewer complaints because multiple work order types can be required to address a single complaint. Table 2-1 shows sewer complaints during the past five fiscal years.

Table 2-1: Sewer Related Complaints Comparison

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Sewer Complaints	9,041	8,883	9,311	7,595	9,227



A list of all sewer complaints is attached in Appendix 2-1 of this report.

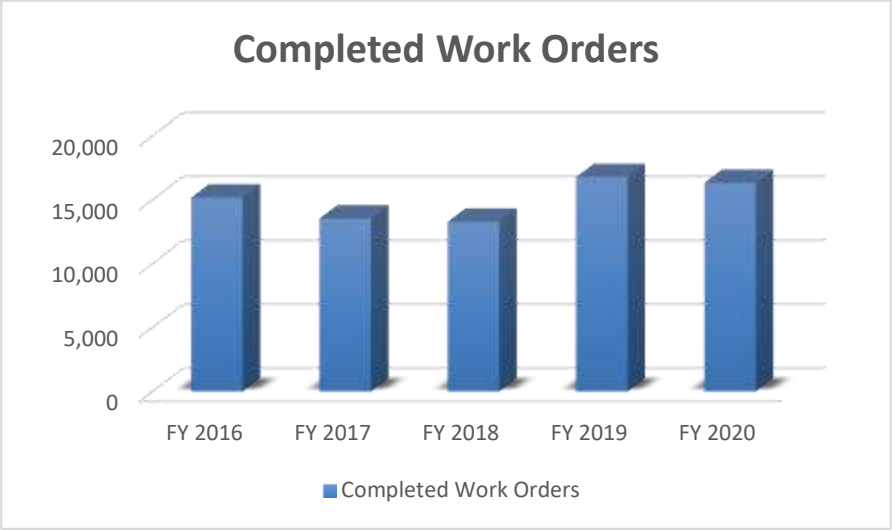
2.2 Completed Work Orders

A work order is considered closed when the problem has been resolved and all related activities have been updated and closed in Cityworks. A list of work orders closed in FY2020 is provided in Appendix 2-2 of this report. A map of the density of these closed work orders is shown in Figure 2-1. This map provides an illustration of problem areas as indicated by the concentration of sewer related complaints during the reporting period.

The number of sewer related work orders completed during the past five fiscal years is illustrated in the Table 2-2 below.

Table 2-2: Work Orders Completed by Fiscal Year

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Completed Work Orders	15,153	13,516	13,257	16,753	16,300



A breakdown of work orders by type is provided in Table 2-3. As previously indicated, a number of work orders (9,527) were generated from sewer complaints logged into the 311 system; an additional 11,990 work orders were generated for preventive maintenance (*i.e.* not driven by a customer complaint) activities during the reporting period.

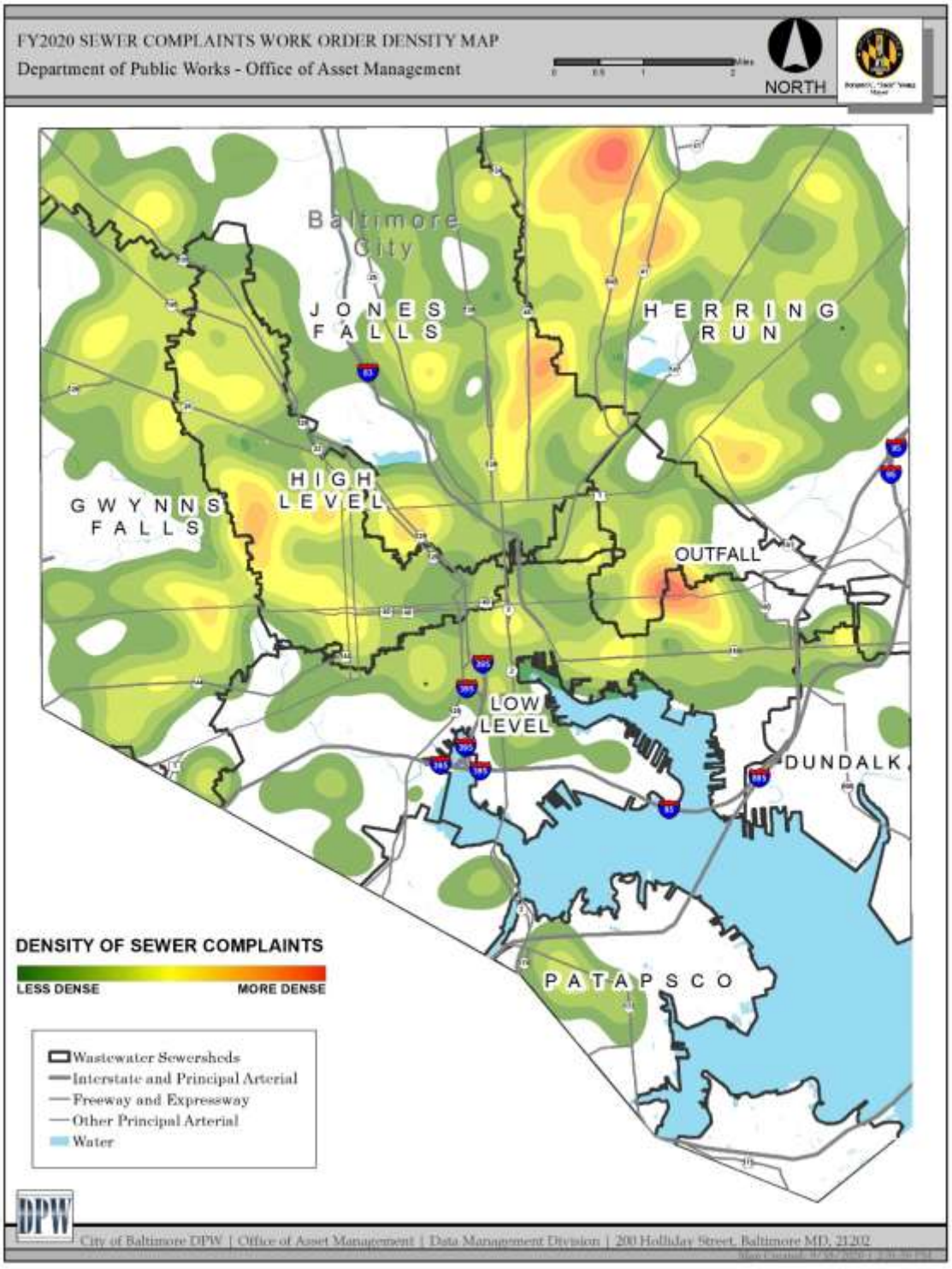
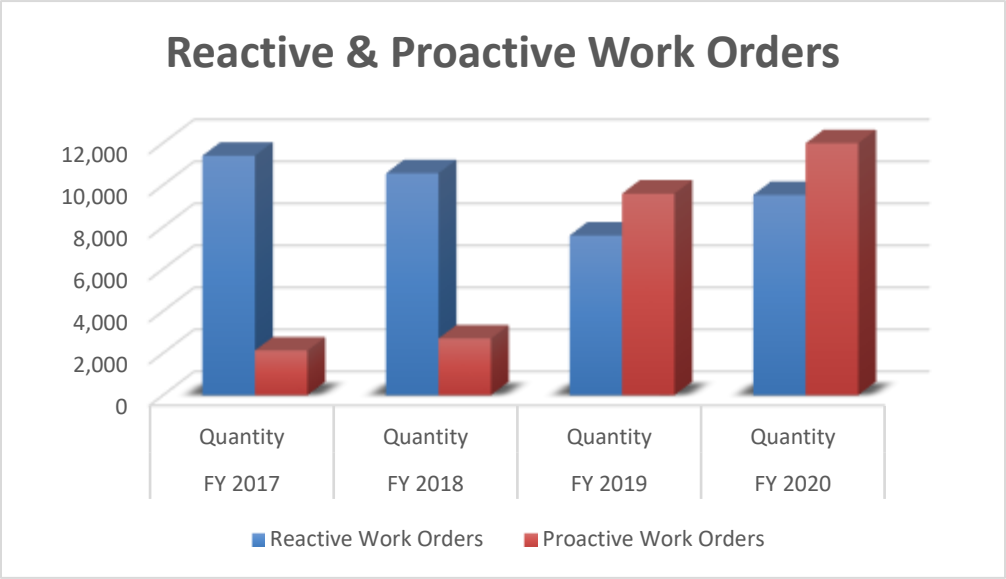


Figure 2-1: Sewer Complaints Density Map in FY20

Table 2-3: Types of Work Orders

Type	FY 2017		FY 2018		FY 2019		FY 2020	
	Quantity	%	Quantity	%	Quantity	%	Quantity	%
Reactive Work Orders	11,394	84.30%	10,561	79.67%	7,595	44.20%	9,527	44.28%
Proactive Work Orders	2,122	15.70%	2,695	20.33%	9,590	55.80%	11,990	55.72%
Total	13,516	100.00%	13,256	100.00%	17,185	100.00%	21,517	100.00%



The above graph shows an increase in both reactive and proactive due to the fact that many proactive activities are now issued as work orders and incorporated in the work orders management system. Some of the proactive programs have ramped up and deployed tactically and strategically to prevent issues from materializing/re-surfacing.

2.3 Outstanding Work Orders

A reactive work order is considered outstanding when any work necessary to address the complaint is not completed. The number of work orders that have been completed at the time of writing this report is 9,507 (99.8%). Proactive maintenance work orders continue to be issued on cyclical schedules.

SECTION 3 – System-Wide Gravity Sewer Cleaning and Inspection Program

3.1 Preventive Maintenance

The City currently implements several preventive maintenance programs as part of the overall O&M strategy. These on-going programs include:

- Sewer Cleaning/Inspection
- Trunk Sewer Inspections
- Grease Abatement and Inspection of Food Service Establishments (See Section 5)
- Root Control (See Section 6)

The FOG and Root Control programs are described in detail in Sections 5 and 6, respectively.

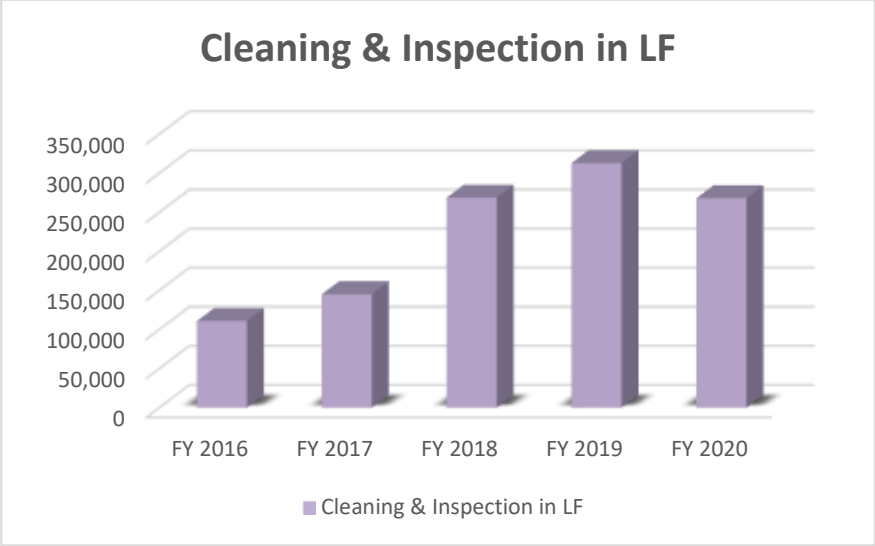
3.2 Comprehensive and Target Cleaning/Inspection Program

The City has developed programs to inspect all sewers greater than 8 inches in diameter and clean, as necessary, every 7 years. Additionally, the City has developed targeted cleaning programs to identify sewers 8 inches and smaller that have experienced high incidents of sewer blockages per lineal foot. The targeted areas were identified and prioritized based on a risk analysis of the lines that serve the target areas. Targeted areas are scheduled to be cleaned on a 2, 3, or 4-year cleaning cycles.

Table 3-1 shows the linear feet of sewers that were proactively cleaned and inspected during the past five fiscal years, and Figure 3-1 shows the spatial distribution of these lines.

Table 3-1: Collection System Cleaning and Inspection Production (Linear Feet)

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Total	110,549	145,049	268,497	312,839	267,821

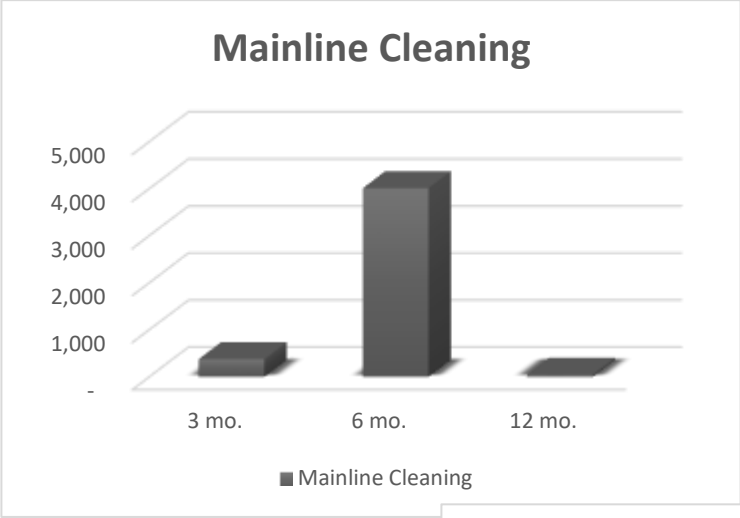


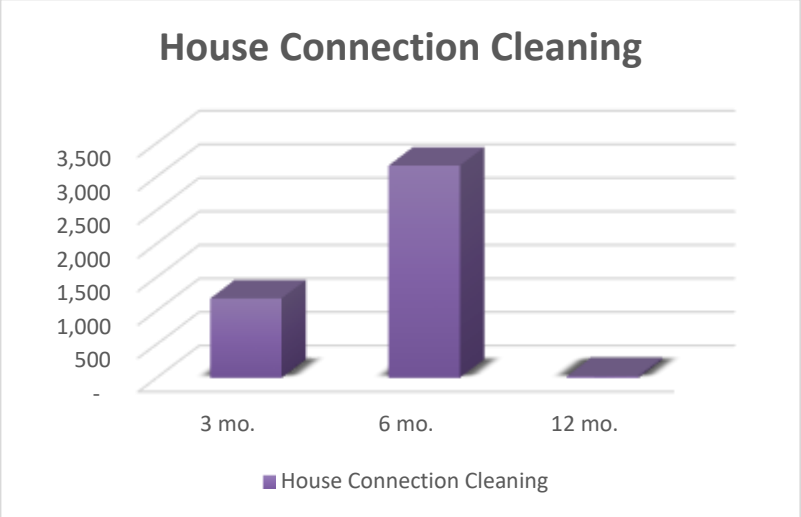
In addition to the scheduled comprehensive and targeted cleaning, routine cleaning continues to be performed at locations with known maintenance issues that cannot be easily resolved or are slated for future projects. Routine cleaning is performed on a 3, 6, or 12-month cleaning cycle, depending on the severity of the issues needed to provide acceptable service. Routine cleaning supplements comprehensive and targeted cleaning efforts. Regular evaluations of these locations are made to determine the adequacy of the cleaning intervals and modifications to the schedule are made when appropriate.

A list of all routine cleaning locations is included in Appendix 3-1. Table 3-2 shows the number of cleaning locations by type and frequency for FY2020.

Table 3-2: Routine Cleaning Locations FY 2020

	Number of Locations by Frequency (Months)				
Type	**3 mo.**	**6 mo.**	**12 mo.**	**Total**	**Percentage**
Mainline Cleaning	374	4,008	42	4,424	50%
House Connection Cleaning	1,183	3,164	26	4,373	50%
Total	1,557	7,172	68	8,797	100%





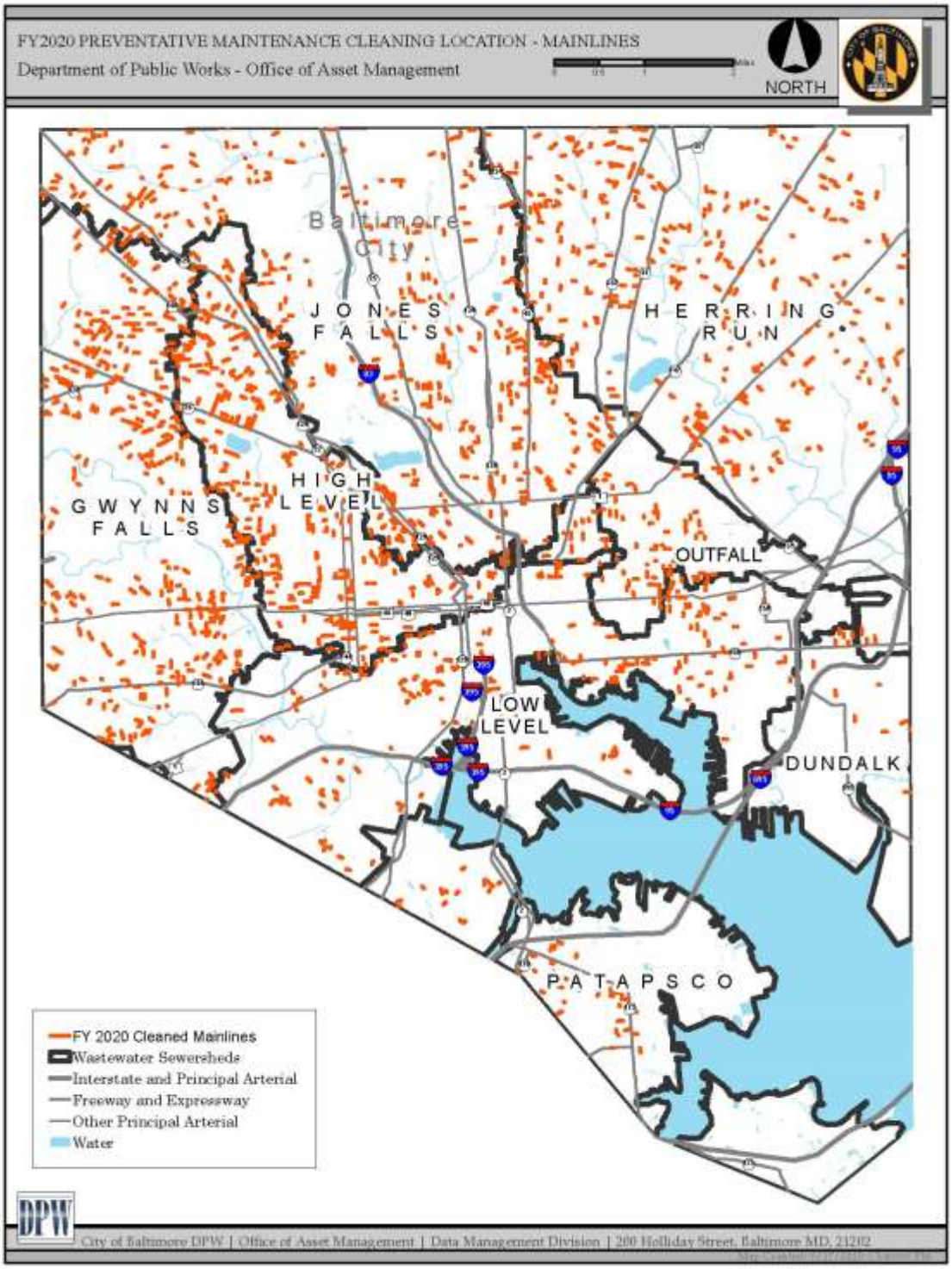


Figure 3-1: Collection System Cleaning and CCTV Inspection Locations

3.3 Trunk Sewer Inspection Program

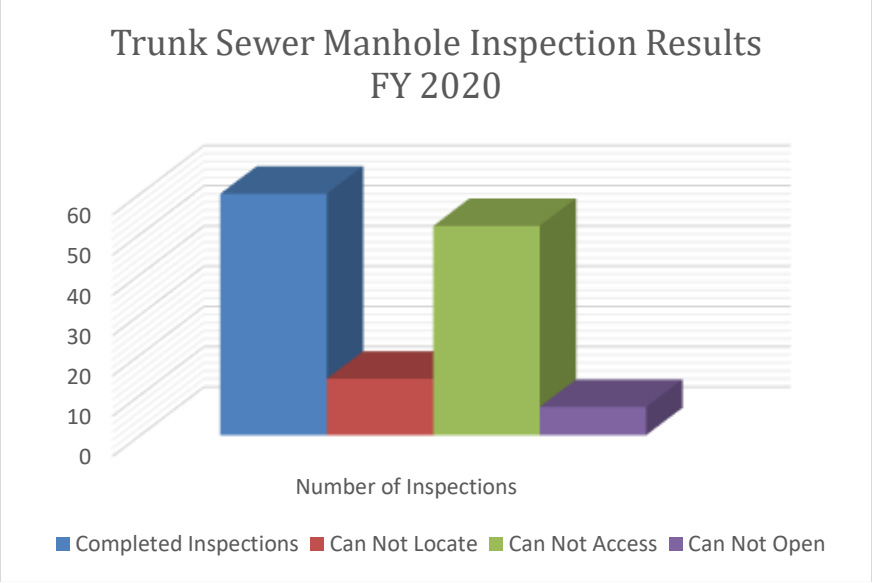
In FY 2015, the City implemented the Trunk Sewer Inspection Program to proactively inspect and identify maintenance needs in the sanitary collection system along streams and in wooded areas. The scope includes all trunk mains and all sewers that connect to the trunk mains. The program aims to inspect all trunk mains and associated manholes at least once every five years.

Inspections are conducted by walking over the sewer alignment, assessing the condition of manholes, assessing mains with pole-mounted cameras, and dye testing exposed sewers and sewers that cross streams. The program has been able to identify maintenance needs, including heavy manhole cleaning, pipe cleaning, CCTV inspection, and manhole cover replacements. In FY 2020, 133 manholes were inspected under the Trunk Walk Program. During the inspections, limited access areas were confirmed, and the list was updated. Results identified 14 manholes that could not be located, 52 that could not be accessed and 7 that could not be opened. The inaccessible manholes will be further investigated when the foliage is minimal and will be the focus of future design and construction projects to ensure that the system is accessible for cleaning and maintenance. Table 3-3 provides a breakdown of the results of manhole inspections completed in the Trunk Sewer Inspection Program in FY 2020. Figure 3-2 shows the manhole inspection locations.

In addition to the Trunk Walk Program, no manholes were inspected under the Collection System Inspection Program and the Public Right of Way (ROW) Program.

Table 3-3: Trunk Sewer Manhole Inspection Results FY 2020

	Number of Inspections	Percent of Total
Completed Inspections	60	45%
Can Not Locate	14	11%
Can Not Access	52	39%
Can Not Open	7	5%
Total Number of Inspections	133	100%



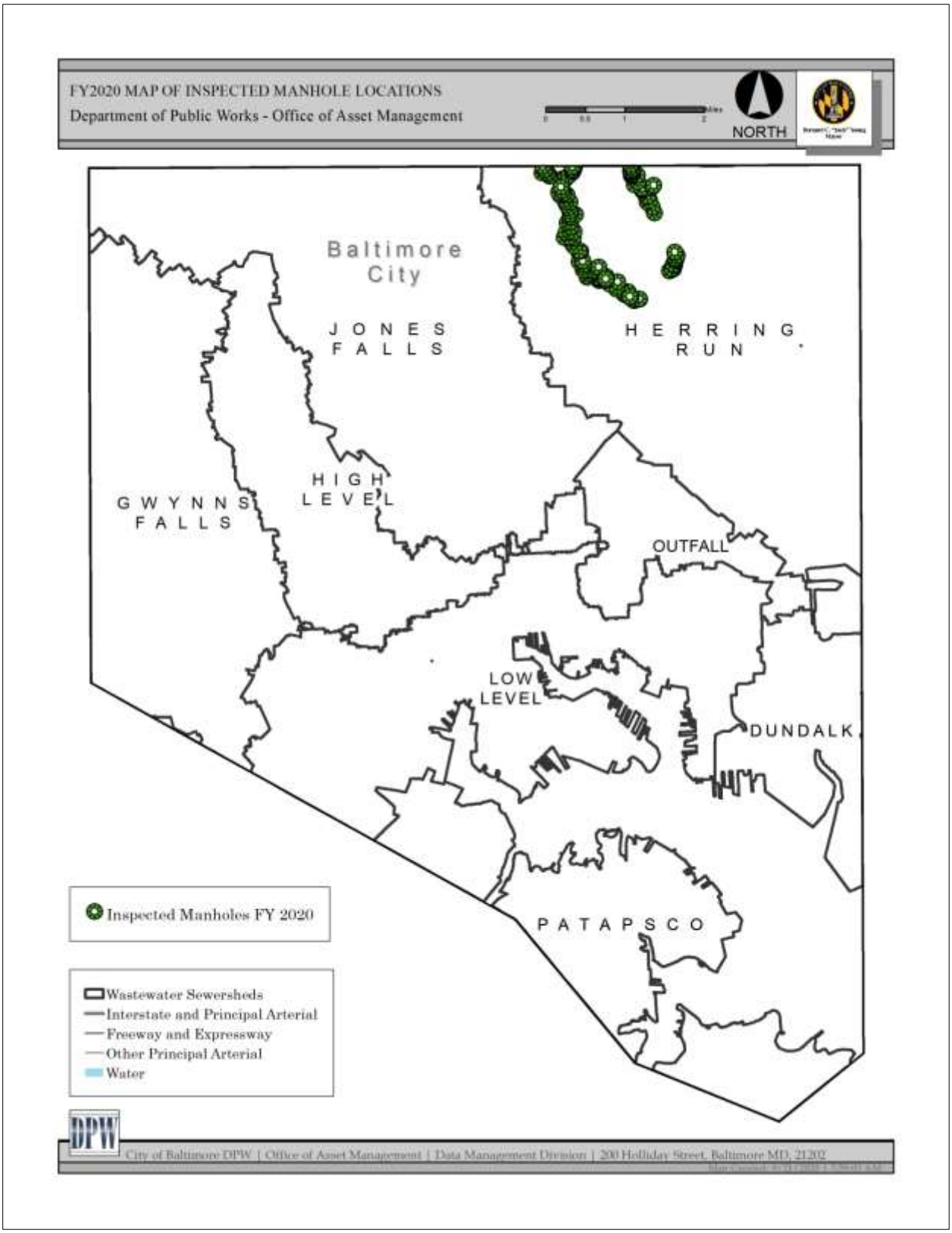


Figure 3-2: Trunk Sewer Inspection Locations

SECTION 4 – New Sewer Installation and Rehabilitation

4.1 New Sewer Installation and Rehabilitation

The City is continuously evaluating the sanitary sewer collection system to develop and implement measures for elimination of unpermitted discharges from the system. These assessments identify capacity deficiencies, infiltration/inflow, and maintenance problems, in order to repair or replace portions of the collection system. A listing of sanitary sewer projects conducted during FY 2020 with tonnage cleaned and linear footage rehabilitated and replaced is provided in Table 4-1 below.

Table 4-1: Sewer Construction Projects

SC No.	Location	Pipe Cleaning (LF/Tons)		New Pipe (LF)	Pipe Rehabilitation (LF)
SC 903	Patapsco	0	LF	0	268
SC 910	Herring Run	0	LF	209	9,348
SC 914	Low Level	0	LF	0	181
SC 919	Outfall	0	LF	0	423
SC 920	Gwynns Falls	0	LF	0	305
SC921	Gwynns Falls	1,067	LF	0	20,074
SC 940	High Level	0	LF	0	92
SC 941	Jones Falls	0	LF	0	0
SC 953	High Level	0	LF	0	15,298
SC 955	Gwynns Falls	0	LF	0	0
SC 956	Herring Run	4,304	LF	0	4,348
SC 962R	Low Level	272	LF	0	8,575
SC 963	HL, LL, GF	2,681	LF	0	1,263
SC 964	HL, JF	0	LF	0	13,080
SC 965	Herring Run	0	LF	0	1,101
SC 976	Jones Falls	2,483	LF	0	10,605
SC 977	Gwynns Falls	0	LF	0	30,535
		Pipe Cleaning (LF/Tons)		**New Pipe (LF)**	**Pipe Rehabilitation (LF)**
Grand Total		**10,807**	**LF**	**209**	**115,496**
		0	**TONS**		

Notes:

1. Completed quantities in this table are based on the approved monthly construction invoices for each FY.
2. Pipe rehabilitation quantities only include CIPP/ Pipe Replacement and Pipe Bursting (point repair is not included).
3. Pipe Cleaning completed quantities include cleaning incidental to CIPP lining

Once construction is complete, newly installed and rehabilitated pipes are tested according to the project specifications and approved by the City. Generally, new sewers are tested from manhole to manhole or from manhole to terminus of the pipeline if there is no manhole at the upstream end. Testing is usually done by low-pressure air and/or infiltration/exfiltration tests as specified by the City. CCTV inspections are typically required for Cured-In Place Pipe (CIPP) lining rehabilitation to ensure that the construction is sound, there are no defects in the liner, and to provide a record of the post-lining condition of the sewer line after rehabilitation has been completed. Projects that involve cleaning only have post construction CCTV testing performed to verify that cleaning was performed as specified. Upon completion of new construction, testing was performed in accordance with the specifications listed below.

4.2 FIELD TESTS

A. Low Pressure Air Test

1. Test gravity sewers including house connections with low air pressure after completion of backfill. Field testing will commence when not more than one thousand feet (1000') sewer has been completed and includes immediate remedial required repair, replacement or modification to the installation procedures if the test section fails the test.

B. Hydraulic Test

1. Sewers over twenty-seven inches diameter and manholes are tested by the hydraulic method if approved air test procedure is not available.

C. Post-Construction Closed Circuit Television (CCTV)

1. Upon completion of the pipe installation, the Contractor performs a CCTV inspection using NASSCO Pipeline Assessment Certification Program (PACP) standards.

SECTION 5 – FOG Program

5.1 Fats, Oils and Grease (FOG) Program

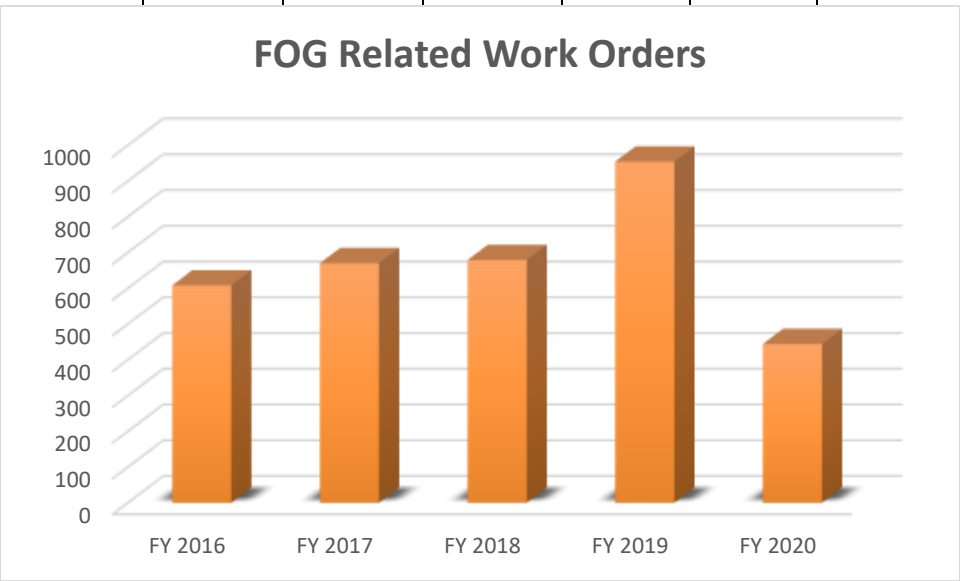
Baltimore has implemented a comprehensive FOG Program that addresses FOG at the source and in the collection system. The FOG Program has two components: 1) Grease Abatement, and 2) Food Service Establishment (FSE) Inspections (described in Sections 5.3 and 5.4, respectively). Initially, Baltimore implemented a Grease Abatement program in 2008 addressing those portions of the collection system with FOG accumulation. In FY2012, the City began developing the FSE Inspection Program, and commenced inspections in FY2014. In FY2014, the FSE inspections were incorporated into Baltimore City's Industrial Pretreatment Program under the authority of Article 25 of the Baltimore City Code. The FOG management aspect of the Pretreatment Program includes promoting kitchen best management practices (BMPs) to residential and commercial customers and minimizing the discharge of FOG-bearing waste streams to the sewer system. The program requires FSEs that discharge or have the potential to discharge process wastewater to the sanitary sewer to have a properly installed and sufficiently maintained grease control device (GCD).

5.2 Evaluation of Maintenance (Reactive) Work Orders

The City's work order management system, Cityworks, provides the ability to note the cause of problems for mainline chokes or blockages. An analysis of the Cityworks data can identify the presence of FOG as a contributor of a blockage. Table 5-1 provides a history of the work orders closed during the reporting period with grease problems identified. The DPW Pollution Control Section staff is notified of grease related blockages so that inspections of FSEs upstream of the impacted sanitary sewer can be performed.

Table 5-1: FOG Related Work Orders

FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
608	670	679	954	444



The FOG related work orders are periodically evaluated to help determine future targeting efforts for proactive treatment. GIS is utilized to overlay CCTV observations with work order history and field data to prioritize treatment schedules. The utilization of GIS has been successful in identifying grease problem areas within the collection system. In the evaluation of the FOG related work orders, there was a decrease from the previous fiscal year. For fiscal year 2020 there was about 54% decrease in FOG related work orders from the previous fiscal year (444 for FY20 compared to 954 for FY19).

Figure 5-1 shows the density of grease-treatment locations/work orders in the sewer system overlaid with the FSE locations.

5.3 Grease Abatement Chemical Application

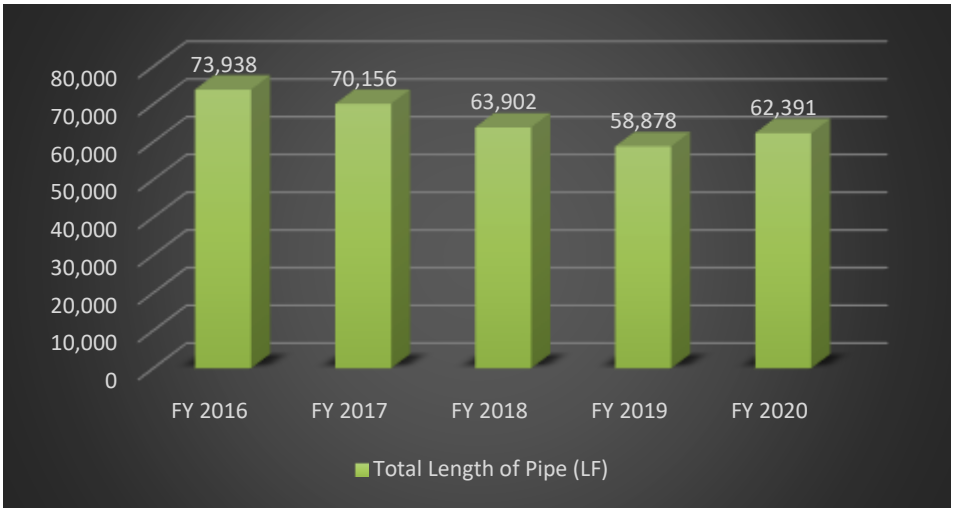
Efforts undertaken for the grease abatement during the reporting period include:

- Reviewed work orders and CCTV with notation of grease observations.
- Applied grease-abatement chemicals to sewers located in grease problem areas.
- Maintained information in Cityworks for tracking the grease problem locations and grease abatement chemical applications.

Procedures for adding sewer segments to or removing sewer segments from the grease abatement inventory list are listed within the Standard Operating Procedure, AMD-PAS-0001 (Fog Abatement Inventory Management). The preliminary chemical application frequency that was assigned to each sewer continues to be refined as field crews return to the sites to perform subsequent grease abatement chemical applications, and field photos and CCTV are analyzed by Utility Engineers. For fiscal year 2020, there was about 6% increase in total linear footage treated from the previous fiscal year, as shown below in Table 5-2.

Table 5-2: Grease Control Chemical Application

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Total Length of Pipe (LF)	73,938	70,156	63,902	58,878	62,391



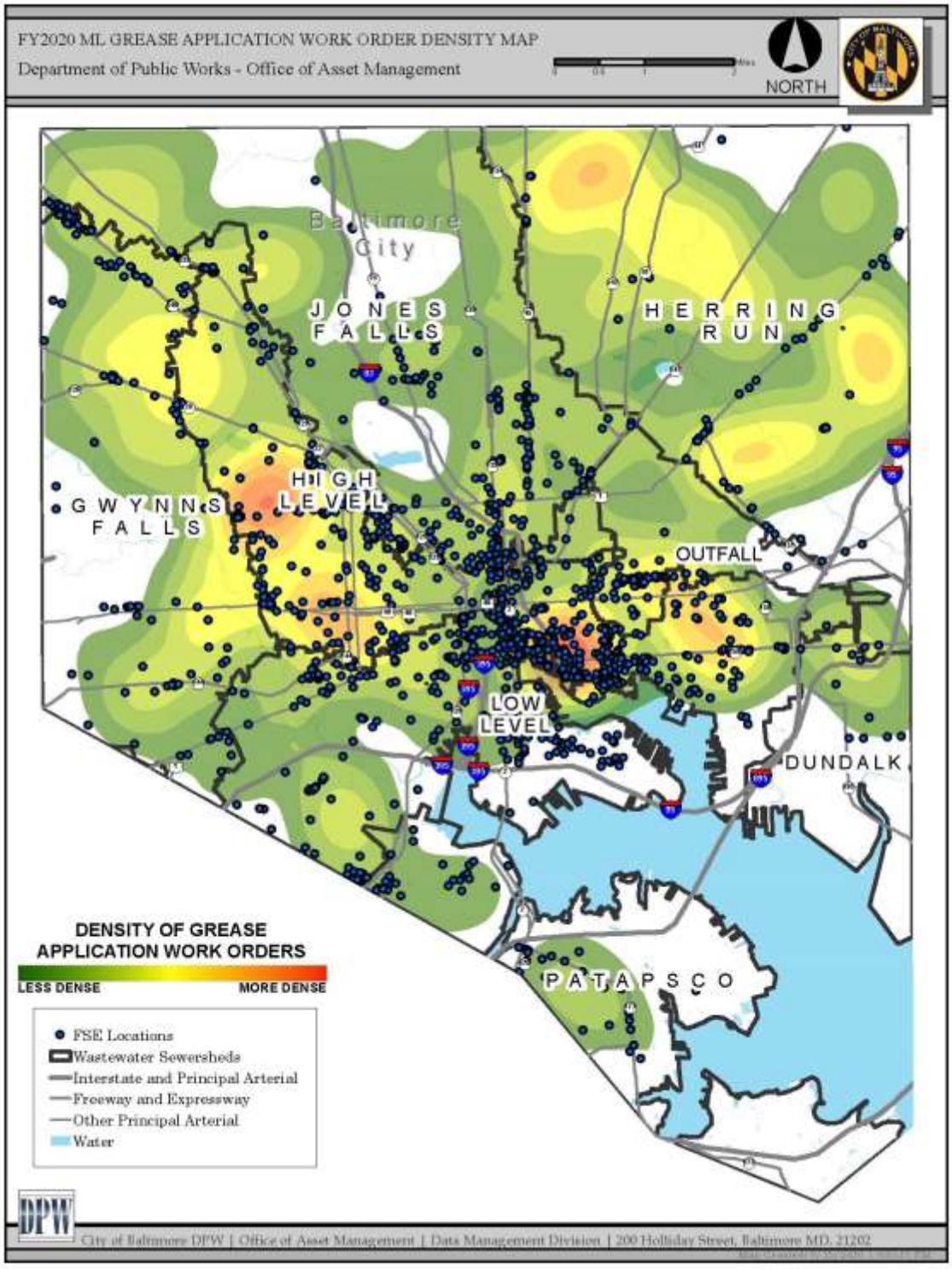


Figure 5-1: Grease Treatment Concentration and FSE Locations

5.4 FOG Prevention and Outreach – FSE Inspections

All FSEs that discharge or have the potential to discharge FOG to the sanitary sewer must comply with the following requirements:

1. Have a valid Wastewater Discharge Permit. DPW's Pollution Control Section issues these permits to non-residential users of the sanitary sewer system.
2. Have a properly sized, installed, and functioning GCD. To be effective, each GCD is to be sized and installed in accordance with the Baltimore City Plumbing Code.
3. Clean and maintain the GCD frequently enough to comply with the 25% Rule (FOG Program Manual (2013) 3.3.1.) This frequency will depend on the number of fixtures discharging to it, the seating capacity of the establishment and the capacity of the device. The 25% Rule is an industry-accepted guideline for establishing cleaning frequency and minimizing the amount of FOG discharged to the sewer. The accumulation of solids settled at the bottom of the GCD and the grease floating on the top should not exceed 25% of the hydraulic depth at any time, as measured from the static water level to the interior tank bottom.
4. Keep a GCD maintenance log up-to-date and on-site. The log must document GCD maintenance and disposal activities. Waste hauler manifests and maintenance records must be retained for three years; and
5. Properly collect and dispose of FOG. It should be disposed as solid waste or stored in a covered, leak-proof receptacle until it can be taken off-site by a licensed hauler.

FOG Inspectors use a mobile application (i.e. the FOG Inspection Application) to aid the inspection process and to maintain the database. FSE inspections are performed by DPW, Environmental Services Division, Pollution Control Section. The focus of the initial round of inspections was on educating customers about the FOG Program and appropriate grease handling practices. This stakeholder outreach continued during FY20 while performing inspections of GCDs within FSEs. During this sixth year of FSE inspections (FY2020) 1,835 inspections were performed (covering 1,613 FSEs). During those inspections, 1,726 GCDs were inspected. Non-compliant FSEs were issued Notices of Violation (NOVs) for lacking a GCD, insufficient maintenance and record-keeping for an existing GCD, certain Plumbing Code nonconformities, inadequate maintenance of waste grease storage areas, inaccessible GCD, and refused admittance. A total of 883 enforcement actions were initiated during this reporting period; none was rescinded. During the reporting period, 249 of the inspections were follow-up inspections after an NOV had been issued. As a result of the program, 25 facilities subsequently installed a GCD in FY2020. A breakdown of the total of FSE inspection violation types for the reporting period is shown in Table 5-3. A list of inspections conducted, and enforcement actions take in contained in Appendix 5-1.

5.5 FOG Program Performance

In 2006, the City began evaluating grease-related work orders. Grease related work orders for mainlines and laterals decreased from previous reporting periods. The decrease could be attributed to the increase of grease control chemical applications and the increased awareness of City residents and businesses.

Table 5-3: FSE Inspection Violation Types FY2020

Violation Type	Total
Unauthorized discharge (Fail 25% Rule, improperly operating GCD, certain appurtenances not connected to GCD)	438
No Grease Control Device	0
Inadequate/No Maintenance Log	333
Plumbing Code	16
Refuses Admittance	26
Inaccessible GCD	7
Inadequate Maintenance of GCD, overflow, waste/recycle grease area	63
NOV Rescinded	0
Total	883

These data are stored in DPW's FSE database ("FOG APP"). This database is an inventory of FSEs that discharge or have the potential to discharge FOG-bearing wastewater to the sanitary sewer. The FSE database is used to track FSE general information, addresses, GCD details, inspection results and enforcement actions. The inventory is updated based on the results of the field investigations and inspections that are performed. The FSE locations are maintained in the GIS and linked to the lateral through which the grease control device discharges. The FSEs can be viewed as a map layer, allowing network traces to be performed and identifying potential sources of FOG at specific locations.

These data are housed in the FSE database, comprised of current and historical data from Baltimore City Health Department and DPW. This database is an inventory of FSEs that discharge or have the potential to discharge FOG-bearing wastewater to the sanitary sewer. The FSE database is used to track FSE general information, addresses, GCD details, inspection results and enforcement actions. The inventory is updated based on the results of the field investigations and inspections that are performed. The FSE locations are maintained in the GIS and linked to the lateral through which the grease control device discharges. The FSEs can be viewed as a map layer, allowing network traces to be performed and identifying potential sources of FOG at specific locations.

During investigations of SSO, the FSE database and grease abatement data may provide potential sources of grease and may facilitate coordination with the Pollution Control Section. These investigations may result in an enforcement action that may require either a GCD installation or increased frequency of GCD maintenance. Escalated enforcement actions including the assessment of penalties commenced with full program implementation during FY2016.

SECTION 6 – Root Control Program

6.1 Root Control Program

DPW continued to execute the Root Control Program during the reporting period. The progress is detailed below and includes:

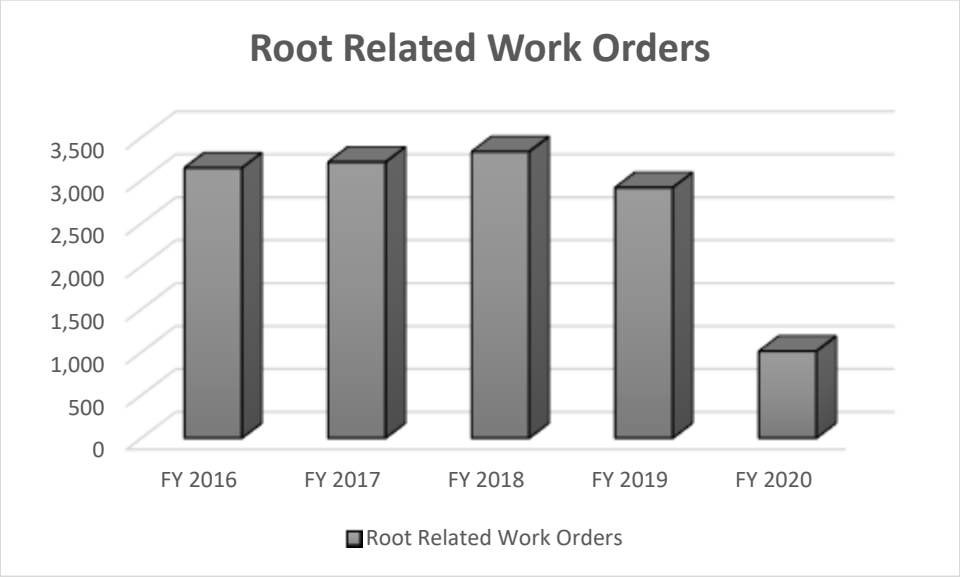
- Continued evaluation of complaint records and maintenance work orders related to roots, and identification of areas with severe root problems.
- Identification of significant root growth through sewer inspection CCTV.
- Continued application of root control chemical to mainlines and laterals with significant root intrusion.

6.2 Evaluation of Maintenance (Reactive) Work Orders

Table 6-1 and Figure 6.1 provide the history of work orders which identified the presence of roots as a contributing factor to the blockage.

Table 6-1: Root Related Work Orders

FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
3,147	3,215	3,336	2,918	1,012



The occurrences of lateral and sewer blockages caused by roots are used to identify laterals and sewer segments that should be added to the Root Control Program or referred for repair. The number of root related work orders decreased from the previous fiscal year by 65%. This can be attributed to the continued use of root control chemical application at selected, targeted locations. In addition, better classification of obstructions (roots vs. rags vs. debris) have contributed to the noticeable reduction in the roots-related reactive WOs.

6.3 Root Control Chemical Application

The City has conducted root chemical treatments since FY 2008. Table 6-2 below reports the linear feet of sewer main treated with root control chemical during this period.

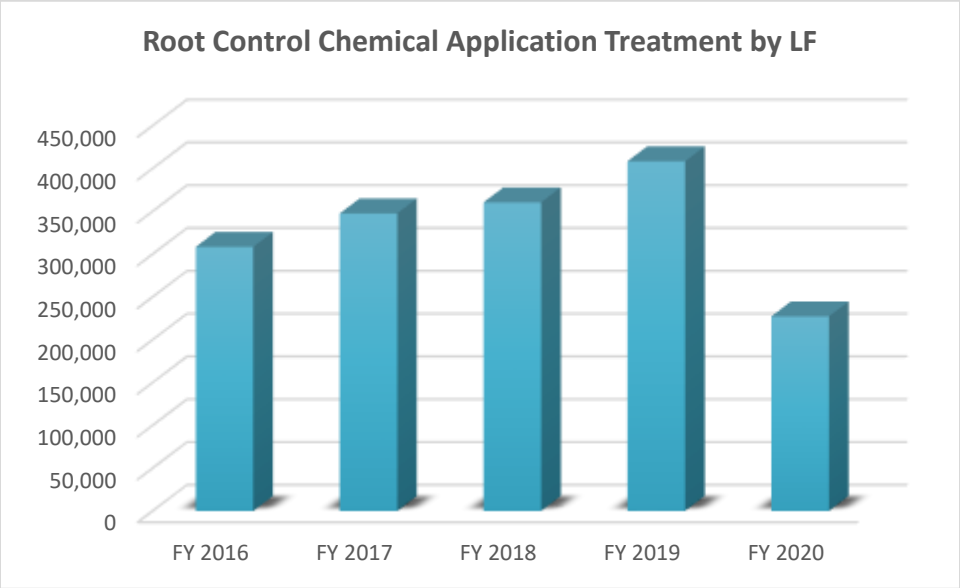
The City began evaluating historical data in FY2016 to determine the long-term chemical treatment cycle for sewer mainlines. The program will continue treatments until it can be demonstrated that areas do not require further treatment. Laterals are also included in the evaluations, but they are not warrantied by the vendor due to the variability in conditions within the lateral. On-going evaluation of pre- and post-treatment CCTV videos for a limited number of mains is used to establish the most appropriate long-term treatment cycle for mains that require continuous treatment. Table 6-3 indicates the length of sewers by linear feet (LF) receiving one or multiple treatments to date, last treated in FY 2020.

The Root Control Program for FY 2020 has been maintained based on detailed review of root related work orders, CCTV that shows presence of live roots, and SSO locations. The program includes expansion to newly identified problem areas as well as re-treatments described above.

Based on the results of the root control chemical application performed this year and confirmation of the success of the program in reducing work orders, the City will continue to schedule repeat treatment where it is deemed necessary.

Table 6-2: Root Control Chemical Application Treatment

Fiscal Year	LF Treated
FY 2016	308,409
FY 2017	347,475
FY 2018	360,436
FY 2019	408,324
FY 2020	227,223

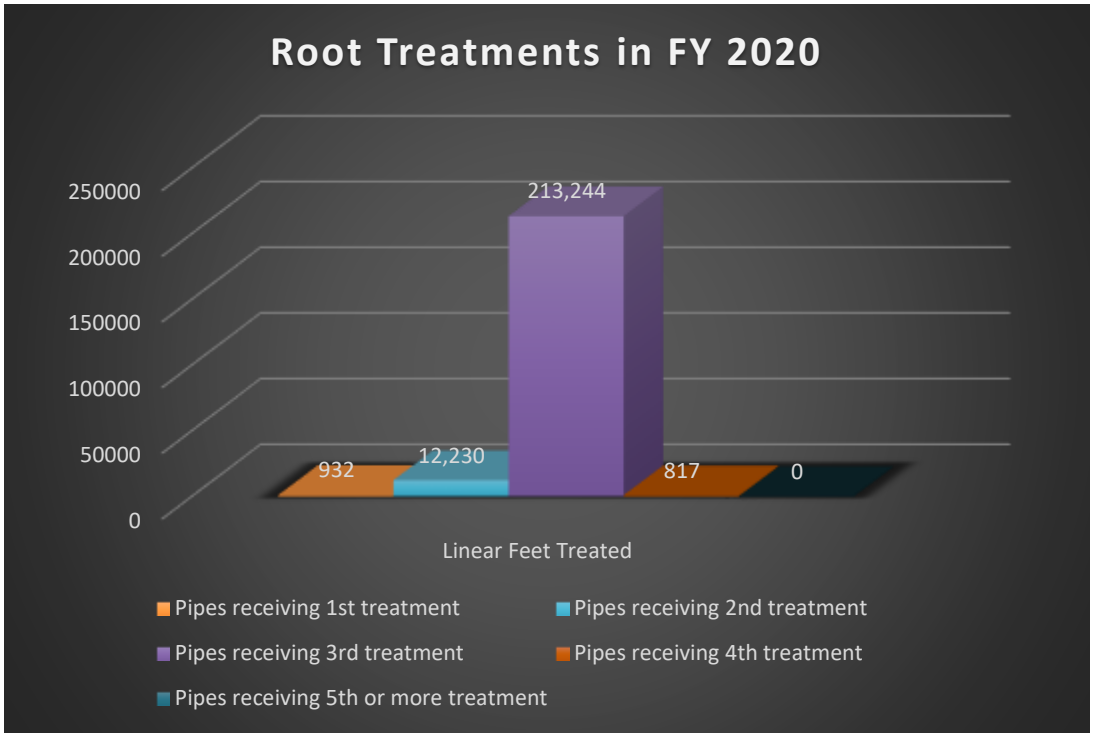


6.4 Root Control Program Performance

In addition to monitoring work orders, in FY2014, the City began to perform random, spot inspection of sewer mainlines that are included in the Root Control Program to help further evaluate the efficacy of the chemical application. The results of these inspections assist the City in establishing the appropriate treatment frequency for specific lines as the program continues to mature. There has been an overall decrease in the root related work orders during this reporting period.

Table 6-3: Root Treatments in FY 2020

Treatment Type	Linear Feet Treated
Pipes receiving 1st treatment	932
Pipes receiving 2nd treatment	12,230
Pipes receiving 3rd treatment	213,244
Pipes receiving 4th treatment	817
Pipes receiving 5th or more treatment	0



SECTION 7 – Limited Access Areas

Limited access areas were previously identified during evaluations for each sewershed and were submitted as attachments in previous O&M annual reports. The list of limited access areas is dynamic and varies over time as additional limited access sewers are discovered through on-going preventive maintenance programs and construction projects. Appendix 7-1 contains a comprehensive list of all manholes with limited access. Manholes in the list have been or will be addressed through construction projects. The City will amend and maintain the comprehensive list of limited access manholes.

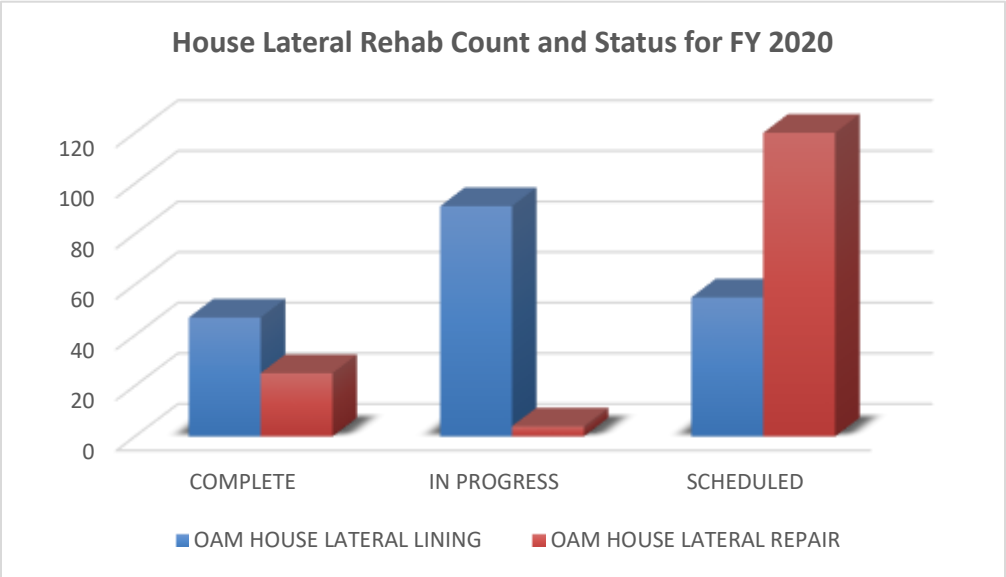
Over the past ten years Baltimore has been addressing accessibility to these areas through construction contracts. These contracts include identifying the means and methods to gain access to the manholes. In most instances access is provided through temporary access roads and existing public trails.

SECTION 8 – Collection System Lateral Prioritization Program

The modified Consent Decree requires the City to address new or reoccurring Building Backups - also known as Water in Cellar (WIC). Baltimore City tracks the number of WICs based on the address of structures and the frequency of backups. The program has three components: (1) identification, (2) inspection and condition assessment, and (3) prioritized repair/replacement and/or maintenance. For FY2020, the city identified and inspected 466 locations. The table below reflects the total number of laterals that were identified as needing additional actions in order to prevent or reduce the number of building backups.

Table 8-1: House Lateral Rehab Count and Status for FY 2020

REPAIR TYPE	COMPLETE	IN PROGRESS	SCHEDULED	TOTAL
OAM HOUSE LATERAL LINING	47	91	55	193
OAM HOUSE LATERAL REPAIR	25	4	120	149
Total	72	95	175	342



The following graph shows the monthly WICs per 100 customer accounts for FY20.

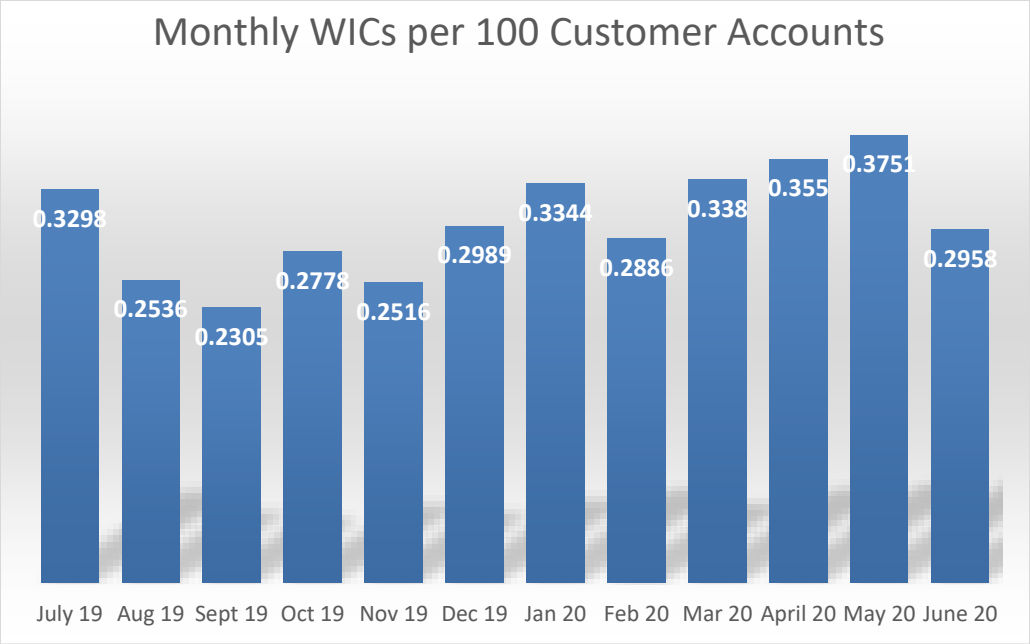


Figure 8-1: Water in Cellar Graph