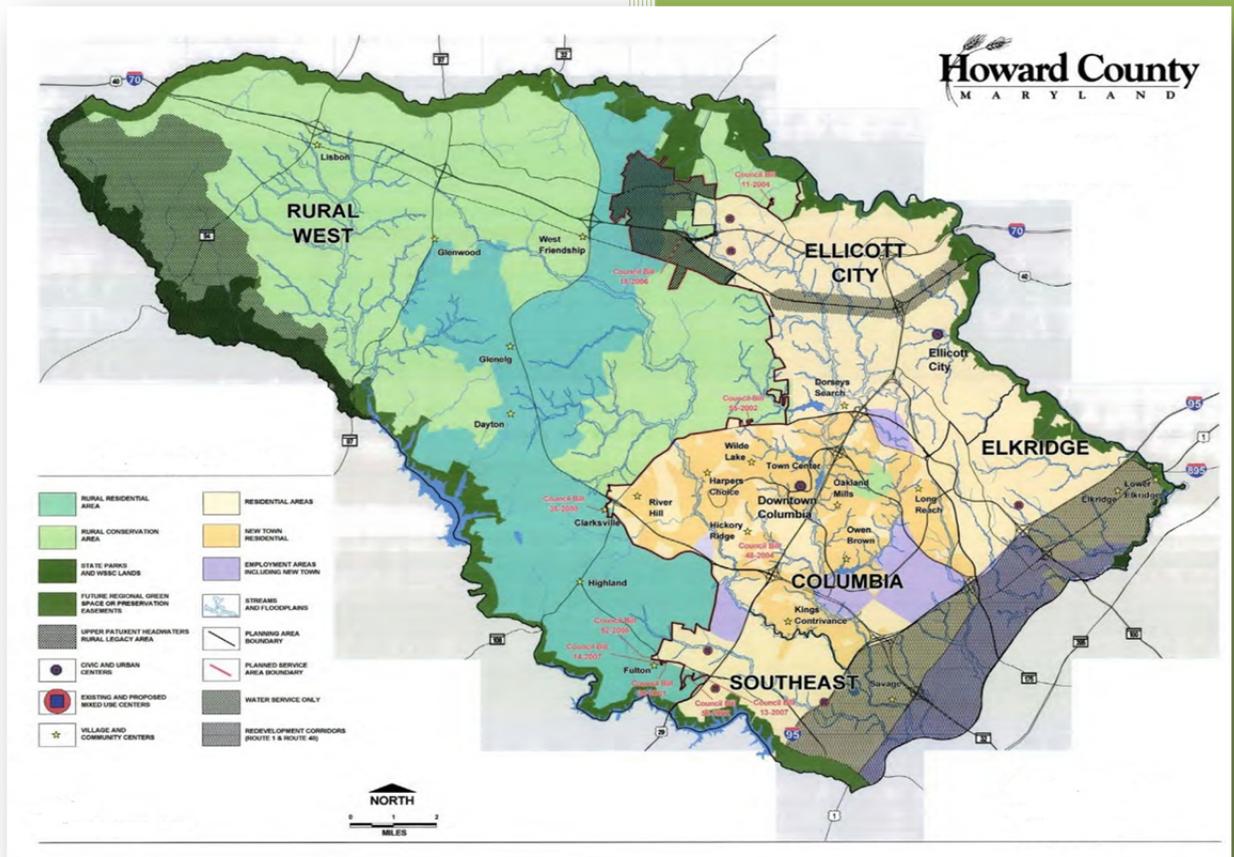




January - December 2015

CMOM Audit Report No. 5



Complaint and Settlement
Agreement between Howard
County, Maryland and the
Maryland Department of the
Environment CO-10-1116

August 2016



CMOM Audit Report No. 5

January, 2015

Through

December, 2015

**Complaint and Settlement Agreement between Howard County,
Maryland and the Maryland Department of the Environment
CO-10-1116**

This Self-Audit Report is a requirement of “Paragraph C, CMOM Audit” of the Complaint and Settlement Agreement. One year after the commencement of implementation of the approved CMOM Program, and annually thereafter until termination of this Agreement, the County shall conduct a performance assessment audit to evaluate the CMOM Program and submit a report to MDE certifying and describing:

- A. All CMOM tasks completed within approved schedules/milestones and providing an explanation for CMOM work not performed as required;
- B. The effectiveness of the CMOM Program in preventing and minimizing the adverse impacts of Overflows and Building Backups; and
- C. The number and causes of Overflows and known Building Backups that have occurred in each sewer shed for the previous year; and
- D. Actions planned and/or implemented to respond to any failures to perform scheduled CMOM tasks;
- E. Any Collection System deficiencies identified during inspections performed pursuant to the CMOM and actions planned or implemented to address them;
- F. Whether the County has adequately prioritized rehabilitation work to maximize the reduction of Overflows.

This report is to address the fifth annual CMOM program Self-Audit. Howard County (County)’s CMOM manual was approved by MDE on June 30th, 2011, and was posted on the County’s website with the approval letter from MDE received on July 1st, 2011. The first CMOM Self-Audit report was submitted to MDE on June 22nd, 2012. The County received the approval letter on December 27th, 2012. The fourth CMOM Self-Audit report was submitted to MDE on October 28th, 2015.

A. All CMOM Tasks Summary in 2015

In order to guide the overall tracking and management of an effective and efficient CMOM program, the County intends to meet the following “General Standards” consistent with the EPA’s CMOM requirements:

- Take all feasible and cost-effective steps, as appropriate, to prevent sanitary sewer overflows and to minimize the impact of sanitary sewer overflows when they do occur.
- Properly manage, operate, and maintain all parts of the sewage collection system operated by or under the control of Howard County.
- Identify sewer system capacity needs and deficiencies to provide adequate collection system capacity to convey base and peak flows.
- Establish a chain for communication for sharing information within County departments, State authorities, and community stakeholders.

As is described in the CMOM manual, the County’s quantitative short-term and intermediate-term and long-term goals are summarized as below:

- Inspect manholes once every five years.
- Clean sewer mains which do not have self-cleaning flow characteristics once every 5 years.
- Perform routine CCTV inspection on approximately 5% of the sewer collector mains each year.
- Enhance the efficiency of maintenance crews to achieve an average response time to routine sewer problems of 1 hour or less.

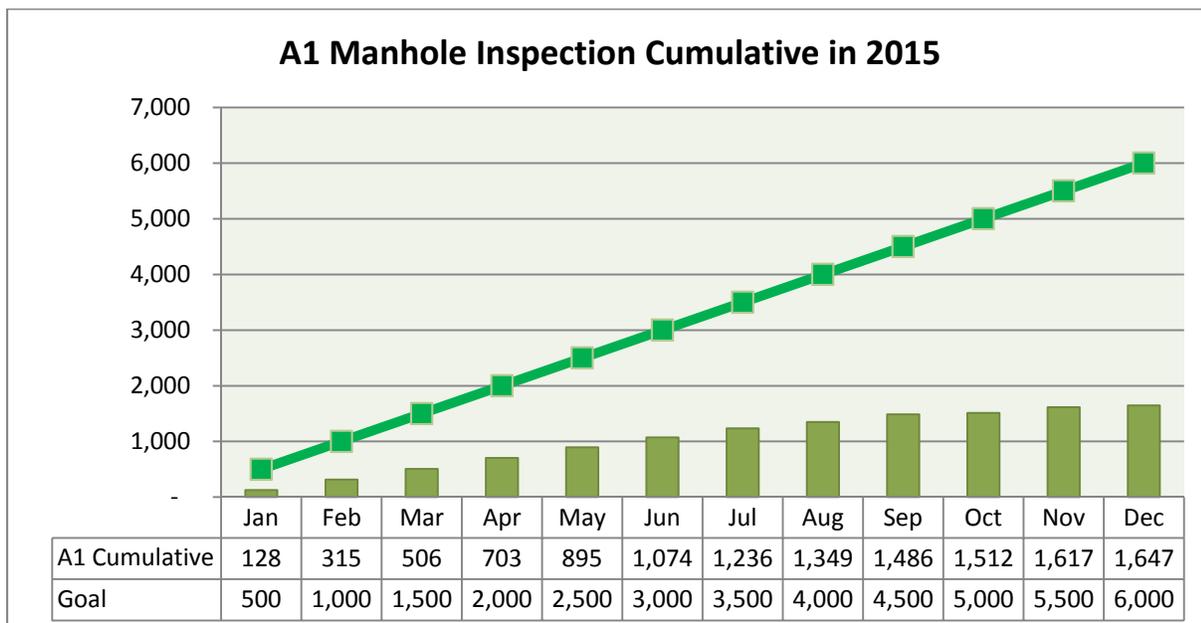
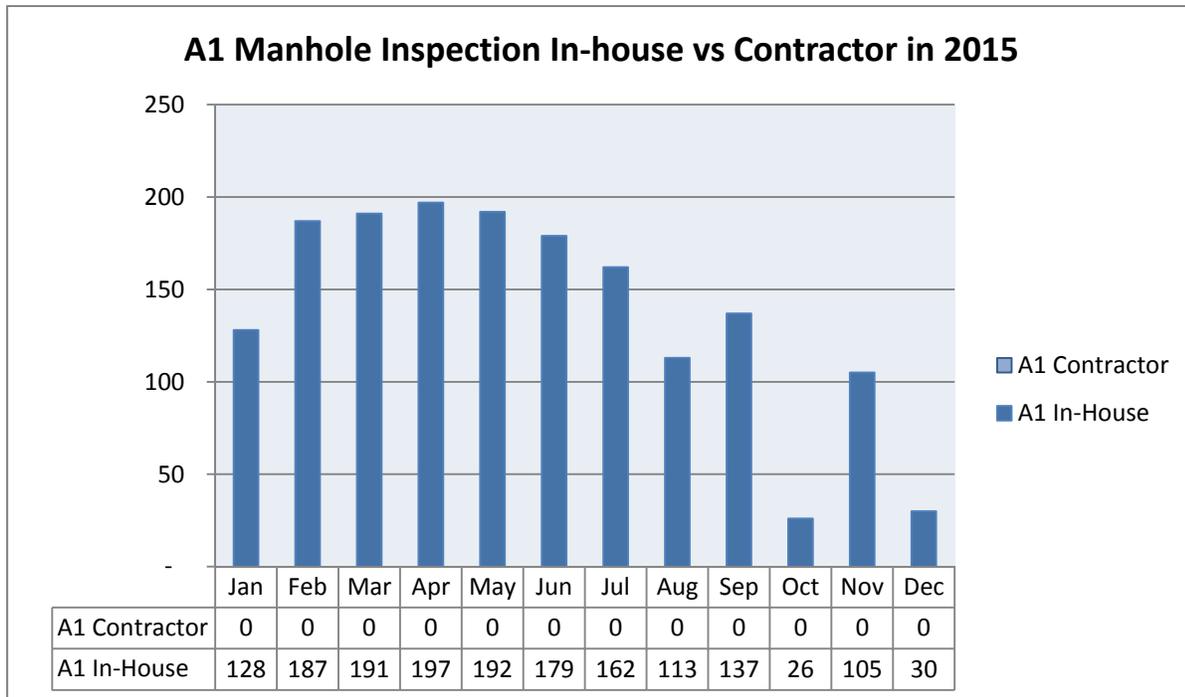
The County’s collection system is served by 30 pumping stations, approximately 1005 miles of sewer ranging in size from 4 to 48 inches, and roughly 30,000 manholes. According to the given assumption, the County’s quantitative goals in 2014 are interpreted as:

- Inspect 6,000 manholes.
- Clean 195 miles of sewer mains.
- Perform routine CCTV inspection on approximately 48.75 miles (257,400 ft) of sewer collector mains.
- Enhance the efficiency of maintenance crews to achieve an average response time to routine sewer problems of one (1) hour or less.

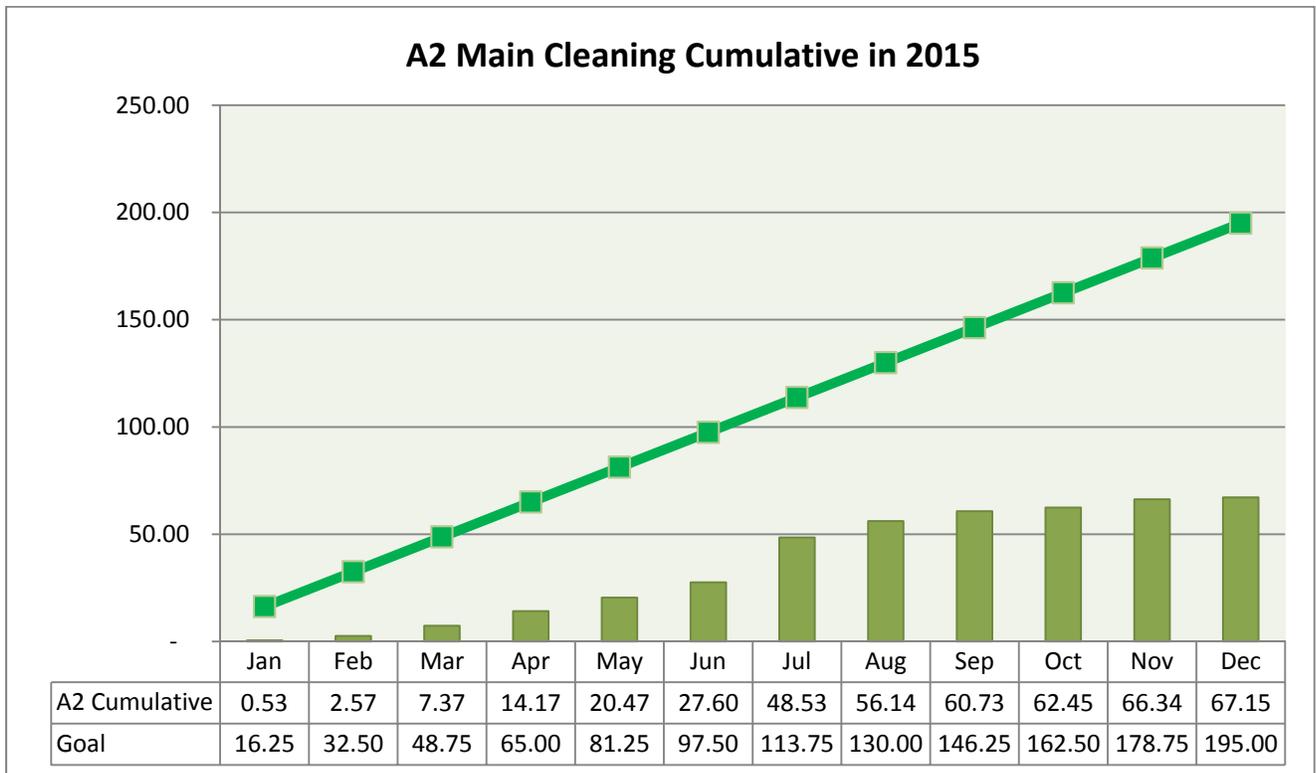
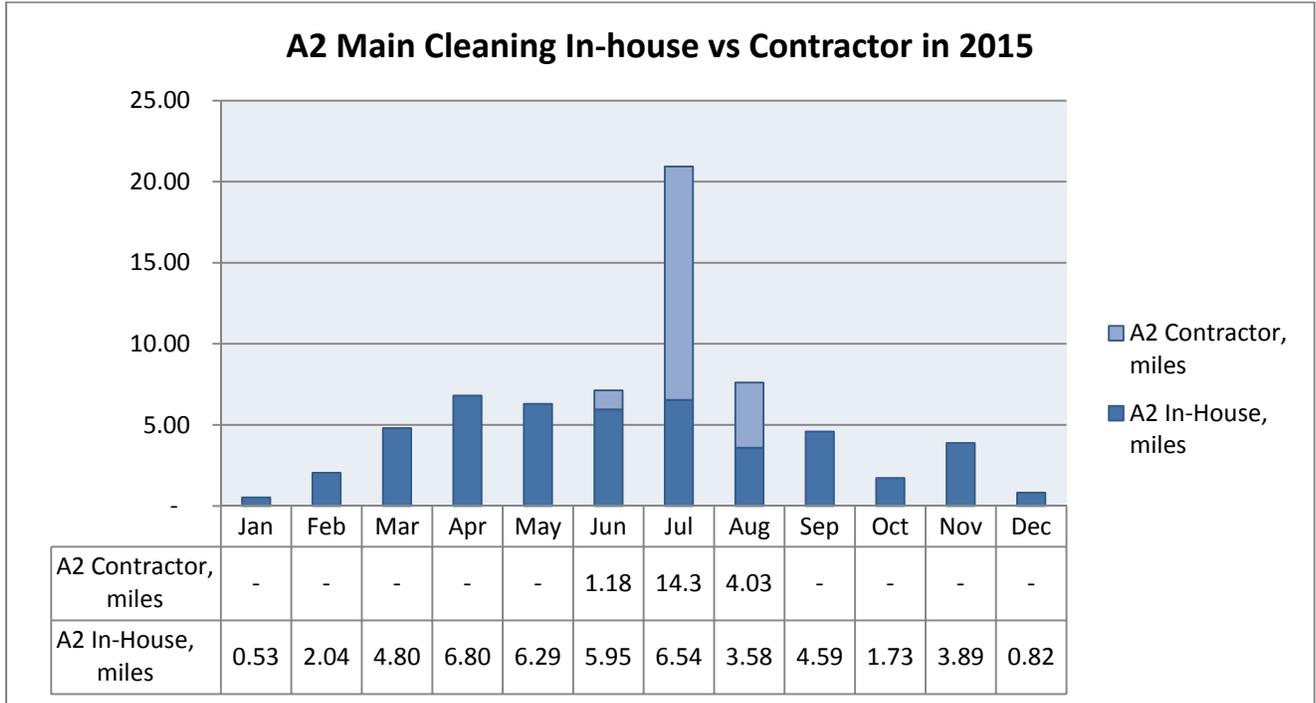
To achieve the CMOM goals, the County has implemented an enhanced collection system maintenance program, with different CMOM components listed in the below charts by month from January through December 2015. Assuming the sewer

collection system has a life span of 100 years, the County will repair/replace 1% of the sewer collection system on average each year; that is, to repair/replace 9.75 miles (51,480 ft) of the sewer mains and 300 manholes. However, as the repair work is identified from the assessment projects, the schedule of repair will be developed accordingly, and will very likely vary from year to year.

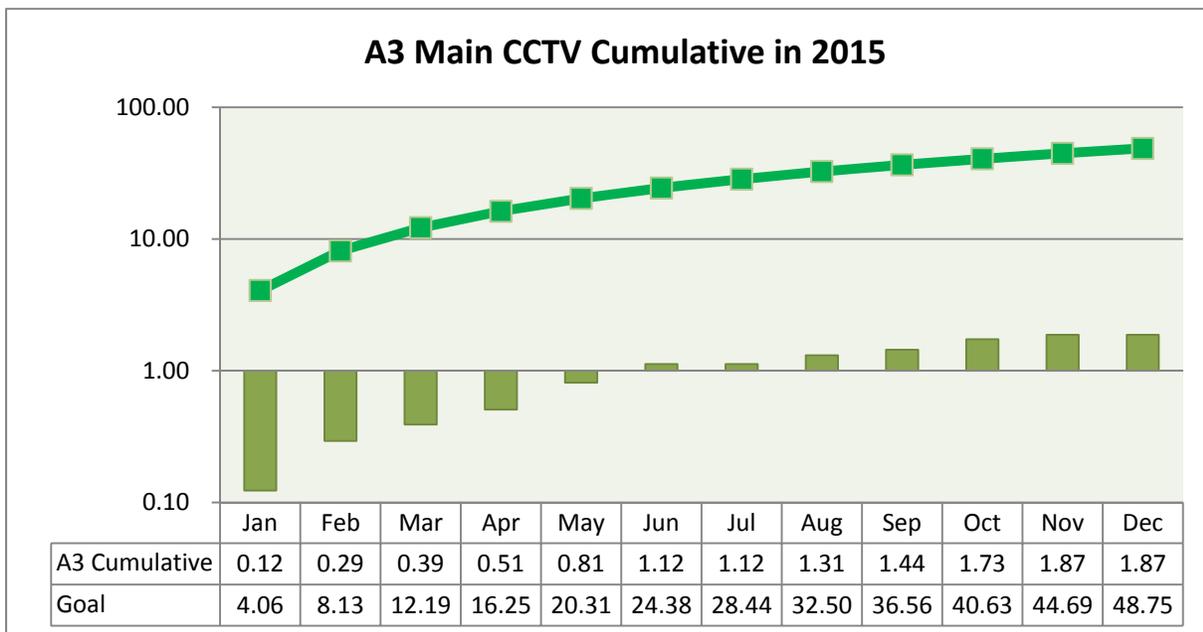
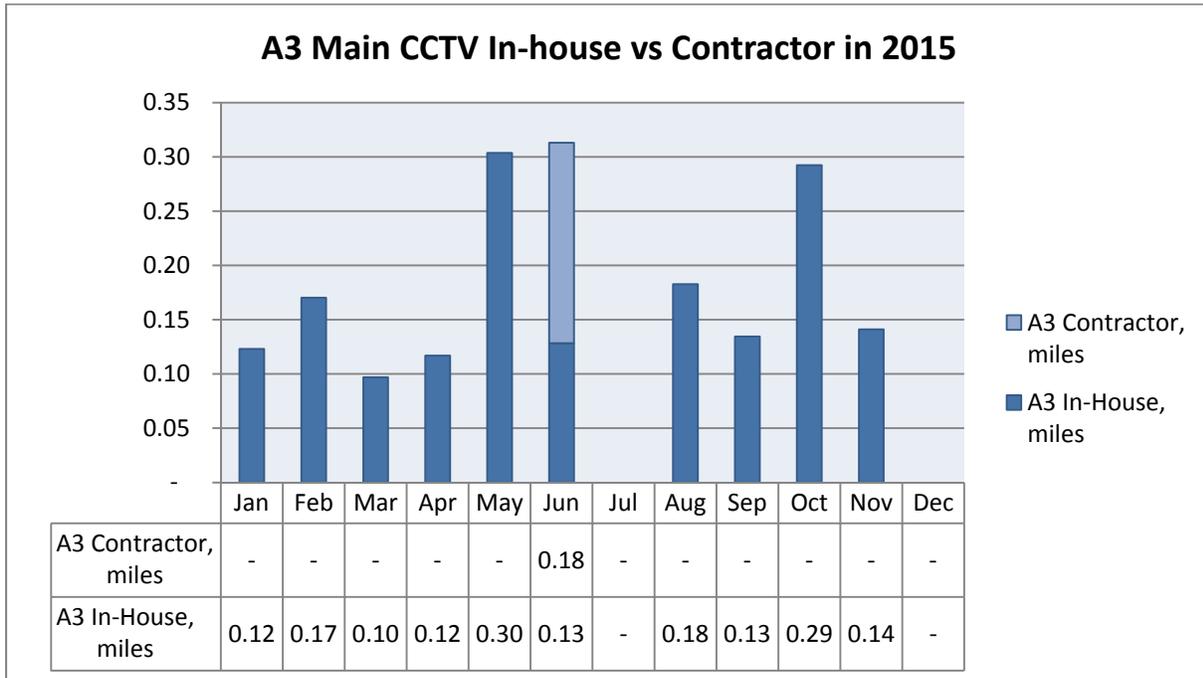
A1. Manhole Inspections:



A2. Sewer Cleaning:

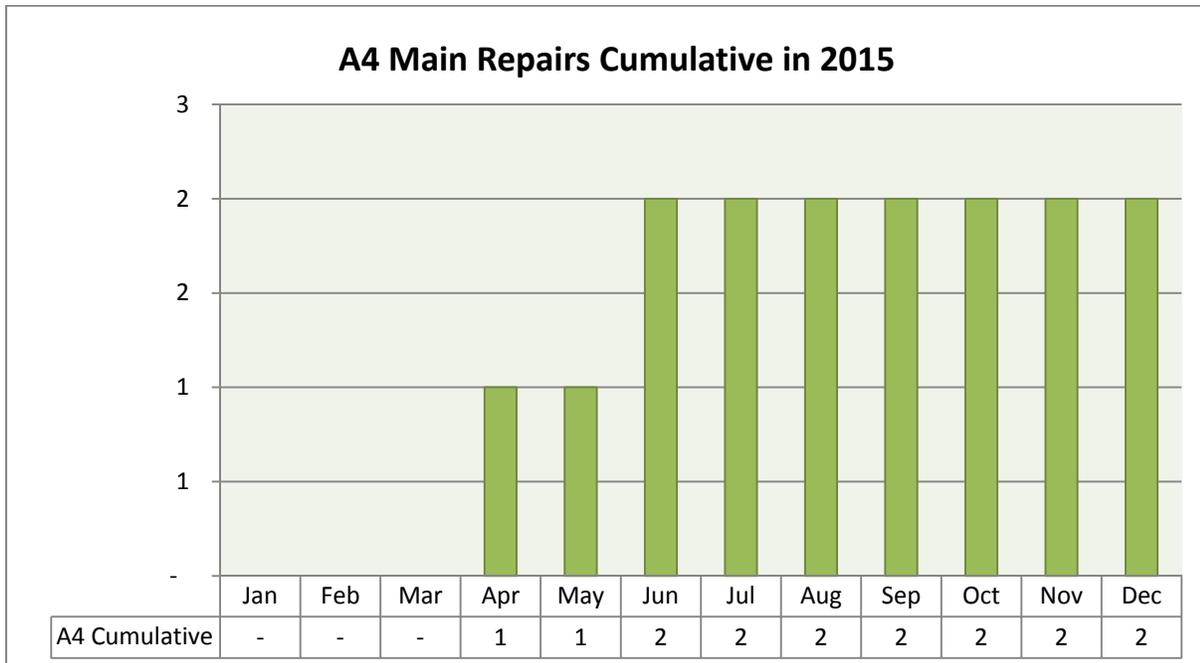
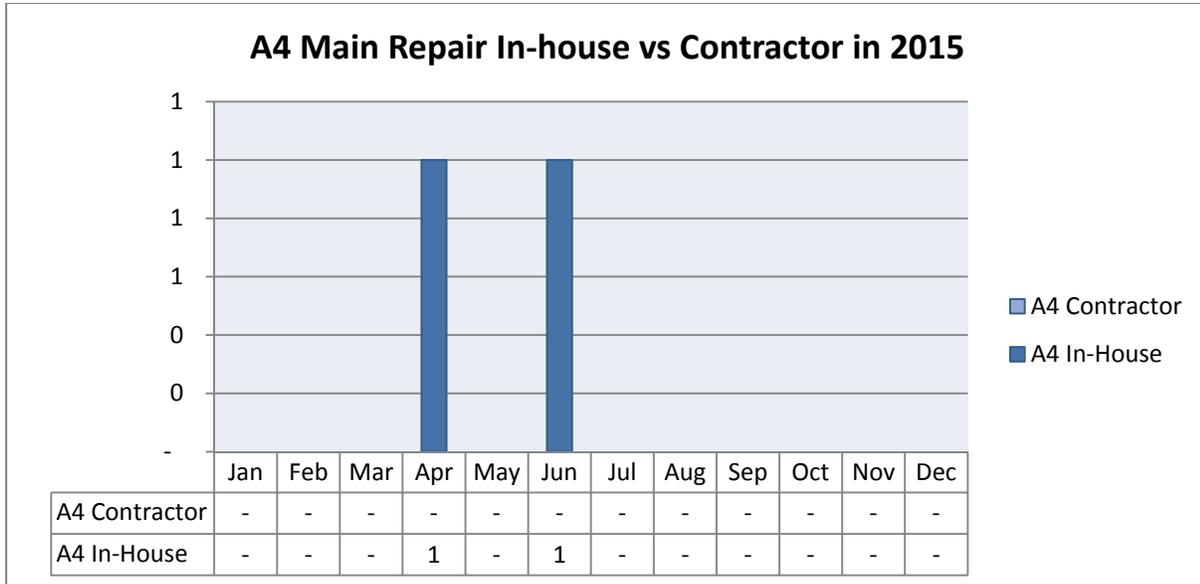


A3. Sewer CCTV Inspection

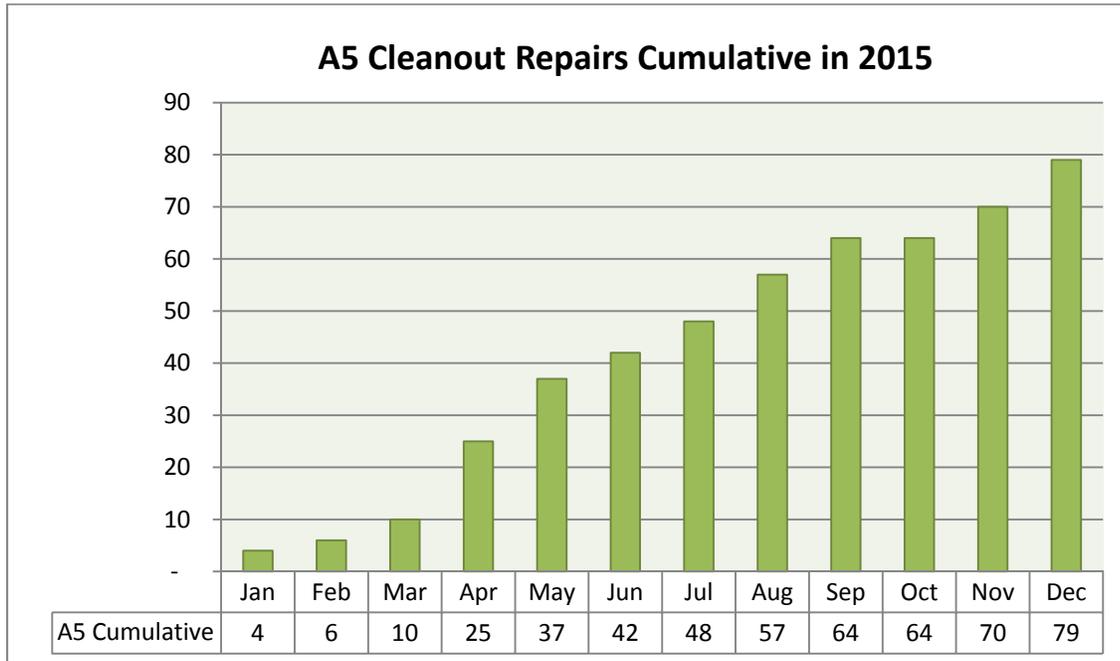


A4. Sewer Main Repairs

The County performed the sewer main repair/replacement on an As-Needed basis. Two (2) sewer mains were repaired by County's in-house staff in 2015, totaled 703 ft.

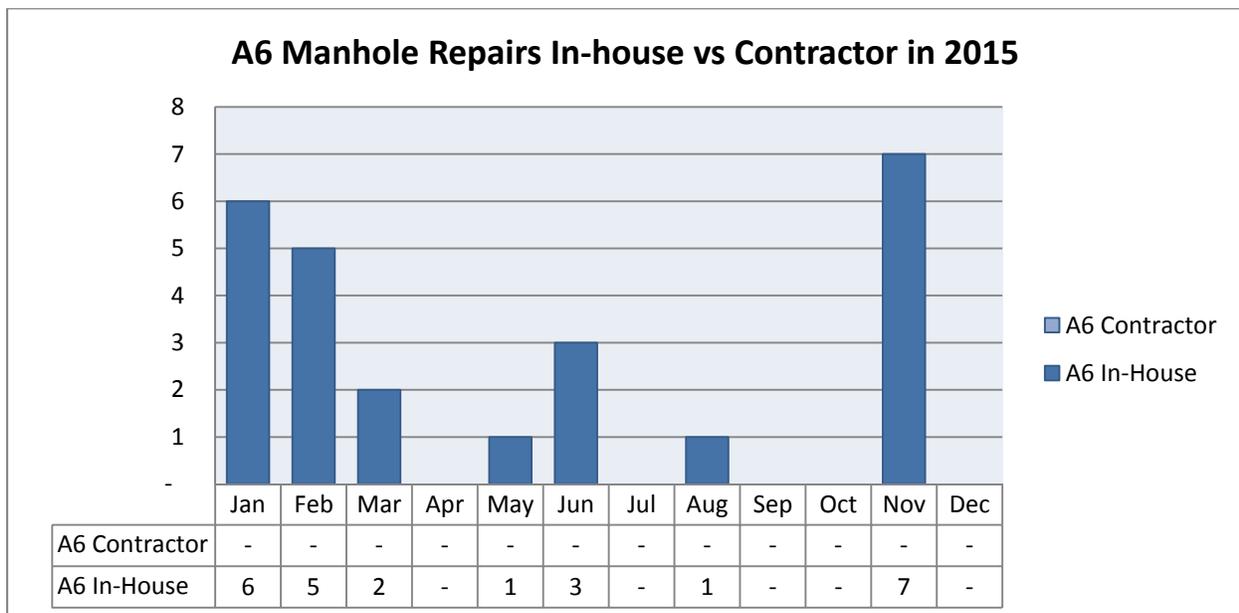


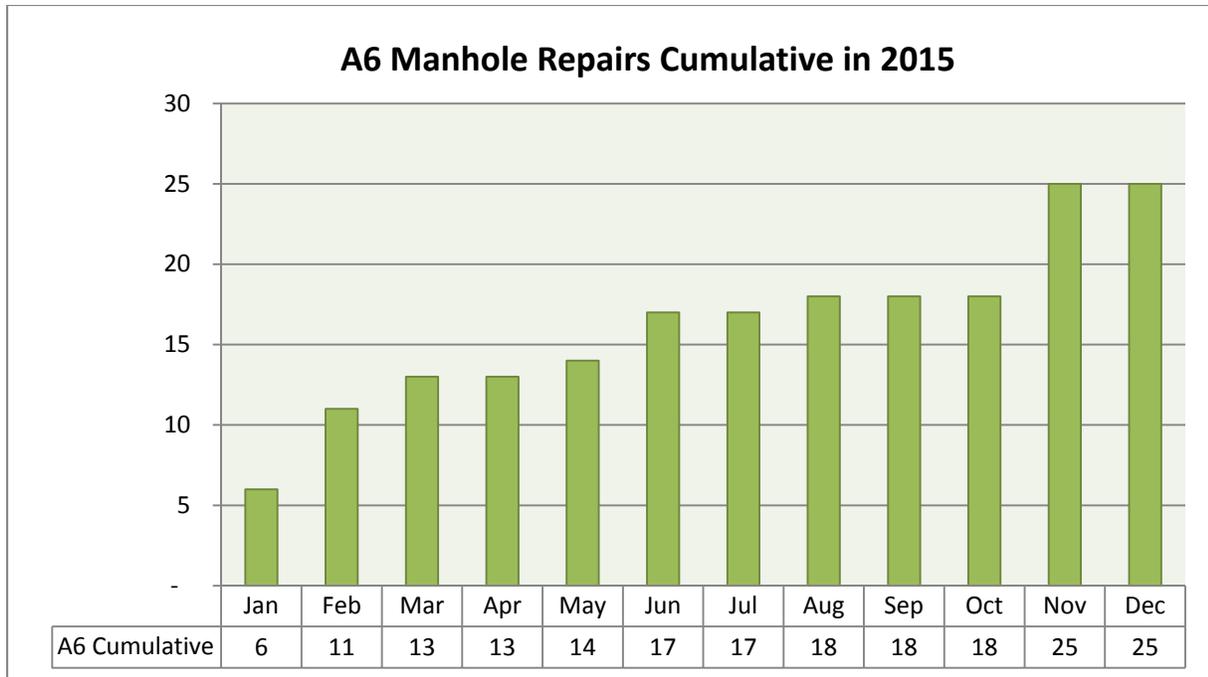
A5. Sewer Cleanout Repairs



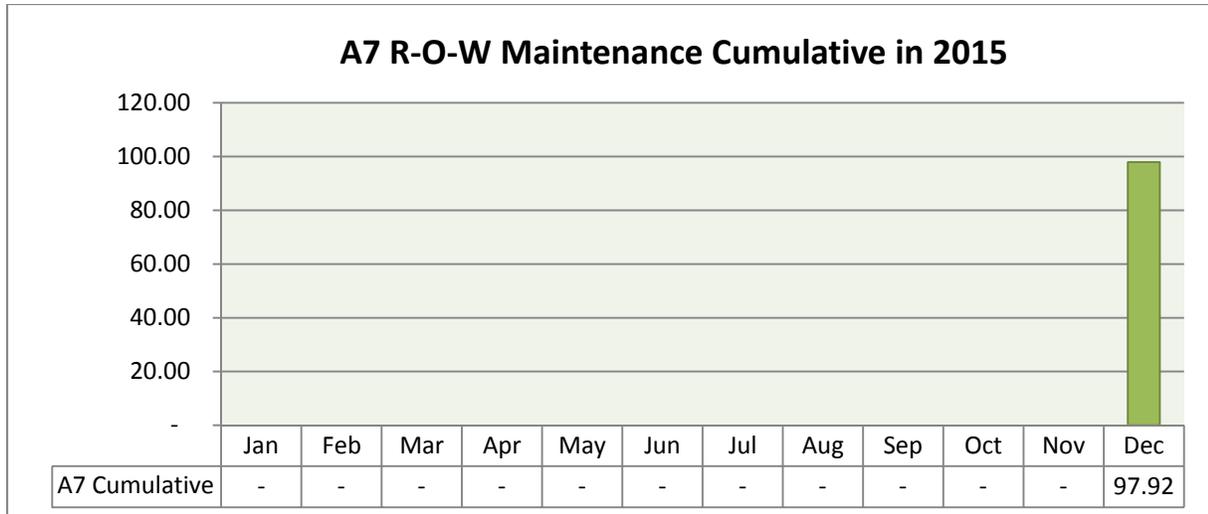
A6. Manhole Repairs

The County performed the manhole repair/replacement on an As-Needed basis. Sanitary sewer manholes are repaired by County’s in-house staff and contractors. There were 25 manholes repaired in 2015 by the County’s in-house staff.



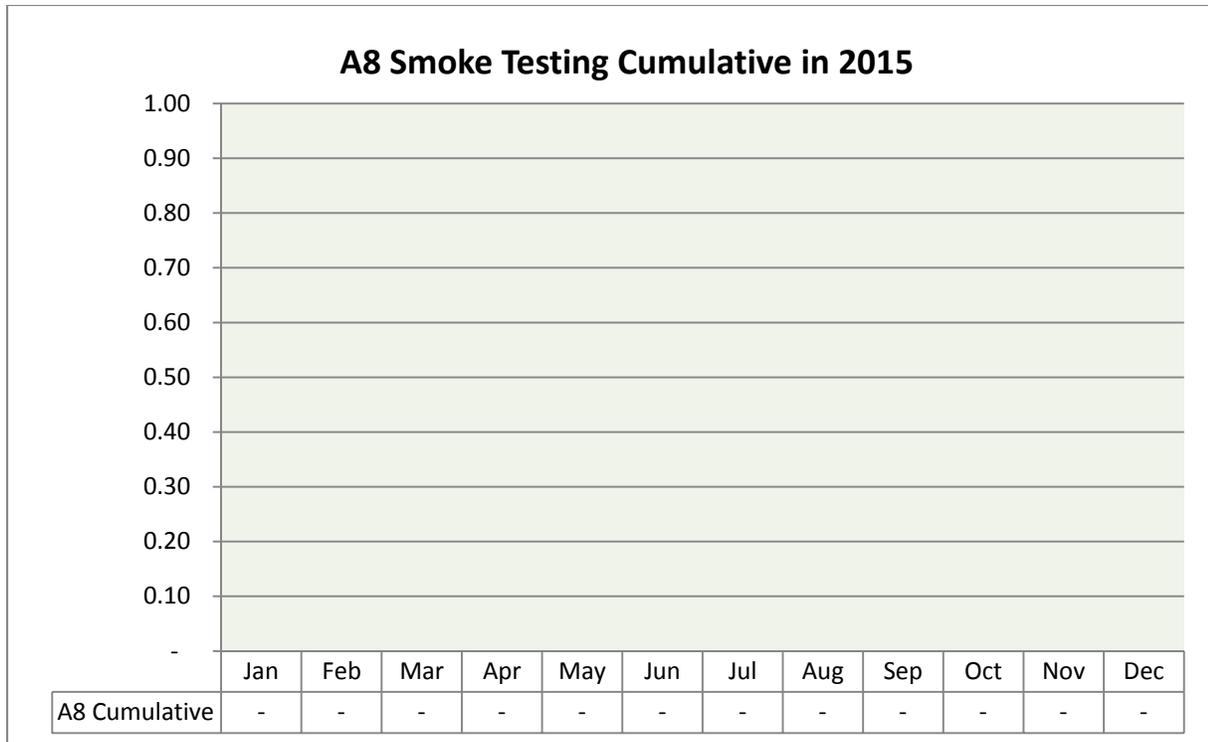


A7. Sewer Right of Way Maintenance



A8. Smoke Testing

In 2015, there was no smoke testing performed by in-house staff. The County has contracted George, Miles & Buhr (GMB) to provide engineering services with smoke testing the Guilford Subsewershed during the Summer of 2016. The intent of this project is to identify the specific locations where the system defects exist to reduce the quantity of extraneous inflow from entering the system.



A9. Sewer Pumping Station Inspections

The Howard County sewer pumping station program, as outlined in the CMOM, provides for station checks of each sewer pumping station twice per week.

A10. Root Treatment

In 2015, the County has performed root treatment on 6 inch and 8 inch sewer mains (5,540 ft), 12 Sewer House Connections..

A11. FOG Program

The County’s FOG program inspections consist of:

- Pretreatment staff inspections on Best Management Practices (BMPs), grease interceptors, used cooking oil handling and collection, solid waste handling and disposal; and other activities
- Inspections conducted by the FSEs through their self-monitoring reports
- Inspections conducted by the waste haulers when they pump the interceptors

In 2015 there was 456 Food Service Establishment inspections and 273 Vehicle Service Facility inspections performed.. The inside interceptors are supposed to be inspected twice every year and the outside interceptors are inspected once every year. A sample FSE inspection checklist is attached in Appendix A-1. The County performed 729 inspections in total in 2015.

On a semi-annual basis, FSEs with inside interceptors are required to submit their self-monitoring reports. See sample semi-annual operation and maintenance report in Appendix A-2. This report shows the dates when the pump outs occurred and when the grease barrels were collected.

The vehicle service program has been reestablished in the pretreatment department during the year of 2016. As of June 2016 there are currently 213 vehicle service facilities permitted in Howard County. Of these 213 facilities 85 have oil/water separators located at their facility. These oil/water separators are to be inspected once per year to ensure proper maintenance has been conducted. From January through June of 2016, there was 35 inspections performed for the vehicle service program.. These oil/water separators are to be inspected once per year to ensure proper maintenance has been conducted.

Also attached in Appendix A-3 is a sample Waste Hauler report. This report contains the condition assessment of the interceptors when they were pumped. The frequency varies from weekly to bi-yearly. The owners or managers of the FSEs make the determination for the pumping, cleaning frequency, and cleaning methods, based on type and size of the FSE, as well as the frequency of usage.

As far as the inspections, reporting requirements, and enforcement actions go, they are consistent with the County's current sewer use ordinance and draft FOG POLICY. The County is in communication with the restaurant association to finalize the proposed amendment. Now the ball is in County's court for review.

A12. Pretreatment

The Howard County Pretreatment staff is based at the County's Little Patuxent Water Reclamation Plant (LPWRP) and is responsible for the implementation of the County's Pretreatment program, including limiting the discharge of Fats, Oils, and Grease (FOG) into the County's collection system. The Pretreatment Compliance Inspection (PCI) is conducted every other year. The next PCI is scheduled to be conducted in 2015.

B. The Effectiveness of the Approved CMOM Program

B1. CMOM Programs Recent Performance Summary

The County's CMOM program has been fully implemented starting January 2011. As of today, the County has submitted twelve (12) semi-annual progress reports, under the requirement of "Paragraph F, Reporting" of the Complaint and Settlement Agreement with MDE.

As of today, the County has submitted four (5) Self-Audit reports, under the requirement of “Paragraph C, CMOM Audit” of the Complaint and Settlement Agreement. The Self-Audit process involves interviewing the various personnel, observance of field activities, field inspection of equipment and resources, and review of pertinent records and management information systems. Specific audit components include audit findings (program deficiencies), audit responses (steps to correct each deficiency), and schedules to implement audit responses. In order to assist the Self-Audit process, the County utilizes a CMOM Self-Audit Checklist as shown in Appendix B-1 to track the audit findings and audit responses.

Johnson Mirmiran & Thompson Inc. (JMT) continues the on-site level of effort is in conjunction with JMT Technology Group’s efforts in developing a Geographic Information System (GIS) for the County’s sanitary collection system and water distribution system. The GIS project to develop the sanitary collection system was completed and delivered to the County.

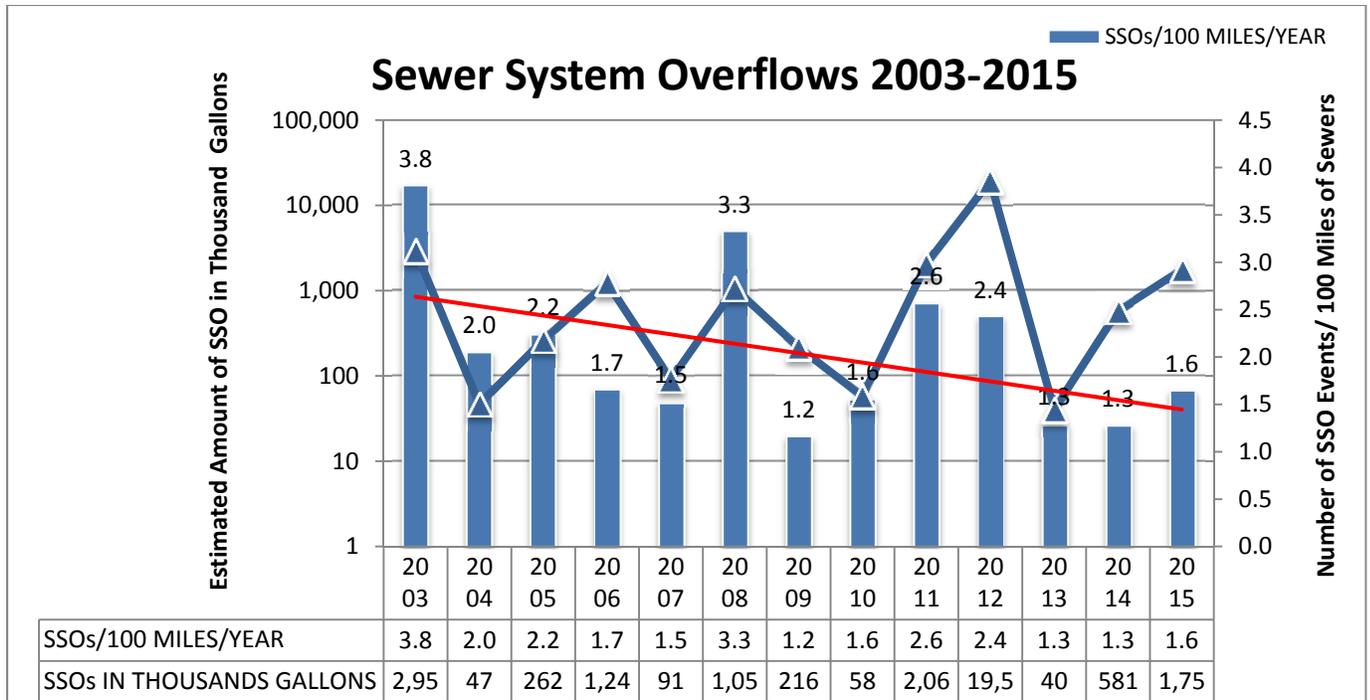
The two County’s on-call contractors, Video Pipe Service (VPS) and TRB Specialty (TRB) continue performing collection system repair/restore/replacement activities concurrently with the maintenance crew of the Bureau of Utilities to meet the CMOM goals.

B2. Sewer System Overflows (SSO’s) in the Previous Year

For the period of January through December 2015, there were 18 SSO’s within the Howard County Sanitary Sewer Collection system for a total of 1,758,380 gallons. See Appendix C for a detailed break-down with probable causes in 2015. Among the 18 SSO’s, five of them occurred due to the storms.

Same as 2011 and 2012, Howard County maintains a far below national average for the number of sewer overflow occurrence. The national average for SSO is 4.5 per 100 miles of sewer, based on a 2004 EPA report to Congress. The County's average is 1.6 per 100 miles of sewer.

The County’s SSO’s have been plotted by month in the above chart. As is shown in the chart, most months’ SSO occurrence numbers in 2014 were all below the previous 10-year average. There was no SSO occurred during February, August, September and November. You can also see the number of SSO occurrence in each month still correlates the amount of precipitation. The more it rained, the more SSO occurred.



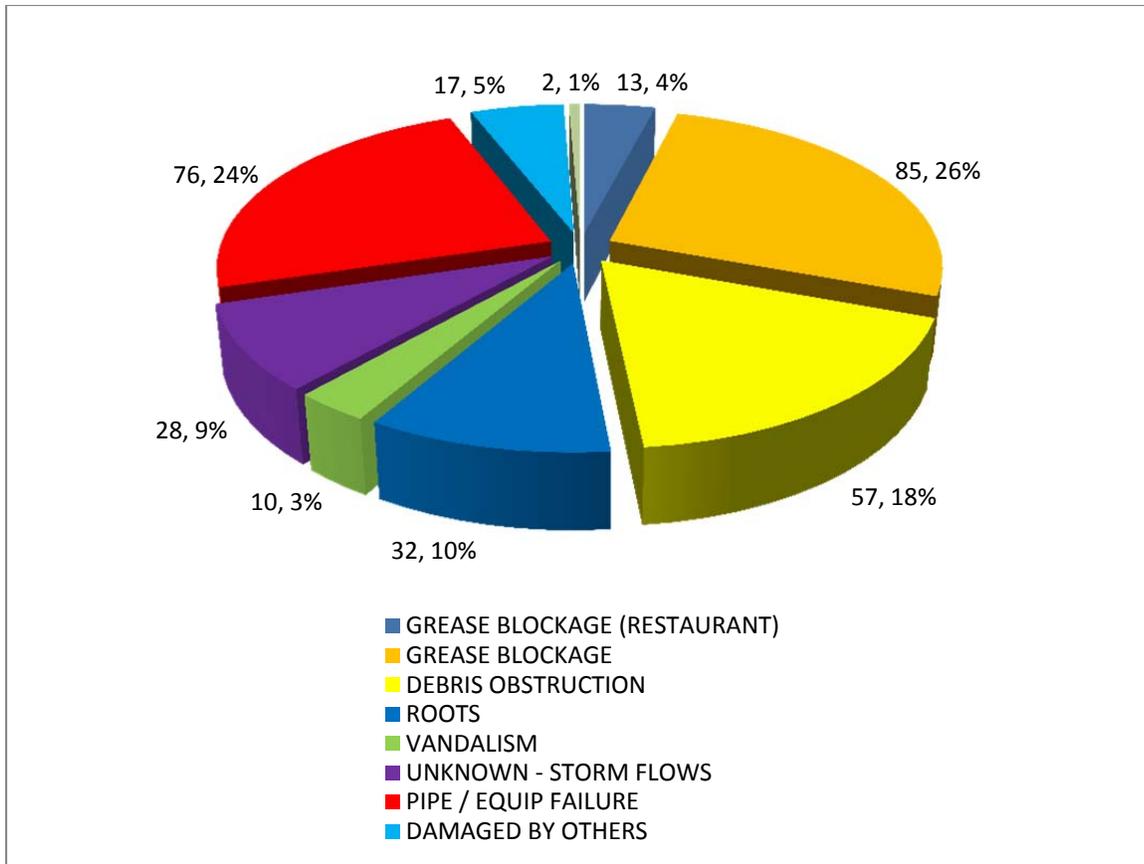
C. The Number and Causes of Overflows and Known Building Backups

In the CMOM Self-Audit Checklist, the causes of overflows have been categorized into:

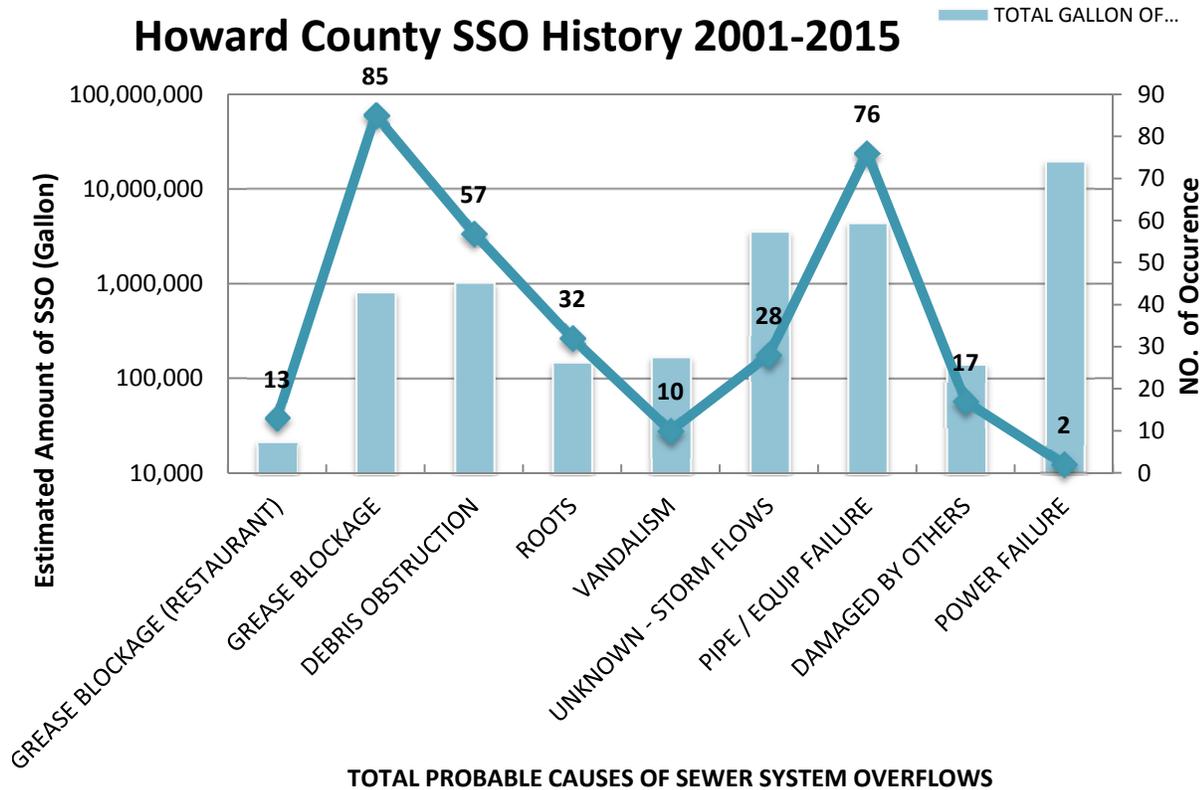
Category	Notes
Capacity Related	SSO's are storm related
Maintenance Related	SSO's due to debris obstruction and roots
Operations Related	SSO's due to power failure
Caused By FOG	SSO's due to restaurant grease blockage
Caused By Sources Other Than FOG	
Caused By Pipe/Equipment Failures	
Caused By Damage	SSO's due to vandalism, contractor misconduct, etc.

The number and probable causes of SSO's and building backups in 2015 have been illustrated in Appendix C.

To take a further step into the long-term investigation, the County researches the causes and numbers of SSO occurrence from 2001 to 2015.



As is shown in the above chart, the top three (3) causes of overflows county-wide are: grease blockage (non FOG, 27%), pipe/equipment failure (24%), and debris obstruction (18%).



While taking the estimated overflow amount into consideration, power failure, storms, pipe and equipment failures rank the highest of the total SSO volume contribution. This observation has not changed from 2012.

D. Actions Planned and/or Implemented to Respond to Any Failures

D1. Successes and Failures in Achieving the Goals in 2015

As is shown in the Section A and Appendix B, although A1-the total number of manholes inspected, A3-the total linear footage of mains CCTVed didn't meet the goal in 2015, the County has improved in the following aspects comparing to the previous year:

- a. Inspected and light cleaned more sewer mains
- b. Inspected more manholes
- c. More cleanout repairs
- d. Achieved more smoke tests and accomplished the program in Rte 108 drainage basin to target the I&I problems.

D2. Action Planned and/or Implemented in Achieving the Goals for 2015

The collection system repair/replacement will still be conducted on an as-needed basis. The County has planned more CCTV and rehabilitation activities in 2016. The cleaning, CCTV and smoke testing activity progress in 2015 has been illustrated in Figure D1, D2 and D3 respectively in the Appendix D.

E. Collection System Deficiencies Identified and Actions Planned or Implemented

E1. Collection Systems Deficiencies Identified under CMOM

As we concluded in Section C, the area of greatest need with regard to the collection system is to control the County's SSO's which are caused by blockages (grease, debris, and roots). The County has programmed various CMOM components to be performed in order for 2014.

The cleaning team is scheduled to go first. Based on the notes taking by the cleaner, the County is able to identify the problematic area with grease, roots, debris and other obstructions. Then the County engages the CCTV contractor to conduct a NASSCO PACP certified condition assessment. Therefore, the engineers could decide the rehabilitation method according to the defects qualified and quantified during CCTV inspections. The County also schedules the comprehensive smoke testing projects. The contractors are looking for locations such as roof drains or storm drain inlets directly to the sewer collection system, as well as defective mains and cleanouts caps. The final steps will be rehabilitation design and construction.

By the end of 2015, the County completed the cleaning for the following drainage basins: small pump stations above route 99, Tiber Branch, Sucker Branch, Route 40 pump station, Plumtree, Edger Horse Farm, Red Hill, Bonnie Branch, Rockburn, Deep Run, Licking Creek, Wilde Lake, Little Patuxent, and Guilford. The County completed the CCTV inspections for the problematic sewers notified by cleaner in the following drainage basins: small pump stations above route 99, Tiber and Sucker Branch, Route 40 pump station, and Plumtree. The drainage basins are illustrated in Appendix D.

E2. Collection Systems Deficiencies Identified under SSES

The SSES report for the Little Patuxent was submitted to MDE on May 25th, 2010 in accordance with the Agreement. The contractor completed the necessary improvements by November 2011. Three progress reports have been submitted to MDE to describe the activity/action taken to reduce I&I along the Little Patuxent Interceptor. The first progress report was submitted on March 24th, 2011, the second was submitted on June 2nd, 2011 and the third progress report was submitted to MDE on January 3rd, 2012.

The SSES reports for the Patapsco Basin and Hammond/Guilford Basin were delivered to MDE on December 7th, 2011, followed by the Recommendations and Implementation Schedule sent through email on August 23rd, 2012. MDE approved both SSES reports along with the Recommendations and Implementation Schedule on October 2nd, 2012. The first Progress Reports for the two SSES describing the County's repairs/actions was delivered to MDE on August 2nd, 2013. The second Progress Reports were delivered on July 28th, 2014.

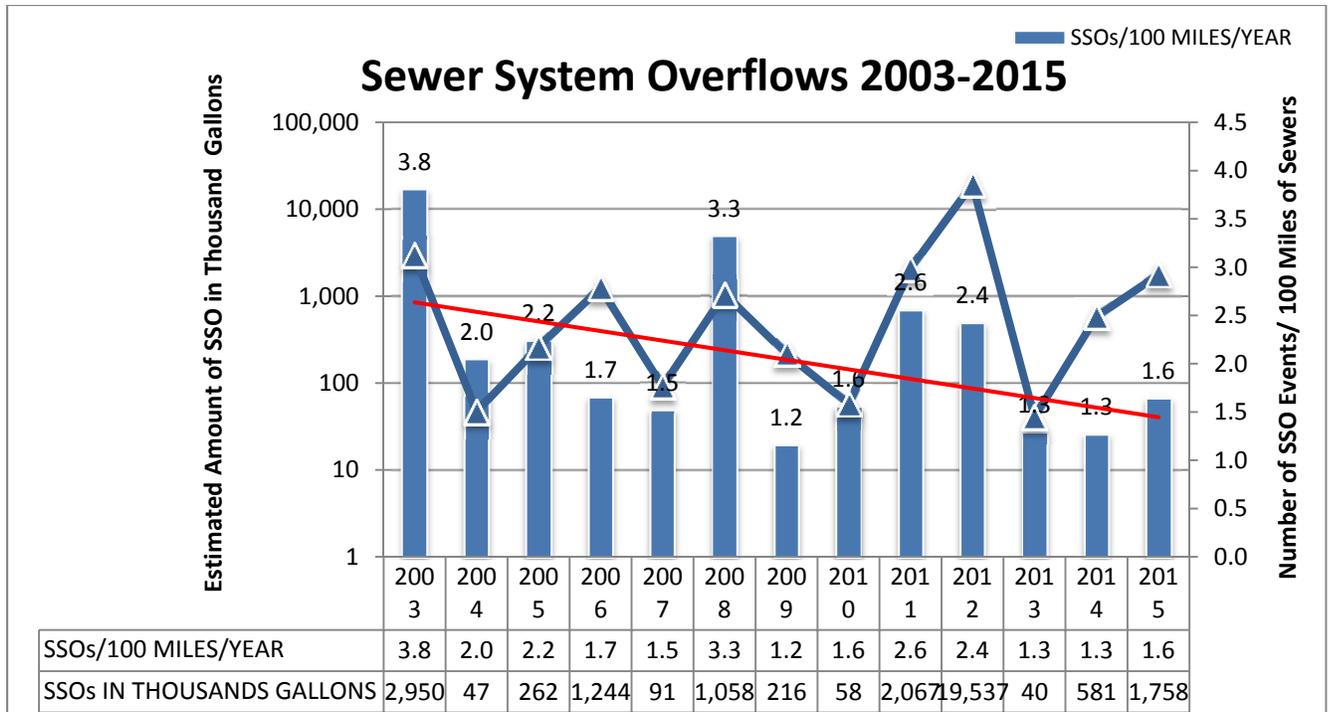
E3. Collection Systems Deficiencies Identified during Routine Preventive O&M

The County's in-house staff implements a preventive O&M program, which is to investigate the collection system on a regular basis and rehabilitate the deficiencies as needed. The County's in-house staff also takes care of the customer complaints and responds to the overflow emergencies.

F. Whether the County has adequately prioritized rehabilitation work to maximize the reduction of Overflows

Since sanitary sewer systems are subject to harsh and corrosive conditions, the CMOM program is required to assess the structural condition of the system through field investigations including CCTV inspections. The results of the assessments lead to identifying and ranking the long-term and short-term rehabilitation actions to correct the problems.

Regarding the rehabilitation actions recommended in the SSES reports of Little Patuxent, Patapsco, Guilford Run/Hammond Branch, the consultants use the combined results not only from the field investigation, including manhole inspections, CCTV sewer main condition assessment, flow monitoring, but also the hydraulic model to prioritize the work to maximize the reduction of overflows.

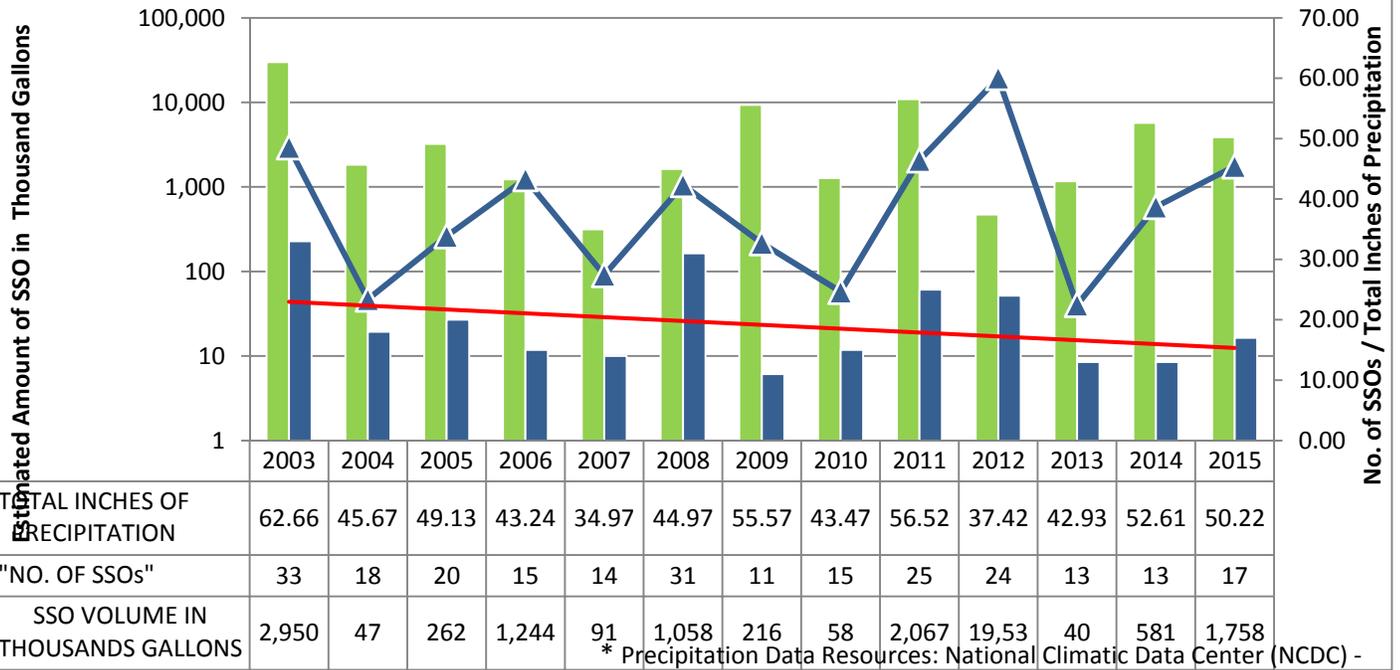


As is shown in the above chart, over the past 13 years from 2003 to 2015, the County has the SSOs/mile/year ranging from 1.2 to 3.8, while the national average posted by EPA in 2004 is 4.5. What's more, the County's overall trend of SSOs/mile/year is downward.

To further investigate the correlation between numbers of SSO occurrence to the total amount, the 13 years' precipitation data is plotted in the below chart. The numbers of SSO occurrence over the years keep a downward trend, despite the fact that the total overflow amount in 2012 was severely affected by the by-pass incident that happened during Hurricane Sandy at LPWRP.

Sewer System Overflows vs Precipitation 2003-2015

TOTAL INCHES OF PRECIPITATION
"NO. OF SSOs"



This report serves the purpose of the County’s fourth yearly Self-Audit. The County will continue to monitor the performance of the CMOM program annually to make sure the County

- Properly manage, operate, and maintain, at all times, the parts of collection system that they own or have operational control.
- Provide adequate capacity to convey base flows and peak flows.
- Take all feasible steps to stop and minimize the impact of sanitary sewer overflows.
- Provide notification to parties with a reasonable potential for exposure to pollutants associated with an overflow event.
- Develop a written summary of their CMOM program and make it available to the public upon request including self-audits.

Appendix A-1

Sample FSE Inspection Checklist

Appendix A-2

Sample Semi-annual Operation and Maintenance Report

Appendix A-3

Sample Waste Hauler Report

Appendix B

CMOM Self-Audit Checklist

Appendix B-1 - CMOM Self Audit Checklist

I. CMOM Programs Recent Performance Summary			
Performance Measures for Year 2015	Year 2016		Month July
	Goal	Actual	Comment
A. Number of Customer Complaints	0	248	Plugged sewer service line: 207 Plugged sewer main: 15 Clean out cap and/or panella issue: 41 Shared Septic Sewer Overflow: 0 Sewer gas odor: 7 Sanitary sewer overflow: 10 Struck sewer service, main or asset: 1 Sewer Inquiry: 3
B. Number of NPDES Permit Violations	0	0	
C. Number of Capacity Related Overflows	0	0	SSOs storm related
D. Number of Maintenance Related Overflows	0	2	SSOs due to debris obstruction and roots
E. Number of Operations Related Overflows	0	0	SSOs due to power failure
F. Number of Overflows Caused By FOG	0	0	SSOs due to restaurant grease blockage
G. Number of Overflows Caused By Sources Other Than FOG	0	3	SSOs due to grease blockage
H. Number of Overflows Caused By Pipe/Equipment Failures	0	4	
I. Number of Overflows Caused By Damage	0	1	SSOs due to vandalism, contractor misconduct, etc.
J. Monthly Average Treatment Plant Flow Rate (gallon per capital-day [gpcd])	179	142	Goal is defined in the 2013 water and sewer allocation report
K. Number of By-Passes at Treatment Plant	0	0	

Appendix B-1 - CMOM Self Audit Checklist

I. CMOM Programs Recent Performance Summary			
Performance Measures for Year 2015	Year 2016		Month July
	Goal	Actual	Comment
L. Volume of Treatment Plant By-Pass	0	0	
M. Miles of Sewer Line CCTV'd	49	0.79	CCTV service contracts expanding expected after sewer shed cleanings
N. Miles of Sewer Line Cleaned	195	11	Contracts for sewer cleaning were renewed and cleaning has resumed.
O. Linear Feet of Sewer Line Repaired	51480	10569	615 LF of sewer repaired by County's In-house Staff 1474 LF of sewer CIPP in the Rt. 103 and Dorsey Run Projects
P. Number of Manholes Inspected	6000	337	
Q. Number of Manholes Repaired	300	16	Repair as needed
R. Number of Grease Interceptors Inspected	827	729	539 = (266 FSE's +273 inspections performed for the vehicle service program)
S. Miles of Sewer Line Smoke Tested	N/A	65,406 LF	Smoke Testing the Guilford Run Drainage Area
T. Number of Pumps Stations Repaired	N/A	0	

Appendix C

2014 Sewer System Overflows (SSO's) Report

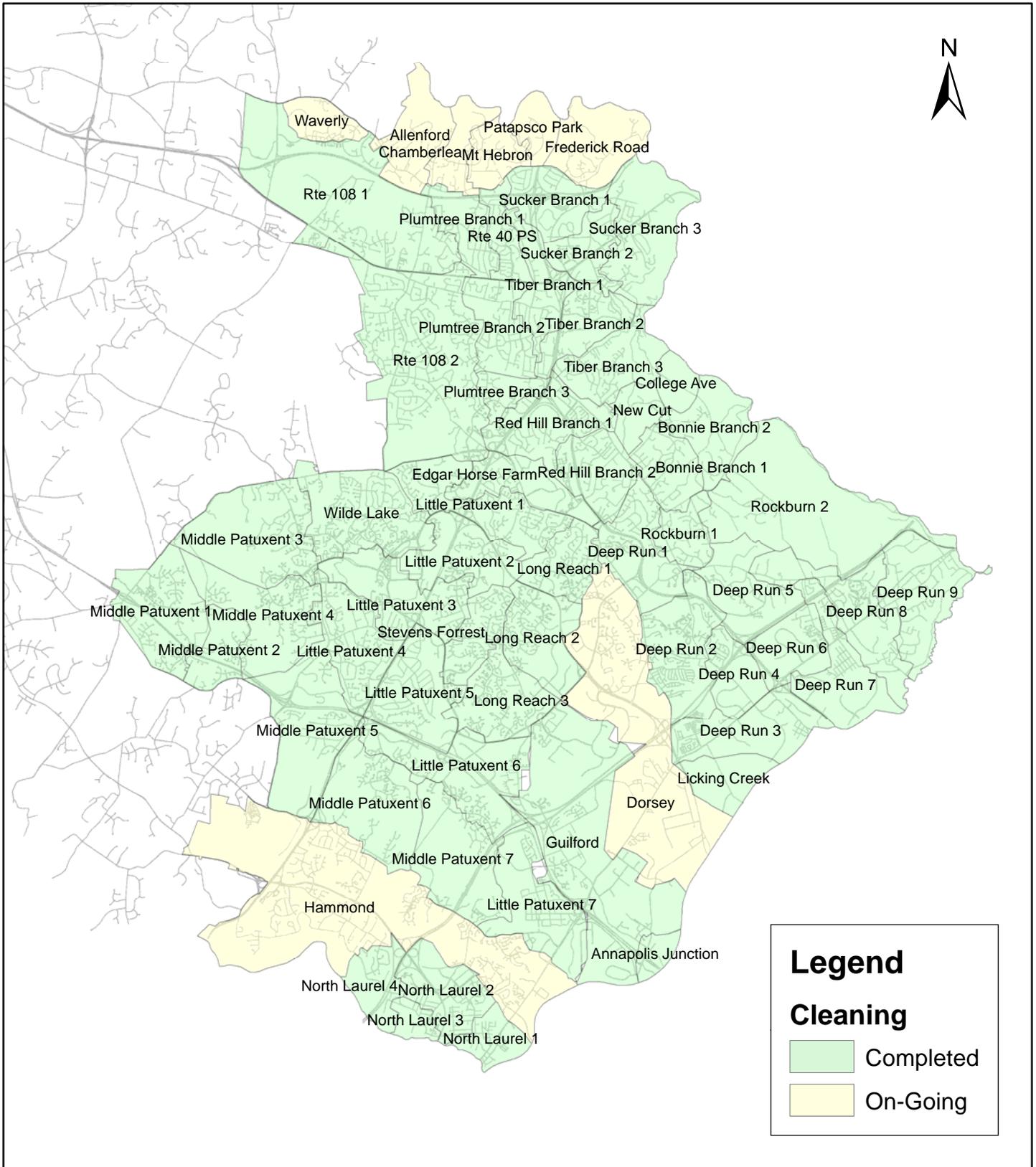
PROBABLE CAUSES OF SEWER SYSTEM OVERFLOWS – 2015

LOCATION	DATE	CAUSE:	GREASE BLOCKAGE (RESTAURANT)	GREASE BLOCKAGE	DEBRIS OBSTRUCTION	ROOTS	VANDALISM	UNKNOWN - STORM FLOWS	PIPE / EQUIP FAILURE	DAMAGED BY OTHERS	POWER FAILURE	DURATION in hours	ESTIMATED AMOUNT - GALLONS
Ilchester Rd and Bonnie Branch Rd	01/04/15							X				9.50	1,500
5686 Stevens Forest Rd	02/27/15			X		X						1.50	10,000
Ilchester Rd and Bonnie Branch Rd	03/14/15							X				0.25	3,000
10130 Junction Dr	03/23/15								X			1.00	600
7951 Dorsey Run Rd	05/11/15									X		3.00	700
8567 Willow Wisp Ct	06/15/15									X		1.25	10,000
Ilchester Rd and Bonnie Branch Rd	06/27/15							X				1.00	5,000
Phelps Luck Dr & Halflight Garth	06/28/15								X			16.00	96,000
Ilchester Rd and Bonnie Branch Rd	07/07/15							X				2.25	1,000
7568 Rain Flower Way	07/10/15			X								2.00	1,000
6169 Waiting Spring	08/16/15					X						1.00	100
10119 North Second St	08/21/15								X			8.00	1,600,000
6150 Rainbow Drive	08/31/15								X			5.00	9,000
6541 Smith Ave,	09/02/15								X			27.00	6,480
3455 Plumtree Dr	09/03/15			X								2.00	1,000
7136 Millbury Ct	11/27/15								X			8.00	8,000
Ilchester Rd and Bonnie Branch Rd	12/25/15							X				1.75	5,000
Totals:			0	3	0	2	0	5	6	2	0	90.50	1,758,380

Blockage FOG
Blockage Other
Maintenance
Maintenance
Other
Capacity
Pipe/Equipment Failures
Other
Operation

Appendix D

Action Planned and/or Implemented in 2014



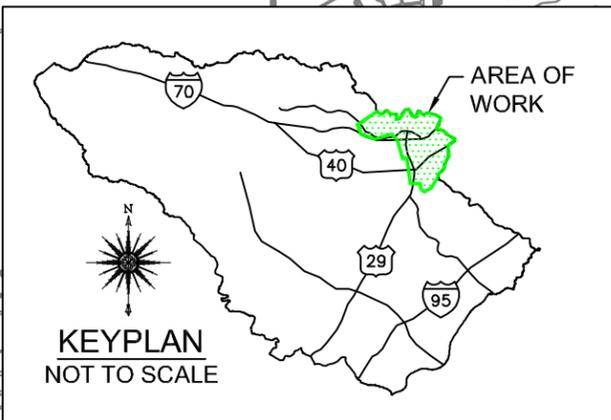
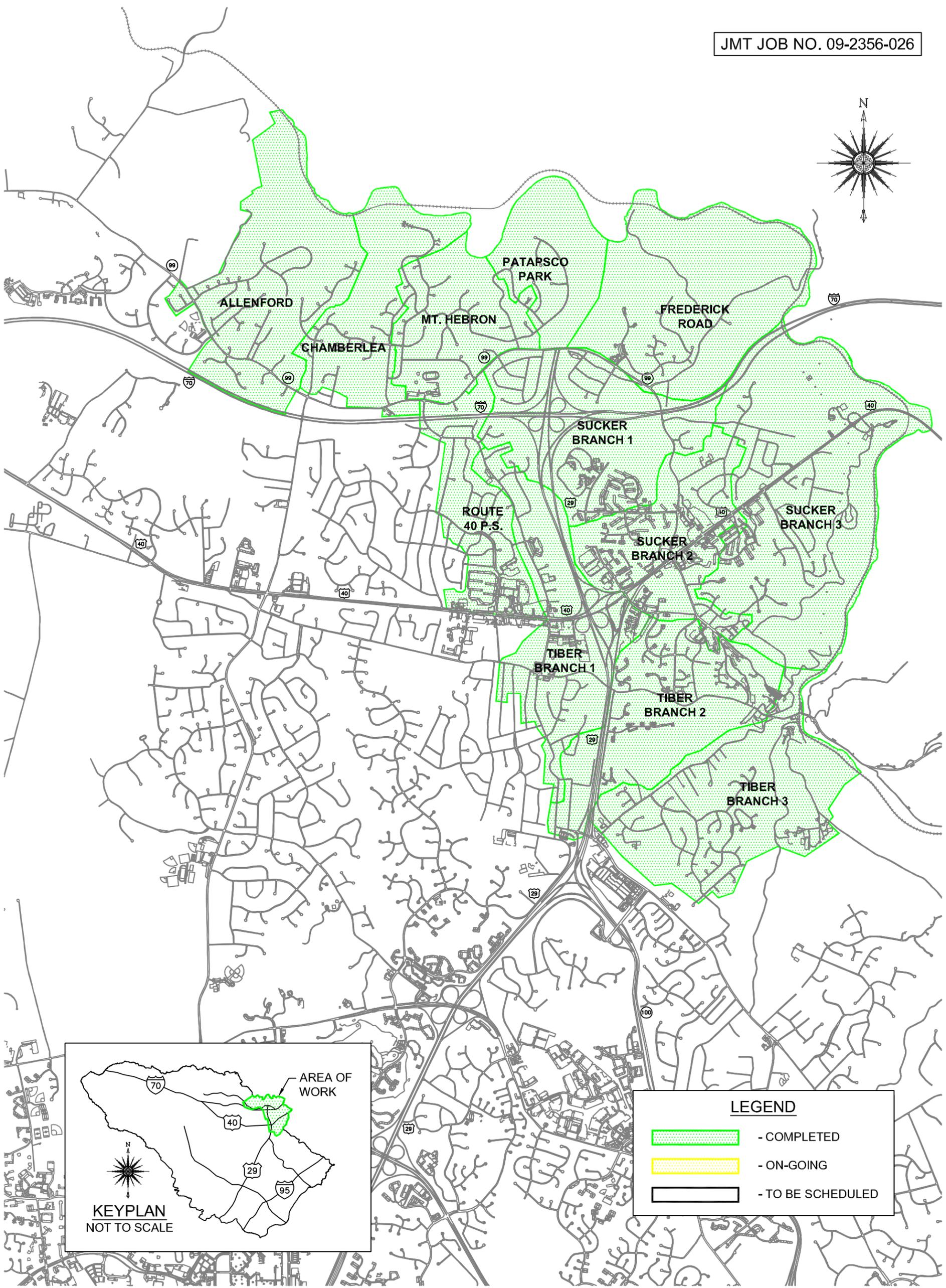
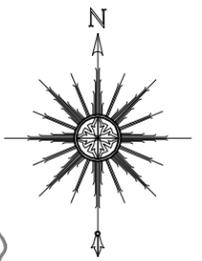
HOWARD COUNTY CMOM PROGRAM CLEANING SCHEDULE



HOWARD COUNTY
DEPARTMENT OF PUBLIC WORKS
BUREAU OF UTILITIES

PRINTED DATE:
8/1/2016

FIGURE D1



LEGEND

- COMPLETED
- ON-GOING
- TO BE SCHEDULED

HOWARD COUNTY CMOM PROGRAM

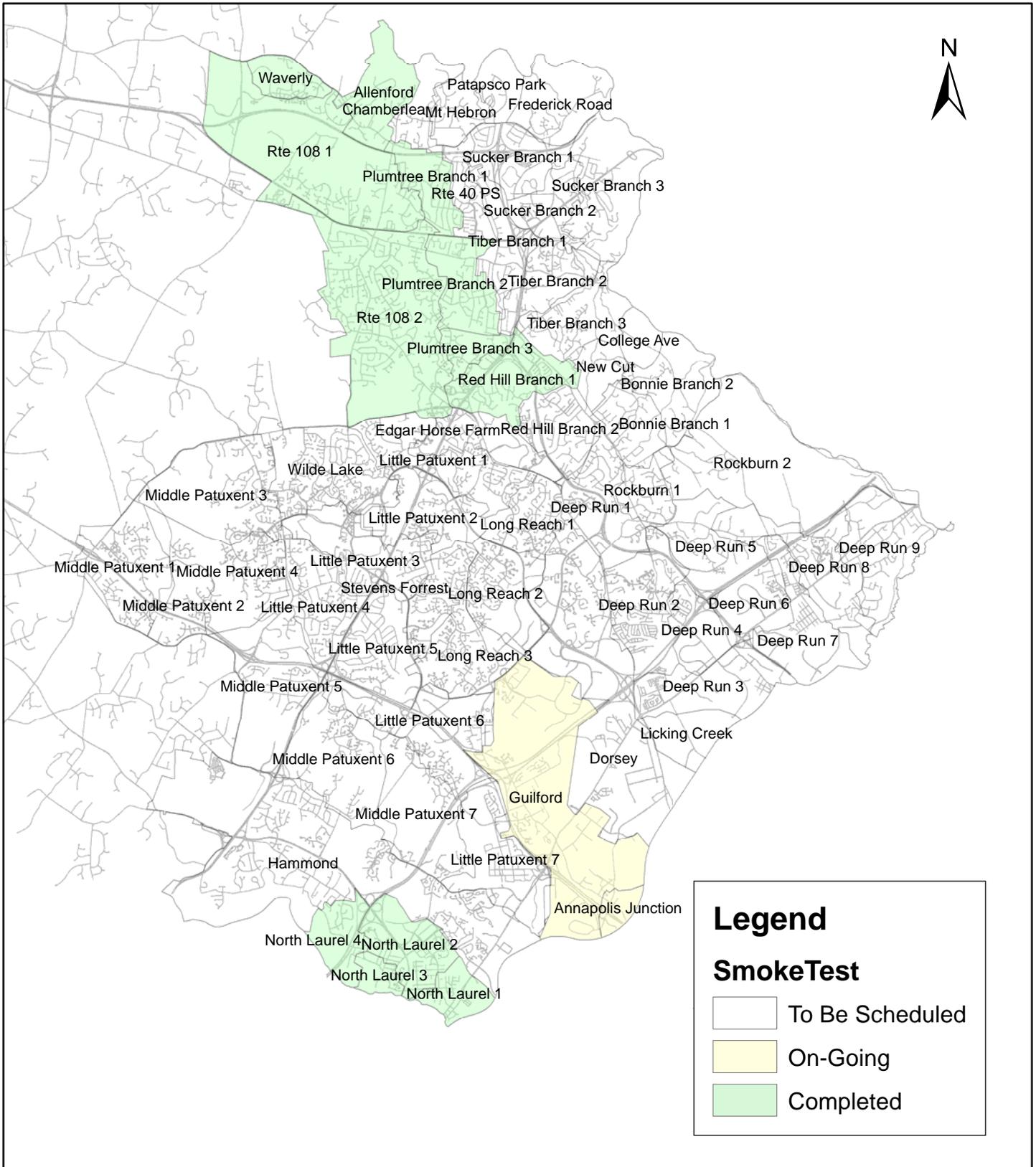
CCTV SCHEDULE



HOWARD COUNTY
DEPARTMENT OF PUBLIC WORKS
BUREAU OF UTILITIES

PRINTED DATE:
8/1/16

FIGURE D2



HOWARD COUNTY CMOM PROGRAM SMOKE TESTING SCHEDULE



HOWARD COUNTY
DEPARTMENT OF PUBLIC WORKS
BUREAU OF UTILITIES

PRINTED DATE:
8/1/2016

FIGURE D3