

**City of Baltimore**  
Department of Public Works

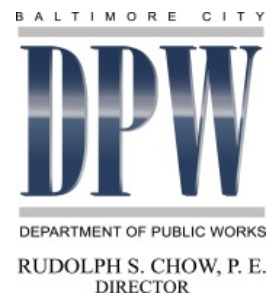
**Modified Consent Decree Program  
Revised Operation & Maintenance Plan**

Sanitary Sewer Overflow Consent Decree  
Civil Action No. JFM-02-1524

February 2, 2018



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## Acronyms and Abbreviations

BMP	best management practice
CMMS	Computerized Maintenance Management System
City or Baltimore City	Mayor and City Council of Baltimore
CCTV	closed circuit television
CCA	Baltimore City Department of Public Works, Office of Communications and Community Affairs
CIPP	cured-in-place-pipe
CNA	cannot access
CNL	cannot locate
CNO	cannot open
CSR	Customer Service Request
DPW	Baltimore City Department of Public Works
FOG	fats, oils, and grease
FSE	food service establishment
GIS	Geographic Information System
GCD	grease control device
DHCD	Baltimore City Department of Housing and Community Development
I/I	infiltration and inflow
MCD	Modified Consent Decree
NOV	Notice of Violation
OAM	Baltimore City Department of Public Works, Office of Asset Management
O&M	operation and maintenance
PCS	Baltimore City Department of Public Works, Pollution Control Section
QA/QC	quality assurance/quality control
SR	service request
SSO	sanitary sewer overflow
SSES	sewer system evaluation survey
UMD	Baltimore City Department of Public Works, Utility Maintenance Division
WIC	water-in-cellar

## 1.0 INTRODUCTION

This section introduces the City's Operation and Maintenance (O&M) Plan for the Collection System.

### 1.1 Purpose

The City of Baltimore (the "City" or "Baltimore City") operates its wastewater Collection System under the terms of a Modified Consent Decree ("MCD") with the U.S. Environmental Protection Agency and the Maryland Department of the Environment. Paragraph 13 of the MCD requires the City to submit a revised operation and maintenance plan ("O&M Plan") for the Collection System to "provide for the proper operation and maintenance of the Collection System in order to minimize failures, malfunctions, and line blockages due to the lack of adequate preventative care." The O&M Plan has been developed to meet these requirements.

### 1.2 Goals

The City's Department of Public Works ("DPW") is responsible for operating and maintaining the Collection System. DPW has established the following goals for the O&M of the Collection System as listed below:

- Prevent dry weather-related sanitary sewer overflows ("SSOs")
- Maintain system capacity to convey wet weather flows to minimize wet weather related SSOs
- Minimize customer service disruptions
- Maximize the useful life of the Collection System

### 1.3 O&M Plan Implementation

Highlights of the O&M Plan will help to meet the goals as stated in Section 1.2 due to the following:

- Comprehensive cleaning and inspection of all sewer mains greater than 8 inches at least once every 7 years to minimize blockages that may cause SSOs and identify structural defects for repair.
- Targeting small diameter gravity sewer mains in areas of reoccurring blockages and/or reoccurring dry weather SSOs for cleaning/inspection at a greater than once every 7-year frequency.
- Identifying and addressing grease accumulation and root growth.
- Assessing sewer laterals where repeat backups occur and prioritizing necessary repairs.

Table 1-1 summarizes the key requirements based on the MCD listing above along with the section in this O&M Plan where the requirement is addressed.

**Table 1-1: O&M Plan MCD Requirement Checklist**

MCD Ref	MCD Requirement	O&M Plan Discussion Location
13.a.(i)	System-wide gravity sewer cleaning and inspection program to inspect and clean, if required, sewers greater than 8 inches in diameter at least once every 7 years and to identify and clean target areas more frequent than every 7 years	Section 2, System-wide Gravity Sewer Cleaning and Inspection Program
13.a.(ii)	Sealing, where appropriate, and maintenance of manholes	Section 3, Manhole Sealing and Maintenance Programs
13.a.(iii)	Identification and remediation of poor construction	Section 4, Identification and Remediation of Poor Construction
13.a.(iv)	Program to prioritize and repair Collection System laterals that cause recurring Building Backups	Section 5, Recurring Building Backup Program
13.a.(v)	Grease control program	Section 6, Fats, Oils and Grease (FOG) Control Program
13.a.(vi)	Root control program	Section 7, Root Control Program
13.a.(vii)	Procedures for updating and maintaining the list of locations where the City does not have ready physical and/or legal access to the Collection System	Section 8, Physical or Legal Limited Access Areas
13.a.(viii)	Documentation of complaints, work orders, updates to equipment inventory, and changes to Collection System components into the information management system	Section 9, Information Management System
13.a.(ix)	Corrective maintenance response and reporting procedures	Section 10, Corrective Maintenance Response and Reporting Procedures (also see separate <i>Revised Emergency Response Plan</i> )
13.a.(x)	Mapping of recurring problems and the effective use of that information in preventing problems that can cause dry weather SSOs	Section 11, Mapping of Recurring Problems
13.a.(xi)	Public education and outreach efforts necessary to inform the public of the need to minimize introduction of debris, grease and other items into the Collection System	Section 12, Public Education and Outreach Program and Section 6, Fats, Oils and Grease (FOG) Control Program

## **2.0 SYSTEM-WIDE GRAVITY SEWER CLEANING AND INSPECTION PROGRAM**

The Collection System inspection and cleaning activities are detailed in this section.

### **2.1 Inspection and Cleaning Purpose**

The purpose of gravity sewer inspection and cleaning program activities is twofold:

- To remove blockages in sewer mains caused by grease accumulation, root intrusion, and debris in order to reduce the potential for SSOs and Building Backups to occur; and
- To identify and subsequently remedy defects in sewer mains that may compromise the structural integrity or proper functioning of the Collection System.

### **2.2 Inspection and Cleaning Programs**

The Collection System cleaning and inspection program is comprised of comprehensive inspection and cleaning (if necessary) for sewer mains that are greater than 8 inches in diameter, and inspection and cleaning (if necessary) of targeted areas for sewer mains that are 8 inches or smaller in diameter. Subsequent sections of this Plan detail these programs.

In addition to the comprehensive and targeted programs, the City proactively cleans individual pipe segments at a frequency of 3, 6, or 12 months, as necessary to maintain proper operation of the Collection System.

#### **2.2.1 Comprehensive Inspection and Cleaning >8-inch Diameter Pipes**

Based on the City's Geographic Information System ("GIS"), there are approximately 340 miles of gravity sewer pipes that are larger than 8 inches in diameter. The City will inspect and clean, where needed, these sewers every 7 years. Therefore, approximately 256,500 linear feet of sewer pipe greater than 8 inches in diameter will be inspected and cleaned (if necessary) on average each year.

#### **2.2.2 Targeted Small-Diameter Inspection and Cleaning Protocol**

##### **2.2.2.1 Identification of Targeted Areas**

Sewer pipes in targeted areas are inspected and cleaned, where needed, at a recurring cycle that is more frequent than 7 years. The majority of these pipes are 6 to 8 inches in diameter. Targeted areas are identified based on a risk score for each area. The risk score is based on the condition, history, and criticality of each targeted area:

- The **condition score** is based on the number of main line blockages<sup>1</sup> per 1,000 linear feet during the past 3 years in sewer pipes ranging in size from 6 to 8 inches in diameter in the targeted area.
- The **criticality score** is determined by pipe size, proximity to wetlands or streams, and water consumption.

The risk score is determined by multiplying the targeted area condition score by the criticality score.

#### 2.2.2.2 Assigning Pipe System Cleaning Frequency.

An inspection/cleaning schedule will be prepared that assigns an inspection/cleaning frequency to the targeted areas with a cycle frequency between 2 and 4 years. The highest risk targeted areas will be assigned during the first year of the MCD and will be updated each subsequent year to ensure the highest risk targeted areas are inspected/cleaned first. In order to maximize efficiency and reduce costs, efforts will be made to level out the workload for each year and to assign targeted areas within each sewer basin to be inspected/cleaned at the same time when feasible.

#### 2.2.2.3 Modifying the Cleaning Frequency of the Targeted Area Inventory

Each year, the risk scores will be re-calculated based on a rolling 3-year total of main line blockages that have occurred in each targeted area. The new risk score will then be compared to the prior year risk score and the results will trigger the following actions:

- If the new risk score for the targeted area remains within the cycle frequency range that was previously assigned, the scheduled year for inspection/cleaning will remain unchanged.
- If the new risk score for the targeted area is either greater or less than the inspection/cleaning frequency range currently assigned, the new schedule will be revised to reflect the changes in the inspection/cleaning cycle frequency.

The inspection/cleaning cycle frequency for targeted areas will be assigned between 2 and 4 years based on the risk score for each targeted area.

#### 2.2.2.4 Removing Pipe Systems from the Target Cleaning Schedule

A targeted area will be removed from the target cleaning schedule when the risk score has reduced to a level that it no longer requires frequent inspection/cleaning.

A targeted area will be removed from the new target cleaning schedule for the next 3 years if the targeted area has been re-lined or replaced during the current year. Thereafter, the risk

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<sup>1</sup> Blockages may be caused by roots, rags, FOG, debris and/or sediment build-up, which are primary causes of dry weather SSOs.



score for the rehabilitated targeted area will determine if it will be targeted for inspection and/or cleaning.

Refer to Appendix A for a map showing the targeted areas and respective inspection/cleaning frequency. Appendix A also presents a listing of targeted areas and the inspection/cleaning frequency that will be updated annually.

### 3.0 MANHOLE SEALING AND MAINTENANCE PROGRAMS

Inspection of manholes will identify potential sources of infiltration and inflow (I/I). Reduction of I/I prevents storm water and groundwater from entering the Collection System and conserves hydraulic capacity, reducing the need for costly upgrades. The trunk sewer inspection program described in Section 10 will provide an ongoing assessment of manholes in proximity to streams and flood prone areas where sources of I/I are most likely to occur. The observations made will include manholes that have ongoing infiltration and inflow, which may also show as severe staining on manhole walls. Observations of manhole defects in other areas will also be made during the inspection and cleaning of Collection System sewers as referenced in Section 2: System-wide Gravity Sewer Cleaning and Inspection Program, and may also be noted during routine maintenance.

Manholes that have structural defects, such as cracks or breaks in the walls, rim, or bottom, are potential sources of infiltration and inflow. Manholes found to be in unacceptable condition will be scheduled for corrective measures or replacement once the appropriate method is determined. OAM will coordinate manhole repair work to restrict I/I until more permanent capacity, I/I reduction projects, or capital projects can be implemented (if practicable).

Prior to any method of manhole sealing or repair, all surfaces of the manhole will be cleaned. If root intrusion has occurred, the roots will be removed and chemical root control will be applied.

Manhole repair work fixes cracks and other defects in the interior face of manhole walls, pipe seals, frames, frame seals, and covers. The scope of work includes all steps necessary to inhibit potential leaks and seal cracks by applying cementitious repair and/or grout injection. The choice of repair material will be based on site conditions and the manufacturer's specifications for the material application. The types of materials used to repair interior defects are as follows:

- Cementitious-leakage sealing mortar (injectable);
- Rapid setting, high early strength, non-shrink cementitious mortar (coating);
- Two component epoxy coating;
- Expanding polyurethane hydrophilic injection grout; and
- Spun Fiberglass Lining coating.

If I/I intrusion is due to issues with the manhole frame and cover, the type of repair will depend on the specific cause of the problem. The type of repair may be as follows:

- Replacement of vented or cracked covers;
- Replacement of damaged frames and covers;
- Resetting of shifted frames;

- Installing manhole inserts to reduce inflow;
- Replacement with locking watertight frames and covers in areas susceptible to flooding or located near streams;
- Installation of frame seals and resetting the frame and cover; or
- Raising and resetting the manhole frame and cover, and installing frame seal for flood-prone locations.

If none the above methods will rectify the situation, the manhole may be replaced as a method of last resort.

Upon completion of the repair and/or/replacement, the manhole will be tested and inspected to ensure the corrective action was successful.

## **4.0 IDENTIFICATION AND REMEDIATION OF POOR CONSTRUCTION**

With the significant amount of Capital Improvement Program construction projects being implemented under the MCD, it is important to ensure high-quality construction is being performed.

### **4.1 Prevention of Poor Construction**

The most important steps to prevent poor construction are to ensure that projects are constructed as specified by monitoring construction-related activities and inspecting work throughout the course of each project.

The DPW Office of Engineering and Construction has developed a Manual of Current Practices as a guide for the field inspection team to follow while overseeing construction activities on wastewater projects.

### **4.2 Identification of Poor or Improper Construction**

#### **4.2.1 Poor Construction**

Poor construction structural defects may be identified while inspecting manholes or during inspections conducted in response to complaints. However, construction structural defects are typically identified during the CCTV inspection review process. The CCTV inspection review process is broken into two categories:

- Pre-construction Inspections (or conditional assessments) – CCTV conducted to capture the initial condition of a pipeline.
- Post-construction (or post-rehab) Inspections – CCTV conducted to show the post-lining condition of a pipeline.

DPW's CCTV analysts are certified by the National Association of Sewer Service Companies under the pipeline assessment and certification program, and are trained to identify structural and rehabilitative defects. The CCTV analysts review both pre- and post-construction inspection videos.

##### **4.2.1.1 Pre-construction Inspections**

Pre-construction inspections are performed to assess the existing condition of a pipeline. The condition of existing pipelines may change as the conditions around these pipelines change. For example, pipelines that were once in good condition may enter into poor condition status due to structural issues. Structural issues may include:

- Cracks, fractures, breaks and/or deformation within the pipe;

- Sags, offset, or separated joints; or
- Collapsed pipes.

#### 4.2.1.2 Post-construction Inspections

Post-CCTV inspections are typically required for pipelines that have been rehabilitated through the use of cured-in-place-pipe (CIPP) lining to ensure that the construction is sound. As CCTV analysts review the post-inspection surveys, they are looking for signs of poor construction during installation or rehabilitation. Such errors may include:

- Lining failures (e.g., detached liner, discoloration, delamination, blistering, holes, wrinkles);
- Undercut, overcut, or non-reinstated laterals;
- Cracked, fractured, broken, deformed, or collapsed pipes; or
- Pipe sags, offsets, or separated joints.

If a post-rehabilitation inspection identifies poor construction, the contractor is required to remediate the problem.

### 4.3 Testing and Inspection of New and Rehabilitated Construction

Once construction is complete, newly installed and rehabilitated pipes are tested according to 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 *DPW Specifications for Materials, Highways, Bridges, Utilities, and Incidental Structures, 2006*, unless modified in the construction contract's specifications or otherwise approved by the City and the design contractor during the course of the project.

### 4.4 Remediation of Poor Construction

If poor construction is identified through a project close-out inspection, the contractor is required to remediate the problem before the project may be accepted.

### 4.5 Remediation of Improper Construction

Work orders will be issued for urgent repair of previous improper construction that is determined to cause SSOs. Work will be performed either by UMD as provided in Section 10: Corrective Maintenance Response and Reporting Procedures, or will be assigned to an On-Call contractor for completion. CCTV and/or dye testing will be used to confirm that remediation of the improper construction was satisfactorily completed. Previous improper construction impairs the effectiveness of the Collection System but does not cause or contribute to an SSO may be assigned to UMD, an On-Call contractor, or included in a future capital project as appropriate.

## **5.0 COLLECTION SYSTEM LATERAL PRIORITIZATION PROGRAM**

### **5.1 Program Purpose**

The City has a sewer lateral program to prioritize corrective action in Collection System laterals that cause recurring Building Backups. The program has three components: (1) identification, (2) inspection and condition assessment, and (3) prioritized repair/replacement and/or maintenance. Collection System laterals with acute or catastrophic failures causing Building Backups will be remediated promptly as provided in the City's Emergency Response Plan.

### **5.2 Identification**

Addresses that have experienced two or more Building Backups within the past 3 fiscal years will be identified on a rolling basis. The addresses will be identified using data collected through service requests and work orders for lateral-based WICs<sup>2</sup> in Cityworks. The addresses will be continually reviewed to remove any Collection System laterals that have been repaired through the program. If a Building Backup occurs after the repair is completed, the Collection System lateral will be flagged for further assessment.

### **5.3 Lateral Inspections and Condition Assessment**

Each address identified through the process described above will be reviewed for any previous CCTV and other relevant information (e.g., tap connection location, length of lateral). If the available information is of sufficient quality, a recommendation of repair may be made. Laterals will be removed from repair consideration if there is no repair to be recommended or if the problem is determined to be a private side issue. For laterals that do not have useable CCTV records, an inspection will be assigned and conducted through the cleanout. If no cleanout is available or there is a blockage in the stack, a lateral launch camera may be required to complete the lateral assessment.

Lateral CCTV inspections are normally performed from a cleanout that is installed on the private side of the lateral at or near the property line. The City may perform lateral repairs from the property line to the sewer main. Any portion of the lateral connection inside the property line is the owner's responsibility to maintain. The property owner will be notified of any major defects discovered on the private side of the lateral.

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<sup>2</sup> A "WIC" refers to a water-in-cellar incident. Notably, not all WICs involve sewage, and not all sewage backups relate to issues in a Collection System lateral. The City evaluates records of WIC incidents to determine whether the WIC was a Building Backup, and, if so, whether the Building Backup arose from an issue in a Collection System lateral.

## 5.4 Lateral Repair and Maintenance

Lateral assessments may result in repair and/or maintenance recommendations. Each Collection System lateral identified through the process described above will be thoroughly reviewed for any defects, such as cracks, holes, infiltration at joints, or roots.

For serious issues, such as a collapsed or deformed pipe, sags, and/or offset joints, open cut point repairs or replacements will be recommended to correct the issue and restore service for the address. For other issues, such as a pipe crack or roots at the joints of the lateral, CIPP lateral lining may be recommended to correct the issue. Repairs will be prioritized for addresses in the general vicinity of one another based on the incidence of Building Backups.

If the condition assessment shows no serious defects, general maintenance may be recommended. Maintenance recommendations may include routine cleaning, root removal, and/or root treatment.

## 5.5 Prioritized List of Collection System Laterals

Appendix B shows the list and map of Collection System laterals, color-coded by type of repair that will be updated annually. Appendix B also presents the list of laterals from highest to lowest number of recurring Building Backups that have been evaluated with repair recommendations provided. Priority for repair will be given to addresses in the general vicinity of one another based on the incidence of Building Backups.

## 6.0 FATS, OILS, AND GREASE CONTROL PROGRAM

In 2013, the fats, oils, and grease (“FOG”) program was incorporated into the City’s pretreatment program under the authority of Article 25 of the Baltimore City Code. The pretreatment program minimizes the discharge of FOG to the Collection System by requiring grease-generating food service establishments (FSEs) to install and maintain grease control devices (GCDs) properly, and promotes kitchen best management practices (BMPs) to residential and commercial customers. In addition, DPW cleans the Collection System and applies commercial grade degreasers as necessary to reduce and eliminate accumulated grease.

The FOG program is a two-pronged approach, managing FOG through mandatory BMPs, such as GCD installation and operation in regulated facilities, and abating grease in sewer lines using a commercial grade degreaser. The FOG program targets non-residential facilities that discharge or have the potential to discharge FOG-laden wastewater; however, since residential FOG discharges also contribute to blockages, a residential outreach component is included.

The goals of the FOG program are to:

- Maintain compliance with the Clean Water Act and requirements set forth by the MCD;
- Substantially reduce or eliminate dry-weather, grease-related SSOs;
- Minimize the amount of FOG discharged to the Collection System;
- Improve current GCD maintenance practices; and
- Educate all users of the Collection System about kitchen BMPs.

The objectives of the FOG program are to:

- Maintain an inventory of regulated grease generating facilities and their associated GCDs;
- Ensure that regulated grease-generating facilities have a valid wastewater discharge permit;
- Require all FSEs that discharge or have the potential to discharge FOG-bearing wastewater to have an adequately sized and properly installed GCD;
- Perform inspections to verify FSE compliance with pretreatment requirements;
- Apply appropriate enforcement responses to code or permit violations;
- Perform routine grease control application and associated inspection (CCTV);
- Abate grease accumulation in sewer mains;
- Facilitate inter-agency coordination to minimize the discharge of FOG to the Collection System and enforce applicable codes;
- Facilitate partnership with FSEs to control FOG discharges;



- Distribute kitchen BMP educational material to residential and commercial customers; and
- Perform community outreach and education.

## 6.1 FOG Abatement

FOG abatement activities include application of a chemical degreasing agent to dissolve grease deposits so FOG blockages can be easily removed in lines that experience rapid accumulation of grease. An inventory of pipes that require FOG abatement has also been developed that is available to pretreatment staff. These pipes are scheduled to be maintained on either a 3- or 6-month FOG abatement cycle, depending on the severity of FOG accumulation in the pipe sections. Prior to initiating the treatment process, DPW inspects and records the flow conditions and any evidence of current or previous surcharges from the upstream or downstream manholes of each pipe section. If an inspection reveals evidence of un-permitted FOG discharges from regulated facilities, pretreatment staff are notified. Use of acoustic testing devices may be employed to aid in determining the degree of grease buildup and to determine the optimal treatment frequency. The inventory consists of approximately 400 pipe sections, with the majority of the pipe sections undergoing 6-month treatment cycles.

## 6.2 Inspections of Food Service Establishments

Routine FSE inspections are performed annually by DPW Pollution Control Section (PCS) inspectors, and follow-up inspections are conducted on an as-needed basis. Initial inspections focus on education. Routine and follow-up inspections evaluate compliance. Examples of conditions leading to an enforcement action include:

- Lack of a required GCD or improper installation of a GCD;
- Inadequate maintenance of GCD (exceeds 25% rule during inspection);
- Evidence of pass-through;
- No maintenance log or maintenance log not up-to-date;
- Inadequate maintenance of waste/recycle grease area;
- Inaccessible GCD;
- Plumbing code nonconformities; or
- Refusal to allow inspection.

In general, the City's response to violations is to issue a Notice of Violation (NOV) and perform a follow-up inspection after the facility has had time to correct the violation. When the condition directly violates the Baltimore City Plumbing Code or Food Service Regulations, Baltimore City code enforcement officers from the Baltimore City Department of Housing and Community Development ("DHCD") or the Baltimore City Health Department may be engaged to correct the condition.

The FOG program is enforced through a combination of permit issuance, inspection, and education. Enforcement actions for violations of the FOG program are made in accordance with Article 25 and the Baltimore City DPW's *Enforcement Response Plan for Fats, Oils and Grease (FOG) Generated by Food Service Establishments (FSE) Emergency Response Plan*. In addition, communication with DHCD and the Health Department ensures compliance with the Baltimore City Building Code and Food Service Regulations.

The records required to manage the FOG program and FSE inspections are maintained in the FOG program database. This database was created by merging the Health Department's food control database with the DPW Pollution Control Section's (PCS) Wastewater Discharge Permit data. The database contains detailed information about each registered FSE and its associated GCD(s), inspection results, and compliance tracking information.

The FOG program database is maintained by OAM and updated by the PCS FOG Inspectors as they conduct inspections. OAM makes data structure changes as needed. The Pollution Control Section inputs data obtained during inspections and per the Wastewater Discharge Permit application and permit issuance process. When performing an inspection, the PCS FOG Inspector creates records using an electronic inspection form, which is automatically saved in the FOG program's FSE database.

The FOG program database is also used to document violations and enforcement actions. The database is used to track dates and responses to violations and enforcement. Entering enforcement and compliance activities into the database ensures they are documented and tracked. In addition, as inspections progress and conditions are noted, certain responses in the inspection forms may trigger an enforcement action such as a NOV. The NOV will cite the noted violations based on the inspection data.

The FSE locations are maintained in the Geographic Information System ("GIS") database and linked to the lateral to which the GCD discharges. These locations can be viewed as a map layer, allowing network traces to be performed to identify potential sources of FOG at a specific location.

During an SSO investigation or other complaint investigation, the FSE database and grease abatement location data are reviewed to determine potential sources of grease. OAM and PCS staff collaborate during these investigations, which may result in an enforcement action.

The pretreatment program also promotes kitchen BMPs to commercial and industrial customers to minimize the discharge of FOG-bearing waste streams to the Collection System.

The public education and outreach targets both the FSEs and commercial/industrial customers under the pretreatment program and the residential customers discharging from single- or multi-family homes. Public education and outreach is coordinated through the Communications and Community Affairs (CCA) Division.

In addition to assisting pretreatment staff with BMP-focused educational efforts, the CCA Division handles the City's *From the Pan to Can* educational initiative. DPW produces and

distributes outreach material explaining FOG disposal consequences and steps people can take to prevent grease from entering their pipes and the Collection System. Plastic lids with the slogan are distributed to encourage customers to store fats, oils, and grease in cans until the material cools and can be safely disposed of as solid waste.

The CCA Division also works with local environmental groups and interested citizens to increase public awareness of FOG issues and problems. During FY 2016, a “Pledge Campaign” initiative was launched to work with private groups to develop a community outreach program to encourage citizens to pledge not to discharge FOG materials to the sewers. DPW continues to promote the campaign’s educational message through the DPW website.

## 7.0 ROOT CONTROL PROGRAM

The City has a root control program that provides both short-term and long-term planning to mitigate root intrusion into the Collection System. The goal of the root control program is to reduce the occurrence of SSOs and Building Backups caused by root-related blockages.

The City uses a contract for the application of chemical root control to areas within the City's existing root control inventory. The contract requires the chemical root control product to kill the root growth in the sewer line and inhibit re-growth for at least two years without permanently damaging the overlying vegetation. In addition, the contractor's warranty coverage guarantees that roots will not cause a blockage in the initial two year period after the first treatment. If the pipe is re-treated within 6 months of the expiration of the two year warranty period, the guarantee is renewed for three additional years from the time the subsequent treatment is made. This warranty can continue on a cycle, as long as the pipe is treated within 3 years and 6 months of the previous treatment. If the warranty is breached, the City notifies the contractor to re-treat the line at no cost to the City.

### 7.1 Inventory of Pipes for Root Control Chemical Treatment

CCTV data are used to identify pipes with root intrusion. Pipes found to have roots with measurable cross sectional area loss that have never been treated are added to the inventory for chemical root control treatment. Pipes remain in the inventory until the mainline is scheduled for replacement, abandonment, or CIPP lining.

Pipe segments that receive root control chemical application are prioritized in the following order:

- Mains that have not previously been chemically treated and have medium or heavy roots as identified through current inspections and flagged by the OAM CCTV analyst;
- Mains due for their second chemical treatment, within 2 years after the first treatment;
- Laterals with root infestation identified through UMD CCTV in response to SSOs or complaints about WIC events and flagged by the OAM analyst;
- Laterals identified for treatment inspections conducted under the Collection System Lateral Prioritization Program described in Section 5, which have not previously been treated; and
- Mains that are included in the long-term, 3-year, treatment cycle.

A database of the sewer lines in the root control inventory is maintained by OAM's Data Management Division to map locations and develop chemical treatment planned work for assignment to the root treatment contractor.

## **7.2 Adding Mainline Pipes to the Chemical Root Control Inventory**

All CCTV videos are reviewed by OAM CCTV analysts. If roots are observed that have caused a blockage and/or have the potential to contribute to a blockage, the analyst will check the root control inventory to verify the status of the pipe under review. If the pipe is not in the inventory, the pipe will be flagged for inclusion in the root control inventory.

## **7.3 Removing Mainline Pipes from the Chemical Root Control Inventory**

If roots are no longer determined to be a blockage risk, a pipe may be removed from the root control inventory. Pipes that have been added to Capital Improvement Projects for rehabilitation (i.e., lining or replacement) are typically removed from the inventory after completion of the rehabilitation work. Furthermore, various other conditions, such as root eradication, tree/shrub/brush removal, or re-development, may also trigger removal from the inventory. Finally, if recent CCTV indicates that the root condition will not likely contribute to a line stoppage, OAM may flag the pipe for removal from the root control inventory.

## **7.4 Adding Laterals/House Connections to the Chemical Root Control Inventory**

Laterals may be added to the root control inventory for two reasons: (1) in response to SSOs that have occurred due to house connection chokes that were caused by roots, or (2) through inspections completed under the Collection System Lateral Prioritization Program, where roots are identified as presenting a potential maintenance issue.

SSO-related root control treatments are not scheduled to be repeated for laterals, as the Collection System Lateral Prioritization Program will ultimately analyze these laterals comprehensively and make long-term repair or maintenance recommendations as provided in Section 5. Analysts from OAM's Data Management Division will cross-check addresses for "repair sanitary connection" work orders prior to distribution of treatment lists to the contractor and remove any addresses that have had repairs from the inventory.

## **7.5 Inspections of Known Problem Areas**

The City performs CCTV inspections and quality assurance/quality control (QA/QC) checks through random sampling of pipe sections included within the root control inventory. Additionally, the City performs spot field inspections of areas with high concentrations of SSOs that may be related to root intrusion.

## 7.6 Long-term Repairs

Pipes in the root control inventory are evaluated to determine if repeat blockages due to roots have occurred following chemical root treatment, or whether there are ongoing indications of heavy root growth. If blockages occur within the warranty period, the lines will be referred to the contractor for re-treatment. Areas with persistent, heavy root growth that cannot be controlled effectively with use of chemical treatment will be evaluated for CIPP lining, point repairs, or pipe replacement.

## 8.0 PHYSICAL OR LEGAL LIMITED ACCESS AREAS

The City's Collection System is extensive and was built primarily during the early and mid-20<sup>th</sup> century. As such, there may be areas of the Collection System where the City lacks ready access due to physical or legal limitations. The following subsections discuss the City's process for identifying areas where physical or legal access is problematic, and describe the City's strategies for obtaining and maintaining access to these locations.

### 8.1 Physical Access

Following initial construction of a Collection System, situations can develop that limit physical access to sewer assets. For example, vegetation may limit access in off-road easement areas; property owners may encroach upon City easements; fences and other barriers may be installed that restrict access; road construction, excavation or paving may bury manholes; or stream bank erosion may interfere with access. This section describes DPW's activities to identify and remediate areas with limited physical access.

#### 8.1.1 Identifying Areas with Limited Physical Access

As part of the City's sewershed studies under the 2002 Consent Decree, the City completed sewer system evaluation survey (SSES) projects for each of the City's eight sewersheds. The SSES activities included flow monitoring, hydraulic modeling, CCTV inspection, smoke testing, and dyed water testing. These activities identified issues that may detract from performance of the Collection System, including potential sources of I/I, capacity constraints, blockages, structural deficiencies, deterioration, dislocated joints, and other factors. As part of the SSES projects, areas with limited physical access were identified and catalogued in a database. DPW maintains this data in its Computerized Maintenance Management System (CMMS) software, which is specific to each Collection System asset. This data is accessible to DPW staff through the CMMS software, and is updated on an ongoing basis through DPW's trunk sewer inspection program as detailed in Section 10, *Corrective Maintenance Response and Reporting Procedures*, as well as through field reports from on-call contracts and other inspection data. Assets are added and removed from the database based on this information.

The data typically includes multiple instances of cannot locate (CNL), cannot access (CNA) or cannot open (CNO) manholes. The CNL manholes may be due to inaccuracies in historical records or GIS mapping, or may have been caused by construction or other activity in the area. The CNA manholes may also be temporary, such as when a vehicle is parked on top of the manhole, or areas where the manhole is located in a fenced area with a menacing dog. The CNO manholes may be partially buried or require heavy equipment or other resources to open.

If inaccessible manholes found during Trunk Inspection are crucial to the inspection or may conceal a serious underlying problem, the inspection crews can create a work order for further investigation of the accessibility issues. OAM also captures the accessibility issue in the CMMS, thereby including the manhole in the limited access database. Additional proactive measures

are undertaken to reduce the number of covered access points in the public right-of-way. These access points may become covered as a result of construction or rehabilitation projects, such as utility work, roadway renovation, or landscape beautification. Pre- and post-construction inspections are performed to ensure that infrastructure is accessible during and after completion of the project, and to ensure that buried infrastructure is identified and brought to grade.

### **8.1.2 Obtaining Physical Access**

In the years since completion of the SSES projects, the City has continued to address lack of physical accessibility through a series of construction contracts. In many cases, the City identifies the means and methods to gain access, thereby reducing costs and using resources more efficiently. For purposes of construction, access may be provided through temporary roads or existing public trails. In other cases, permanent access roads may be constructed.

In order to address temporary access issues, crews will attempt to contact the property owner to schedule a follow-up inspection. If practicable, the property owner will be asked to address the access impairment.

For more permanent physical access issues, such as when the property owner built a structure or out-building over the sewer, DPW will assess the ability to access the sewer from adjacent manholes. If a significant issue persists, the City may require the property owner to remove the obstruction by initiating appropriate legal process.

## **8.2 Legal Access**

When Collection System assets are installed on property that is not owned by the City, access may be provided through an easement. Easements are usually established when Collection System components are constructed on non-City property. If City-owned property is transferred to non-City ownership, easements may also be retained to ensure continued access to utility assets. The Baltimore City Department of Transportation (DOT) reviews all capital improvement and development projects, identifies any necessary easements, and negotiates agreements with property owners. Projects cannot be approved or constructed until appropriate easements have been established.

### **8.2.1 Identifying Areas of Limited Legal Access**

There may be isolated areas where past development proceeded without the necessary easements, or where easements were not documented appropriately. These areas are usually identified when new construction activity is planned. Easement issues may also be identified if UMD crews identify a physical obstruction and subsequent investigation uncovers a missing or improperly documented easement.

### **8.2.2 Obtaining Legal Access**

If a potential easement issue is identified, OAM notifies DOT of the need to identify a valid easement or negotiate an easement with the affected property owner. DOT is then responsible



for researching records, searching tax maps, and conducting a title search. If the research is unsuccessful, negotiations may begin to acquire a new easement. If negotiations are unsuccessful, the City may initiate condemnation proceedings to acquire an easement. Independent of condemnation proceedings, the City also maintains legal authority under Article 25 of the Baltimore City Code to regulate or repair sewer assets on public or private property.

## 9.0 INFORMATION MANAGEMENT SYSTEM

The DPW maintains an information management system to document information regarding the operation, maintenance, and performance of the Collection System. This enterprise solution includes the Customer Service Request (CSR) System, the Cityworks CMMS, and the GIS.

Customer complaints generate CSR records that may lead to reactive or proactive work orders so that problems can be tracked from inception to completion. This improves both customer service and problem detection and remediation activities.

The Cityworks CMMS tracks all maintenance activities on the Collection System by asset ID and location, documenting the repair history for the Collection System. Use of Cityworks has been strengthened through staff training programs and implementation of random QA/QC checks to ensure work orders are properly closed after work has been performed. In addition, Cityworks is used to tie inspection and replacement history to Collection System assets housed in the GIS.

Additional QA/QC procedures and field data collection improvements have been implemented to increase SSO reporting accuracy and timeliness. With the integration of CSR, Cityworks, and GIS data, complaint tracking and reactive work can facilitate identification of defects and predict system rehabilitation and renewal needs.

The GIS maintains a record of all known Collection System components that are linked to associated documents. Roots, FOG, and other issues are captured in the GIS, allowing programs to be accurately targeted for appropriate programs. The GIS maintains a unique identifier for each asset, along with core information germane to the system (e.g., status, material, age, size).

In addition to establishing these databases, DPW created the Office of Asset Management (OAM) to evaluate and integrate data through enterprise solutions for information management. Information contained in the CMMS informs strategic planning development, key performance indicators, and operational metric tracking for a number of preventive and reactive maintenance programs, including:

- Collection System Lateral Prioritization Program;
- Comprehensive Collection System cleaning;
- Trunk sewer inspection;
- Root control program;
- FOG abatement;
- SSO/WIC investigations; and
- SSO compliance.

In addition to updating inaccessible assets on a routine basis, all relevant data from new construction and rehabilitation projects is entered into the GIS database. The City's construction project specifications require contractors and vendors to submit as-built data in a specified electronic format to facilitate incorporation into the City's GIS database.

## 10.0 CORRECTIVE MAINTENANCE RESPONSE AND REPORTING PROCEDURES

Collection System maintenance is performed on a reactive and preventive basis. Corrective maintenance is reactive and includes repairs that are performed when Collection System assets break down. Corrective maintenance focuses on restoring assets to their normal operating condition. Preventive maintenance is proactive and includes repairs, rehabilitation, or replacement to stabilize the reliability of Collection System assets. Preventive maintenance focuses on extending the useful life of assets.

### 10.1 Corrective Maintenance

The City's emergency dispatch operation is a central call system that is available via phone (311) 24 hours a day, 7 days a week, for citizens to report sewer-related complaints. This service is also available online for 24 hours a day, 7 days a week, as well as by mobile application. Each complaint in the 311 system is assigned a customer service request (CSR) number to enable tracking from the moment the service request (SR) enters the system until the SR is resolved.

When a sewer-related complaint is entered into the 311 system, it is forwarded by an automated transaction to the Cityworks CMMS. A dispatcher in DPW's Control One office will view the SR and notify the DPW Utility investigator of the complaint. Once a DPW Utility Investigator has investigated the complaint and a determination of corrective requirements (if any) 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 work order is updated in Cityworks. In some instances, there may be multiple complaints in the 311 system for the same problem. If so, all complaints are forwarded to Cityworks, but work orders are generated only for unique problems that need to be resolved. A work order is resolved when the problem has been corrected and all related activities have been updated and closed in Cityworks.

The City's reactive activities in the event of an SSO or Building Backup are detailed in the City's Emergency Response Plan and are not detailed in this O&M Plan. Common corrective maintenance activities relating to SSOs are outlined below.

#### 10.1.1 Blockages and Overflows

Most corrective maintenance deals with alleviating stoppages in the Collection System, which may be either physical or hydraulic in nature. Physical stoppages are usually located in the pipe between manholes, but can also occur in the manhole itself. Physical stoppages are usually caused by grease build-up, roots, sand, rocks, sticks, rags, flushable wipes, other foreign objects, or structural problems in the sewer line.

In the event of a system choke, the responding Sewer Maintenance crew identifies the blockage location and cleans the sewer main, Collection System lateral, or manhole with hydraulic jetting

equipment. As the blockage dislodges and flows downstream, the crews will trap and remove the debris from the Collection System. Removing the debris reduces the potential for blockages in downstream pipes. If the crew determines that the blockage is on the privately-owned portion of the lateral or inside a building, the customer is notified to call a plumber to resolve the private-side problem.

As part of the emergency response, the Wastewater Maintenance Section will clean up overflow areas once the blockage is cleared and normal flow is restored within the Collection System. The crews are also responsible for ensuring that field data is transmitted to office personnel for follow-up reporting. OAM provides assistance in meeting reporting requirements within the mandated schedules.

Additionally, OAM performs root cause analysis for SSO events. These analyses determine whether preventive maintenance or follow-up corrective actions are needed to reduce the potential for future events. As part of root cause analysis, DPW leverages the GIS and SSO location information. Additional detail is provided in Section 11, *Mapping of Recurring Problems*.

### 10.1.2 Wet Weather Overflows

As communities grow, downstream sewers may not be upgraded to handle the additional wastewater flow, while aging pipes and manholes may allow for greater volumes of I/I entry. In these areas, the Collection System may become capacity-limited and subject to overflows during peak wet weather events.

The Baltimore City Department of Public Works - Utility Maintenance Division (UMD) responds to wet weather overflows to ensure that proper signage and access restrictions are enforced. As with dry weather SSO events, UMD is responsible for cleaning the area and transmitting the field data to office personnel once the overflow is detected. OAM assists with reporting wet weather SSO events. Details of procedures used for responding to and reporting of wet weather SSOs are provided in the City's Emergency Response Plan.

OAM has established an SSO Compliance Team to monitor DPW's response to SSO events. The team reviews all SSO 24-hour reports for quality assurance, and coordinates with the DPW Bureau Head of Water and Wastewater when submitting the 5-day written reports to regulatory agencies.

## 10.2 Preventive Maintenance

DPW implements a number of preventive maintenance programs as part of the City's O&M strategy. The various sewer inspection and cleaning programs are detailed in Section 2, *System-wide Gravity Sewer Cleaning and Inspection Program*. The Collection System Lateral Prioritization Program addresses laterals as detailed in Section 5, *Recurring Building Backup Program*. The FOG program and FOG abatement of problem spots is detailed in Section 6, *Fats, Oil, and Grease Control Program*, and control of root growth in sewers is detailed in

Section 7, *Root Control Program*. An additional preventive maintenance program is outlined below.

### **10.2.1 Trunk Sewer Inspection Program**

In order to inspect and identify proactive maintenance needs in the Collection System along streams and in wooded areas where problems may go, the City has implemented a trunk sewer inspection program. These inspections include trunk mains and sewers that connect to the trunk mains. The program aims to inspect all trunk mains and associated manholes at least once every 5 years.

Inspections are conducted by walking over the sewer alignment, reviewing the condition of manholes, assessing mains with pole-mounted cameras, and dye testing exposed sewers and sewers that cross streams. Manhole inspections are tracked for each of the City's eight sewersheds. The program has been able to identify maintenance needs, including heavy manhole cleaning, pipe cleaning, CCTV inspection, and manhole cover replacements. In addition, these inspections may identify and confirm limited access areas to update the limited access list described in Section 8, *Physical or Legal Limited Access Areas*. These inspections follow the guidelines of the NASSCO manhole assessment and certification program.

## **11.0 MAPPING OF RECURRING PROBLEMS**

### **11.1 Leveraging Data**

Collection System operations generate significant amounts of data. Leveraging this data is critical to ensure limited O&M resources are directed to the most effective activities and continue an overall shift from reactive to proactive maintenance. Since initiation of the 2002 Consent Decree, DPW has made substantial progress in leveraging this data effectively.

#### **11.1.1 Problem Area Mapping**

OAM conducts root cause analyses for SSO events. These root cause analyses identify recurring problems caused by capacity, FOG, roots, or potential defects, and each analysis is associated with specific assets and locations within the Collection System as tracked in the GIS. Follow-up activities are tracked in the CMMS.

The GIS and CMMS solutions allow DPW to locate potential causes of recurring problems, map those problems, and utilize effective means to mitigate the issue. Problem area location maps and trend analyses are key components in this process.

## 12.0 PUBLIC EDUCATION AND OUTREACH PROGRAM

### 12.1 Overview

The City conducts significant public education and outreach activities for customers and the general public. In addition to targeting specific customers that may be impacted by O&M activities or construction projects with project-specific information, DPW promotes water, wastewater, and stormwater issues by participating in community events and neighborhood meetings.

DPW's Communication and Community Affairs (CCA) Division maintains a website (<http://publicworks.baltimorecity.gov/pw-bureaus/water-wastewater/wastewater/consent>) to provide information about the 2002 Consent Decree and the MCD. The website provides general information and has links for more detailed information on specific projects, reports, and programs throughout the City.

The CCA Division also issues topic-specific educational materials on an as-needed basis. For example, FOG source control materials are developed to assist residential, commercial, and industrial customers in preventing the introduction of FOG-laden materials and non-flushable materials into the Collection System. DPW's FOG program is detailed in Section 6, *Fats, Oils, and Grease Control Program*.

CCA Division resources include three public information officers, six community liaisons, three graphic artists (two of whom are assigned to the Sign Shop), and an administrative assistant. The Division relies on other DPW bureaus and offices to provide subject-matter expertise.

### 12.2 Strategies

The CCA Division uses several strategies to educate the public about issues relating to the Collection System and the MCD, including the following:

- News releases;
- Press conferences;
- Public events (e.g., Big Truck Day and street festivals);
- Flyers, presentations, and related promotional materials distributed by community liaisons at meetings and events;
- Website and social media (including Facebook, Twitter, Nextdoor, and YouTube);
- Media interviews and TV/radio/film appearances; and
- Water bill inserts and messages.

Often these strategies overlap. For instance, a news release is likely to generate media interest, leading to interviews and additional media exposure. This may also create public interest that



can be addressed at community meetings or other events. Social media helps extend messaging to additional audiences, and allows DPW to respond to real-time concerns and questions. Using more than one strategy helps to explain, repeat, and amplify the messaging.

In spring 2017, the CCA Division, working with private and non-profit partners, kicked off a *Clean Drain Campaign* to help raise awareness of the problems of improper FOG and wipes disposal and ways to dispose of these wastes properly. The campaign, more than a year in the making, used social media, personal appeals, and word-of-mouth marketing to generate interest in the topic and to encourage people to pledge to follow recommended disposal procedures. The CCA Division will build on the Clean Drain Campaign brand by using it as the website home for FOG and non-flushable educational materials.

### 12.3 Messaging

The work required under the MCD is costly, and DPW works tirelessly to help customers understand how wastewater enterprise funds are used to improve the Collection System and wastewater treatment plants. By building on the Clean Drain Campaign and the massive interest generated by the recent “Fatberg” news coverage, the CCA Division will continue to provide regular reminders to *Can the Grease* and *Trash the Wipes*.

Although not part of the MCD, ongoing messaging about projects to produce cleaner effluent at the City’s wastewater treatment plants and to reduce trash and pollutants in urban streams will echo and emphasize messaging about how the MCD work protects public health and the environment.

### 12.4 Audiences

Homeowners and renters need to know how their water/sewer bill payments are used to improve the Collection System, the environment, and public health. This is DPW’s largest audience that collectively pays the most toward infrastructure work and contributes the most waste to the Collection System. As such, homeowners and renters need to understand proper waste disposal practices, including what should go down the sink or toilet.

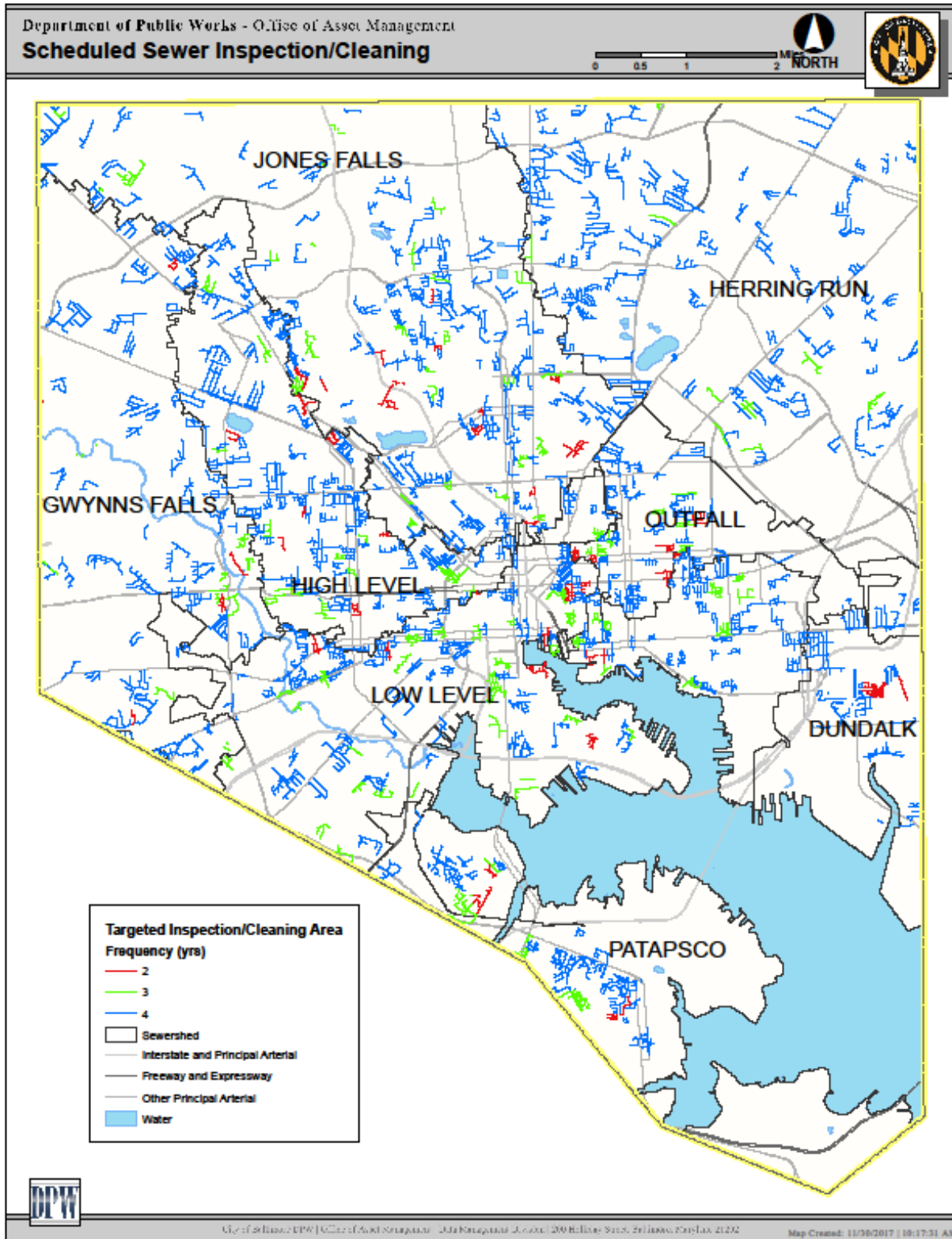
Commercial food service establishments (FSEs) produce FOG that must be kept out of the Collection System. As noted in Section 6, DPW administers a program to address FOG through enforcement, abatement, and outreach. This program works directly with regulated entities to ensure that facilities install and maintain grease control devices, while observing good housekeeping practices.

Commercial property owners and professional building managers tend to pay the highest monthly bills, and expect information and assistance when necessary. Finally, elected officials serve multiple roles as customers, representatives, and watchdogs of and advocates for DPW.

DPW targets its education and outreach efforts to each of these audiences in order to ensure that all customers receive appropriate information regarding the need to minimize the introduction of FOG, non-flushables, and other inappropriate items into the Collection System.

**Appendix A:  
Targeted Areas for 2-, 3-, or 4-Year Inspection/Cleaning  
Cycles**

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**Figure A-1: Targeted Areas Scheduled for Inspection/Cleaning on a 2, 3, or 4 year Cleaning Cycle**

**Table A-1: List of Targeted Areas Scheduled for Inspection/Cleaning on a 2-, 3-, or 4-year Cycle**

Basin	Basin Chokes	No. of Dry SSOs	Volume of Dry SSOs	Target Area (linear feet)			Total to be Cleaned (linear feet)
	3-year History			2-year Cleaning Cycle	3-year Cleaning Cycle	4-year Cleaning Cycle	
BGF1	2	1	0	0	0	1,199	1,199
BHR2	8	2	606	0	1,035	3,683	4,718
DU01	1	2	711	0	0	869	869
DU02	4	1	3	0	0	3,688	3,688
DU03	13	0	0	0	0	16,074	16,074
DU04	5	2	3,185	0	0	6,221	6,221
DU05	4	0	0	0	0	3,378	3,378
DU06	1	1	0	0	0	1,584	1,584
DU07	4	2	9,975	146	0	2,239	2,386
GF01A	14	2	1,797	0	0	12,400	12,400
GF02	11	7	5,749	0	870	7,289	8,160
GF03	14	3	2,633	1,377	0	10,881	12,258
GF05	1	0	0	0	0	1,972	1,972
GF06	2	2	1,520	0	0	1,831	1,831
GF08	6	3	13,621	0	0	6,355	6,355
GF09	4	8	3,257	0	0	2,204	2,204
GF10	21	8	19,210	2,280	3,775	10,536	16,591
GF11	11	5	2,104	0	1,698	8,763	10,461
GF13	11	7	29,807	265	4,277	1,347	5,889
GF14	10	11	3,880	0	0	11,589	11,589
GF15	2	1	0	0	0	3,598	3,598
GF17	4	2	3,709	0	0	963	963
GF18	6	2	0	0	0	5,350	5,350
GF19	2	2	10	0	0	1,663	1,663
GF20	7	0	0	0	1,246	3,895	5,142
GF21	6	6	15,252	0	0	1,746	1,746
GF22	12	6	12,174	0	0	8,407	8,407
GF23	5	3	167	0	0	3,233	3,233
GF24	5	1	3	0	0	2,961	2,961

Basin	Basin Chokes	No. of Dry SSOs	Volume of Dry SSOs	Target Area (linear feet)			Total to be Cleaned (linear feet)
	3-year History			2-year Cleaning Cycle	3-year Cleaning Cycle	4-year Cleaning Cycle	
GF25	6	2	9	0	0	4,352	4,352
GF27	5	3	132	0	0	6,507	6,507
GF28	5	0	0	0	0	2,209	2,209
GF30	7	0	0	0	0	6,528	6,528
GF32	10	5	1,705	0	0	5,938	5,938
GF33	4	0	0	0	0	6,605	6,605
GF34	13	10	709	1,525	0	12,804	14,329
GFS13	4	0	0	0	0	7,208	7,208
GFS14	6	2	401	0	926	3,654	4,579
HL01	9	1	0	0	1,722	4,792	6,515
HL02	14	3	2,440	2,125	3,680	6,534	12,338
HL02A	1	0	0	0	0	1,732	1,732
HL03	5	4	574	0	0	6,935	6,935
HL04	8	6	223	0	0	11,327	11,327
HL05	13	5	1,042	0	0	7,782	7,782
HL06	2	5	0	0	0	2,659	2,659
HL07	3	5	10	0	1,497	0	1,497
HL08	3	1	1,225	0	0	4,683	4,683
HL09	5	1	80	312	789	5,685	6,786
HL10	3	4	971	0	2,258	0	2,258
HL11	5	3	95	0	1,291	5,033	6,324
HL12	3	4	1,319	0	0	3,357	3,357
HL13	3	3	289	0	0	5,528	5,528
HL14	2	1	0	0	0	2,098	2,098
HL15	3	7	13	0	0	3,752	3,752
HL16	1	2	1	0	0	1,618	1,618
HL17	8	3	606	1,362	1,326	3,593	6,281
HL18	12	3	1,680	2,299	0	2,897	5,195
HL20	6	7	1,075	0	2,155	6,428	8,583
HL21	15	8	47	0	3,358	14,866	18,224
HL22	13	6	372	0	0	17,644	17,644

Basin	Basin Chokes	No. of Dry SSOs	Volume of Dry SSOs	Target Area (linear feet)			Total to be Cleaned (linear feet)
	3-year History			2-year Cleaning Cycle	3-year Cleaning Cycle	4-year Cleaning Cycle	
HL23	5	6	3,714	0	0	7,139	7,139
HL24	10	6	1,536	1,680	0	10,626	12,307
HL25	9	7	2,163	0	1,059	7,731	8,790
HL26	15	6	317	1,348	0	10,923	12,271
HL27	11	3	136	0	2,026	13,980	16,006
HL28	9	3	575	0	0	9,605	9,605
HL29	8	2	250	1,737	0	5,493	7,231
HL30	16	8	6,253	1,848	1,427	11,706	14,981
HL31	6	2	970	0	0	6,304	6,304
HL32	8	1	0	0	0	12,032	12,032
HL33	5	2	70	0	0	3,823	3,823
HL34	4	0	0	0	0	3,069	3,069
HL35	11	2	542	0	510	9,034	9,544
HL37	6	3	10	0	0	5,034	5,034
HL38	7	1	0	0	0	10,366	10,366
HL39	10	3	7	0	3,006	4,834	7,840
HL40	4	3	11	0	0	3,201	3,201
HL41	3	1	0	0	0	3,188	3,188
HR02B	7	1	0	0	1,707	2,432	4,139
HR03	9	1	340	0	4,253	4,132	8,385
HR05	6	1	0	0	0	8,891	8,891
HR06	5	0	0	0	0	1,916	1,916
HR07A	3	0	0	0	1,371	0	1,371
HR07B	5	0	0	0	0	2,432	2,432
HR09A	3	0	0	0	0	4,760	4,760
HR09B	1	1	0	0	0	1,074	1,074
HR10	6	7	2,112	0	0	7,133	7,133
HR11	3	1	0	0	0	4,694	4,694
HR12	8	5	750	0	0	12,751	12,751
HR13	4	1	10	0	0	3,598	3,598
HR14	7	6	692	0	2,094	4,225	6,319

Basin	Basin Chokes	No. of Dry SSOs	Volume of Dry SSOs	Target Area (linear feet)			Total to be Cleaned (linear feet)
	3-year History			2-year Cleaning Cycle	3-year Cleaning Cycle	4-year Cleaning Cycle	
HR15	9	5	816	0	0	15,809	15,809
HR17	4	2	5	0	0	2,142	2,142
HR18	3	2	100	0	0	3,710	3,710
HR19	3	1	2	0	0	4,986	4,986
HR20	7	2	55,400	0	0	4,373	4,373
HR21	9	6	21,192	0	0	10,220	10,220
HR22	6	3	15	0	0	6,208	6,208
HR23	10	0	0	0	0	8,939	8,939
HR24	11	2	180	0	0	11,547	11,547
HR25	9	2	90	0	0	12,374	12,374
HR26	5	0	0	0	0	4,121	4,121
HR27A	4	1	0	0	0	2,235	2,235
HR27B	8	1	0	0	0	9,362	9,362
HR28	7	4	4	0	0	3,485	3,485
HR29	3	4	4	0	0	1,337	1,337
HR30	4	6	6,250	0	0	2,322	2,322
HR32	7	1	186	0	0	7,676	7,676
HR33	3	0	0	0	0	2,499	2,499
HR34	8	1	2	0	2,409	3,181	5,591
HR35	2	1	10	0	0	3,178	3,178
HR36	3	0	0	0	0	1,467	1,467
HR37	12	4	380	0	0	6,503	6,503
HR38	4	0	0	0	0	1,960	1,960
HR39	3	5	386	0	0	2,998	2,998
HR40	5	0	0	0	0	4,179	4,179
HR41	6	0	0	0	0	4,032	4,032
HR42	4	1	12	0	0	3,642	3,642
HR43	6	2	1,310	0	0	4,416	4,416
HR45	7	2	0	0	0	2,504	2,504
HR46	4	0	0	0	0	2,357	2,357
HR48	4	3	9,217	0	0	1,966	1,966



Basin	Basin Chokes	No. of Dry SSOs	Volume of Dry SSOs	Target Area (linear feet)			Total to be Cleaned (linear feet)
	3-year History			2-year Cleaning Cycle	3-year Cleaning Cycle	4-year Cleaning Cycle	
HR49	2	3	1,060	0	0	3,478	3,478
HR50	4	1	30	0	0	1,815	1,815
HR51	10	1	120	0	0	7,389	7,389
HR53	5	1	186	0	0	4,360	4,360
HR54	5	0	0	0	0	2,256	2,256
HR56	4	0	0	0	1,740	1,038	2,778
HRS4	4	1	405	0	1,522	1,211	2,733
JF01	5	4	1,158	688	0	1,552	2,239
JF02	5	2	0	0	2,523	4,087	6,610
JF03	9	1	0	3,605	0	0	3,605
JF04	9	5	1,415	0	0	15,876	15,876
JF05	11	9	11,169	1,439	0	5,314	6,754
JF06	5	2	0	0	1,897	2,562	4,459
JF07	3	3	0	0	0	3,928	3,928
JF08	6	1	1,140	0	0	8,819	8,819
JF09	6	9	32,398	0	1,423	6,288	7,711
JF10	10	14	7,912	0	2,429	11,576	14,005
JF11	11	11	3,792	0	1,693	10,211	11,904
JF12	2	4	150	0	0	3,558	3,558
JF13	7	6	1,340	0	1,411	7,241	8,652
JF14	3	1	0	0	1,342	1,683	3,025
JF15	1	3	2	0	0	1,029	1,029
JF16	9	5	2,042	1,338	0	7,710	9,048
JF17	11	7	10,773	710	1,945	5,729	8,385
JF18	5	6	410	0	0	6,511	6,511
JF19	4	3	16,248	0	0	1,793	1,793
JF20	2	3	3,505	0	0	4,574	4,574
JF21	1	0	0	0	0	1,432	1,432
JF22	16	2	278	1,048	1,743	10,141	12,931
JF23	15	5	1,695	0	2,294	5,434	7,728
JF24	16	2	85	1,413	0	18,457	19,870

Basin	Basin Chokes	No. of Dry SSOs	Volume of Dry SSOs	Target Area (linear feet)			Total to be Cleaned (linear feet)
	3-year History			2-year Cleaning Cycle	3-year Cleaning Cycle	4-year Cleaning Cycle	
JF25	17	7	106,044	0	3,458	11,084	14,542
JF26	6	2	5	0	0	4,941	4,941
JF29	8	6	6,318	0	1,744	5,947	7,691
JF32	5	7	1,015	0	888	5,057	5,945
JF33	7	1	3,900	1,348	0	2,747	4,095
JF34	23	15	7,961	2,439	5,390	10,711	18,540
JF35	7	3	866	0	2,096	4,121	6,217
JF36	3	2	1,690	0	0	4,252	4,252
JF37	1	2	8,811	0	0	1,671	1,671
JF38	7	11	10,113	0	1,402	4,243	5,645
JF39	1	1	4,820	0	317	0	317
JF40	1	6	205	0	0	2,793	2,793
JF41	8	5	246	0	0	4,757	4,757
JF42	5	11	40,991	0	0	3,559	3,559
JF43	1	0	0	0	0	2,009	2,009
JF44	4	2	1,309	0	311	3,263	3,574
JF47	3	2	2,380	0	0	1,196	1,196
JFINL	1	0	0	0	768	0	768
JFOUT	9	5	321	1,034	1,314	3,850	6,198
JFS5	5	1	5	0	1,532	4,113	5,645
JFWR01	24	9	7,885	0	4,938	2,218	7,156
JFWR11	2	0	0	0	0	1,302	1,302
JFWR12	2	4	39,277	0	0	1,581	1,581
JFWR14	1	2	149	0	0	1,417	1,417
JFWR19	6	5	1,953	0	0	6,089	6,089
JFWR22	3	3	15	0	0	2,324	2,324
JFWR24	6	5	12,337	0	520	7,008	7,529
JFWR29	9	1	0	0	1,012	9,738	10,750
JFWR34	1	1	5,400	0	0	1,423	1,423
LL01	11	0	0	841	2,734	5,752	9,327
LL02	10	1	0	876	3,148	5,449	9,473

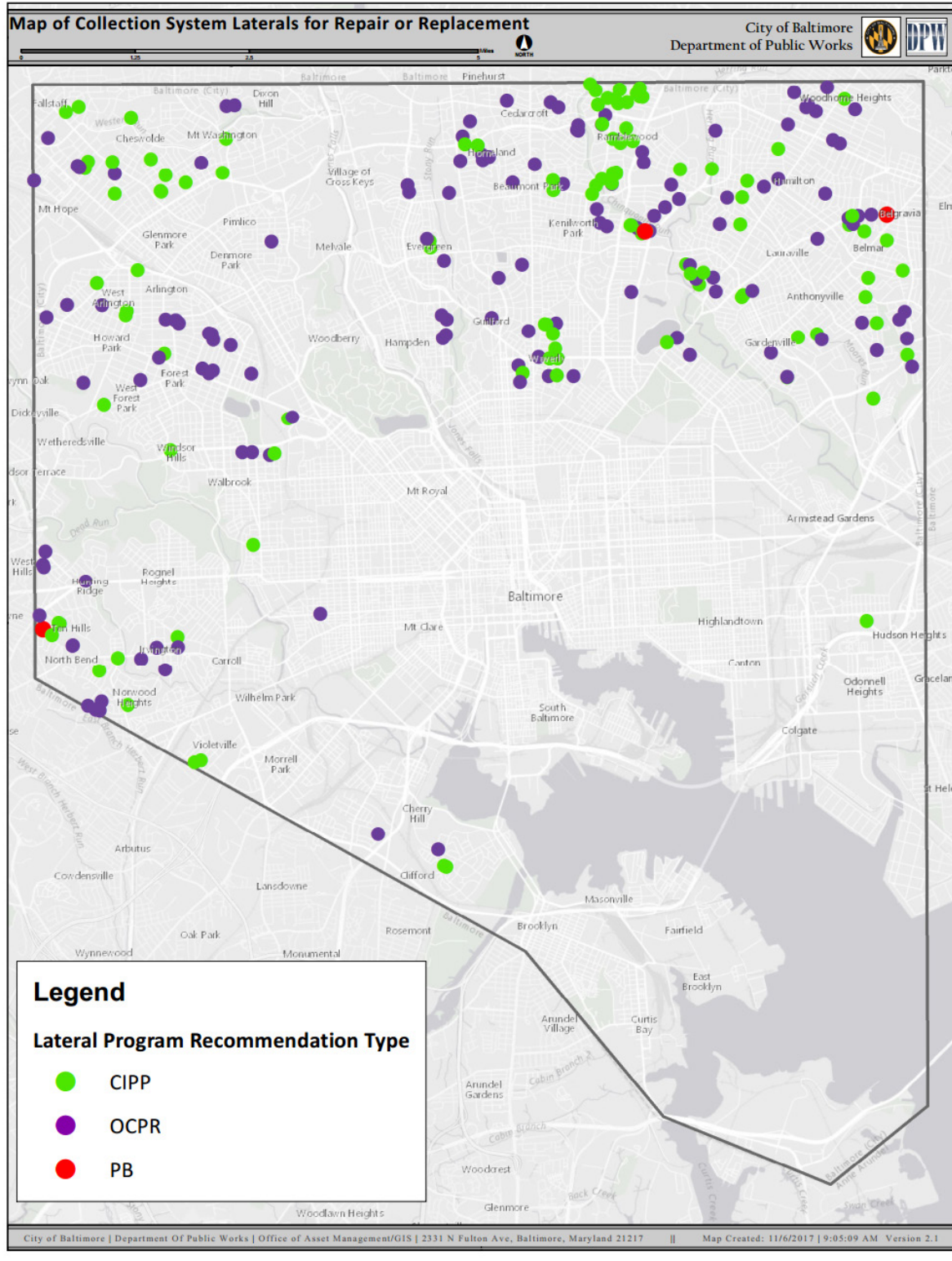
Basin	Basin Chokes	No. of Dry SSOs	Volume of Dry SSOs	Target Area (linear feet)			Total to be Cleaned (linear feet)
	3-year History			2-year Cleaning Cycle	3-year Cleaning Cycle	4-year Cleaning Cycle	
LL03	4	3	11	0	0	5,326	5,326
LL04	3	2	0	0	0	4,129	4,129
LL05	12	0	0	0	3,803	5,351	9,154
LL06	13	5	97	0	3,000	6,942	9,942
LL07	14	7	921	873	0	16,817	17,689
LL08	11	3	4,090	0	3,169	7,939	11,108
LL09	6	0	0	0	1,104	4,701	5,806
LL10	6	3	345	0	1,294	4,834	6,127
LL11	4	2	18	0	0	4,978	4,978
LL12	6	2	765	0	0	5,957	5,957
LL13	7	0	0	0	0	7,595	7,595
LL14	4	1	1,495	0	0	3,223	3,223
LL15	9	3	6,347	1,556	1,296	4,105	6,958
LL16	2	0	0	0	0	2,357	2,357
LL17	18	7	28	2,487	4,802	3,416	10,706
LL18	11	1	2,025	977	4,149	1,663	6,788
LL19	4	0	0	0	0	9,571	9,571
LL20	13	1	1,025	1,180	1,227	6,389	8,796
LL21	5	1	4,315	0	0	9,784	9,784
LL22	3	0	0	0	1,038	1,477	2,515
LL23	4	0	0	0	1,409	3,481	4,890
LL24	6	3	2,010	0	2,208	5,554	7,762
LL25	5	2	360	627	1,919	0	2,546
LL26	3	2	1,996	0	1,058	1,392	2,450
LL27	5	2	0	1,154	0	4,206	5,360
LL28	4	0	0	0	792	4,339	5,131
LL29	3	1	1,070	0	1,045	0	1,045
LL29A	4	1	0	0	2,990	0	2,990
LL30	4	0	0	0	1,519	2,865	4,384
LL31	3	0	0	0	0	5,640	5,640
LL32	10	2	546	0	2,372	9,163	11,535

Basin	Basin Chokes	No. of Dry SSOs	Volume of Dry SSOs	Target Area (linear feet)			Total to be Cleaned (linear feet)
	3-year History			2-year Cleaning Cycle	3-year Cleaning Cycle	4-year Cleaning Cycle	
LL33	7	0	0	0	0	10,007	10,007
LL34	3	1	0	0	0	3,745	3,745
LL35	4	6	65	0	1,456	2,486	3,942
LL36	11	6	4,260	1,687	0	10,979	12,666
LL37	7	2	0	0	2,889	4,311	7,200
LL38	4	0	0	0	0	5,048	5,048
LL38A	1	1	10	0	0	1,331	1,331
LL39	11	2	1,965	0	1,650	6,094	7,744
LL40	13	9	1,982	0	1,804	3,199	5,003
LL41	7	6	2,161	0	3,710	0	3,710
LL42	10	2	798	0	1,145	8,923	10,069
LL43	4	2	6,230	0	0	9,601	9,601
LL44	21	8	2,058	2,278	1,098	20,519	23,894
LL45	8	2	8,100	0	0	8,889	8,889
LL46	2	1	6,860	0	0	2,143	2,143
LL47	3	0	0	0	1,219	0	1,219
LLS11	4	1	7	0	1,096	0	1,096
OUT01	9	1	2,375	0	0	10,599	10,599
OUT02	1	2	0	0	0	962	962
OUT03	11	0	0	1,348	1,404	9,145	11,897
OUT06	3	1	0	0	0	2,837	2,837
OUT07	8	4	557	0	0	11,015	11,015
OUT08	8	3	8	1,802	0	2,560	4,362
PA03	9	2	3,115	0	0	5,647	5,647
PA04	17	3	150	1,742	0	10,934	12,676
PA06	11	4	360	0	0	13,354	13,354
PA07	15	5	932	0	2,729	11,703	14,433
PA08	1	0	0	0	0	1,601	1,601
PA09	10	2	264	0	2,570	2,363	4,934
PA10	16	11	7,473	298	2,571	3,806	6,676
PA11	11	4	1,116	1,716	1,590	3,984	7,289

Basin	Basin Chokes	No. of Dry SSOs	Volume of Dry SSOs	Target Area (linear feet)			Total to be Cleaned (linear feet)
	3-year History			2-year Cleaning Cycle	3-year Cleaning Cycle	4-year Cleaning Cycle	
PA12	1	0	0	0	0	2,039	2,039
PA13	1	1	12,450	0	0	539	539
TSDU03	6	4	487	1,875	0	3,177	5,053
TSGF02	4	0	0	526	247	0	773
TSHL03	6	3	10,804	0	3,093	1,789	4,882
TSHR04	11	3	0	0	0	10,189	10,189
TSJF02B	3	13	7,700	556	0	1,401	1,957
TSL05	6	4	8,550	0	2,264	1,074	3,337
UAMD9003	1	0	0	0	0	964	964
Total	1,685	746	740,040	57,764	178,034	1,326,332	1,562,130

**Appendix B:**  
**Collection System Laterals for Repair or Replacement**

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Note: Building Backups were evaluated from fiscal year 2015 to fiscal year 2017 using data collected through customer service requests and work orders for lateral-based WICs.

**Figure B-1: Collection System Laterals for Repair or Replacement**

Recurring Building Backups were identified from fiscal year 2015 to fiscal year 2017 using data collected through customer service requests and work orders for lateral-based WICs. Laterals are prioritized based on the number of Building Backup occurrences during a rolling 3-year timeframe.

**Table B-1: List of Collection System Laterals for Repair or Replacement**

Address	Building Backups	Recommendation
<b>CIPP</b>		
1012 CHERRY HILL RD	14	CIPP
5738 NASCO PL	9	CIPP
2727 INGLEWOOD AVE	8	CIPP
3202 ABELL AVE	8	CIPP
2605 AILSA AVE	8	CIPP
4845 MELBOURNE RD	7	CIPP
3917 BOARMAN AVE	7	CIPP
1016 MARLAU DR	7	CIPP
3403 GLENMORE AVE	7	CIPP
3020 OVERLAND AVE	7	CIPP
601 W 38TH ST	6	CIPP
604 E 33RD ST	6	CIPP
4501 HAMPNETT AVE	6	CIPP
4223 STANWOOD AVE	6	CIPP
905 STAMFORD RD	5	CIPP
7 SAINT MARTINS RD	5	CIPP
5306 PURLINGTON WAY	5	CIPP
1132 ELBANK AVE	5	CIPP
1010 MARLAU DR	5	CIPP
5315 SAINT ALBANS WAY	5	CIPP
5108 HILLEN RD	5	CIPP
323 MARYDELL RD	5	CIPP
2027 HILLENWOOD RD	5	CIPP
3914 BOARMAN AVE	4	CIPP
325 BROADMOOR RD	4	CIPP
803 MONTPELIER ST	4	CIPP
6217 BILTMORE AVE	4	CIPP
6201 FAIRDEL AVE	4	CIPP



Address	Building Backups	Recommendation
615 NOTTINGHAM RD	4	CIPP
5615 SAINT ALBANS WAY	4	CIPP
5562 CEDONIA AVE	4	CIPP
3717 RASPE AVE	4	CIPP
3547 NEWLAND RD	4	CIPP
3001 MILFORD AVE	4	CIPP
2708 WOODLAND AVE	4	CIPP
2 N BENTALOU ST	4	CIPP
1652 SHADYSIDE RD	4	CIPP
113 CHURCHWARDENS RD	4	CIPP
651 CHARRAWAY RD	3	CIPP
5209 EDMONDSON AVE	3	CIPP
4895 MELBOURNE RD	3	CIPP
4200 GREENWAY	3	CIPP
406 NORTHWAY	3	CIPP
3817 CALLAWAY AVE	3	CIPP
3601 DENNLYN RD	3	CIPP
3407 COPLEY RD	3	CIPP
1651 STONEWOOD RD	3	CIPP
1540 E BELVEDERE AVE	3	CIPP
1173 E NORTHERN PKWY	3	CIPP
709 HIGHWOOD DR	3	CIPP
7013 SURREY DR	3	CIPP
6202 YORKSHIRE DR	3	CIPP
6108 IVYMOUNT RD	3	CIPP
6013 WALTHER AVE	3	CIPP
5800 MERVILLE AVE	3	CIPP
5607 LIBERTY HEIGHTS AVE	3	CIPP
5511 GERLAND AVE	3	CIPP
539 BENNINGHAUS RD	3	CIPP
442 S AUGUSTA AVE	3	CIPP
411 WESTGATE RD	3	CIPP
3806 PARKMONT AVE	3	CIPP
3411 CEDARDALE RD	3	CIPP

Address	Building Backups	Recommendation
321 E 30TH ST	3	CIPP
3125 NORTHWAY DR	3	CIPP
3107 NORTHWAY DR	3	CIPP
2912 MALLVIEW RD	3	CIPP
2823 INGLEWOOD AVE	3	CIPP
2819 OVERLAND AVE	3	CIPP
2800 INGLEWOOD AVE	3	CIPP
2712 E NORTHERN PKWY	3	CIPP
2403 PELHAM AVE	3	CIPP
2315 ROGENE DR	3	CIPP
2306 ECHODALE AVE	3	CIPP
2111 LAKE MONTEBELLO TERR	3	CIPP
204 SAINT DUNSTANS RD	3	CIPP
1901 WINFORD RD	3	CIPP
1812 WOODBOURNE AVE	3	CIPP
104 SAINT DUNSTANS RD	3	CIPP
901 STAMFORD RD	2	CIPP
613 NOTTINGHAM RD	2	CIPP
5507 PURDUE AVE	2	CIPP
4821 MELBOURNE RD	2	CIPP
4403 SEDGWICK RD	2	CIPP
4277 LABYRINTH RD	2	CIPP
3920 BOARMAN AVE	2	CIPP
3919 BOARMAN AVE	2	CIPP
3803 COPLEY RD	2	CIPP
3609 KESWICK RD	2	CIPP
1575 WINSTON AVE	2	CIPP
1321 WINSTON AVE	2	CIPP
1302 SILVERTHORNE RD	2	CIPP
1027 COOKS LN	2	CIPP
711 E 33RD ST	2	CIPP
6323 PIONEER DR	2	CIPP
6005 WALTHER AVE	2	CIPP
6 LONGWOOD RD	2	CIPP

Address	Building Backups	Recommendation
5932 NORTHWOOD DR	2	CIPP
5601 GREENFIELD AVE	2	CIPP
5516 PEERLESS AVE	2	CIPP
5471 WHITWOOD RD	2	CIPP
5429 RADECKE AVE	2	CIPP
5418 CEDONIA AVE	2	CIPP
5416 LOTHIAN RD	2	CIPP
5238 FREDCREST RD	2	CIPP
5236 FREDCREST RD	2	CIPP
5203 CEDGATE RD	2	CIPP
5005 BOXHILL LN	2	CIPP
4620 HARCOURT RD	2	CIPP
4619 SCHENLEY RD	2	CIPP
4615 PARKWOOD AVE	2	CIPP
4339 PLAINFIELD AVE	2	CIPP
4220 EUCLID AVE	2	CIPP
4101 KATHLAND AVE	2	CIPP
4014 GARRISON BLVD	2	CIPP
4004 LIBERTY HEIGHTS AVE	2	CIPP
3835 KESWICK RD	2	CIPP
3818 MIDHEIGHTS RD	2	CIPP
3817 MIDHEIGHTS RD	2	CIPP
3814 MILFORD AVE	2	CIPP
3812 COPLEY RD	2	CIPP
3640 ELLERSLIE AVE	2	CIPP
3636 BEECH AVE	2	CIPP
3402 CEDARDALE RD	2	CIPP
3317 DOLFIELD AVE	2	CIPP
321 MARYDELL RD	2	CIPP
3115 HARVIEW AVE	2	CIPP
304 CEDARCROFT RD	2	CIPP
3012 ELGIN AVE	2	CIPP
3 SAINT JOHNS RD	2	CIPP
2915 GLENMORE AVE	2	CIPP

Address	Building Backups	Recommendation
2906 ELGIN AVE	2	CIPP
2810 HARVIEW AVE	2	CIPP
2800 EVERGREEN AVE	2	CIPP
2712 OVERLAND AVE	2	CIPP
2608 MOORE AVE	2	CIPP
2511 W FOREST PARK AVE	2	CIPP
231 S LOUDON AVE	2	CIPP
2223 KOKO LN	2	CIPP
1538 STONEWOOD RD	2	CIPP
1536 STONEWOOD RD	2	CIPP
1351 STONEWOOD RD	2	CIPP
1136 GORSUCH AVE	2	CIPP
<b>Open Cut Point Repair</b>		
622 LUCIA AVE	9	OPEN CUT POINT REPAIR
4337 PLAINFIELD AVE	8	OPEN CUT POINT REPAIR
3702 BARTWOOD RD	7	OPEN CUT POINT REPAIR
2307 LYNDBURST AVE	7	OPEN CUT POINT REPAIR
1909 RAMBLEWOOD RD	6	OPEN CUT POINT REPAIR
2725 ROUND RD	6	OPEN CUT POINT REPAIR
2933 MOSHER ST	6	OPEN CUT POINT REPAIR
4608 KESWICK RD	5	OPEN CUT POINT REPAIR
5727 CLOVER RD	5	OPEN CUT POINT REPAIR
5729 CLOVER RD	5	OPEN CUT POINT REPAIR
4707 FREDERICK AVE	5	OPEN CUT POINT REPAIR
4707 W FOREST PARK AVE	5	OPEN CUT POINT REPAIR
6235 NORTHWOOD DR	5	OPEN CUT POINT REPAIR
4205 ELSRODE AVE	5	OPEN CUT POINT REPAIR
3809 PARKMONT AVE	5	OPEN CUT POINT REPAIR
5616 FRANKFORD AVE	5	OPEN CUT POINT REPAIR
4524 KESWICK RD	4	OPEN CUT POINT REPAIR
1264 MERIDENE DR	4	OPEN CUT POINT REPAIR
1218 CEDARCROFT RD	4	OPEN CUT POINT REPAIR
2711 OVERLAND AVE	4	OPEN CUT POINT REPAIR
5271 CEDONIA AVE	4	OPEN CUT POINT REPAIR

Address	Building Backups	Recommendation
652 E 37TH ST	4	OPEN CUT POINT REPAIR
707 E 33RD ST	4	OPEN CUT POINT REPAIR
5510 PIONEER DR	4	OPEN CUT POINT REPAIR
5505 THE ALAMEDA	4	OPEN CUT POINT REPAIR
3316 LEIGHTON AVE	4	OPEN CUT POINT REPAIR
3307 GLEN AVE	4	OPEN CUT POINT REPAIR
386 E 31ST ST	3	OPEN CUT POINT REPAIR
3734 CLARENELL RD	3	OPEN CUT POINT REPAIR
3402 OLYMPIA AVE	3	OPEN CUT POINT REPAIR
1312 GITTINGS AVE	3	OPEN CUT POINT REPAIR
1337 GITTINGS AVE	3	OPEN CUT POINT REPAIR
1222 MERIDENE DR	3	OPEN CUT POINT REPAIR
1606 PENTWOOD RD	3	OPEN CUT POINT REPAIR
1532 STONEWOOD RD	3	OPEN CUT POINT REPAIR
1530 STONEWOOD RD	3	OPEN CUT POINT REPAIR
5631 SAGRA RD	3	OPEN CUT POINT REPAIR
1351 GITTINGS AVE	3	OPEN CUT POINT REPAIR
3901 PINKNEY RD	3	OPEN CUT POINT REPAIR
1216 WOODBOURNE AVE	3	OPEN CUT POINT REPAIR
5311 HAMLET AVE	3	OPEN CUT POINT REPAIR
3300 BEVERLY RD	3	OPEN CUT POINT REPAIR
3005 CLEARVIEW AVE	3	OPEN CUT POINT REPAIR
6000 GLENFALLS AVE	3	OPEN CUT POINT REPAIR
2736 BOOKERT DR	3	OPEN CUT POINT REPAIR
113 S LOUDON AVE	3	OPEN CUT POINT REPAIR
805 E 34TH ST	3	OPEN CUT POINT REPAIR
622 E 37TH ST	3	OPEN CUT POINT REPAIR
3911 DORCHESTER RD	3	OPEN CUT POINT REPAIR
3323 MORAVIA RD	3	OPEN CUT POINT REPAIR
823 E 33RD ST	3	OPEN CUT POINT REPAIR
2727 LOUISE AVE	3	OPEN CUT POINT REPAIR
4521 PARKWOOD AVE	3	OPEN CUT POINT REPAIR
4705 BLUERIDGE AVE	3	OPEN CUT POINT REPAIR
4213 POWELL AVE	3	OPEN CUT POINT REPAIR

Address	Building Backups	Recommendation
7028 WALLIS AVE	2	OPEN CUT POINT REPAIR
6307 PARK HEIGHTS AVE	2	OPEN CUT POINT REPAIR
6220 THE ALAMEDA	2	OPEN CUT POINT REPAIR
5935 LEITH WALK	2	OPEN CUT POINT REPAIR
5818 FALKIRK RD	2	OPEN CUT POINT REPAIR
5625 SAGRA RD	2	OPEN CUT POINT REPAIR
411 HAZLETT AVE	2	OPEN CUT POINT REPAIR
3805 BARTWOOD RD	2	OPEN CUT POINT REPAIR
3707 CLARENELL RD	2	OPEN CUT POINT REPAIR
1635 STONEWOOD RD	2	OPEN CUT POINT REPAIR
1338 WALKER AVE	2	OPEN CUT POINT REPAIR
1261 WALKER AVE	2	OPEN CUT POINT REPAIR
1213 GLENHAVEN RD	2	OPEN CUT POINT REPAIR
1206 COCHRAN AVE	2	OPEN CUT POINT REPAIR
1103 GITTINGS AVE	2	OPEN CUT POINT REPAIR
5802 LEITH WALK	2	OPEN CUT POINT REPAIR
1534 STONEWOOD RD	2	OPEN CUT POINT REPAIR
1621 STONEWOOD RD	2	OPEN CUT POINT REPAIR
1613 STONEWOOD RD	2	OPEN CUT POINT REPAIR
6135 DUNROMING RD	2	OPEN CUT POINT REPAIR
1134 ELBANK AVE	2	OPEN CUT POINT REPAIR
5708 BLAND AVE	2	OPEN CUT POINT REPAIR
3309 LUDGATE RD	2	OPEN CUT POINT REPAIR
5628 SAGRA RD	2	OPEN CUT POINT REPAIR
5304 WABASH AVE	2	OPEN CUT POINT REPAIR
5511 PURDUE AVE	2	OPEN CUT POINT REPAIR
5412 SAINT ALBANS WAY	2	OPEN CUT POINT REPAIR
5505 GROVELAND AVE	2	OPEN CUT POINT REPAIR
3904 HILLSDALE RD	2	OPEN CUT POINT REPAIR
3812 HILLSDALE RD	2	OPEN CUT POINT REPAIR
5811 PIMLICO RD	2	OPEN CUT POINT REPAIR
2600 KEN OAK RD	2	OPEN CUT POINT REPAIR
717 WOODBOURNE AVE	2	OPEN CUT POINT REPAIR
2514 HAMILTON AVE	2	OPEN CUT POINT REPAIR

Address	Building Backups	Recommendation
2805 OVERLAND AVE	2	OPEN CUT POINT REPAIR
2824 MONTEBELLO TERR	2	OPEN CUT POINT REPAIR
2812 RUECKERT AVE	2	OPEN CUT POINT REPAIR
6101 WALTHER AVE	2	OPEN CUT POINT REPAIR
5317 BRABANT RD	2	OPEN CUT POINT REPAIR
421 WESTGATE RD	2	OPEN CUT POINT REPAIR
412 WESTGATE RD	2	OPEN CUT POINT REPAIR
409 WESTGATE RD	2	OPEN CUT POINT REPAIR
2105 KENTUCKY AVE	2	OPEN CUT POINT REPAIR
555 DUNDALK AVE	2	OPEN CUT POINT REPAIR
726 E 36TH ST	2	OPEN CUT POINT REPAIR
648 E 37TH ST	2	OPEN CUT POINT REPAIR
622 TUNBRIDGE RD	2	OPEN CUT POINT REPAIR
2303 ASHBURTON ST	2	OPEN CUT POINT REPAIR
715 E 33RD ST	2	OPEN CUT POINT REPAIR
6222 BENHURST RD	2	OPEN CUT POINT REPAIR
5514 TODD AVE	2	OPEN CUT POINT REPAIR
5539 PLAINFIELD AVE	2	OPEN CUT POINT REPAIR
5715 ANTHONY AVE	2	OPEN CUT POINT REPAIR
907 HOMESTEAD ST	2	OPEN CUT POINT REPAIR
4710 HAZELWOOD AVE	2	OPEN CUT POINT REPAIR
113 E NORTHERN PKWY	2	OPEN CUT POINT REPAIR
<b>Pipe Bursting</b>		
5313 WENDLEY RD	9	PIPE BURSTING
6204 BROOK AVE	2	PIPE BURSTING
1625 STONEWOOD RD	2	PIPE BURSTING