

# TOWN OF MONTGOMERY, ORANGE COUNTY, NEW YORK

## WASTEWATER TREATMENT FACILITY FLOW MANAGEMENT PLAN

PREPARED BY:



**DELAWARE ENGINEERING, D.P.C.**

28 MADISON AVENUE EXTENSION  
ALBANY, NEW YORK 12203  
518-452-1290

**SEPTEMBER 12, 2019**



## TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
<b>1.0 BACKGROUND</b>	<b>1</b>
<b>2.0 DISCUSSION</b>	<b>5</b>
<b>3.0 DESCRIPTION OF COLLECTION SYSTEM CONSTRUCTION</b>	<b>7</b>
<b>4.0 ANTICIPATED SYSTEM GROWTH</b>	<b>8</b>
<b>5.0 PROPOSED SCOPE OF WORK</b>	<b>9</b>
<b>6.0 SMOKE TESTING OVERVIEW</b>	<b>10</b>
<b>7.0 VIDEO INSPECTION OVERVIEW</b>	<b>11</b>
<b>8.0 SUMMARY &amp; CONCLUSIONS</b>	<b>12</b>

## APPENDICES

<b>Appendix A1</b>	<b>WWTF 2018 Annual Certification Form</b>
<b>Appendix A2</b>	<b>6/17/2019 Memorandum on I&amp;I Repair and Flow Reduction</b>
<b>Appendix A3</b>	<b>2018 WWTF Flow Summary</b>
<b>Appendix A4</b>	<b>WWTF ADF Post I&amp;I Repair</b>
<b>Appendix A5</b>	<b>2019 WWTF Flow Breakdown Graph</b>
<b>Appendix A6</b>	<b>Inflow &amp; Infiltration Removal Plan (July 27, 2011) (Includes CDM 12/5/2008 Sewer Collection System I/I Assessment Study Report and Includes Addendum to I/I Removal Plan 12/14/2012 Prepared by Mike Aiello, P.E.)</b>
<b>Appendix A7</b>	<b>12/16/2013 Approved I&amp;I Removal Program Addendum Letter Report (Compliance Document)</b>
<b>Appendix A8</b>	<b>Photo Inspection of Accessible Manholes (September 9, 2019)</b>
<b>Appendix A9</b>	<b>Map of Sections that were Video Inspected and Identified</b>
<b>Appendix A10</b>	<b>Video Inspection Description – 2017</b>
<b>Appendix A11</b>	<b>TAM Field Reports on Video Inspection and Repair</b>
<b>Appendix A12</b>	<b>Collection System Mapping</b>

## 1.0 BACKGROUND

The Town of Montgomery owns and operates a Wastewater Treatment Facility (SD1 STP, also known as the Neelytown WWTP) which is located at 470 State Route 416 in the Town of Montgomery (NYS-SPDES Permit No. **NY0247782**). The discharge permit allows for a monthly average flow of up to 0.1475 MGD to be discharged into the Wallkill River. Under NYS conservation law an annual Wastewater Treatment Facility Design, Planning and Flow Management Certification must be filed with the NYSDEC Region-3, Regional Water Engineer. New York State law – 6NYCRR Part 750-2.9(1) requires that an approvable Flow Management Plan (FMP) or engineering report be submitted to the NYSDEC Regional Water Quality Engineer if the annual flow exceeds 95% of the design flow for a facility.

On May 13, 2019 the Town of Montgomery filed an amended Flow Certification for the calendar year of 2018; the 2018 annual average of 0.1444 MGD is 97.9% of the 0.1475 MGD permitted flow of the facility. Because the 2018 monthly average day flow exceeded 140,125 GPD (95% of 147,500 GPD) Delaware Engineering, D.P.C. has been retained by the Town of Montgomery to prepare this Flow Management Plan.

**Table 1.0 - 2018 WWTP Average Daily Flow**

Month	Average Daily Flow (MGD)	12-Month Running Average (MGD)
January	0.1206	0.1188
February	0.1541	0.1188
March	0.1689	0.1206
April	0.1518	0.1186
May	0.1489	0.1217
June	0.1285	0.1231
July	0.1279	0.1252
August	0.1484	0.1288
September	0.1320	0.1312
October	0.1351	0.1340
November	0.1717	0.1402
December	0.1445	0.1444

This Flow Management Plan will be based on the requirements set forth in the applicable regulations, and will include:

1. A statement signed by the Town Supervisor ensuring NYSDEC that the Town of Montgomery has the authority to implement said Flow Management Plan within the service area of the Town of Montgomery's wastewater collection system and POTW; this statement can be found on page 13 of this document.
2. The Supervisor of the Town of Montgomery, its Chief Operating Officer, has endorsed said Flow Management Plan; this endorsement affidavit is attached and can be found on page 13 of this document.
3. Delaware Engineering, D.P.C. is responsible for the development of this Flow Management Plan and will work with the Town of Montgomery's sewer department & Town Board to insure its implementation.
4. An inventory of all known projects that have applied for connection to the sewer system has been compiled and is included as a part of this document in Section 4.0 below.
5. A schedule for the implementation of this plan, and for flow reduction measures identified within said plan, is under review and consideration by the Town Board.
6. A map, delineating the service area, is provided along with a working plan of the areas within the collection system, so locations with excessive I&I may be identified.
7. This document identifies the likely cause for the increased flow and establishes a step by step formula for reducing said excessive flows, including a schedule for all phases of the project. The report will be submitted to the Region – 3 Water Engineer for review and approval.
8. Because of the conditions identified within the collection system during the development of this Flow Management Plan, **it is Delaware Engineering's recommendation to the Town of Montgomery that, in addition to the actions identified within this plan, a more comprehensive strategic analysis be performed on the entire sewer system.** There is concern that the current design of the existing sewer system, regardless of the steps called for in this FMP, will allow for continued deterioration of the collection system. The concern is that a large portion of the existing system may have reached the end of its useful life and is not suitable for future long-term management of a Publicly Owned Treatment Works (POTW). Most of the system's wastewater originates as the effluent of septic tanks. A problem inherent in that design is that the wastewater becomes highly corrosive and destructive to concrete and steel. The corrosive sewer gases have, over time, caused extensive deterioration and damage to the sewer collection system, pumping station, and wastewater treatment facility.

Septic tank effluent contains hydrogen sulfide (H<sub>2</sub>S), which is a colorless chalcogen hydride gas with the characteristic foul odor of rotten eggs. In high enough concentrations, it

is poisonous, corrosive, and flammable. Hydrogen sulfide is produced from the microbial breakdown of organic matter in the absence of oxygen. This process is commonly known as anaerobic digestion, which is performed by sulfate-reducing microorganisms. Hydrogen sulfide is heavier than air, it tends to accumulate at the bottom of poorly ventilated spaces, such as pump stations and manholes. Although pungent at first, it quickly deadens the sense of smell, so workers may be unaware of its presence until it is too late. Safety measures specific to working in an environment with H<sub>2</sub>S includes the regular use of gas detectors, portable air delivery systems, and an OSHA-approved safety training. A mixture of H<sub>2</sub>S and air can become explosive. Hydrogen sulfide generally acts as a reducing agent which, in the presence of oxidizing agents, may be responsible for corrosion, which is defined as the "degradation of metals as a result of electrochemical activity". Hydrogen sulfide gas can penetrate through the pores of concrete and corrode the supporting structural steel within reinforced concrete structures like manholes, wet wells, and buildings.

As required by the applicable regulations, this Flow Management Plan includes the following recommendations to stabilize the influent flows below 95% of the permitted flow of the facility:

1. A strategic analysis of the drinking water supplies within the sewer districts' service area was conducted to determine the rates of water loss versus water billed. As a part of the analysis of the system, recommendations were made to the Town Board for modernization of the existing water billing system to a metering and billing system that promotes conservation of potable water. A metering system was subsequently put in place. This system includes individual user metering which allows for a review of the water rates and billing methods. Other municipalities have invested in similar water meter modernization programs with meter sending units for real time monitoring. Water metering systems ensure water customers are being billed for all of the water they use, which impacts water use and conservation.
2. The Town will undertake a program of flushing and video inspection of its entire collection system. The last system-wide analysis was performed 15 years ago. This will require funding, as studies of this type, included in an overall strategic plan, can generate costs that may exceed \$100,000.00. A formal funding application for an engineering grant will be filed with NYSEFC in July of 2020, as part of the anticipated next round of Engineering Planning Grants. If funding becomes available at December of 2020, the study could be completed by September 2021. This study would include video inspection, which will serve to identify sources of extraneous water entering the system. Once identified, those locations shall be prioritized for repair. This will begin 6 months after the video inspection report becomes available. The study, and the recommendations identified therein, would be the basis for funding applications to NYSEFC and other agencies for implementation. The actual repair of identified issues will be an ongoing process that will likely involve one or more construction projects being publicly bid, depending on the conditions found and the cost for said repairs.

The video inspection will also enhance the system-wide mapping, and allow for an analysis of pipe sizes versus flow data for the present and the future. The real time condition of all pipes, manholes, cleanouts and pump stations will be tied into the mapping to allow for the prioritized plan for improvement. These mapping details will subsequently be used during the design and public bidding process for future repair work projects. Following the system wide inspection, future reduction of infiltration & inflow will be accomplished through continued manhole inspection and repair or replacement as required. Sewer system metering, evaluation, rehabilitation, and the removal of roof leaders and footing drains will incrementally reduce extraneous water sources if identified. The installation of separate storm sewers, where necessary, is a method available for the reduction of extraneous water from sanitary sewers, since this would direct stormwater away from manholes and cleanouts. All of these methods may become a part of an overall strategic plan.

3. Prevention of future sources of I&I is accomplished by the enforcement of the current Town Building Code, as well as the Planning Board review process which requires engineering inspections and certification of any new sewer being connected to the Town's collection system. Sewer use rules and regulations specifically designed for the prevention of future sources of inflow and infiltration will be reviewed and implemented, where appropriate, by December 2020.
4. The WWTP is scheduled for an upgrade. The plan is to increase the facility's capacity to 0.25 MGD by installing new Sequencing Batch Reactor (SBR) technology, which uses aerobic bacteria for the treatment of wastewater. An increase in flow is being added to account for anticipated future needs of the Town of Montgomery, and to account for allowable I&I. It is anticipated that the final design of this upgrade project will be presented to NYSDEC by October 1, 2019.
5. The implementation of the recommendations within this report should ensure the annual average flows for the Town of Montgomery's WWTP do not exceed 95% of POTW, as required by the NYSDEC.

It should be noted that on or about June 6, 2019 the Town of Montgomery performed an analysis of a section of the collection system, downstream from the Morrison Heights Pump Station and upstream of the Truck Stop Pump Station, where an unusual amount of flow was entering the collection system. Approximately 3,900 lineal feet of sewer main was video-inspected as well as approximately 30 manholes. Delaware Engineering has reviewed all of this video multiple times and we have visually inspected 27 individual manholes and collected photographic documentation of existing conditions. The photographs from this inspection are located in Appendix A8 of this report.

A major leak was identified and repaired in the 8" gravity sewer main between CCXMH-4 and CCXMH-5 that discharges into the Truck Stop Pump Station (TSPS). A review of the video of the leak shows a high volume of clear water entering the sewer main. The flow rate of the leak

appeared to be approximately 30-50 GPM or greater. Video of the section was also taken after a repair liner was installed and there was no extraneous water entering the collection system at the repair. A review of the flow records and the Flow Breakdown Graph (attached as Appendix A5) showed that once the leak was repaired the flow began dropping immediately. There is a spreadsheet attached as Appendix A4 which shows the rapid drop of flow following the repair, with an average daily flow for the 2.5 months post repair of 106,500 GPD. This represents over a 40,000 GPD reduction of the average day flow.

## 2.0 DISCUSSION

The Town of Montgomery has two sanitary sewer service areas, Sewer District #1 and Sewer District #2, both of which discharge to the Neelytown WWTP. Both districts rely on primary on-sight treatment in the form of septic tanks. This treatment removes the settleable solids and floating solids, stores them within the septic tanks, and produces an effluent called gray water. Anaerobic digestion occurs on the stored solids (sludge) which reduces the volume of sludge.

A septic tank consists of one or more concrete or plastic tanks of between 1,000 and 10,000 gallons, depending on the flow from the wastewater source. The design of a septic tank incorporates two chambers separated by a dividing wall with openings located about midway between the floor and ceiling of the tank. The influent end of the tank is connected to a pipe from the wastewater source. The effluent end of the tank makes use of a sanitary tee to allow the settled wastewater to leave the tank as effluent flow, while the settled solids on the bottom and the floating solids on the top remain.

Waste that is not decomposed by the anaerobic digestion must eventually be removed from the septic tank. Septic tanks are cleaned by use of a vacuum truck, which will remove the floating mat and the settled solids. The required cleaning frequency of a septic tank depends on the volume of the tank relative to the input of solids, and the amount of indigestible solid waste stored in the tank. A septic tank must be periodically tested to determine the level of sludge and to understand when it needs to be emptied of the accumulated sludge (septage).

If a septic tank is not properly monitored and cleaned solids will accumulate, and wastewater containing organic solids (sludge) will begin to discharge from the tank. Septic sludge is detrimental to the structural integrity of the collection system and the biological process at the wastewater treatment plant.

Grey water systems provide a benefit for small communities where leach fields are failing due to soil conditions and a central facility is established to treat gray water. One benefit of a gray water system is that they are considerably less expensive to install, since the removal of the solids allows for smaller diameter piping making up the collection system. Additionally, the low solids concentrations mean much of the wastewater can be delivered through pumping and forcemains, which can be installed in trenching at varying elevations. New hook-ups along

forcemain sewers require a septic tank, and a pump to deliver the wastewater under pressure to the district's pressure forcemain.

Once the flow of a collection system rises to higher levels, gray water systems become less advantageous because the traditional gravity sewer collection system can be damaged by the septic tank effluent. There are also significant odor issues from the combination of the gravity system and gray water, as the dissolved sewer gases are released in the manholes and pumping stations, and especially at forcemain end points where a pump station is discharged. The turbulence from a pump discharge increases the off gassing of dissolved Hydrogen Sulfide, and thus odor control and corrosion control systems must be added and maintained.

### **System Description**

The design of the existing sewer collection systems consists of two means of conveyance of the wastewater to the treatment facility: traditional gravity sewers and pumped septic effluent forcemains. There are well developed as-built drawings of the entire collection system. Sewer District #2 (SD-2) is primarily a gray water system. The effluent from on-lot septic tanks is collected and transported to the 17K Pumping Station (17K-PS) through small diameter gravity sewer mains, generally 4" PVC pipe and small diameter forcemains, generally 2" or 4" in diameter. SD-2 is located upstream of sewer district #1. Flow from the 17K-PS is pumped through a 4" PVC forcemain and discharges into MH-BK which is located on NYS RT-208 just north of the I-84 exit. Manhole BK also receives gravity flow from Hawkins Drive (Shop Rite plaza) and Hollis Lane, off NYS RT-208. There are also commercial users with their own pump stations downstream of the 17K-PS that pump gray water directly into the 4" forcemain. From Manhole BK a gravity sewer runs along NYS RT-208. It collects flow from about 10 residential properties, a number of commercial properties on the north and south of I-84, and the SD-2 forcemain which discharges into MH-BK upstream of the Morrison Heights Pump Station (MHPS). The Morrison Heights PS is the final collection point of all flow from SD-2. All of Sewer District #2's flow passes through the collection system of Sewer District #1.

SD-1 is comprised of both forcemain and gravity sewers. MHPS pumps through a 6" PVC forcemain to a gravity manhole MH-CCX7 I in SD-1. There are a series of 15 precast gravity manholes and 8" PVC gravity sewers that collect flow from commercial properties along Neelytown Road and transmit the flow to the Truck Stop Pump Station. The TSPS pumps into a 6" PVC forcemain which transmits flow to the wastewater treatment plant.

A major leak was identified and repaired on 6/6/19 in the 8" gravity sewer main between CCXMH-4 and CCXMH-5. A review of the video of the leak shows a high volume of clear water entering the sewer main under hydrostatic pressure. The volume of the leak appeared to exceed 30-50 GPM which would indicate the sewer main was located at an elevation below the water table at the time of the video. There is also a video of the section after a liner was installed, which showed no extraneous water entering the collection system at the repair.

### 3.0 DESCRIPTION OF COLLECTION SYSTEM CONSTRUCTION

The estimated break down of pipe diameter and length within the Town is as follows:

**Table 3.0 – Summary of Collection System Components**

Sewer District # 1		Sewer District # 2	
Component:	Quantity:	Component:	Quantity:
6" PVC Force Main	12,736 linear feet	2" PVC Force Main	1,039 linear feet
6" PVC Gravity Main	268 linear feet	4" PVC Force Main	10,996 linear feet
8" PVC Gravity Main	3,212 linear feet	4" PVC Gravity Main	4,756 linear feet
8" AC Gravity Main	3,532 linear feet	6" PVC Force Main	2,475 linear feet
-	-	8" PVC Gravity Main	7,867 linear feet
Total Length of Sewer Main = 19,748 linear feet		Total Length of Sewer Main = 27,133 linear feet	
Residential Gravity Services	0	Residential Gravity Services	84
Residential Pressure Services	0	Residential Pressure Services	9
Commercial Gravity Services	6	Commercial Gravity Services	23
Commercial Pressure Services	12	Commercial Pressure Services	13
Total Number of Customer Services = 18		Total Number of Customer Services = 129	
Pump Stations (Public)	1	Pump Stations (Public)	3
Pump Stations (Residential)	0	Pump Stations (Residential)	9
Pump Station (Commercial)	13	Pump Station (Commercial)	14
Manholes	15	Manholes	39
Clean-outs	10	Clean-outs	23
Valves	9	Valves	4
Air Release Valves	5	Air Release Valves	10

#### 4.0 ANTICIPATED SYSTEM GROWTH

Design flows from projects that are within the current sewer districts, have received site plan approval and are actively under construction:

• 105 Bracken	1,140 GPD
• Mondelez	1,250 GPD
• <u>84 Square</u>	<u>600 GPD</u>
TOTAL	2,990 GPD

Projects currently in the site plan process that are also in the sewer districts:

• 134 Neelytown Rd.	1,500 GPD
• Skibitsy	2,500 GPD
• Galaxy	960 GPD
• <u>European Outdoors</u>	<u>3,018 GPD</u>
TOTAL	10,728 GPD

Projects not in any district, but currently seeking district extensions:

• Medline	5,332 GPD
• <u>Nedlaw</u>	<u>10,250 GPD*</u>
TOTAL	15,582 GPD

(\*Not a project, owner seeking annexation to sewer district)

Potential project that is in the sewer district, but has not yet formally applied for site plan approval:

• Bracken 4.3	760 GPD
---------------	---------

The total of the flows associated with all these potential projects and district expansions equals 27,310 GPD.

According to the flow data included in Appendix A4, the average daily flow recorded at the Town's WWTF, during the period following the collection system repair on June 6 to August 20, 2019, was approximately 105,100 GPD. If all the potential projects described above were to receive approval and move forward, they are expected to add an additional average daily flow of approximately 27,310 GPD to the system. This would bring the future average daily flow to 132,410 GPD, which is below 95% of the permitted average daily flow. However, this projected future average daily flow rate is within 8,000 GPD of 140,125 GPD, which is 95% of the permitted average daily flow.

The Town is currently involved in plans to upgrade and modify the existing wastewater treatment facility. This plan is expected to involve an increase in the facility's permitted flow capacity from 147,500 GPD to 250,000 GPD. This increase should accommodate all currently planned development within the system.

## 5.0 PROPOSED SCOPE OF WORK

The purpose of the Town of Montgomery Flow Management Plan is to reduce the annual average flow to the Town's wastewater treatment facility to less than 95% of the permitted flow, as required by NYSDEC. Through instituting this plan, the Town will be able to determine the best course of action over the next several years to address the annual average flows in the sanitary sewer system. This will include the removal of sources of infiltration and inflow, which are currently entering the system and causing the annual average flow to be greater than 95% of the permitted flow. The first step in this project will be to gather and organize information on the sanitary sewer system so the Town can create a system wide inventory documenting the conditions of manholes and sewer mains. The necessary information will be gathered from a number of different sources including:

- Original design drawings
- Filed maps located on-line
- Past video inspection of the collection system
- Past engineering studies performed over the years
- Field inspection of the collection system and manholes

Once there is an understanding of the data available it will be organized into a format that will allow the Town's staff to establish a workable preventative maintenance program for the future. The data will provide the basis for a system-wide evaluation to determine the sources and locations of the extraneous water entering the collection system. The collection system evaluation will take advantage of available technologies, including flow analysis with flow meters and data loggers, smoke testing, and sewer video inspections to locate and evaluate potential sources of infiltration and inflow (I&I). The sources of I&I will be evaluated to determine the amount of extraneous water entering the Town's system as a result of each. The results of the evaluation will be analyzed to determine the best course of action for the Town. This will involve determining the largest sources of I&I to allow for maximum flow removal, the best method of rehabilitation, and the cost for rehabilitation. The scope of this study will include the following specific items:

1. Flushing of the entire collection system to remove grease build up and debris to ensure video inspection is possible where necessary
2. Creation of a manhole inventory
3. Flow analysis of the collection system to isolate the likely areas of concern
4. Video inspection and smoke testing of those identified areas of concern
5. Identification of sources of I&I flow that can be cost-effectively removed
6. Recommendations, with associated costs, for proposed system improvements

Through the course of this project, it is anticipated that additional work will be identified. This may include additional televising of sewers, excavation of the sewer main to perform emergency

repairs, and additional manhole inspections. The results will be reported in the final report that will be provided to the NYSDEC.

## **6.0 SMOKE TESTING OVERVIEW**

Smoke testing is an effective method of locating inflow and infiltration. This method can be used to determine if cross connections from storm sewers or downspouts exist. It can also be used to locate other sanitary system defects, such as missing sanitary clean-out caps, and connection of yard drains. Smoke testing can also aid in evaluating structure repair requirements by showing defects not readily visible during the visual inspections. It is important to note that smoke testing is used for detecting inflow sources but cannot be used to quantify inflow.

The smoke used during testing is non-toxic, non-staining, odorless, and creates no fire hazard. However; prior to smoke testing a system wide notification will be provided to area residents and businesses due to the potential for smoke to enter the buildings. This can be done with flyers distributed that provided notification to residences and businesses of the details and schedule of the smoke testing program. The Town's Police and Fire Departments would also be notified.

Smoke testing is performed by setting a gasoline powered air blower on an open manhole structure and introducing a lit smoke bomb. The blower forces air into the system, pushing the smoke through the sanitary sewers and into adjacent structures.

Once the smoke is introduced into the system, observations of the adjacent structures and surrounding areas will be recorded. Photographs will be collected during the smoke testing to become a part of the record. Once smoke testing is completed, the field observations and photographs will be added to a database; this data can be linked to a Geographic Information System (GIS). The information in the database will identify areas where smoke leaks were observed along the ground, at structures, through roof drains, or other potential inflow sources. The information in the database will include the most common problems expected to be observed:

- Smoke leaking from clean-outs due to a missing or damaged cap
- Smoke leaking along the edge of lawns
- Smoke leaking from cracks in sidewalks and driveways
- Smoke leaking from the surface of lawns
- Smoke leaking through damaged or offset manholes
- Smoke leaking through manhole frames
- Smoke leaking from gutters and roof drains
- Smoke leaking from adjacent storm drains

## 7.0 VIDEO INSPECTION OVERVIEW

A sealed T.V. camera is mounted to either a device similar to a small sled which can be pulled through the sanitary sewer, or on a self-propelled robotic unit that drives through the piping and also has a cable attached so that it may be pulled back with a winch if it becomes lodged. A color camera is normally used for video inspections; these cameras have a pan & tilt or radial view with the ability to look up any connection. Lighting for the cameras is suitable to allow a clear picture for the entire periphery of the pipe. These cameras are operable in 100 percent humidity conditions and the camera cable length is typically sufficient to go from manhole to manhole without a reverse setup. The camera color monitor is normally located within a mobile vehicle unit where a technician controls the operation of the equipment from a control panel located in the mobile unit. The camera is moved through the line in the downstream direction at a uniform rate, usually lower than 30 ft./min., stopping when necessary to insure proper documentation of the sewer's condition. The camera can be stopped and aimed up each connection, ensuring the connections are properly documented. A log is provided for all line inspections listing the date, project number, inspection number, manhole numbers, and street location where applicable. Normally a printed location record is provided by the video contractor which shows the location of each defect observed during the inspection. The locations of defects and other points of interest can be identified by logging the distance to each defect or point of interest measured from the center of the starting manhole.

A single section of sewer can have several types of deficiencies and multiple cases of deficiencies. For example, a sewer can have a longitudinal crack and root intrusions in the same section. The number of deficiencies, their type, and rating would be recorded for each sewer. This information helps to determine the overall condition of the section in order to determine possible recommended improvements. Each section's structural integrity may require different repair methods. Sewer collapse, severe depressions, and severe cracks will require a sewer to be completely replaced. Several medium joint leaks may have greater inflow, but can be repaired by grouting the sewer. The structural integrity of the sewers will be broken into five (5) categories listed below:

Category 1 – Monitor and televise again in 5 years

Category 2 – Grout or line in the next 5 years

Category 3 – Grout ASAP

Category 4 – Grout or line ASAP

Category 5 – Replace or repair ASAP

## 8.0 SUMMARY & CONCLUSIONS

The Town of Montgomery had an annual average flow that exceeded 95% of the permitted capacity of their wastewater treatment plant in 2018, as noted in the flow certification submitted to NYSDEC. In accordance with their SPDES permit regulations, a flow management plan has been prepared to identify potential mitigating strategies to reduce influent flows to the facility below this threshold.

A number of strategies have been identified in this report, for the Town to implement to reduce flows. Strategies center around investigations into the collection system, to identify sources of inflow and infiltration, and to remediate any identified errant flows. The recommendation of this report is to continue these investigations and repairs, which have already begun.

In June 2019 the Town conducted televised inspections of segments of their collection system, and identified a significant source of groundwater entering the piping, estimated at 30-50 GPM. A repair was conducted and upon inspection afterward the leak was confirmed to be sealed. This repair alone resulted in the reduction in influent flows to the WWTP. The average flow in the period since the repair was made is approximately 105,100 gallons per day, compared to the 147,500 gallon per day permitted capacity of the facility. The reduction in flow would allow for the accommodation of the planned development in Montgomery, and the corresponding estimated wastewater flow increases, noted in Section 4.0 of this report.

In both the short and long term, continued review, inspection, and repair of the collection system is needed. This will ensure the I&I flows are kept to a minimum, and the Town is not paying to treat excess water, or wasting the treatment facility's capacity which would be better used to accommodate growth in the Town.

In addition to the inspection and repairs to address I&I, a comprehensive review should be conducted to address the septic tank effluent which drains to the system, and has caused deterioration of infrastructure from corrosive sewer gases.

**STATEMENT OF AUTHORITY**

As the Chief Operating Officer for the Town of Montgomery it is within my power, with the approval of the Town Board, to authorize the implementation of this Flow management Plan as required by New York State law – 6NYCRR Part 750-2.9(1) and enforced by Region-3 of the NYSDEC. The purpose of this Flow Management Plan is to reduce the flow entering the Town of Montgomery’s Publicly Owned Treatment Works to less than 95% of the SPDES Permit limit of 147,500 GPD.

Rodney Winchell, Supervisor,

\_\_\_\_\_

Date: \_\_\_\_\_

# APPENDICES

<b>Appendix A1</b>	<b>WWTF 2018 Annual Certification Form</b>
<b>Appendix A2</b>	<b>6/17/2019 Memorandum on I&amp;I Repair and Flow Reduction</b>
<b>Appendix A3</b>	<b>2018 WWTF Flow Summary</b>
<b>Appendix A4</b>	<b>WWTF ADF Post I&amp;I Repair</b>
<b>Appendix A5</b>	<b>2019 WWTF Flow Breakdown Graph</b>
<b>Appendix A6</b>	<b>Inflow &amp; Infiltration Removal Plan (July 27, 2011) (Includes CDM 12/5/2008 Sewer Collection System I/I Assessment Study Report and Includes Addendum to I/I Removal Plan 12/14/2012 Prepared by Mike Aiello, P.E.)</b>
<b>Appendix A7</b>	<b>12/16/2013 Approved I&amp;I Removal Program Addendum Letter Report (Compliance Document)</b>
<b>Appendix A8</b>	<b>Photo Inspection of Accessible Manholes (September 9, 2019)</b>
<b>Appendix A9</b>	<b>Map of Sections that were Video Inspected and Identified</b>
<b>Appendix A10</b>	<b>Video Inspection Description – 2017</b>
<b>Appendix A11</b>	<b>TAM Field Reports on Video Inspection and Repair</b>
<b>Appendix A12</b>	<b>Collection System Mapping</b>

# *APPENDIX A1*

## *WWTF 2018 Annual Certification Form*

**TOWN OF MONTGOMERY**  
110 BRACKEN ROAD  
MONTGOMERY, NEW YORK 12549-2627

Fax (845) 457-2760  
www.townofmontgomery.com



Building (845) 457-2640  
Planning (845) 457-2643  
Zoning (845) 457-2644  
Water/Sewer (845) 457-2642

June 12, 2019

NYSDEC Region 3  
Attn.: H Joe Fung, EIT  
100 Hillside Ave, Suite 1W  
White Plains, NY 10603

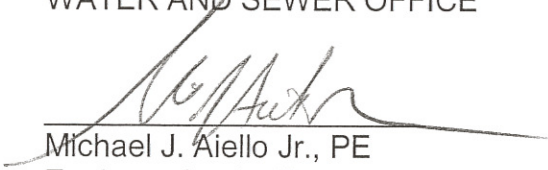
Re: SPDES NY0247782

Dear Mr. Fung,

In response to your correspondence of May 30, enclosed please find revised Annual Certification Form for 2018.

Very truly yours,

TOWN OF MONTGOMERY  
WATER AND SEWER OFFICE

  
Michael J. Aiello Jr., PE  
Engineer-for-the-Town  
On Behalf of Water & Sewer Office

Cc: Town Supervisor  
Town Clerk



NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
**WASTEWATER TREATMENT FACILITY  
 DESIGN, PLANNING AND FLOW MANAGEMENT  
 2018 ANNUAL CERTIFICATION FORM**

PERMITTEE NAME	FACILITY NAME	NYSDEC REGION	SPDES NUMBER
MONTGOMERY (T)	MONTGOMERY (T) SD1 STP	3	NY0247782

**Section 1 - Flow: Compare the annual average flow to the flow limit in the permit:**

For WWTFs monitoring **monthly average** flow, calculate annual average flow by averaging the 12 monthly average flows for 2018.

For WWTFs monitoring **quarterly average** flow, calculate annual average flow by averaging the 4 quarterly flows for 2018.

For WWTFs monitoring **semiannual** flow, calculate annual average flow by averaging the 2 semiannual measurements for 2018.

For WWTFs monitoring **annual average** flow or **12 month rolling average** flow, use the annual average flow calculated for 2018.

Year-round value (or Season 1)      Season 2 (if applicable)

Indicate dates that seasonal limits apply: \_\_\_\_\_

- a. What was the actual annual average flow, using the appropriate method above?      0.1444 \_\_\_\_\_ MGD
- b. What is the design flow of the WWTF?      0.1475 \_\_\_\_\_ MGD
- c. What is 95% of the design flow of the WWTF? (multiply line 1b by 0.95)      0.1401 \_\_\_\_\_ MGD
- d. Did the annual average flow exceed 95% of the design flow? (Is line 1a greater than line 1c?)       Yes       No
- e. Has a Flow Management Plan been submitted to NYSDEC?       Yes       No      If yes, date submitted: \_\_\_\_\_

*If the answer to 1d above is "Yes", a Flow Management Plan must be prepared in accordance with 6 NYCRR Part 750-2.9(c)(1) and be submitted to the Regional Water Engineer no later than August 1, 2019. If previously submitted, indicate date on Line 1e above.*

**Section 2 - Loadings: Compare the design BOD and TSS influent loadings to the actual BOD and TSS loadings:**

For WWTFs monitoring **monthly average** loadings, use the actual loadings as reported on your DMRs during calendar year 2018.

For WWTFs monitoring **quarterly, semiannual, or annual** loadings, calculate the actual loadings by averaging the loadings as reported during calendar year 2018.

For WWTFs that have no influent monitoring requirements please check this box and proceed to Section 4:     

Year-round value (or Season 1)      Season 2 (if applicable)

- a. The design influent loading for BOD (or CBOD if applicable) is:      438 \_\_\_\_\_ lbs/d
- b. The design influent loading for Total Suspended Solids is:      250 \_\_\_\_\_ lbs/d

- Form continues on other side -

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
**WWTF DESIGN, PLANNING AND FLOW MANAGEMENT**  
**2018 ANNUAL CERTIFICATION FORM**

Page 2 of 2

**Section 2. Loadings (continued):**

- Answer question 2c for the MOST FREQUENT monitoring period required by the permit and **check only ONE BOX.**
- Provide a response for questions 2d and 2e.
- If the answer to 2c is "Yes", a Plan for Future Growth must be submitted to the Regional Water Engineer in accordance with 6 NYCRR Part 750-2.9(c)(1) no later than August 1, 2019.

Using the WWTF operational data submitted on the DMRs for 2018, determine whether the actual influent loading for either BOD (or CBOD) or TSS exceeded the design influent loading (from 2a and 2b) for the time periods listed below.

- c. For WWTFs monitoring **monthly** loadings: Was design exceeded for any eight months?  Yes  No
- c. For WWTFs monitoring **quarterly** loadings: Was design exceeded for any three quarters?  Yes  No
- c. For WWTFs monitoring **semiannual** loadings: Was design exceeded for both semiannual periods?  Yes  No
- c. For WWTFs monitoring **annual** loadings: Was design exceeded for the annual period?  Yes  No
- d. Has a Plan for Future Growth been submitted to NYSDEC?  Yes  No If yes, date submitted: \_\_\_\_\_
- e. Has the WWTF discharge exceeded the SPDES permit effluent limit for BOD, CBOD, Ultimate Oxygen Demand or Total Suspended Solids for any four or more months during two consecutive calendar quarters, or (for facilities with quarterly monitoring) for two consecutive quarters?  Yes  No

**Section 3 - Implementation of Plan for Future Growth and Sewer Moratorium:**

If the answers to **BOTH 2c and 2e** are **Yes**, the permittee must begin implementation of the Plan for Future Growth and immediately cease the approval of further sewer connections to the WWTF in accordance with 6 NYCRR 750-2.9(c)(3).

**Section 4 - Additional Information:**

- a. Is the WWTF currently under an Order on Consent to address flow and/or loading concerns?  Yes  No
- b. Are additional comments and explanations attached to this form?  Yes  No

**Certification Statement**

*"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."*

Print Name: Bob Winkler Title: Supervisor

Signature: [Signature] Date: 6/11/12

This form must be signed by the **Chief Fiscal Officer** of the permittee (NOTE: refer to instructions for qualifying individuals)



## TOWN OF MONTGOMERY

110 BRACKEN ROAD  
MONTGOMERY, NEW YORK 12549

Tel: (845) 457-2600 • Fax (845) 457-2603  
email: rwinchell@townofmontgomery.com

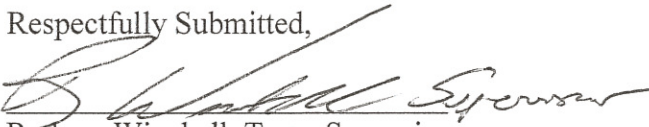
**Rodney Winchell** Supervisor

June, 11, 2019

Additional comments to “WWTF Design, Planning and Flow Management 2018 Annual Certification Form”:

- Redesign of previously approved, but expired WWTF expansion is near completion by Bipin Gandhi, PC for planned submittal to NYSDEC by September 2019.
- Previous WWTF expansion was for total capacity of 0.25 MGD, while newly proposed expansion is for total capacity of 0.30 MGD.
- Upon approval, the plan will immediately let for bid.
- Camera inspection of oldest segment of collection system was performed the week of May 28. A significant source of infiltration was discovered and repaired on June 5.

Respectfully Submitted,



Rodney Winchell, Town Supervisor

## NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Water, Region 3  
100 Hillside Avenue, Suite 1W, White Plains, NY 10603  
P: (914) 428-2505 | F: (914) 428-0323  
www.dec.ny.gov

**Sent via U.S. Mail & E-Mail**

May 30, 2019

Michael J. Aiello, PE, PLLC  
Consulting Engineer  
P.O. Box 226  
Montgomery, NY 12549

Re: POTW Design, Planning and Flow Management Annual Certification  
Town of Montgomery Sewer District No. 1 Sewage Treatment Plant  
Town of Montgomery, Orange County  
SPDES Permit No. NY0247782

Dear Mr. Aiello:

In response to your letter dated May 13, 2019, the Department has determined that the Town **cannot** amend the design flow of the above-referenced facility to 0.170 MGD in the 2018 Annual Certification Form.

The limiting flow capacity of 0.170 MGD, indicated in the hydraulic capacity analysis of the facility expansion (Neelytown WWTP) performed by Camp, Dresser & McKee dated October 27, 2008 and on the Department's letter dated December 24, 2008, is based only on the hydraulic capacity of the facility and does not consider treatment. In fact, when treatment is considered, the analysis determined that the organic capacity of the rotating biological contactors is 150,700 GPD and that the chlorination tank provides 14.1 minutes of contact time at maximum rate of pumpage, less than the minimum 15-minute contact period required by Department accepted standards. The analysis only concludes that Neelytown WWTP can accommodate monthly average flows of 147,500 GPD.

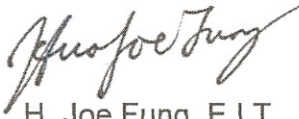
Pursuant to Title 40 of the Code of Federal Regulations § 122.45(b)(1) and Title 6 of the New York Codes, Rules and Regulations (6 NYCRR) § 750-1.11(a)(9), the permit limitation for monthly average Flow is the design flow of the facility. **Therefore, the Town must revise the design flow of the facility to 0.1475 MGD on the 2018 Annual Certification Form and resubmit the form.** As such, since the annual average flow for 2018 to the facility, 0.1460 MGD, exceeded 0.1401 MGD, 95 percent of the 0.1475 MGD design flow, a Flow Management Plan must be submitted to the Department **by August 1, 2019** as prescribed in 6 NYCRR § 750-2.9(c)(1).

Should you have any questions, please contact me at (914) 803-8140.



Department of  
Environmental  
Conservation

Sincerely,

A handwritten signature in black ink, appearing to read "H. Joe Fung". The signature is written in a cursive, flowing style.

H. Joe Fung, E.I.T.  
Assistant Engineer

Ecc: Lorraine Holdridge, P.E., Regional Water Engineer, NYSDEC  
Manju Cherian, P.E., Professional Engineer 1, NYSDEC  
Cc: Supervisor and Town Board, Town of Montgomery

---

PO Box 226  
Montgomery, NY 12549  
(845) 778-0230

May 13, 2019

NYSDEC DOW  
Attn: Lorraine Holdridge, PE, RWE  
21 South Putt Corners Road  
New Paltz, NY 12561

Re: SPDES 0247782

Dear Ms. Holdridge,

With reference to the attached notification requiring the Town of Montgomery to prepare and implement a Flow Management Plan, we are requesting a determination as to whether this facility has in fact surpassed 95% of its design flow based on communication between the office of Camp, Dresser, McKee (CDM) and your Department from 2008 and 2009, which is also attached.

Specifically, circa 1998 this office was associated with the most recent 125,000 GPD WWTP expansion design that is currently still in operation. It was designed to operate as a parallel treatment train in conjunction with the original 25,000 GPD facility for a total facility design capacity of 150,000 GPD, based on unusually high influent concentration levels provided by the Town at the time, but levels which did not continue in the ensuing years. Later, in 2008, CDM was hired by the Town to design an expanded replacement of the entire facility. As part of its work it also assessed the existing facility and concluded the latest 125,000 GPD treatment train actually has a capacity of 170,000 GPD, and the Regional Water Engineer concurred with CMD's findings.


Therefore, in consideration of this is it possible for the Town to amend its Annual Flow Certification to state the design flow of the current facility is at least 0.170 GPD? In fact, a case can be made the total capacity of the permitted facility is actually 0.195 MGD when including the original 25,000 GPD. Such a revision would negate the requirement of preparing a formal Flow Management Plan. Please be advised however that many components of a flow management plan are currently being practiced, such as:

1. New expansion/replacement design plans of the entire facility are nearing completion by Bipin Gandhi, PC as the CDM design had previously been considered too costly by the Town Board.
2. An advanced metering system of all customers and sewage pump stations has been in place for almost a year and has identified at least one area of approximately 25,000 GPD of extraneous flow. Video monitoring is presently being scheduled to further locate and repair any sources of infiltration.

3. This same metering system allows both the Town and every customer to access its accounts and monitor hourly consumption each day, thereby promoting water conservation that translates to less sewage generation.

We have also attached the most recent Annual Flow Certification that reflects 0.150 MGD as the design flow. The Flow Management Plan of 7/27/2011 that is referenced in the certification pertains to the aforementioned CDM design plans and has been referenced in the annual certifications every year since. Thank you for considering this request and please contact this office if you have any questions.

Very truly yours,



Michael J. Aiello Jr., PE

cc: Town of Montgomery  
Austin Dubois, Esq  
NYSDEC DOW White Plains

# *APPENDIX A2*

## *6/17/2019 Memorandum on I&I Repair and Flow Reduction*

# Memorandum

**Date:** June 17, 2019  
**To:** Montgomery Town Board, Rod Winchell, Supervisor  
**CC:** Town Clerk, Austin Dubois, Esq, Stephanie Tunic, Esq.  
**Re:** Condition of Sewage Collection System

---

The recent repair to the sewer main in Sewer District 1 (SD1) yielded instant results that has reduced extraneous flow by at least 15,000 gallons per day, thereby increasing capacity at the treatment plant by that same volume. The camera work that identified the hole in the pipe also revealed the extent of deterioration from sewer gases within the concrete main, which is over 40 years old. The most recent hole was the third such repair on this segment of the sewer main. While we cannot evaluate the structural integrity of the piping or how much longer it will last, we can only assume that other cracks and holes are actively developing along the 6700 ft stretch of pipe and will eventually result in additional infiltration if not actual collapse. As such, at a minimum, we strongly recommend that planning for a pipe lining project begin. However, other issues that should be considered along with this are:

1. Capacity of this sewer main is restricted by the combination of its minimum size (8 inches) and minimum slope (0.4%) along certain segments. Therefore, if capital planning is made for pipe lining, perhaps a further investment is warranted at the same time into increasing the size of the main – via pipe bursting or other methods – before future demands upstream from these sewers surpass the current capacity.
2. The growing commercial corridor of Route 208 and Hawkins Drive and the rest of Sewer District 2 are still forced to utilize septic tanks due to the sag that was discovered and documented in 2014 within the principal sewer trunk line along Route 208. This sewer main is also of minimal 8-inch size.
3. There is interest in developing lands at the easterly end of Bracken Road, near the bend. These properties are within SD2 but have no immediate access to the sewer system; the closest point of sewer connection being approximately 1500 feet away. The Town owns land at the low elevation point on Bracken Rd at the Water 2B pump house, which is an ideal site for a pump station that is necessary on this along road. Planning for a pump station at this location should be contemplated.
4. The age and condition of the 17K Pump Station (17KPS) should also be taken into consideration, as a strategically placed pump station on Bracken Rd could address rehabilitation and capacity needs here as well.

Therefore, we believe a comprehensive but independent evaluation of the system is warranted.

# *APPENDIX A3*

## *2018 WWTF Flow Summary*

**TOWN OF MONTGOMERY**  
**WASTEWATER TREATMENT FACILITY DESIGN, PLANNING AND FLOW MANAGEMENT ANNUAL**  
**CERTIFICATION FORM**

2018	FLOW		BOD	TSS	BOD	TSS	Flow >95% of SPDES = 0.140125 MGD
	SPDES LIMIT	12-month running average	Effluent LB/DAY	Effluent LB/DAY	Effluent MG/L	Effluent MG/L	
	0.1475 MGD		36.9 LB MO AVG 55.4 LB/DAY AVG	36.9 LB MO AVG 55.4 LB/DAY AVG	30/45	30/45	
Jan	0.1260	0.1188	11.10	24.20	11.00	24.00	
Feb*	0.1541	0.1188	12.90	27.00	10.00	21.00	0.1541
Mar*	0.1689	0.1206	18.30	18.30	13.00	13.00	0.1689
Apr*	0.1518	0.1186	10.60	16.50	8.40	13.00	0.1518
May	0.1489	0.1217	5.00	5.00	4.00	4.00	0.1489
Jun	0.1285	0.1231	6.10	10.70	5.70	10.00	
Jul	0.1279	0.1252	9.10	3.90	8.50	3.70	
Aug*	0.1484	0.1288	6.20	9.50	5.00	7.70	0.1484
Sep	0.1320	0.1312	5.00	4.40	4.50	4.00	
Oct	0.1351	0.134	8.00	7.20	7.10	6.40	
Nov*	0.1717	0.1402	8.90	9.70	6.20	6.80	0.1717
Dec	0.1445	0.1444	9.60	18.10	8.00	15.00	0.1445
<b>Average</b>	<b>0.1448</b>	<b>0.1271</b>	<b>*NOTE: SPDES violation of monthly average of 0.1475 MGD: annual average in compliance</b>				

95% of SPDES:  $0.1475 \times 95\% = 0.140125$  MGD

Section 1 - Flow: Compare the annual average flow to the flow limit in the permit: All flow calculations must be based on total flow. For wastewater treatment facilities (WWTF) with one monthly average flow limit, calculate the average annual flow by averaging the 12 monthly average flows reported on the monthly DMRs for calendar year 2018.

# *APPENDIX A4*

## *WWTF ADF Post I&I Repair*

Town of Montgomery  
Wastewater Treatment Facility  
Flow Management Plan

9/12/2019

**Appendix A4**

<b>TOWN OF MONTGOMERY - WWTF ADF POST I&amp;I REPAIR</b>			
<b>Day</b>	<b>Date</b>	<b>Average Daily Flow (MGD)</b>	<b>Notes</b>
We	6/5/2019	0.128	
Th	6/6/2019	0.118	I&I Repair Conducted
Fr	6/7/2019	0.136	
Sa	6/8/2019	0.108	
Su	6/9/2019	0.098	
Mo	6/10/2019	0.118	
Tu	6/11/2019	0.117	
We	6/12/2019	0.134	
Th	6/13/2019	0.118	
Fr	6/14/2019	0.116	
Sa	6/15/2019	0.097	
Su	6/16/2019	0.081	
Mo	6/17/2019	0.111	
Tu	6/18/2019	0.142	
We	6/19/2019	0.142	
Th	6/20/2019	0.133	
Fr	6/21/2019	0.124	
Sa	6/22/2019	0.101	
Su	6/23/2019	0.091	
Mo	6/24/2019	0.117	
Tu	6/25/2019	0.108	
We	6/26/2019	0.111	
Th	6/27/2019	0.103	
Fr	6/28/2019	0.131	
Sa	6/29/2019	0.090	
Su	6/30/2019	0.091	
Mo	7/1/2019	0.101	
Tu	7/2/2019	0.100	
We	7/3/2019	0.117	
Th	7/4/2019	0.085	
Fr	7/5/2019	0.109	
Sa	7/6/2019	0.082	
Su	7/7/2019	0.082	
Mo	7/8/2019	0.088	
Tu	7/9/2019	0.099	
We	7/10/2019	0.107	
Th	7/11/2019	0.100	
Fr	7/12/2019	0.102	
Sa	7/13/2019	0.087	
Su	7/14/2019	0.075	

Town of Montgomery  
Wastewater Treatment Facility  
Flow Management Plan

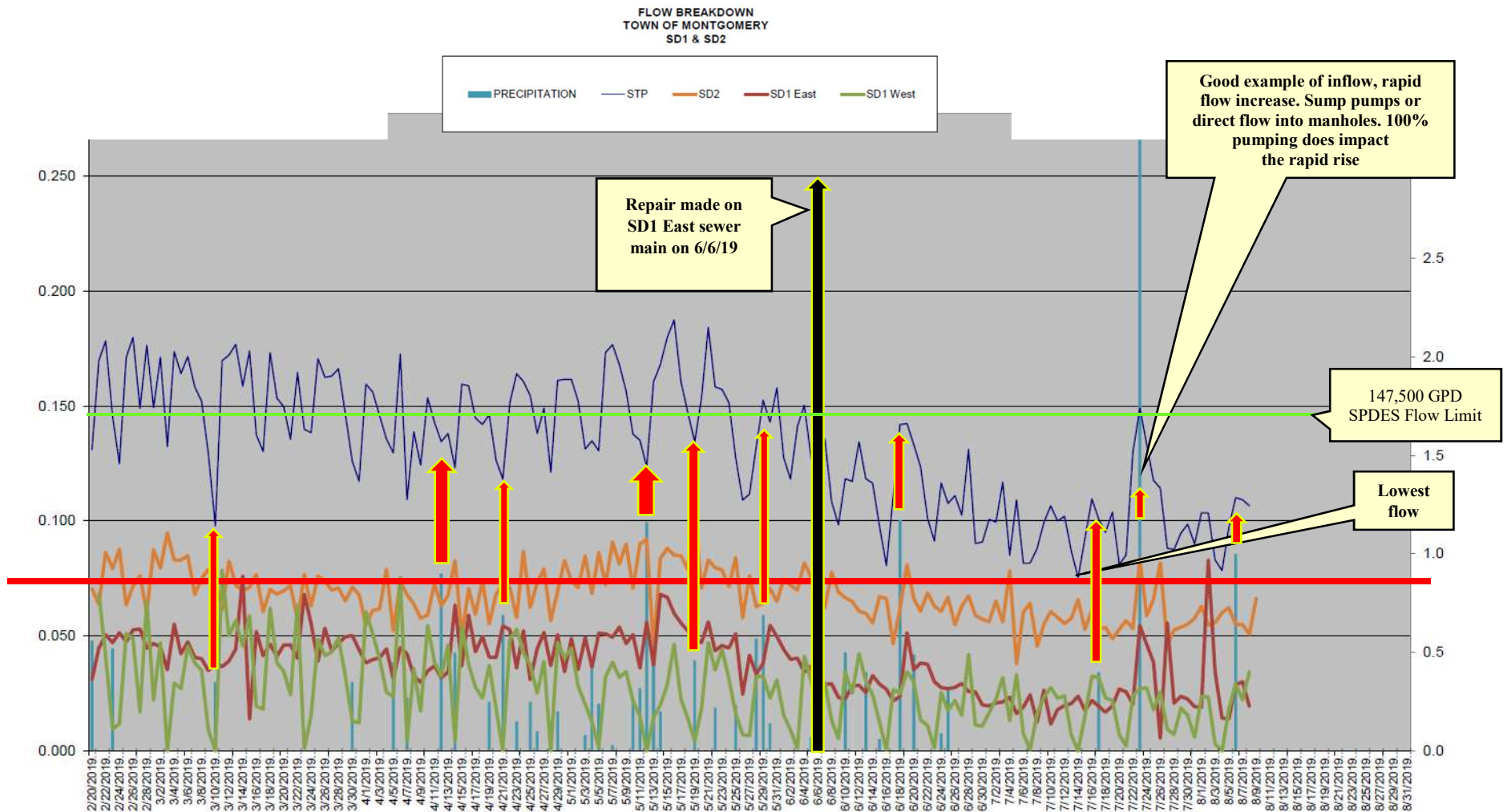
9/12/2019

**Appendix A4**

<b>Town of Montgomery - WWTF ADF Post I&amp;I Repair (Continued)</b>			
Mo	7/15/2019	0.092	
Tu	7/16/2019	0.110	
We	7/17/2019	0.101	
Th	7/18/2019	0.095	
Fr	7/19/2019	0.104	
Sa	7/20/2019	0.081	
Su	7/21/2019	0.085	
Mo	7/22/2019	0.130	
Tu	7/23/2019	0.149	
We	7/24/2019	0.133	
Th	7/25/2019	0.118	
Fr	7/26/2019	0.114	
Sa	7/27/2019	0.088	
Su	7/28/2019	0.088	
Mo	7/29/2019	0.095	
Tu	7/30/2019	0.099	
We	7/31/2019	0.090	
Th	8/1/2019	0.104	
Fr	8/2/2019	0.104	
Sa	8/3/2019	0.083	
Su	8/4/2019	0.078	
Mo	8/5/2019	0.097	
Tu	8/6/2019	0.110	
We	8/7/2019	0.109	
Th	8/8/2019	0.107	
Fr	8/9/2019	0.121	
Sa	8/10/2019	0.090	
Su	8/11/2019	0.088	
Mo	8/12/2019	0.097	
Tu	8/13/2019	0.101	
We	8/14/2019	0.114	
Th	8/15/2019	0.108	
Fr	8/16/2019	0.110	
Sa	8/17/2019	0.090	
Su	8/18/2019	0.093	
Mo	8/19/2019	0.107	
Tu	8/20/2019	0.113	
<b>Average =</b>		<b>0.1051</b>	

# *APPENDIX A5*

## *2019 WWTF Flow Breakdown Graph*



- 1.) Appears that flow never goes to zero, this is unusual?
- 2.) Do we know when the last calibration of the WWTP flow meter took place?
- 3.) Flow drops off after 6/6/19 showing reduction at WWTP
- 4.) Red/yellow arrow = rain impact →
- 5.) All flows drop post 6/6/19.
- 6.) Significant pumping peaks post 8/5/19 after dramatic wet weather event and following days; potential for sump pumps from wet basements.

# *APPENDIX A6*

*Inflow & Infiltration Removal Plan  
(July 27, 2011)*

*(Includes CDM 12/5/2008 Sewer Collection  
System I/I Assessment Study Report and  
Includes Addendum to I/I Removal Plan  
12/14/2012 Prepared by Mike Aiello, P.E.)*

# TOWN OF MONTGOMERY

110 BRACKEN ROAD  
MONTGOMERY, NEW YORK 12549-2627



Fax (845) 457-2760  
www.townofmontgomery.com

Building (845) 457-2640  
Planning (845) 457-2643  
Zoning (845) 457-2644  
Engineer (845) 457-2642

## **INFLOW AND INFILTRATION REMOVAL PLAN**

**SERVING**

**SANITARY SEWER DISTRICTS**

**WITHIN**

**TOWN OF MONTGOMERY  
COUNTY OF ORANGE  
STATE OF NEW YORK**

**JULY 27, 2011**

**Prepared By:**

**MICHAEL J. AIELLO, PE, PLLC  
PO Box 226  
Montgomery, NY 12549**

*This report is prepared pursuant to the conditions of amended SPDES Permit NY-027782 for the Town of Montgomery Sewer District #1 STP, and has been prepared to address the requirement of ongoing sewer assessment for the purpose of controlling inflow and infiltration.*

## Introduction

In an effort to identify and address inflow and infiltration (I/I) that is present within its sewage collection system, the Town of Montgomery (Town) contracted with Camp Dresser & McKee (CDM) in 2008 to prepare an assessment study of its Sewer Districts 1 and 2. The findings in the CDM report remain relevant today. In an effort to avoid redundancy and duplicity, this report is attached. Review of the attached report is recommended at this time.

A synopsis of the CDM report with updated information follows.

## System Description

The collection system serving the two sewer districts consists of two means of conveyance: gravity and pressure forcemain.

Sewer District 2 (SD2) was originally established as a septic tank effluent system prior to it sending its flows to Sewer District 1 (SD1). Flow is conveyed via both septic tank effluent gravity (STEG) lines and septic tank effluent pump (STEP) forcemains. 3 (three) pump stations convey the sewage, in series and in combination with gravity lines, to SD1. The approximate total length of SD2 sewer is 30,500 lineal feet consisting of the following:

- 5700 LF of 8" STEG
- 8450 LF of 4" STEG
- 2500 LF of 6" STEP
- 13,900 FL of 4" STEP
- 35 manholes
- 125 septic tanks

The septic tanks within this district are accessible from grade without lockable or watertight lids. This alone has the potential to contribute significantly to inflow. However, the ability to observe and monitor flow in the 4" STEG lines that follow the septic tanks is severely restricted due to the small diameter pipe and limited access to the piping from grade.

Sewer District 1 is more conventional as it receives raw, unsettled sewage from its customers. SD1 consists of 4300 LF of 8" gravity main with 14 manholes. Downstream of this gravity collection system is the 1 (one) municipal pump station (Truckstop Pump Station) that conveys the sewage, including that from SD2, thru 12,800 feet of 6" forcemain to the sewage treatment plant (STP). Along the forcemain run are 8 (eight) industrial customers that pump its domestic wastewater directly into the forcemain.

## Flow Monitoring

The first step in reducing I/I is to identify, as narrowly as possible, the areas contributing to extraneous flow. As such, it is necessary to continuously monitor flows at critical locations where base flows can be determined and compared against flows following precipitation events and elevated groundwater. The data from which CDM prepared its findings were based upon approximated flows that were provided to it by the Town from data collected at select pump stations. That is, the flow figures CDM was provided were only approximations based upon computations of either run times of sewage pumps multiplied by its capacity or from a linear regression analysis of certain pump station's electricity usage. Both methods provide indication as to when flows significantly increased from the previous day, but the values themselves are limited in accuracy due to many variables such as intermittent restrictions in the discharge lines that may reduce the capacity of the pumps, or the reduction in capacity of any individual pump when high flows might trigger the operation of the 2<sup>nd</sup> pump in the station, thereby reducing the discharge rate of both. The ideal method to monitor flows, therefore, is to truly meter it.

In order to more accurately differentiate between inflow and infiltration, flow data must also be available in hourly time increments if not more frequently, rather than daily cumulative values that is currently the only way possible. The only practical means to accomplish this is by utilizing chart recorders or other means to plot flow patterns. Trends associated with flow patterns can then be analyzed to differentiate between inflow and infiltration, at which point sub-areas may then be prioritized in order of highest concern to study further.

With patterned flow data available, it can then be determined what additional studies of the upstream collection systems are required. These subsequent evaluations can consist of measures such as, but not limited to smoke testing that can identify sources of direct inflow to closed-circuit television (CCTV) inspection of the sewer mains that identify sources of infiltration or indirect inflow.

## Investigation and Repairs to Date

CDM identified the major route of entry as the gravity collection system upstream of the Truckstop Pump Station. Chemical grouting and cement lining of select manholes was performed in the winter of 2011 after heavy infiltration was identified. These manholes had received attention and similar treatment in the past. Therefore, a more durable, long-term method of treatment is recommended such as urethane lining.

CCTV recording was performed within this entire system, as well as 2000' upstream of the Morrison Heights Pump Station, in the spring of 2011 during a period of higher flow at the STP. Some sources of infiltration were identified within the sewer and quotations for repairs are being sought. However, it did not appear to be as significant as the CDM report suspected. In order to determine the full extent of extraneous flow within this corridor comparisons must be made of real-time flow data.

### Available Resources

The Town of Montgomery's sewer system is not town wide, but within the limited confines of two special districts (SD1 and SD2). Funds for capital improvements or corrective measures are restricted to that which can be legally collected by the limited tax base.

The Town employs two personnel that are assigned to the routine tasks of operation and maintenance of the sewer system as well as the Town's multiple water systems:

- NYSDEC licensed wastewater treatment plant operator.
- General laborer assigned to grounds keeping and routine maintenance and repairs.

Both report to the Town Board thru the Town Supervisor who is also the special districts' financial officer. Technical and operational guidance is provided by the Town's engineer, also a licensed NYSDEC wastewater operator, who provides managerial and administrative oversight to the sewer and water systems. The engineer also reports to the Town Board thru the Supervisor. Records, mapping, reports and documentation of the collection system are filed in the sewer/water office at the Town Hall. The Town provides wireless cellular telephones with direct-connect two-way radio for all employees, as well as a utility vehicle for each.

In the absence of a formal department of public works, the Town's Highway Department provides excavation and labor assistance when available. However, for significant emergency repairs or improvement projects beyond the resources of the Highway Department, private contractors are used.

Of the 4 (four) sewer pump stations, two (Truckstop and Morrison Heights) are served with stationary, on-site generators that provide auxiliary power during utility interruptions. A portable 3-phase generator is available for one of the remaining pump stations (Route 17K), but is not capable of providing single phase power for the Lake Vue Pump Station. The Lake Vue Pump Station,

however, has a wet well volume capable of providing 24-hours of retention in the event of a power failure.

All sewage pump stations are centrally monitored for utility power failure and high sewage level alarms such that personnel are contacted and can respond before a sanitary sewer overflow (SSO) occurs. All pump stations are alternating duplex systems consisting of an available pump if one fails. The contact list for the central monitoring alarm company is updated as necessary and is also provided to the Town's police department dispatcher.

Assorted pipe material and associated fittings are centrally stocked and sorted, and available for emergency repairs.

### Measures and Activities to Assure Ongoing Assessment

#### 1. System Mapping

Mapping of the collection system is prepared by the Town's engineer utilizing AutoCAD software. An official paper Record Drawing is available in the Sewer Dept. Office at the Town Hall. Additional copies are available at the STP. When extensions to the system are constructed, all additions will be hand noted on the official Record Drawing and the digital AutoCAD drawing will be routinely amended as required.

#### 2. Preventive Operational Maintenance

The sewer personnel's primary responsibility, other than daily operation and maintenance of the STP, is the monitoring and grounds keeping of the sewage pump stations.

- Pump stations are monitored daily. Cumulative flow and other data is collected by sewer personnel and compiled in spreadsheet format by the Town's engineer for continuous observation of flow trends.
- Following severe precipitation or when the flow trend indicates the presence of extraneous flows, manholes are inspected and visual observations noted.
- Maintenance to problem manholes are prioritized dependent on the extent of extraneous flow that is observed.
- In the event of SSO from excessive I/I or pump station failure, NYSDEC is notified and Non-Compliance Report is filed with the NYSDEC region.

- Other data that is collected at each pump station is the number of hours each pump has run, which indicates if there is a pending problem with a pump before such an issue reaches a critical stage.

### 3. Scheduled Maintenance

- Flow metering will be installed at critical locations of the collection/conveyance system for continuous 24-hour monitoring.
- Manholes contributing to I/I will be sealed with the most cost-effective technology available by private contractor. Where significant I/I is not observed within actual manholes, sewer line cleaning and CCTV by private contractor will be scheduled for gravity sewer lines that are hydraulically upstream of metering points.
- Where extraneous flow is more indicative of inflow versus infiltration, smoke testing by private contractor will be scheduled.

#### Work Completed to Date

- Select manholes have been sealed with both chemical grouting and cement lining.
- Manhole lid inserts have been purchased and installed beneath manhole lids known to contribute to inflow, those with open keyways.
- Select concrete septic tank access lids have been replaced with screw-down polyethylene lids, which provide a watertight seal.
- 6000 ft of 8" gravity main has been cleaned and recorded with CCTV.
- Base mapping completed.

#### Schedule of Achievable Goals for Remaining Work

- Complete skeletal mapping of the collection system and identify the practical locations for flow metering – **completion Dec. 2011**
- Continue the replacement of concrete septic tank access lids with watertight polyethylene lids. – **completion Dec. 2011**
- Continue the installation of manhole lid inserts – **completion Dec. 2011**
- Budget flow metering funds for availability in 2012 – **Nov. 2011**
- Install flow meters at critical locations – **Feb. – Jun. 2012**

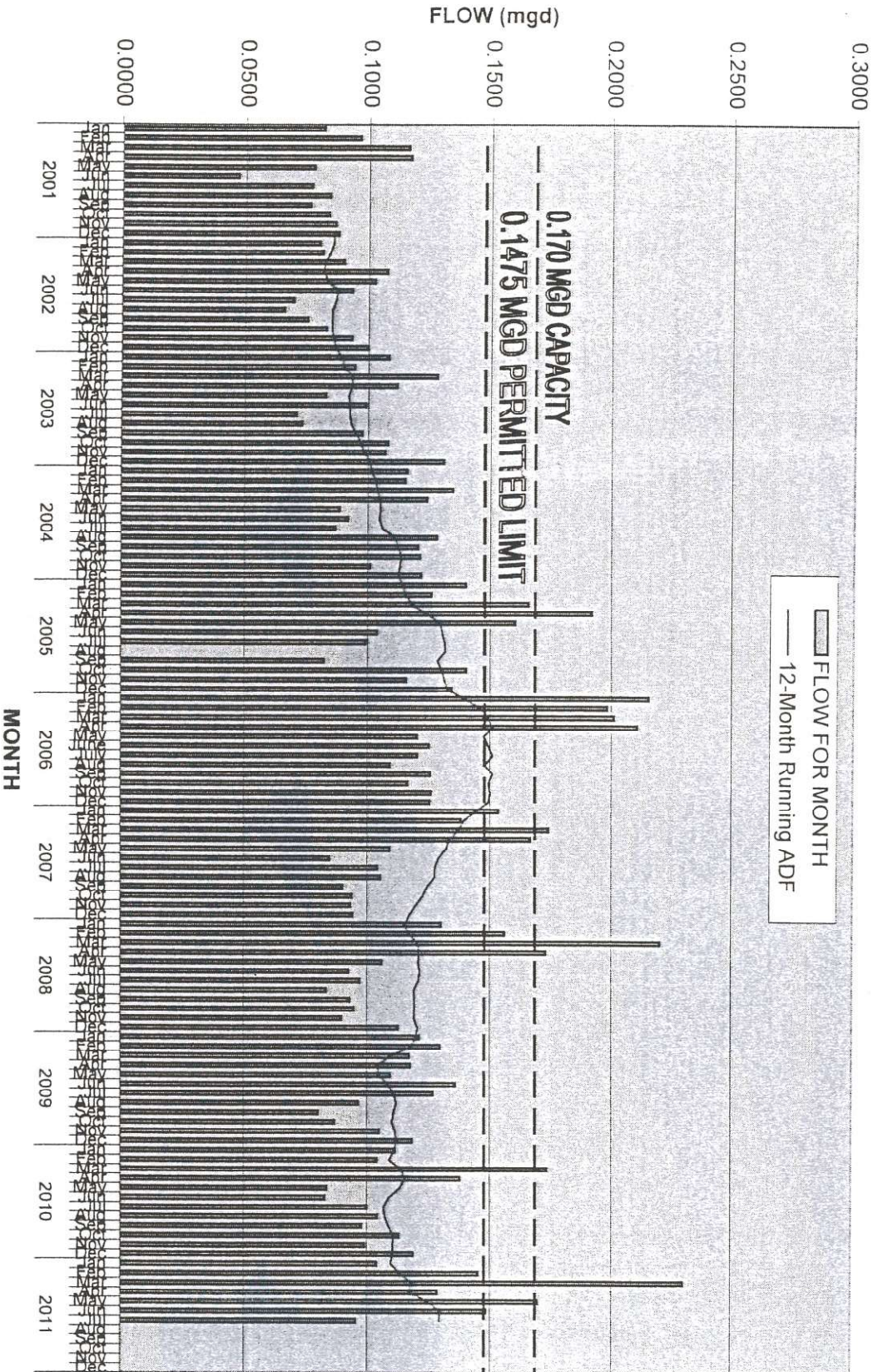
- Apply more durable and corrosion resistant manhole treatment to select manholes – **Apr. - Sep. 2012**
- Evaluate extended flow data to isolate further areas of I/I – **Continuous**
- Budget funds for availability in subsequent years for further corrective actions following evaluation of anti-I/I measures performed to that point – **Annually**

### Conclusion

It is suspected that the majority of I/I is within the small diameter STEG collection system of the Route 17K sub-area, while the full extent of extraneous flow within the SD1 Truckstop sub-area is not conclusive at this time. In order to conclusively quantify the extraneous flow and prioritize areas of further study and repairs, real-time flow data is necessary over an extended period of time. Flow comparisons must be made between upstream and down-stream sub-areas to determine the extent of extraneous flow between the physical points of metering. The critical locations to install flow monitoring are the Truckstop, Morrison Heights and Route 17K Pump Stations.

Industry standard corrective measures will continue to be implemented while future flow patterns will be monitored continuously to determine the effectiveness of such measures. Where extraneous flows persist, further investigation will be targeted to more isolated corridors of the system.

# MONTGOMERY STP 1 FLOW HISTORY





1375 Broadway, Suite 1401  
New York, New York 10018  
tel: 212 221-9462  
fax: 212 221-9540

December 5, 2008

The Hon. Michael Hayes, Town Supervisor  
Government Center  
Town of Montgomery  
110 Bracken Road  
Montgomery, NY 12549

Subject: Task Order No. 2  
Sewer Collection System I/I Assessment Study Report

Dear Mr. Hayes:

CDM has completed a review of available data for Sewer Districts No. 1 and No. 2 in the Town of Montgomery for the period December 2003 through October 2008. The purpose of the review is to identify regions of Sewer Districts No. 1 and No. 2 susceptible to infiltration and inflow (I/I). In addition to the flow data available for the Town's pump station and wastewater treatment facility, CDM reviewed available rainfall and groundwater data, collection system construction records, and topographical surveys of the area. This letter report summarizes the findings of the data review and provides recommendations for corrective actions and further investigation.

#### **Executive Summary**

Available pump station records indicate that the Town's wastewater collection system experiences elevated flows during periods of high groundwater and precipitation. Pump station records suggest that while manhole rehabilitation work recently undertaken by the Town has reduced I/I entering the collection system in the area upstream of the Morrison Heights Pump Station, large quantities of extraneous flows are still entering the collection system. The majority of these flows appear to be introduced in the area immediately upstream of the Truck Stop Pump Station. Stormwater and groundwater entering the collection system in this area can result in flows 0.17 to 0.22 MGD recorded at the pump station during moderate precipitation events (1.5 to 2.8 inches). This is significant as these values do not include areas downstream that normally contribute approximately 30% of the baseline sanitary flow treated at the Neelytown WWTP, which is only permitted to handle flows of 0.125 MGD. Furthermore, the extent of I/I entering the collection immediately upstream of the treatment facility is unknown at this time.

Smaller though significant quantities of non-sanitary flow also enter the collection system in the area upstream of the Route 17K Pump Station. The collection system in this area uses an alternative design intended to minimize groundwater and stormwater intrusion. While wet weather flows under moderate precipitation may represent only 1.3 to 2.2 times the average dry weather flows in this area, infiltration/inflow is a concern as it may result backups in the small-diameter sewer, which may in turn cause backups in residential septic tanks as was observed in October 2005.

CDM recommends further study of the collection area, which includes targeted flow monitoring along with cleaning and inspection of the Town's gravity sewer collection system. The intent of these additional investigations is to identify areas susceptible to groundwater/ stormwater intrusion and to develop appropriate rehabilitation strategies that may ultimately increase the capacity of the existing collection system.



Mr. Michael Hayes  
December 5, 2008  
Page 2

## Background

The Town of Montgomery operates a combination conventional gravity, Septic Tank Effluent Gravity (STEG), and Septic Tank Effluent Pumped (STEP) sewer system (see Figures 1 and 2 attached). The conventional gravity sewer portion of the collection system is comprised of approximately 4,000 linear feet of 8-inch asbestos cement pipe and at least 13 manholes in the vicinity of County Route 208 in the primarily industrial Sewer District No. 1. Users connected to this system are the Super 8 Motel, CCX, Storage Town, Penske, and the Truck Stop. Based on available information, the conventional gravity sewer portion of the collection system was constructed in 1977.

The STEG component of the collection system is confined mostly to the residential areas of Sewer District No. 2 and to a small portion of Sewer District No. 1. In Sewer District No. 2 this system is located along Carmen Lane, Lake Vue Road, portions of Route 17K, a short section of Fedorko Lane, and the western half of NYS Highway 208, where the gravity sewer is 4-inch diameter PVC. A modified version of the STEG system is located along the eastern half of NYS Highway 208 and Hawkins Drive in Sewer District No. 2 and along the northern section of County Route 208, south of Interstate 84. This portion is comprised of larger diameter gravity (6- and 8-inch diameter) sewer. Another difference is that the larger diameter sewer has standard manholes while access to the 4-inch sewer is via 4-inch cleanouts.

Private connections to the STEG collection system discharge wastewater to septic tanks that provide primary treatment and allow the bulk of the solid materials to settle out. Effluent pumps at each septic tank discharge only the liquid portion of the effluent to a small-diameter (4-inch) gravity sewer, which conveys flow to a downstream pump station. These pump stations, from upstream to downstream, are as follows:

- Lake Vue Pump Station
- Route 17K Pump Station
- Morrison Heights Pump Station
- Truck Stop Pump Station

The STEP portion of the collection system runs along Fedorko Lane, Leonards Drive, and Bracken Road in Sewer District No. 2 and in Sewer District No. 1 from the Truck Stop Pump Station to the Neelytown WWTP. Effluent pumps at septic tanks in this portion of the system serve as individual pump stations to transport flows under pressure to a gravity sewer main (Sewer District No. 2) or to the treatment facility (Sewer District No. 1).

The alternative STEP/STEG collection system was constructed in 1984 under an EPA-funded innovative and alternate technology grant. There are several advantages of such collection systems, particularly for rural or low-density areas which include:

- Primary treatment and retention of solids in septic tanks allows for the use of less expensive smaller diameter pipe than conventional sewers.
- The elimination of manholes along gravity sewer lines, which can be a major source of infiltration
- The retention of solids in individual septic tanks eliminates the requirement for minimum scouring velocities. Consequently, the gravity portions of the collection system do not have to continuously



Mr. Michael Hayes  
December 5, 2008  
Page 3

slope downward like conventional sewers, significantly reducing the costs associated with excavation during installation.

- Since the mainline sewer does not need to be continuously sloped downwards, sewer pipe can be installed at shallower depths, reducing the probability of placement below groundwater tables, thereby minimizing groundwater intrusion.

While alternative collection systems can significantly reduce capital costs for small communities, operational problems related to excessive I/I can arise in systems designed to serve existing neighborhoods as discussed further in the analysis presented below.

#### **Problems Observed in the Town of Montgomery's Collection System**

The Town has experienced occasional high flow rates at their pump stations, particularly at the Truck Stop Pump Station. A total of twenty-five such incidents were observed at the Truck Stop Pump Station between December 2003 and January 2006, however only one of these high level events resulted in overflow (January 14, 2005). Fourteen of these incidents occurred during or within one or two days of significant precipitation (i.e. greater than 0.2 inches). One incident was reported at the Route 17K Pump Station (October 29, 2005) and at the Morrison Heights Pump Station (December 3, 2005), however these were not associated with high precipitation and were determined to be caused by mechanical breakdowns and not capacity issues.

In order to investigate potential sources of extraneous flows to their collection system, in July 2004 the Town inspected via closed-circuit television 1,300 feet of 4-inch sewer upstream of the Morrison Heights Pump Station and 1,100 feet of 8-inch sanitary sewer along a utility easement on the CCX property. Attempts were made to inspect an additional 2,500 feet of 8-inch and 5,900 feet of 4-inch sewer, however these segments were found to be inaccessible to inspection equipment. It is also noted that this inaccessible section of 8-inch sewer has a history of back-ups during heavy rainfall.

The Town also rehabilitated four manholes upstream of the Truck Stop Pump Station with chemical grout in an attempt to reduce infiltration entering the collection system. Since this work was completed on February 1, 2006, no further overflows or high flow events have been reported at any of the Town's pump stations.

#### **Estimation of I/I Rates in the Town of Montgomery's Collection System**

##### **Evaluation of I/I Contribution by Collection System Sub-Areas**

In order to evaluate the extent of extraneous flows treated by the Neelytown WWTP during precipitation events, CDM analyzed flow data from each of the Town's pump stations during precipitation events. Baseline flows were established for each collection sub-area based on average per capita rates of 70 gpd<sup>1</sup>. Flow contributions for commercial users were estimated based on fifty percent of flow allocations and flows from industrial users were based on available water meter readings from 2003 through 2008.

---

<sup>1</sup> WEF Manual of Practice FD-12: Alternative Sewer Systems, 2<sup>nd</sup> Edition



Mr. Michael Hayes  
 December 5, 2008  
 Page 4

Estimation of Infiltration Rates

Minimum infiltration rates were estimated by subtracting the established baseline flow for each sub-area (as defined by the pump station) from the average flow dry weather flows observed in September 2005 and March 2006 when the total precipitation was 0.78 and 0.62 inches, respectively. Maximum infiltration rates were estimated by deducting baseline flows from the average flows observed during periods where the regional groundwater elevations (based on available USGS data for Myers Grove, NY and New Paltz, NY) were seasonally high. Finally, infiltration rates were normalized with respect to pipe diameter and length for the gravity portions (conventional and STEG) of the collection system. This comparison was performed under the assumption that there is no infiltration in the pressurized portions of the collection system. A summary of these calculations is presented below:

Pump Station	Lake Vue	Route 17K	Morrison Heights	Truck Stop
Baseline Sanitary Flow (MGD)	0.0031	0.0157	0.0364	0.0554
Average Dry Weather Flow (September 2005)	0.0062	0.0280	0.0388	0.0754
<b>Minimum Infiltration (MGD)</b>	<b>0.0031</b>	<b>0.0123</b>	<b>0.0024</b>	<b>0.0200</b>
Minimum Infiltration (gpd/idm)	4,113	3,633	222	3,080
Average Flow during Regionally High GW (October 16 to November 8, 2005)	0.0167	0.0375	0.1238	0.1431
X Dry Weather Flow	2.7	1.3	3.2	1.9
<b>Peak Infiltration (MGD)</b>	<b>0.0136</b>	<b>0.0218</b>	<b>0.0874</b>	<b>0.0878</b>
Peak Infiltration (gpd/idm)	18,128	6,432	8,179	13,485

Table 1 – Estimated Infiltration Rates Before Manhole Rehabilitation

Pump Station	Lake Vue	Route 17K	Morrison Heights	Truck Stop
Baseline Sanitary Flow (MGD)	0.0031	0.0157	0.0364	0.0554
Average Dry Weather Flow (March 2006)	0.0057	0.0330	0.0434	0.0913
<b>Minimum Infiltration (MGD)</b>	<b>0.0026</b>	<b>0.0173</b>	<b>0.0070</b>	<b>0.0359</b>
Minimum Infiltration (gpd/idm)	3,501	5,108	657	5,524
Average Flow during Regionally High GW (June 30 to July 13, 2006)	0.0067	0.0301	0.0470	0.1309
X Dry Weather Flow	1.2	0.9	1.1	1.4
<b>Peak Infiltration (MGD)</b>	<b>0.0036</b>	<b>0.0143</b>	<b>0.0106</b>	<b>0.0756</b>
Peak Infiltration (gpd/idm)	4,759	4,238	994	11,610

Table 2 – Estimated Infiltration Rates After Manhole Rehabilitation

Based on the data presented, the ratio of flows during high groundwater to the average dry weather flow decreased after manhole rehabilitation for all of the areas investigated (it must be noted that the average flow to the Truck Stop during dry weather appeared to have increased by 21% after the manhole rehabilitation work). The greatest decrease was observed in the collection area just upstream of the Morrison Heights Pump Station where flows at high groundwater levels decreased from 3 times



Mr. Michael Hayes  
 December 5, 2008  
 Page 5

(October to November 2005) to approximately the same (July 2006) as those observed during low rainfall and low groundwater (September 2005 and March 2006). It is unclear whether this reduction after February 2006 is due to improved maintenance of the collection system (such as the manhole rehabilitation work) or due to the higher regional groundwater elevations observed in 2005. For example, the average flow in the area of the collection system upstream of the Lake Vue and Route 17K Pump Stations were 2.7 and 1.3, respectively during the period of high regional groundwater elevation experienced in October-November 2006. Though these values decreased to 1.2 and 0.9, respectively for July 2006, no rehabilitation work was performed in these areas of the collection system.

Although no definitive conclusions can be made about the decrease in infiltration observed in the period after the manhole rehabilitation, it is apparent that groundwater infiltration appears to be a significant problem for most areas considering that an infiltration rate of 4,000 gpd/idm is considered excessive<sup>2</sup>. If the total volume of infiltration is considered, the area just upstream of the Truck stop Pump Station is of the greatest concern as it accounts for the majority of the extraneous flows experienced during the high groundwater/low precipitation period between June 30 and July 13, 2006.

Estimation of Inflow Rates

In order to determine whether the manhole rehabilitation work decreased inflow and/or rain-induced infiltration entering the system, flow data collected after periods of rainfall were evaluated. Inflow after select rain events was estimated by subtracting dry weather flow from the total flow observed during the period. The inflow entering each sub-area of the collection system was determined by subtracting the inflow entering upstream. These values are presented below:

	Lake Vue	Route 17K	Morrison Heights	Truck Stop
12/12/2003				
Total Flow (MG)	0.0089	0.0361	0.0772	0.1555
X Dry Weather Flow	1.4	1.3	2.0	2.1
Est. Inflow for Sub-Area (MG)	0.0027	0.0053	0.0303	0.0417
% of Total	3%	7%	38%	52%
Total Est. Inflow (gpd/idm)	3,637	1,574	2,836	6,414
% of Total	25%	11%	20%	44%
4/14/2004				
Total Flow (MG)	0.0078	0.0300	0.0602	0.1260
X Dry Weather Flow	1.3	1.1	1.6	1.7
Est. Inflow for Sub-Area (MG)	0.0017	0.0003	0.0194	0.0292
% of Total	3%	1%	38%	58%
Total Est. Inflow (gpd/idm)	2,201	78	1,819	4,487
% of Total	26%	1%	21%	52%

<sup>2</sup> Commonwealth of Massachusetts Department of Environmental Protection (1993) Guidelines for Performing Infiltration/Inflow Analyses and Sewer System Evaluation Survey



Mr. Michael Hayes  
 December 5, 2008  
 Page 6

	Lake Vue	Route 17K	Morrison Heights	Truck Stop
10/20/2004				
Total Flow (MG)	0.0070	0.0323	0.0690	0.1258
X Dry Weather Flow	1.1	1.2	1.8	1.7
Est. Inflow for Sub-Area (MG)	0.0008	0.0034	0.0260	0.0201
% of Total	2%	7%	52%	40%
Total Est. Inflow (gpd/idm)	1,125	998	2,290	3,341
% of Total	16%	12%	29%	42%

Table 3 – Estimated Rates of Inflow/Rain-Induced Infiltration Before Manhole Rehabilitation

	Lake Vue	Route 17K	Morrison Heights	Truck Stop
6/29/2006				
Total Flow (MG)	0.0084	0.0422	0.0637	0.1856
X Dry Weather Flow	1.5	1.3	1.5	2.0
Est. Inflow for Sub-Area (MG)	0.0027	0.0066	0.0110	0.0740
% of Total	3%	7%	12%	79%
Total Est. Inflow (gpd/idm)	3,531	1,938	1,031	11,372
% of Total	20%	11%	6%	64%
9/15 to 9/16/2006				
Total Flow (MG)	0.0154	0.0998	0.1307	0.3336
X Dry Weather Flow	1.3	1.5	1.5	1.8
Est. Inflow for Sub-Area (MG)	0.0040	0.0298	0.0100	0.1071
% of Total	3%	20%	7%	71%
Total Est. Inflow (gpd/idm)	2,634	4,407	470	8,231
% of Total	17%	28%	3%	52%
3/3/2007				
Total Flow (MG)	0.0081	0.0737	0.0886	0.2189
X Dry Weather Flow	1.4	2.2	2.0	2.4
Est. Inflow for Sub-Area (MG)	0.0024	0.0383	0.0044	0.0824
% of Total	2%	30%	3%	65%
Total Est. Inflow (gpd/idm)	3,172	11,323	414	12,664
% of Total	12%	41%	2%	46%

Table 4 – Estimated Rates of Inflow/Rain-Induced Infiltration After Manhole Rehabilitation

It must be noted that the events described in the preceding tables resulted in relatively low rainfall (0.9 to 2.8 inches) and flows during more significant events were not analyzed due to unreliable flow data. However, the data obtained during the low rain events is still useful for identifying areas of the collection system responsible for the largest portion of extraneous flows entering the treatment facility. For each of the events presented in the tables it is apparent that the largest volume of inflow and/or



Mr. Michael Hayes  
December 5, 2008  
Page 7

rain-induced infiltration is introduced in the area upstream of the Truck Stop Pump Station. This section of the collection system lies between Sewer Districts No. 1 and No. 2 and is comprised primarily of conventional gravity sewer and at least thirteen associated manholes.

From the above data it is apparent that the manhole rehabilitation work has reduced extraneous flows entering the system from the area upstream of the Morrison Height Pump Station due to inflow and/or rainfall-induced infiltration.

Smaller volumes though significant rates of inflow (on a gpd/idm basis) appear to originate from the sewers upstream of the Route 17K Pump Station. These sewers serve the residential area along Lake Vue Drive, Route 17K, and Fedorko Lane. It is surprising that such significant quantities of extraneous flows appear to be entering the collection system in an area that was designed primarily to have minimal problems with infiltration and inflow. In the absence of hourly flow data, particularly during storm events, it is difficult to state conclusively whether these can be attributed to inflow or occur as a result of rainfall percolating through the soil and entering the collection system through pipe and service connection defects.

#### **Potential Sources of Extraneous Flows**

##### Lake Vue Sub-Area

This collection area comprises approximately 435 linear feet of 4-inch PVC STEG sewer on Carmen Lane and 558 linear feet on Lake Vue Drive. The data presented in Tables 1 and 2 indicate that this area is responsible for a very small percentage of the total volume of extraneous flows entering the collection system. The sewers in this area are located less than 500 feet east of a local pond and a public water supply well. Though no information is available regarding operation of the well, the pond along with groundwater intrusion in this relatively low-lying area may account for the higher than anticipated flows to the Lake Vue Pump Station in the absence of precipitation.

Based on USDA Natural Resources Conservation Service's Soil Survey, the predominant soil type in this area is frequently subject to flooding and/or ponding under normal weather conditions (>50% in any given year). This soil is characterized by slow infiltration rates; as a result groundwater may collect in gravel backfill material surrounding sewer piping and septic tanks and enter the collections system via cracks or open joints. Septic tanks in this area were replaced at the time of construction of the collection system in accordance with recommended construction practices. However, effluent screens were not installed at the discharge piping and it is unclear whether the house connections to the septic tanks were replaced.

During a site visit conducted on October 14, 2008, CDM was unable to locate some septic tanks, suggesting that some tank risers may be at an elevation low enough to provide an entry route for standing stormwater or even groundwater. A concrete access lid that was opened did not appear to be watertight, providing a potential route for stormwater.

##### Route 17K Sub-Area

This collection area consists of approximately 4,467 linear feet of 4-inch PVC STEG sewer on Lake Vue Drive, route 17K, and Fedorko Lane. This gravity sewer collects effluent from septic tanks along the alignment, as well as flows from the Lake Vue Pump Station via 2-inch PVC sewer force main. There is also a short section of approximately 218 linear feet of 2-inch PVC STEP sewer, fed by at least 3



Mr. Michael Hayes  
December 5, 2008  
Page 8

residential septic tanks, that discharges to the 4-inch STEG system. Septic tanks in this area were also replaced when the collection system was installed; a large number of which are located less than 300 feet east of the local pond.

The major soil type along this portion of the gravity sewer alignment exhibits no ponding or flooding under normal weather conditions. In addition, the upper limit of the water table in this area is anticipated to be greater than 6 feet, which is below the invert of the 4-inch sewer in most sections.

The data presented in Tables 1 and 2 indicate that although the area accounts for a larger absolute volume of extraneous flows entering the collection system than the Lake Vue area, the Route 17K area is of less concern on a gpd/idm basis, despite longer sections of gravity sewer installed in this area. However, due to the large volume of extraneous flows entering the collection system during precipitation, this area should still be considered for further investigation.

#### Morrison Heights Sub-Area

This collection area receives wastewater flow from the upstream Route 17K Pump Station and a 4-inch PVC STEP sewer along the western portions of Bracken Road via a 4 inch sewer force main. The majority of the gravity collection system in the Morrison Heights area is STEG sewer composed of approximately 2,977 linear feet of 4-inch, 1,093 of 6-inch, and 2,609 linear feet of 8-inch PVC. Additionally, 2,850 linear feet of 6-inch conventional gravity sewer is located upstream of the 4-inch segment. This section of conventional sewer has at least twelve associated manholes, which is not consistent with the principle behind the STEG sewer system designed to minimize extraneous flows. This relatively large number of manholes along this comparably short section of gravity sewer may be a significant source of extraneous flows during periods of high groundwater or precipitation. Furthermore, it is unclear whether the wastewater collected by the 6-inch conventional gravity sewer is intercepted by septic tanks or is discharged directly into the collection system via conventional sewer connections. If the latter is the case, a "bottleneck" effect may be present at the connection of the conventional 6-inch to the 4-inch STEG sewer on Hawkins Drive, which may be the cause of the blockages observed during CCTV inspections of the 4-inch line.

In addition to the inconsistencies noted above, a short portion of the conventional gravity sewer is located in an area of Hawkins Drive that is anticipated to be frequently subjected to ponding<sup>3</sup> since water percolates downwards through these soils very slowly. The upper limit of the water table in this area is anticipated to be less than 10 inches, which is above than the invert of the sewer this area. The remainder of the conventional gravity sewer in the Morrison Heights collection area is located in Group C soils that also have a slow rate of percolation but are rarely subject to ponding.

From Tables 2 and 4, it is apparent that the rehabilitation of the two manholes along the 8-inch STEG sewer line immediately upstream of the pump station has reduced extraneous flows both based on absolute volume and on a gpd/idm basis.

#### Truck Stop Sub-Area

The gravity sewer in this area comprises approximately 4,295 linear feet of 8-inch ACP conventional gravity sewer and at least thirteen manholes. Although this area constitutes only 25% of the gravity

---

<sup>3</sup> Based on available USDA data



Mr. Michael Hayes  
December 5, 2008  
Page 9

sewer in the entire collection area, it accounts for the majority of extraneous flows entering the Neelytown WWTP. This section of conventional gravity sewer is also not consistent with the principle behind alternative collection systems since flow is relayed to the plant via a 6-inch STEP system along Neelytown Road.

Only a very short portion of the sewer is located in areas subject to ponding (approximately 260 feet), however the upper limit of the water table in this collection area is anticipated to approximately 6.5 feet, which is higher than the pipe invert in several areas along the alignment. Based on available construction records, some sections of the ACP sewer were constructed prior to 1978 and may have deteriorated since construction. Although approximately 1,100 feet along the utility easement on the CCX property were recently inspected using closed-circuit television (CCTV) and no defects were observed, this represents only a quarter of the sewer in this area and therefore may not be representative of the alignment for several reasons. Firstly, the inspected portion is not subject to the surface loading experienced along other portions of the pipe as it is located along an easement as opposed to under a paved roadway. Secondly, fewer manholes are located along this section of sewer and so the potential for groundwater intrusion is anticipated to be less in this area. Thirdly, CCTV inspections were conducted in July 2004 when regional groundwater elevations were low; consequently pathways for groundwater intrusion such as cracks and offset or displaced joints may not have been visible during the CCTV inspections.

There are other issues besides those related to the gravity sewer in this collection area that may contribute to the operational problems the Town has experienced at the Truck Stop Pump Station despite the rehabilitation of the manholes at the Truck Stop and at the entrance to the CCX property. Firstly, the sanitary connection from the Truck Stop is at the same elevation as the 8-inch ACP sewer at the pump station's wet well. Consequently, under the high flows observed during wet weather, backups at the actual Truck Stop may occur.

Secondly, anecdotal evidence suggests that flow conditions downstream of the Truck Stop Pump Station may also have contributed to overflows at the pump station. During precipitation events, very high flows enter the collection system via the connection at the Cardinal Healthcare/Baxter Pharmaceutical property. The extent of inflow from this and other sources downstream of the Truck Stop Pump Station is difficult to determine as the flow meter at the Neelytown WWTP is located downstream of a flow equalization tank. Nevertheless, this observation provides some insight into conditions that may limit the capacity of the Truck Stop Pump Station during wet weather.

#### **Recommendations for Further Investigation**

From the available flow data, it is apparent that the most significant source of extraneous flows is in the area of the collection system immediately upstream of the Truck Stop Pump Station. Another area of concern is the residential area upstream of the Route 17K Pump Station. Further study is recommended to identify the nature of these extraneous flows so that rehabilitation methods can be selected to address these sources. For example, while pipe rehabilitation and/or replacement methods may be suitable for reducing infiltration these methods will have little effect if extraneous flows are caused by inflow of stormwater entering the collection system through drains or septic tank access lids and risers.



Mr. Michael Hayes  
December 5, 2008  
Page 10

#### Real-Time Flow Monitoring

While the available pump station flow data has been very useful for identifying the areas of the Town of Montgomery's collection system likely to have significant I/I issues, the pumps operate only intermittently so it is difficult to determine groundwater infiltration rates if minimal daily flow rates are not quantified. In addition, flow variations due to inflow and rain-induced infiltration are distinguishable by their characteristic lag times following precipitation. Flows from the areas of highest concern for I/I should be monitored for a period of at least 6 weeks to evaluate whether rehabilitation strategies should target groundwater infiltration, inflow, or rain-induced infiltration. These locations are as listed below:

- Neelytown WWTP, upstream of equalization tank
- Manhole at Truck Stop Pump Station
- Burger King Manhole
- Route 17K Pump Station

#### Pipe Cleaning and CCTV Inspection

As previously discussed, CCTV inspections were conducted in July 2004 when regional groundwater elevations were low. Re-inspection is recommended during periods of high regional groundwater or a day or two after significant precipitation. Where sewers are inaccessible due to heavy debris, these sewers should be cleaned to immediately increase capacity of the collection system and to facilitate CCTV inspection equipment.

#### **Summary**

CDM's review of flow data from the Town of Montgomery's pump stations indicates that large volumes of extraneous flow enters the collection system that was designed specifically to reduce infiltration and inflow. The major route of entry is the conventional gravity sewer upstream of the Truck Stop Pump Station. Significant volumes also enter the collection system in upstream areas such as the residential area along Lake Vue Road and Fedorko Lane. While rehabilitation of manholes along the collection area appears to have reduced infiltration and inflow entering the system upstream of the Morrison Heights Pump Station, this work does not appear to have reduced total flows entering the Neelytown WWTP.

In the absence of hourly flow data it is difficult to determine whether increased flows experienced during wet weather can be directly attributed to inflow. Subsequently, a targeted flow monitoring program is recommended to isolate the causes of increased flows. Sewer cleaning and inspection should be conducted to pinpoint areas of the collection system susceptible to groundwater and rain-induced infiltration and to develop an appropriate rehabilitation strategy.



Mr. Michael Hayes  
December 5, 2008  
Page 11

Should you have any questions regarding the findings or recommendations of this assessment, please contact me at 212-221-9462.

Very truly yours,

A handwritten signature in black ink, appearing to read 'Geoff Baldwin'.

Geoffrey G. Baldwin, P.E., BCEE  
Senior Project Manager  
Camp Dresser & McKee

Enclosures

cc: Mr. Michael Aiello - Town of Montgomery, NY  
Mr. Charles Bazydlo, Esq.  
Mr. Russell Budd  
Mr. William S. Gettings, P.E. - CDM  
Ms. Christie Arlotta, P.E - CDM  
Ms. Simone R. Christie - CDM

**ADDENDUM**

**TO**

**INFLOW AND INFILTRATION REMOVAL PLAN**

**SERVING**

**SANITARY SEWER DISTRICTS**

**WITHIN**

**TOWN OF MONTGOMERY**  
**COUNTY OF ORANGE**  
**STATE OF NEW YORK**

**DECEMBER 14, 2012**

**Prepared By:**

**MICHAEL J. AIELLO, PE, PLLC**  
**PO Box 226**  
**Montgomery, NY 12549**



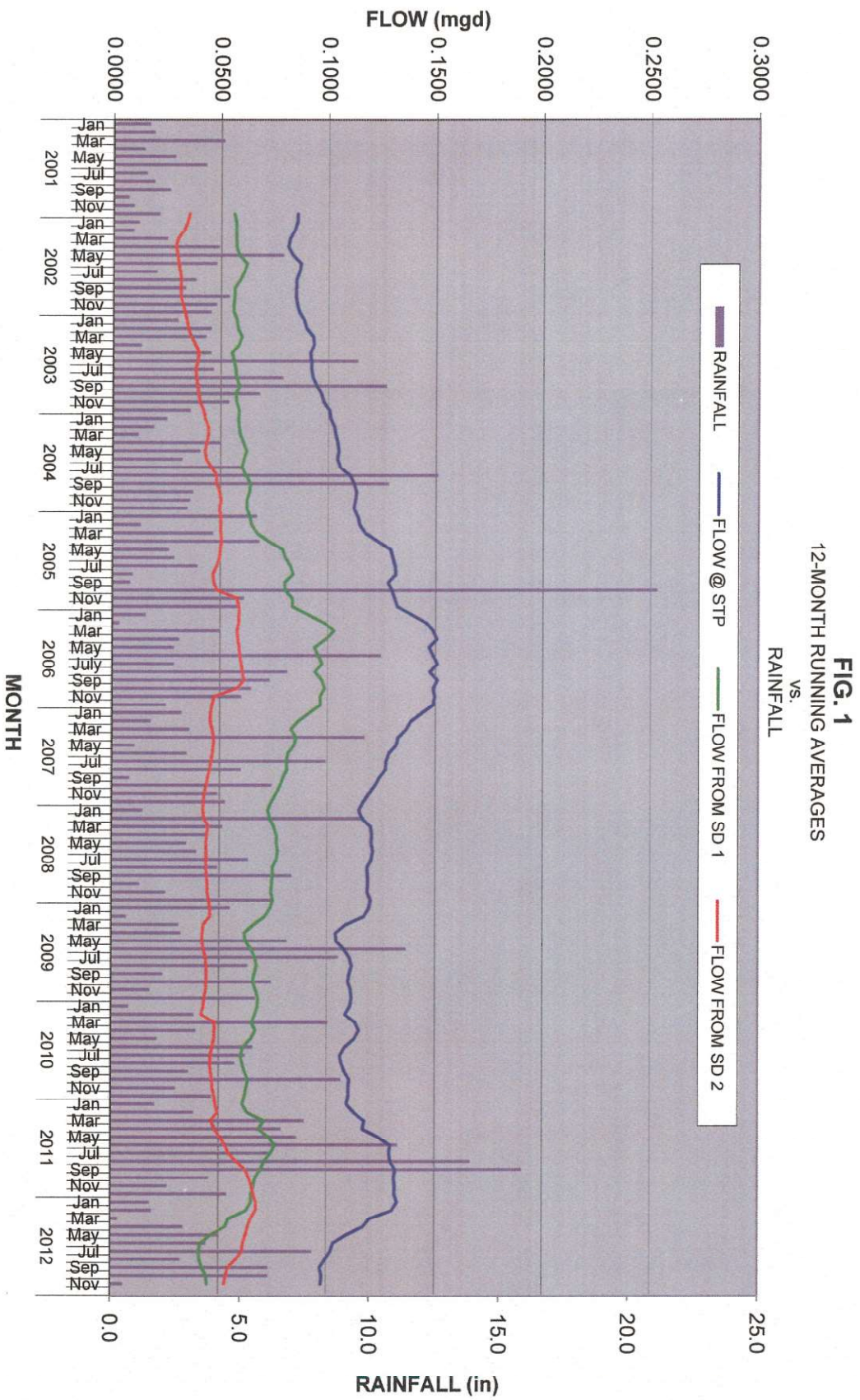
This addendum was prepared to evaluate extended flow data to isolate and control further areas of inflow & infiltration (I/I) pursuant to the conditions of amended SPDES Permit NY-027782 for the Town of Montgomery Sewer District #1 STP

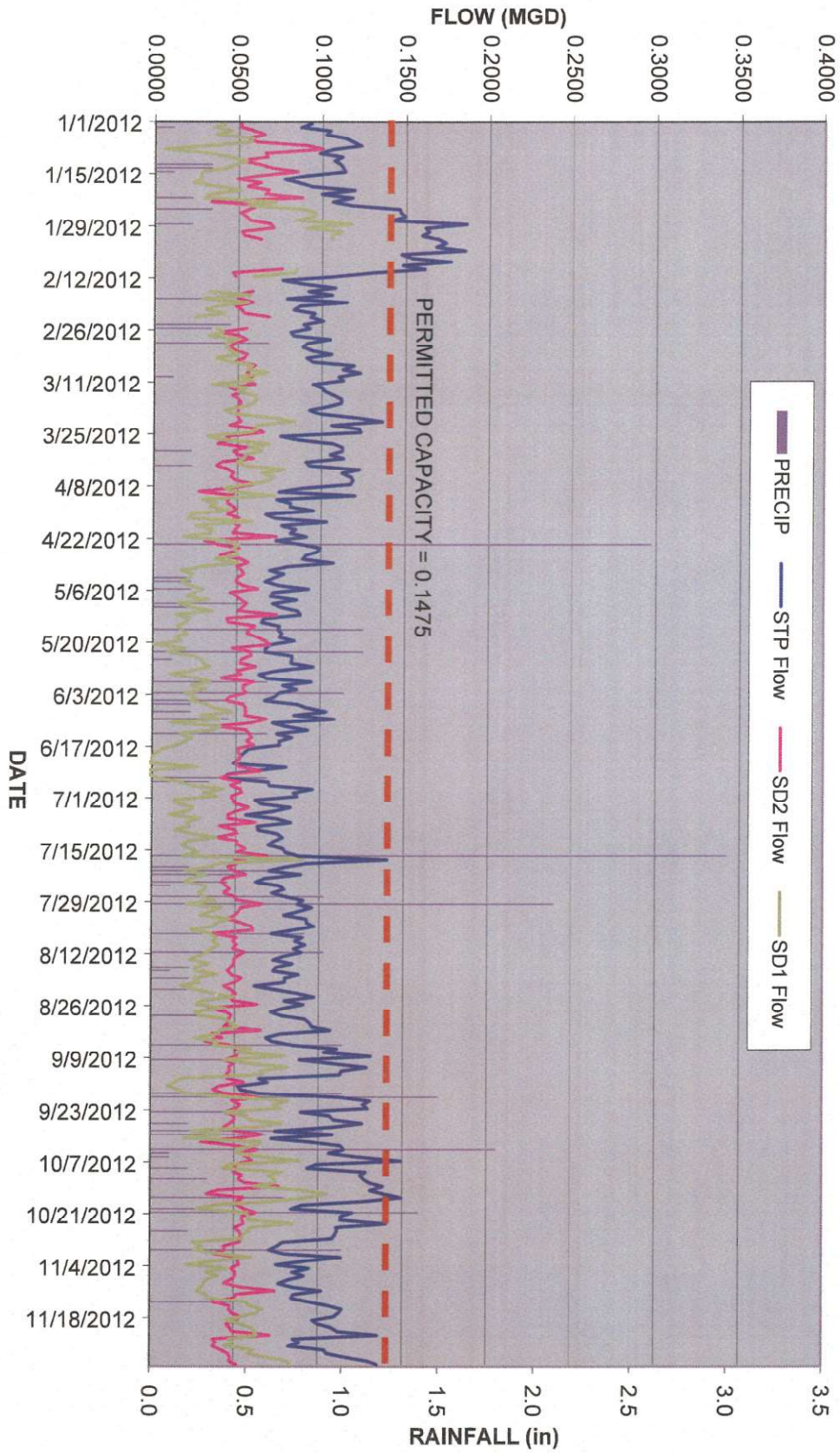
Flow meter readings have been collected daily at both the Town of Montgomery's (Town's) STP1 as well as its Morrison Heights Pump Station, which is the final collection point of all sewage generated from within Sewer Dist. 2. A new sewage mag-meter was re-installed at the Morrison Heights Pump Station in April after the original meter was deemed inoperable for a number of years. Prior to the re-installation, flow volumes at the pump station had been estimated based upon its daily electric consumption. 24-hour flow volumes are computed and analyzed daily with the volume of sewage from within SD1 calculated as the difference between the STP1 and SD2 flows. 12-month running averages are analyzed monthly.

The attached Fig.1 illustrates a recent, decreasing 12-month running average flow trend for SD1 beginning in July 2011 that continued for 12-months despite 2 (two) months of heavy precipitation in Aug. and Sep. of the same year. Conversely, an increasing 12-month running average flow trend for SD2 began in Mar. 2011 and continued until Feb. 2012. Since that time the running average flow from SD2 has been declining and converging with the lower running average flow of SD1, also illustrated in the graph. Overall, Fig. 1 illustrates a declining pattern of flow to the STP since its peak at the end of 2006, with the increase in 2011 associated with extreme precipitation events of that year.

Considering that a select number of the relatively few manholes within SD1 were treated in Nov. 2011, 6 (six) months after its running average flow began to subside, and the running average flow from SD2 at this same time continued to increase, it is believed that the majority of remaining I/I is prevalent within SD2. However, as mentioned, the running average flow from SD2 has been declining since peaking this past Feb. and is approaching its current and consistent metered flow of approximately 50,000 GPD as illustrated in Fig. 2.

Since precipitation for 2012 has been lighter than from the previous year, extended observation and analysis is justified before funds are allocated to further isolate remaining extraneous flows within SD2. Potential I/I control measures to the STEP and STEG (septic tank effluent pump & gravity) systems of SD2 will be costly, possibly prohibitively, due to the small diameter piping and limited points of access for further investigation.





# *APPENDIX A7*

*12/16/2013 Approved I&I Removal Program  
Addendum Letter Report (Compliance  
Document)*

December 16, 2013

NYSDEC  
Region 3 Division of Water  
Attn.: Mr. Adedayo Adewole, PE  
100 Hillside Ave. Suite 1W  
White Plains, NY 10603-2860

Re: Inflow and Infiltration Assessment for 2013  
SPDES NY-0247782

Dear Mr. Adewole,

With reference to the December 14, 2012 addendum to the "Inflow and Infiltration Removal Plan" for the Town of Montgomery of July 27, 2011, extended flow analysis has indicated that inflow and infiltration (I/I) has stabilized following an extended period of reduction (a graphical illustration of the data is enclosed). As such, there are currently no plans for additional improvements or to study more isolated areas of the collection system for the coming year. However, flow analysis will continue on a daily basis.

Very truly yours,

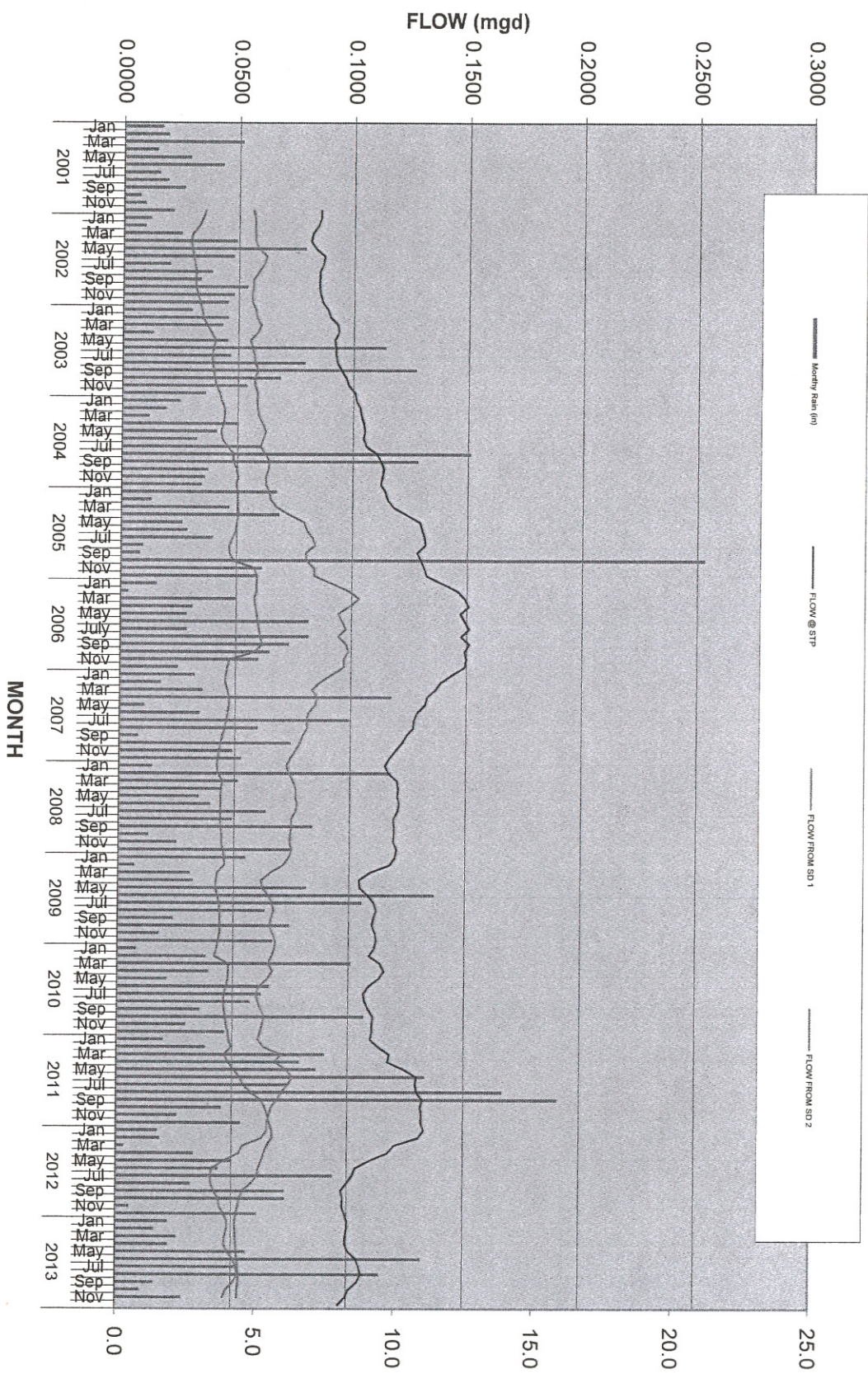


---

Michael J. Aiello Jr., PE

cc: Town Sewer Dept.  
Montgomery Supervisor and Town Board

# COMPARISON OF 12-MONTH RUNNING AVG'S



**MICHAEL J. AIELLO P.E.**  
CONSULTING ENGINEER

---

PO Box 226  
Montgomery, NY 12549  
Office & Fax 845-778-0230

December 14, 2012

NYSDEC  
Region 3 Division of Water  
Attn.: Mr. Adedayo Adewole, PE  
100 Hillside Ave. Suite 1W  
White Plains, NY 10603-2860

Re: Inflow and infiltration assessment  
SPDES NY-0247782

Dear Mr. Adewole,

As requested, enclosed please find amendment to "Inflow and Infiltration Removal Plan" of July 27, 2011 for the purpose of evaluation to isolate further locations of inflow and infiltration.

Very truly yours,

  
Michael J. Aiello Jr., PE

cc: **Town Sewer Dept.** *Addendum included w/ Report*  
Montgomery Supervisor and Town Board

# TOWN OF MONTGOMERY

110 BRACKEN ROAD  
MONTGOMERY, NY 12549-2627



Fax (845) 457-2760  
www.townofmontgomery.com

Building (845) 457-2640  
Planning (845) 457-2643  
Zoning (845) 457-2644  
Engineering (845) 457-2642

October 2, 2012

NYSDEC Region 3 Division of Water  
Attn.: Mr. Dayo Adewole, PE  
100 Hillside Ave. Suite 1W  
White Plains, N.Y. 10603-2860

Re: SPDES 0247782

Dear Mr. Adewole,

In response to your email of October 2, please be advised the achievable goals of the Town of Montgomery's inflow and infiltration (I/I) program have been complied with to date.


1. Skeletal mapping was completed at the end of 2011.
2. A flow meter and chart recorder at the Morrison Heights Pump Station was installed on April 25. This pump station is of critical importance to flow monitoring as it is the final collection point of all flow generated within the Town's Sewer District #2 (SD2) before it is discharged to Sewer District #1 (SD1). By subtracting the SD2 flow from that thru the STP, the volume generated from within SD1 can be calculated. This is critical when budgeting for I/I work.
3. Manhole rehabilitation was performed on critical manholes during the year with additional manhole treatment scheduled.
4. The 12-month running average of flow thru the sewage treatment plant (STP) has gradually declined since 1 (one) year ago from 90% of permitted capacity to approximately 67% of the STP's permitted capacity, although precipitation has not been as heavy as in recent years. Evaluation of the flow figures and charted flow patterns between Morrison Heights PS and the STP have indicated that remaining I/I, to the extent that it currently exists, is primarily generated from within SD2. Additional manholes were identified within SD2 that warranted the installation of "Man-pan" inserts beneath vented manhole lids, thereby capturing runoff that entered the system through the open keyways of the manhole lids. Chartist flow patterns during the

precipitation events have remained typical to non-precipitation baseline flows following the installation of these inserts.

We believe substantial progress has been made in identifying and addressing sources of I/I. We will continue to monitor the metered flows daily and compare such with recorded precipitation. A copy of the graphical flow trend thru September of this year is attached for your use.

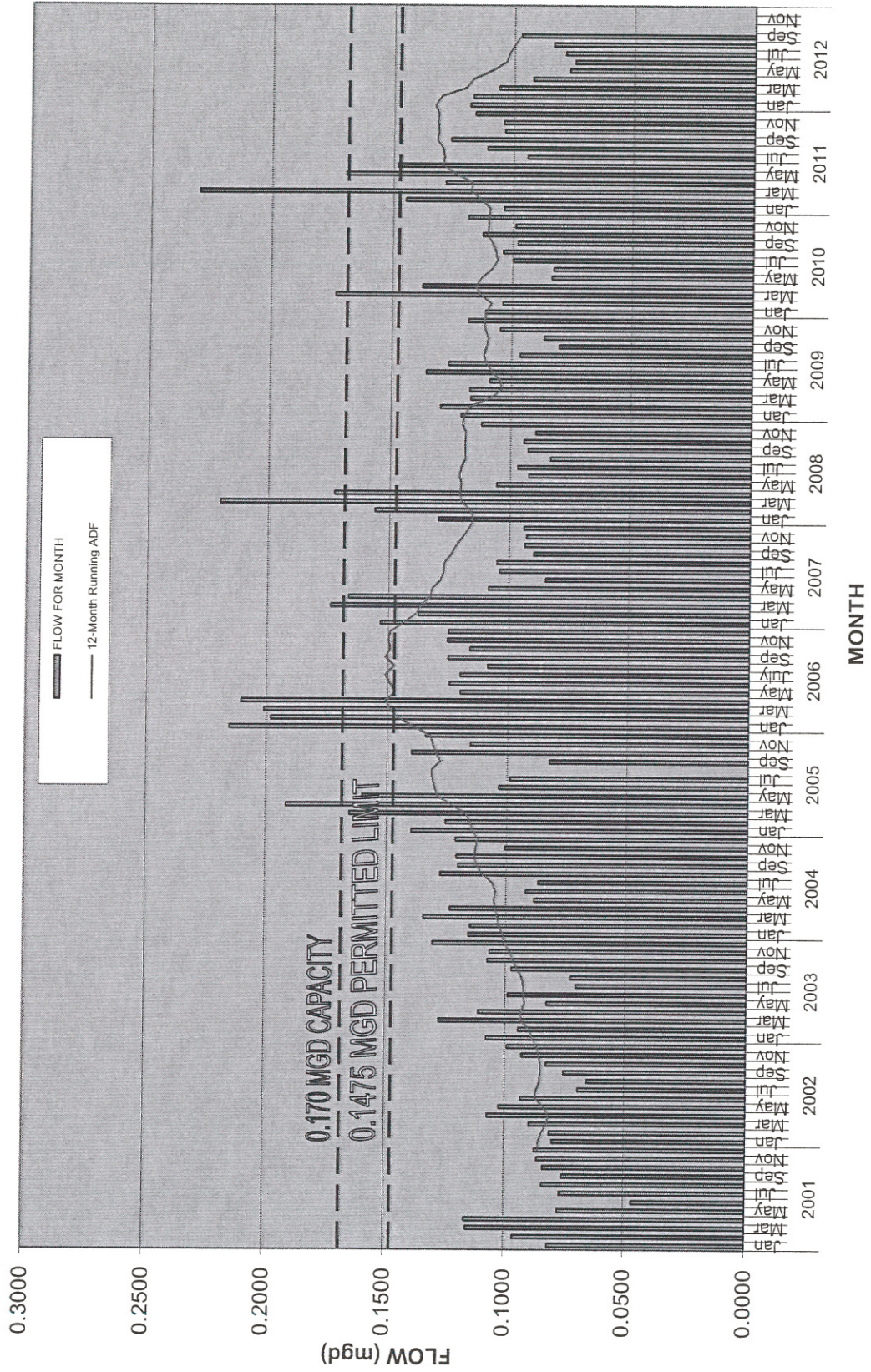
Very truly yours,

SEWER DEPARTMENT  
TOWN OF MONTGOMERY



Michael J. Aiello Jr., PE  
Engineer-for-the-Town

# MONTGOMERY STP 1 FLOW HISTORY



## Montgomery Engineering

---

**From:** Adedayo Adewole <ajadewol@gw.dec.state.ny.us>  
**Sent:** Tuesday, October 02, 2012 10:34 AM  
**To:** tomengineering@frontiernet.net  
**Subject:** Mike,  
**Attachments:** I&I plan approval\_2.pdf

Mike,

Please can you verify compliance with the proposed I/I schedule contained in the I/I program (see attachment).  
***Evaluate extended flow data to isolate further area of I/I - June 2012.*** I have to report on the status of compliance with this item.

Thanks

Dayo Adewole, P.E.  
NYSDEC  
Division of Water  
100 Hillside Ave. Suite 1W  
White Plains, N.Y. 10603-2860

Tel: (914)428-2505 Ext. 365  
Fax: (914)428-0323  
email: [ajadewol@gw.dec.state.ny.us](mailto:ajadewol@gw.dec.state.ny.us)

**New York State Department of Environmental Conservation  
Division of Water, Region 3**

100 Hillside Avenue - Suite 1W, White Plains, New York 10603-2860

Phone: (914) 428-2505 • FAX: (914) 428-0323

Website: www.dec.state.ny.us



**Joe Martens  
Commissioner**

August 5, 2011

Michael J. Aiello, Jr., P.E.  
Michael J. Aiello, PE, PLLC  
Consulting Engineer  
P O Box 226  
Montgomery, NY 12549

**Re: Infiltration & Inflow Removal Program  
Town of Montgomery Wastewater Treatment Plant  
SPDES Permit No.: NY-0247782**

Dear Mr. Aiello:

The Department has reviewed the Infiltration and Inflow Removal Program Plan submitted for the purpose of controlling infiltration and inflow into the collection system. The report is approved and hence made part of the above-referenced SPDES permit.

Your cooperation in operating and maintaining this facility, complying with your SPDES Permit and the protection of New York's waters is appreciated. Should you have any questions, please contact me at (914) 428-2505, Ext 365.

Very truly yours,

Adedayo Adewole, PE  
Environmental Engineer 1

cc: Thomas Rudolph, PE, Regional Engineer  
Supervisor and Town Board, Town of Montgomery

**MICHAEL J. AIELLO P.E.**  
CONSULTING ENGINEER

---

PO Box 226  
Montgomery, NY 12549  
Office & Fax 845-778-0230

July 27, 2011

NYSDEC, Region 3  
Division of Water  
Attn.: Mr. Adedayo Adewole  
Division of Water  
100 Hillside Ave. Suite 1W  
White Plains, N.Y. 10603-2860

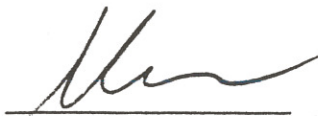
Re: Inflow and infiltration assessment  
SPDES NY-0247782

Dear Mr. Adewole,

Pursuant to the conditions of amended SPDES Permit NY-027782 for the Town of Montgomery Sewer District #1 STP, the enclosed revised report has been prepared to address the requirement of ongoing sewer assessment for the purpose of controlling inflow and infiltration.

This report has been submitted to the Montgomery Town Board so that it is aware of the financial planning necessary for implementation. If you should have further questions, as always please feel free to contact this office.

Very truly yours,



Michael J. Aiello Jr., PE

Enclosures

cc: Montgomery Supervisor and Town Board  
Charlie Bazydlo, Esq.

# *APPENDIX A8*

## *Photo Inspection of Accessible Manholes (September 9, 2019)*

Morrison Heights - Pump Station / Valve Pit / Meter / Pump Pit



Some damage

[1] Rust

[2] New Flow Meter installed 2 weeks prior to inspection

Morrison Heights Wet Well - MH



Minor to no damage  
[1] Concrete erosion

Troop F NYSP – MH 1



Some damage

- [1] Manhole cover offset from center
- [2] Rust present
- [3] Infiltration at intersection of floor and MH wall
- [4] Rebar exposure on interior wall
- [5] No boot or grout seal around influent pipe

Quality - MH



Minor damage  
[1] Minor debris, no invert

Houston PL - MH



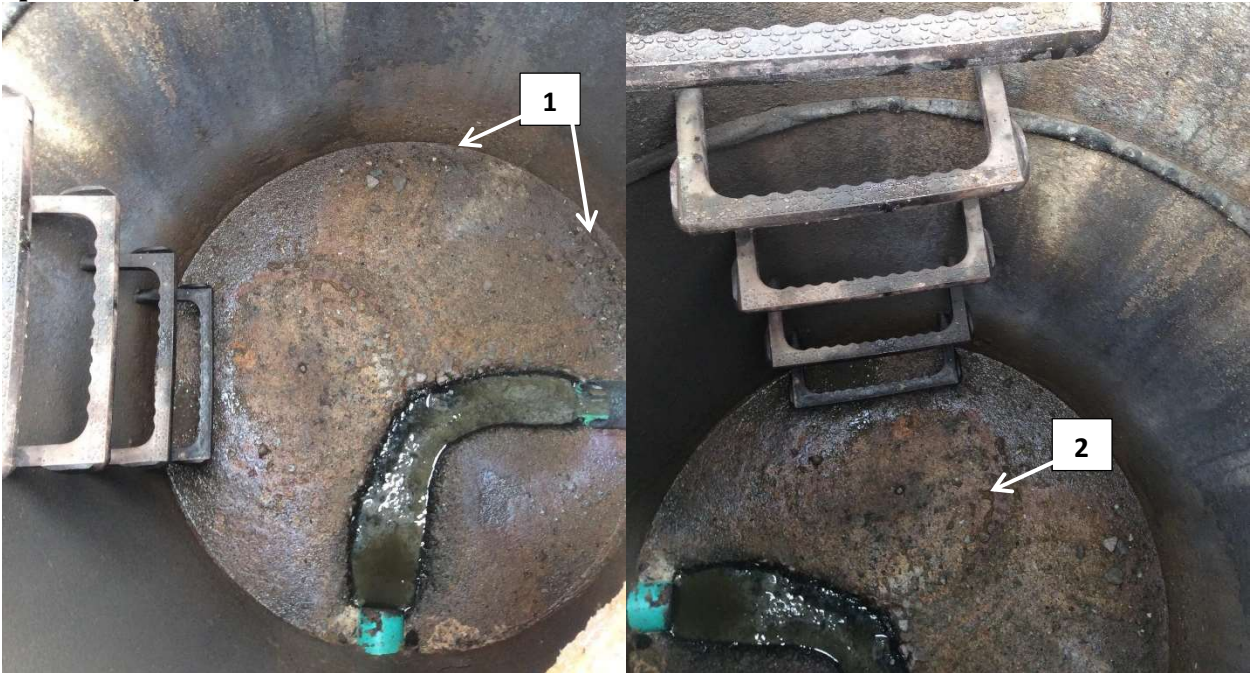
Minor to no damage  
[1] Standing water and debris on bottom  
Appears to be sludge from downstream backups.

Advanced Auto Parts - MH



- Minor to no damage
- [1] Lifting hole open through MH
- [2] Concrete erosion
- [3] Debris buildup
- [4] Wastewater very dark in color

Speedway - MH



Some damage  
[1] Concrete erosion  
[2] Debris buildup

I-84 Exit 5- MH



Minor to no damage

**Burger King - MH**



A lot of damage

- [1] Man pan stuck to manhole cover
- [2] Concrete erosion, stone and aggregate showing through concrete
- [3] Debris buildup

I-84 W - MH



Some damage

- [1] Man hole cover offset from center
- [2] Concrete erosion, stone/aggregate showing through concrete
- [3] Rust

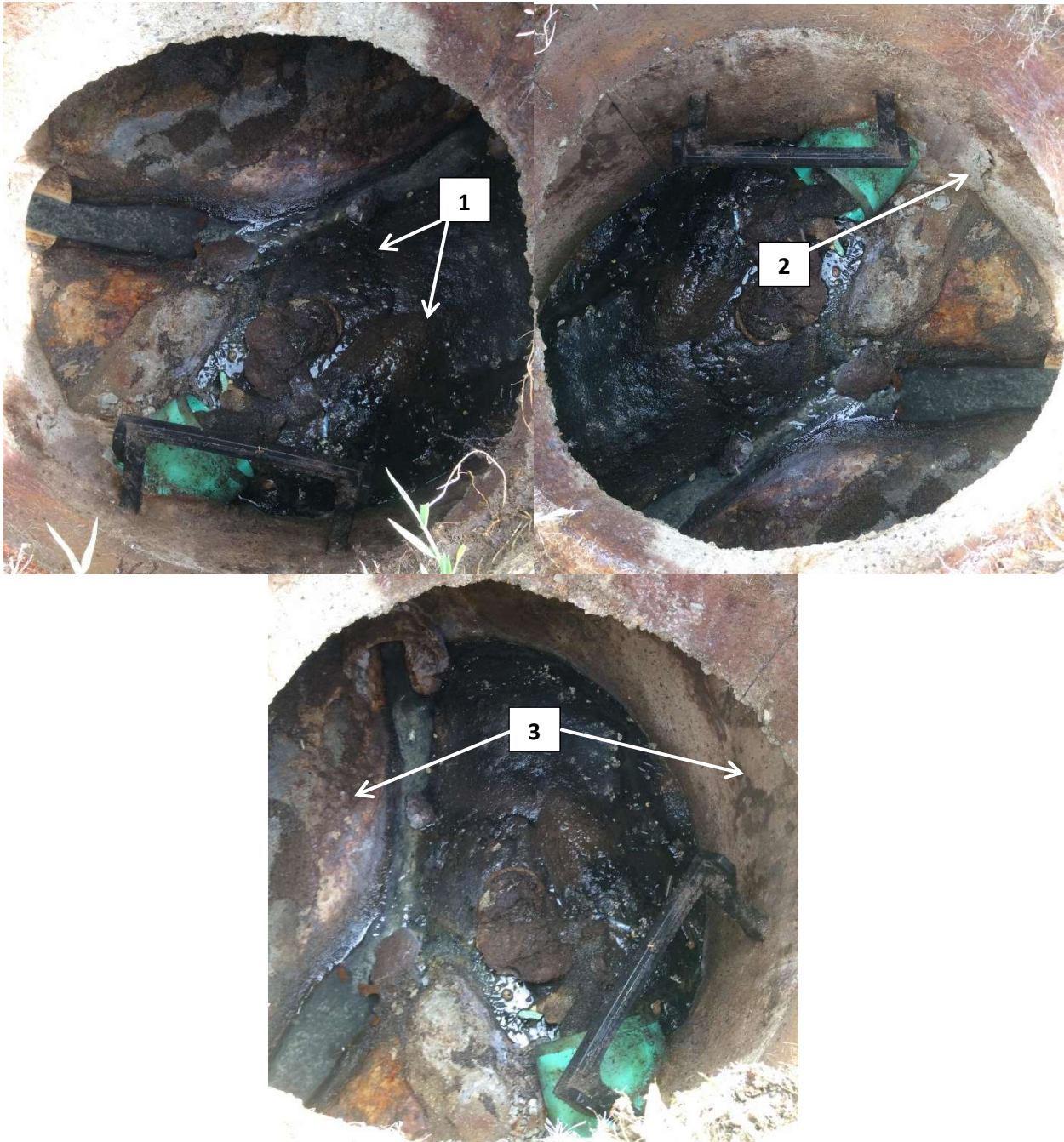
Sunoco 1 - MH



Some damage

- [1] Invert appears to be steel or cast iron, rusting
- [2] Grease buildup lining invert
- [3] Sewage appears to be extremely heavy and colored
- [4] Bench showing stone and aggregate

Sunoco 2 - MH



- A lot of damage
- [1] Heavy buildup of debris, sludge, grease
  - [2] Cracking of concrete
  - [3] Concrete erosion

Walgreens - MH



Minor damage  
[1] Rebar Exposure  
[2] Debris buildup within invert

Hawkins Dr 2 (next to Sheely's Laundromat) - MH



A lot of damage

- [1] Concrete erosion with debris on benches and within invert
- [2] Manhole could not be seated properly

Hollis Lane - MH



Minor to no damage  
[1] Rust

46 Fedoroko Lane - MH



Some damage

- [1] A lot of coarse aggregate visible
  - [2] Debris and stones present on bottom, no invert
- Standing water

Fedoroko Lane - MH



Little to no damage  
No invert

17K Pump Station



Little to no damage  
[1] Top slide rail support shows corrosion

Lake Vue - Pump Station



Little to no damage  
[1] Rust

CCX-7 - MH1 - Forcemain Discharge



A lot of damage  
[1] Grease and other debris buildup  
[2] Concrete erosion cracks in water stop

CCX-6 - MH2



Little to no damage  
[1] Rust  
[2] Debris on bench, bench is wet

CCX-5 - MH3



Little to no damage  
[1] Rust  
[2] Standing water & debris on bench

CCX-4 - MH4



- Some damage
- [1] Concrete erosion
- [2] Upper ring coated with water stop (flaking?)
- [3] Rust
- [4] Debris in sewer main, blockage

CCX-3 - MH5



Some damage  
[1] Mortar under ring not tight  
[2] Rust

CCX-2 - MH6



Little to no damage

CCX-1 / NT-4 - MH7



Some damage  
[1] MH coated with water stop coating  
[2] Water Stop discolored

NT-3 - MH8



Some damage  
[1] Gravel on bench  
[2] Concrete erosion & debris on the bench

NT2 - MH



Some damage

- [1] Inflow insert holding water
- [2] Riser mortar some cracking
- [3] Riser mortar on precast top w/debris on bench

NT-1 - MH



Little to no damage

NT-6 - MH S8



Little to no damage  
Standing water and debris on bench

Super 8-1 - MH



A lot of damage

- [1] Riser CMU, potential inflow – loose mortar; 2 course concrete block 4-5 course CC brick; standing water on bench
- [2] Broken step
- [3] Sign of downstream blockage – Grease, rags, debris buildup
- [4] Rusted ring

Truck Stop - PS



Little to no damage

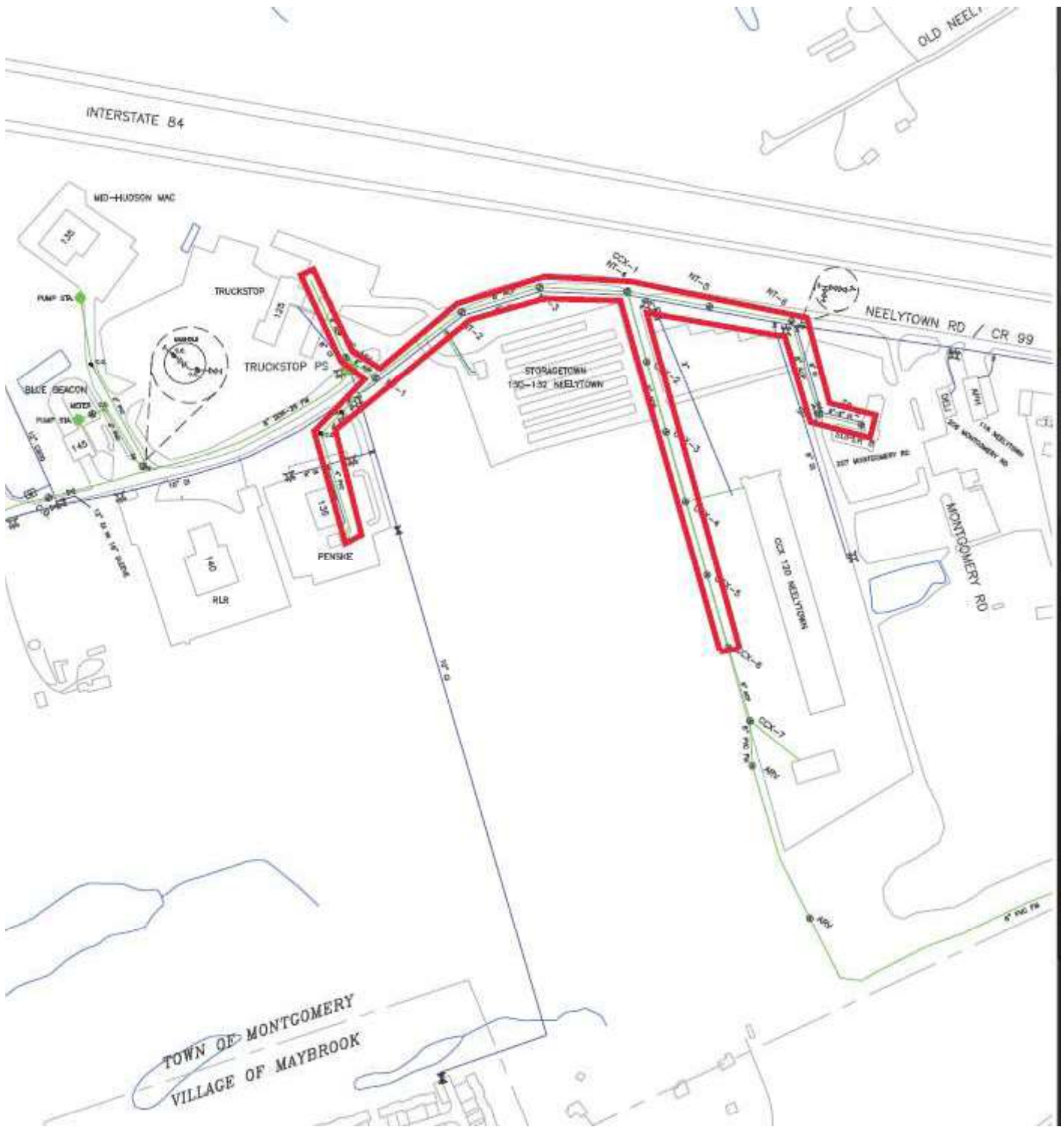
Truck Stop – MH



A lot of damage  
[1] Concrete erosion  
[2] Rust

# *APPENDIX A9*

*Map of Sections that were Video Inspected and Identified*



Bill

# *APPENDIX A10*

## *Video Inspection Description – 2017*

## TOWN OF MONTGOMERY COLLECTION SYSTEM

VIDEO INSPECTION DESCRIPTION - 2017

Man Hole Run	TOTAL FEET MH TO MH	PIPE	Observations
Building to CCX	202.80	8" AC	At 44.9' tee w/plug
CCXMH-1 TO CCX MH-2	180.2	8" AC	
CCXMH-2 TO CCX MH-3	266.6	8" AC	
CCXMH-3 TO CCXMH-4	268.5	8" AC	
CCXMH-4 TO CCXMH-5	253.2	8" AC	major leak at 1.3' REPAIRED W/liner
CCXMH-5 TO CCXMH-6	259.5	8" AC	
CCXMH-6 TO CCXMH-7	506.6	8" AC	unnamed manhole at 266.9"
MH-1 TO MH-2 shop rite plaza	180.2	8" PVC	
MH-2 TO MH-3 shop rite plaza	113.5	8" PVC	MH-3 blocked by bench
MH-3 TO MH-4 shop rite plaza	84.5	8" PVC	
MH-4 TO MH-5 shop rite plaza	110.1	8" PVC	
MH-5 TO MH-6 shop rite plaza	210.5	8" PVC	
MH-6 TO MH-7 shop rite plaza	158.7	8" PVC	
MH-7 TO MH-8 shop rite plaza	247.6	8" PVC	
MH-8 TO MH-9 shop rite plaza	92.5	8" PVC	
MH NT-5-cc-neelytown*	320.6	8" AC	
MH S8-1 TO MH NT-6	341.6	8" AC	At 138' there is a Tee w/plug
MH S8-2 TO MH super 8-1	147.6	8" AC	
Truck Stop TO Pump Station	149.3	8" AC	
<b>TOTAL LINEAL FEET</b>	<b>4094.10</b>		

Note: \*Camera work map MH labeling does not match video on Neelytown Rd.

# *APPENDIX A11*

## *TAM Field Reports on Video Inspection and Repair*



## Main Inspection with Pipe-Run Graph

Project Name: <b>Montgomery</b>		Mainline ID: <b>5/30/2019-9:44</b>		City: <b>Montgomery</b>		Address: <b>XPO Logistics</b>	
Start date/time: <b>5/30/2019</b>		Pipe width:	Pipe height: <b>8</b>	Pipe type: <b>Transite</b>	Surface condition: <b>Asphalt</b>	Weather: <b>Dry</b>	
Direction: <b>Towards Downstream</b>		Surveyed footage: <b>258.2</b>		Operator: <b>Joe Kata</b>		Comments	

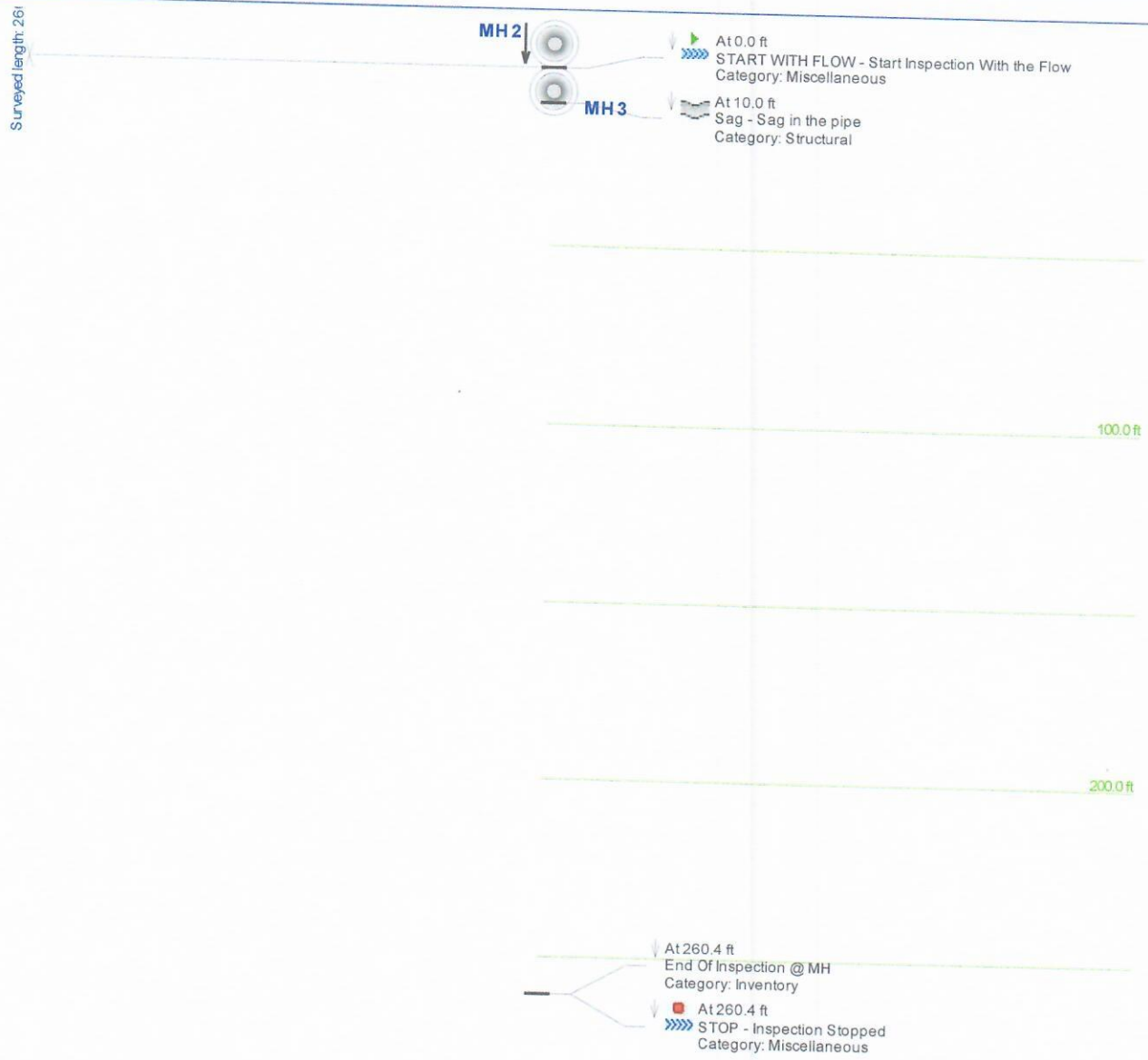


TAM ENTERPRISES INC.  
 114 HARTLEY ROAD  
 GOSHEN, N.Y. 10924  
 Phone 845-294-8882 , Fax 845-294-8883  
 E-MAIL: TONY@TAMENTINC.COM



## Main Inspection with Pipe-Run Graph

Project Name: <b>Montgomery</b>		Mainline ID: <b>5/30/2019-9:59</b>		City: <b>Montgomery</b>		Address: <b>XPO Logistics</b>	
Start date/time: <b>5/30/2019</b>		Pipe width:	Pipe height: <b>8</b>	Pipe type: <b>Transite</b>	Surface condition: <b>Asphalt</b>		Weather: <b>Dry</b>
Direction: <b>Towards Downstream</b>		Surveyed footage: <b>260.4</b>		Operator: <b>Joe Kata</b>		Comments	



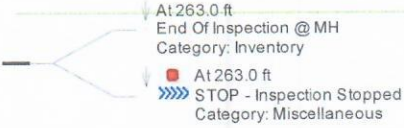
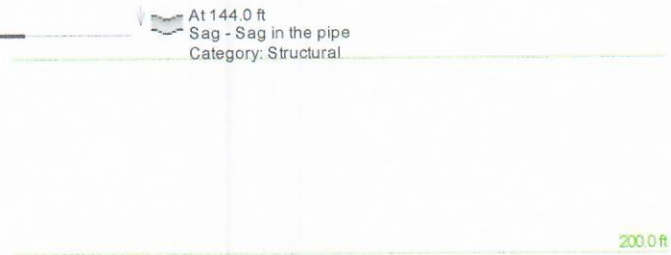
TAM ENTERPRISES INC.  
 114 HARTLEY ROAD  
 GOSHEN, N.Y. 10924  
 Phone 845-294-8882 , Fax 845-294-8883  
 E-MAIL:TONY@TAMENTINC.COM



## Main Inspection with Pipe-Run Graph

Project Name: <b>Montgomery</b>		Mainline ID: <b>5/30/2019-10:09</b>		City: <b>Montgomery</b>		Address: <b>XPO Logistics</b>	
Start date/time: <b>5/30/2019</b>		Pipe width: <b></b>	Pipe height: <b>8</b>	Pipe type: <b>Transite</b>	Surface condition: <b>Asphalt</b>		Weather: <b>Dry</b>
Direction: <b>Towards Downstream</b>		Surveyed footage: <b>263.0</b>		Operator: <b>Joe Kata</b>		Comments <b></b>	

Surveyed length: 263.0

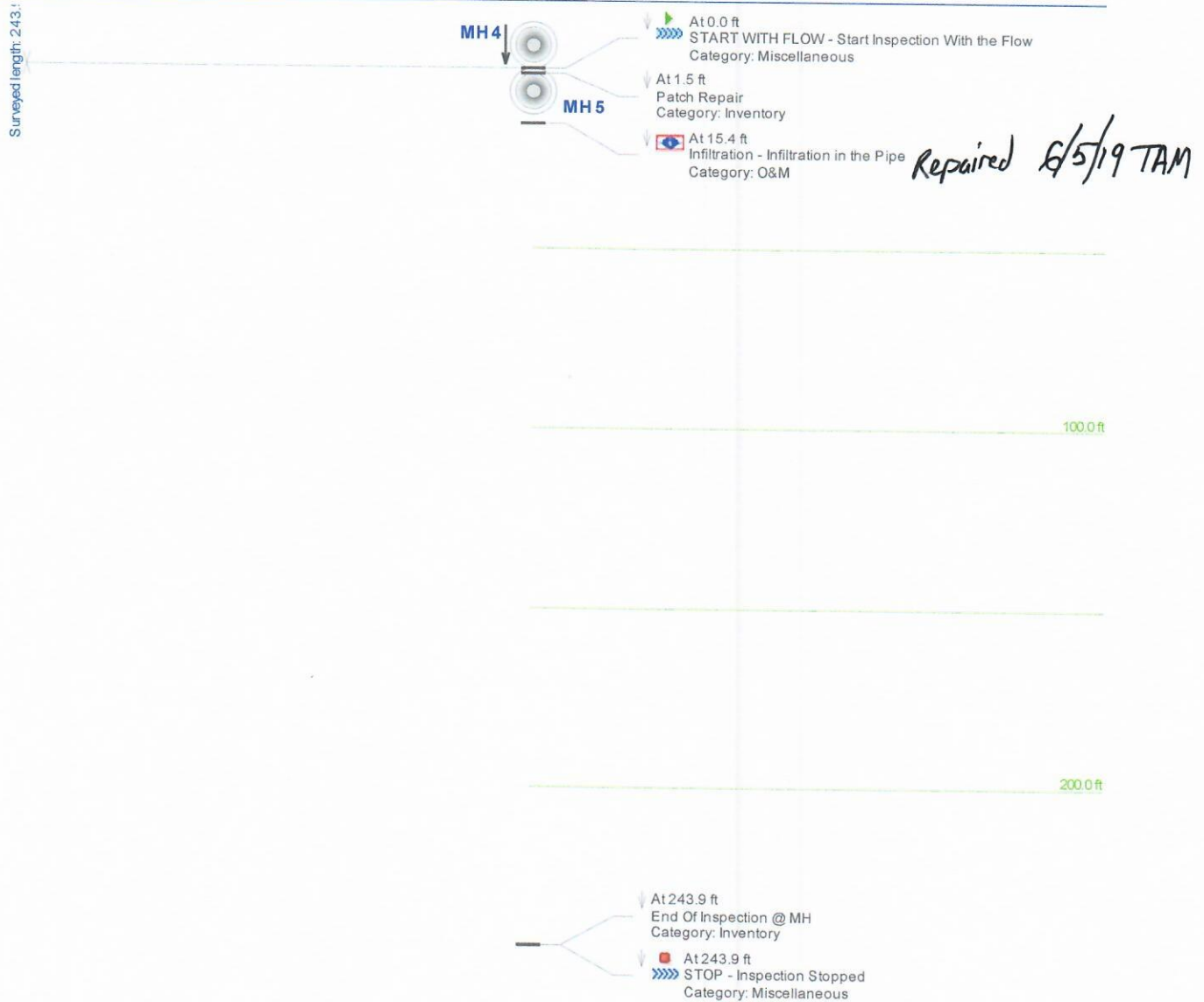


TAM ENTERPRISES INC.  
 114 HARTLEY ROAD  
 GOSHEN, N.Y. 10924  
 Phone 845-294-8882 , Fax 845-294-8883  
 E-MAIL:TONY@TAMENTINC.COM



## Main Inspection with Pipe-Run Graph

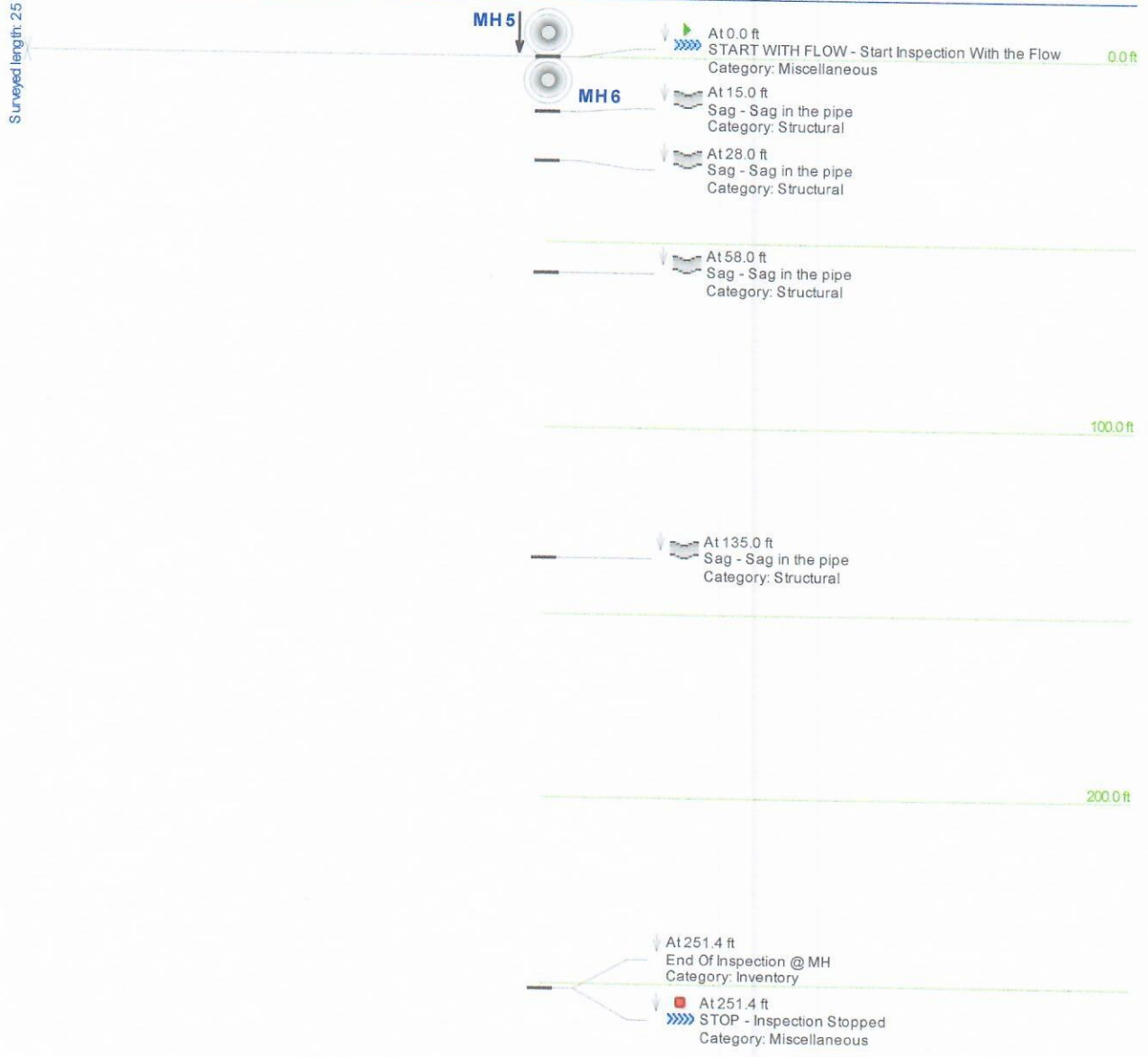
Project Name: <b>Montgomery</b>		Mainline ID: <b>5/30/2019-10:44</b>		City: <b>Montgomery</b>		Address: <b>XPO Logistics</b>	
Start date/time: <b>5/30/2019</b>		Pipe width: <b></b>	Pipe height: <b>8</b>	Pipe type: <b>Transite</b>	Surface condition: <b>Asphalt</b>		Weather: <b>Dry</b>
Direction: <b>Towards Downstream</b>		Surveyed footage: <b>243.9</b>		Operator: <b>Joe Kata</b>		Comments	





## Main Inspection with Pipe-Run Graph

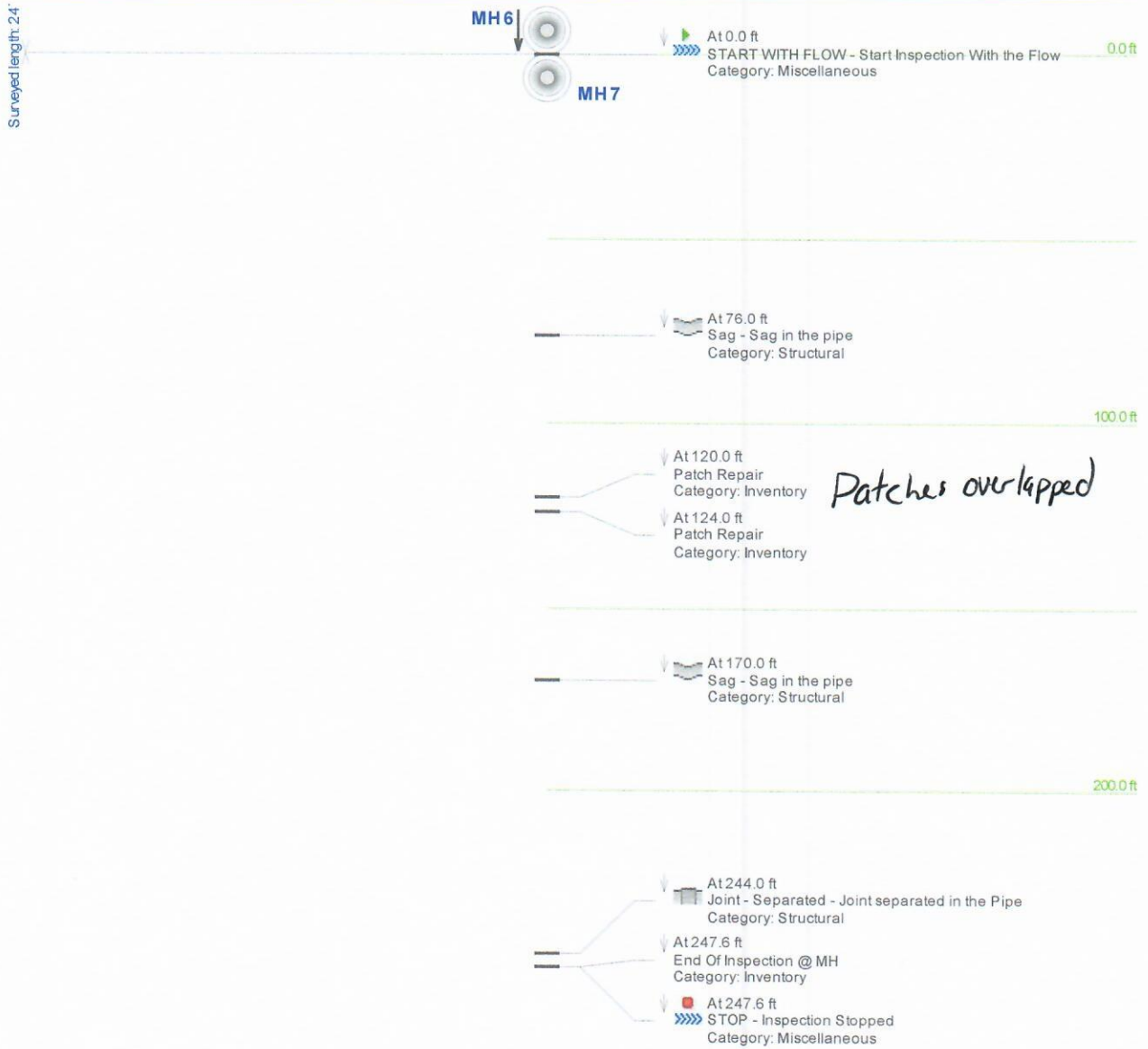
Project Name: <b>Montgomery</b>		Mainline ID: <b>5/30/2019-11:37</b>		City: <b>Montgomery</b>		Address: <b>XPO Logistics</b>	
Start date/time: <b>5/30/2019</b>		Pipe width:	Pipe height: <b>8</b>	Pipe type: <b>Transite</b>	Surface condition: <b>Asphalt</b>		Weather: <b>Dry</b>
Direction: <b>Towards Downstream</b>		Surveyed footage: <b>251.4</b>		Operator: <b>Joe Kata</b>		Comments	





## Main Inspection with Pipe-Run Graph

Project Name: <b>Montgomery</b>		Mainline ID: <b>5/30/2019-12:36</b>		City: <b>Montgomery</b>		Address: <b>XPO Logistics</b>	
Start date/time: <b>5/30/2019</b>		Pipe width:	Pipe height: <b>8</b>	Pipe type: <b>Transite</b>	Surface condition: <b>Asphalt</b>		Weather: <b>Dry</b>
Direction: <b>Towards Downstream</b>		Surveyed footage: <b>247.6</b>		Operator: <b>Joe Kata</b>		Comments	

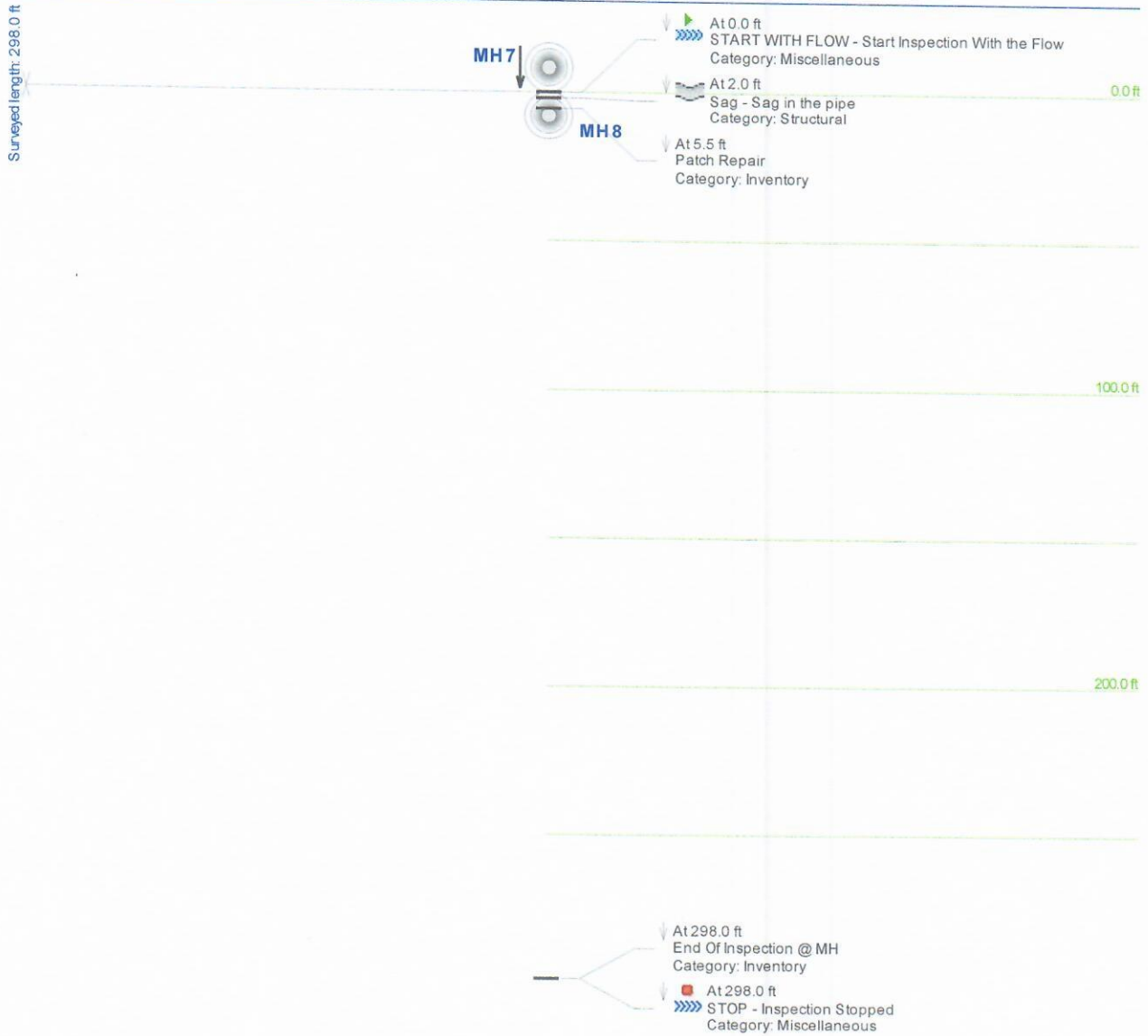


TAM ENTERPRISES INC.  
 114 HARTLEY ROAD  
 GOSHEN, N.Y. 10924  
 Phone 845-294-8882 , Fax 845-294-8883  
 E-MAIL: TONY@TAMENTINC.COM



## Main Inspection with Pipe-Run Graph

Project Name: <b>Montgomery</b>		Mainline ID: <b>5/30/2019-12:57</b>		City: <b>Montgomery</b>		Address: <b>XPO Logistics</b>	
Start date/time: <b>5/30/2019</b>		Pipe width: <b></b>	Pipe height: <b>8</b>	Pipe type: <b>Plastic</b>	Surface condition: <b>Asphalt</b>		Weather: <b>Dry</b>
Direction: <b>Towards Downstream</b>		Surveyed footage: <b>298.0</b>		Operator: <b>Joe Kata</b>		Comments	

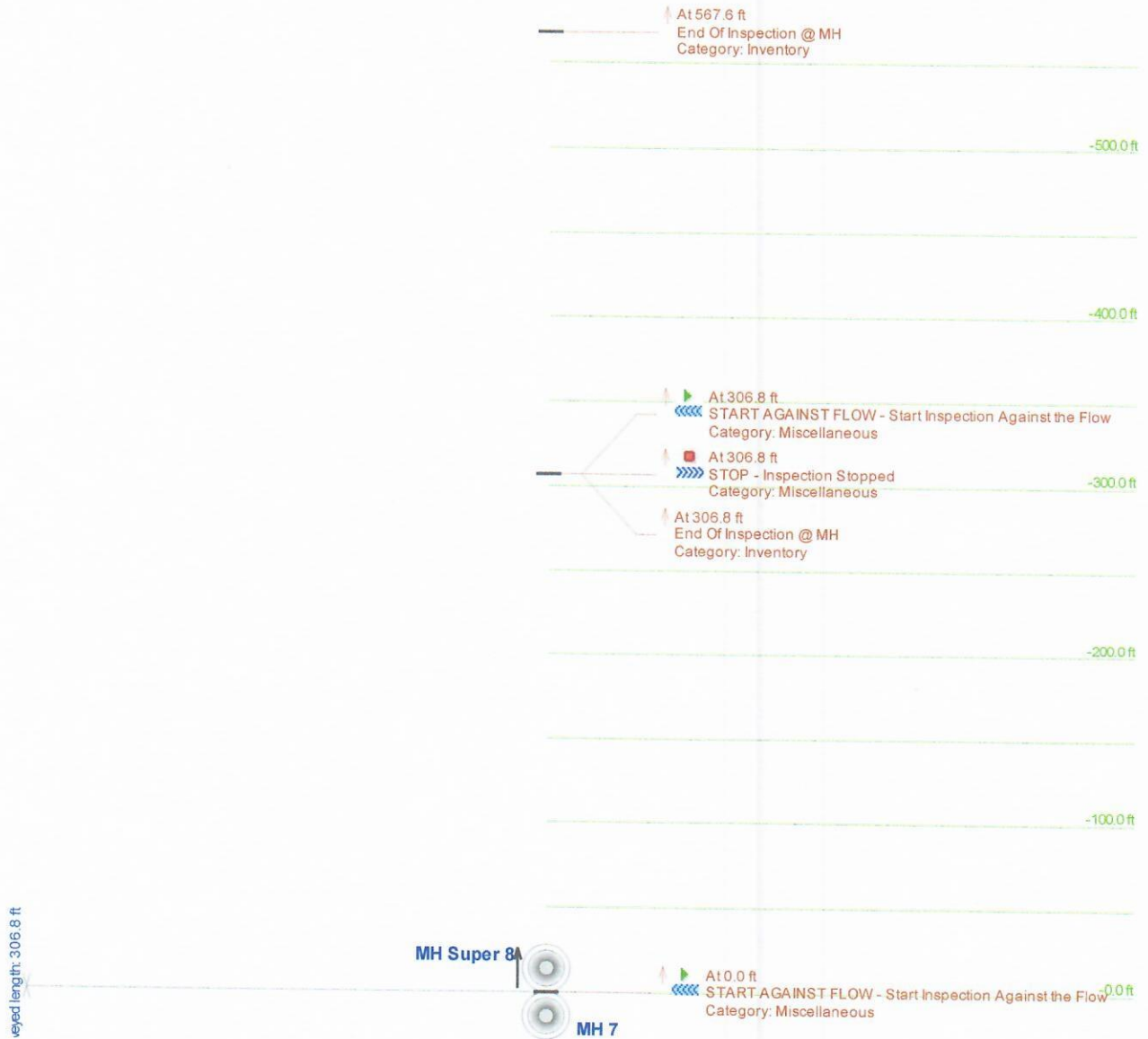


TAM ENTERPRISES INC.  
 114 HARTLEY ROAD  
 GOSHEN, N.Y. 10924  
 Phone 845-294-8882 , Fax 845-294-8883  
 E-MAIL:TONY@TAMENTINC.COM



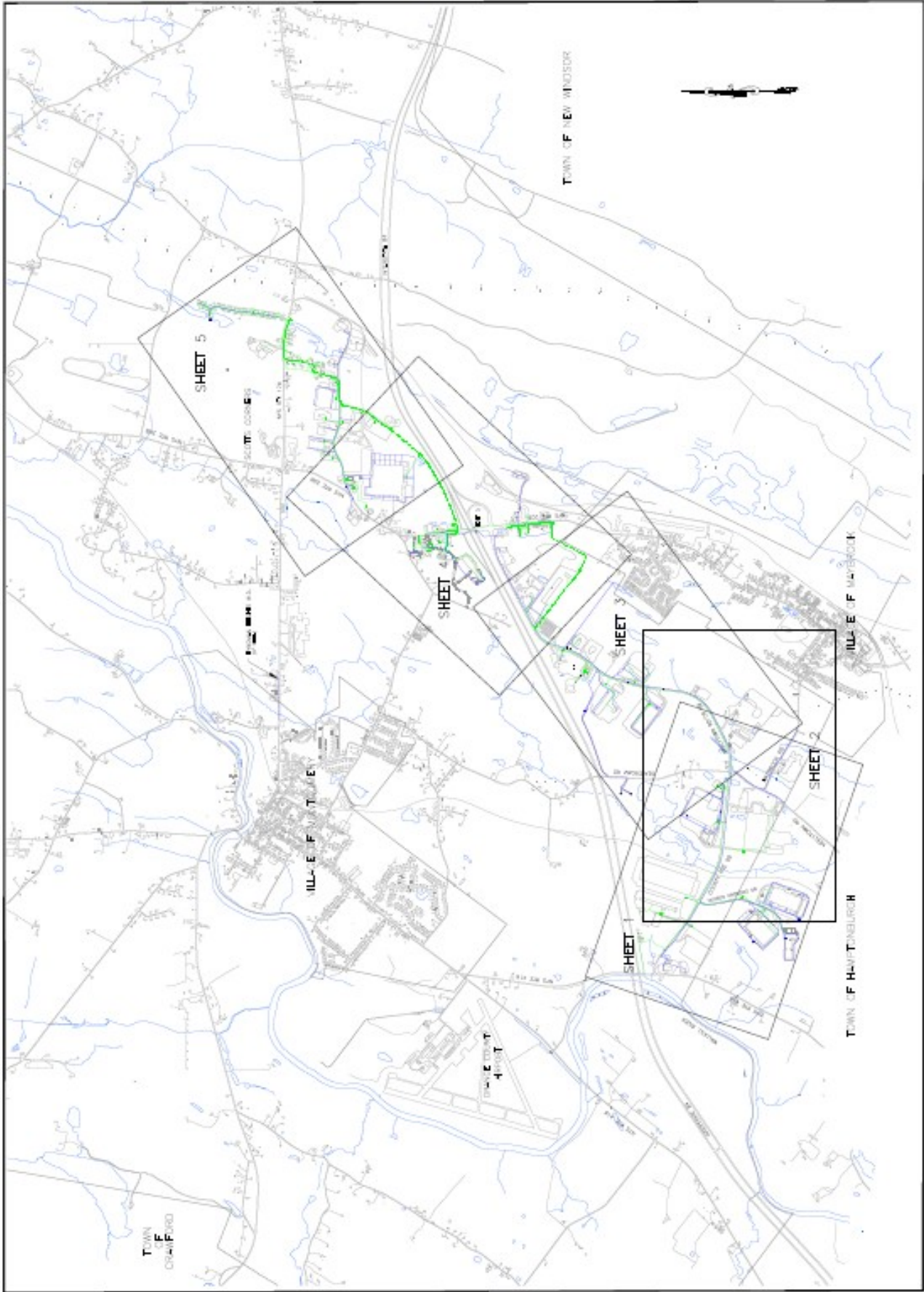
## Main Inspection with Pipe-Run Graph

Project Name: <b>Montgomery</b>		Mainline ID: <b>5/30/2019-1:42</b>		City: <b>Montgomery</b>		Address: <b>XPO Logistics</b>	
Start date/time: <b>5/30/2019</b>		Pipe width: <b></b>	Pipe height: <b>8</b>	Pipe type: <b>Transite</b>	Surface condition: <b>Asphalt</b>		Weather: <b>Dry</b>
Direction: <b>Towards Upstream</b>		Surveyed footage: <b>306.8</b>		Operator: <b>Joe Kata</b>		Comments <b></b>	

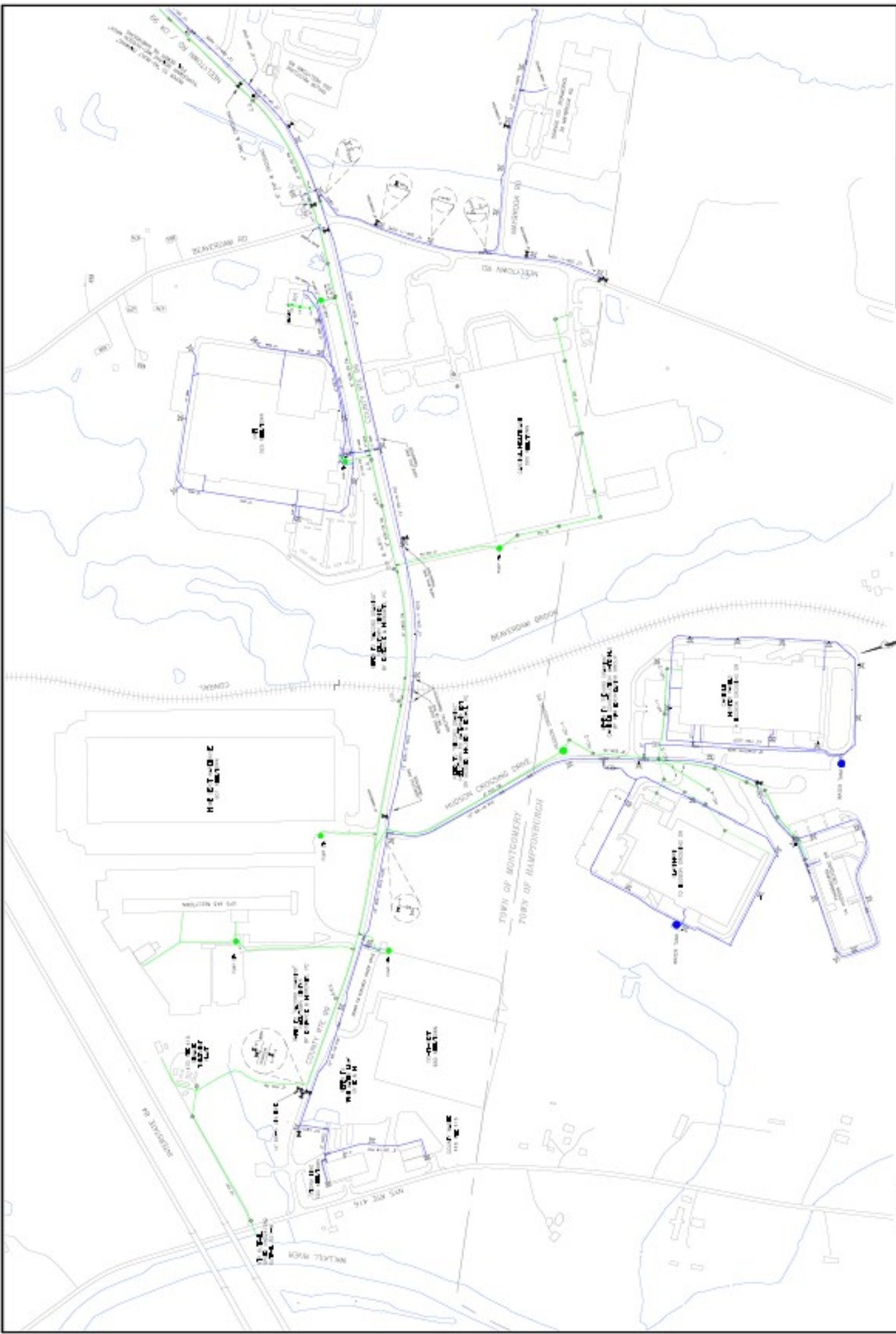


# *APPENDIX A12*

## *Collection System Mapping*

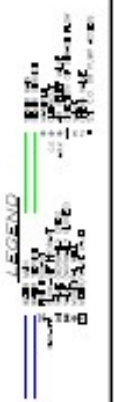
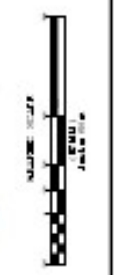


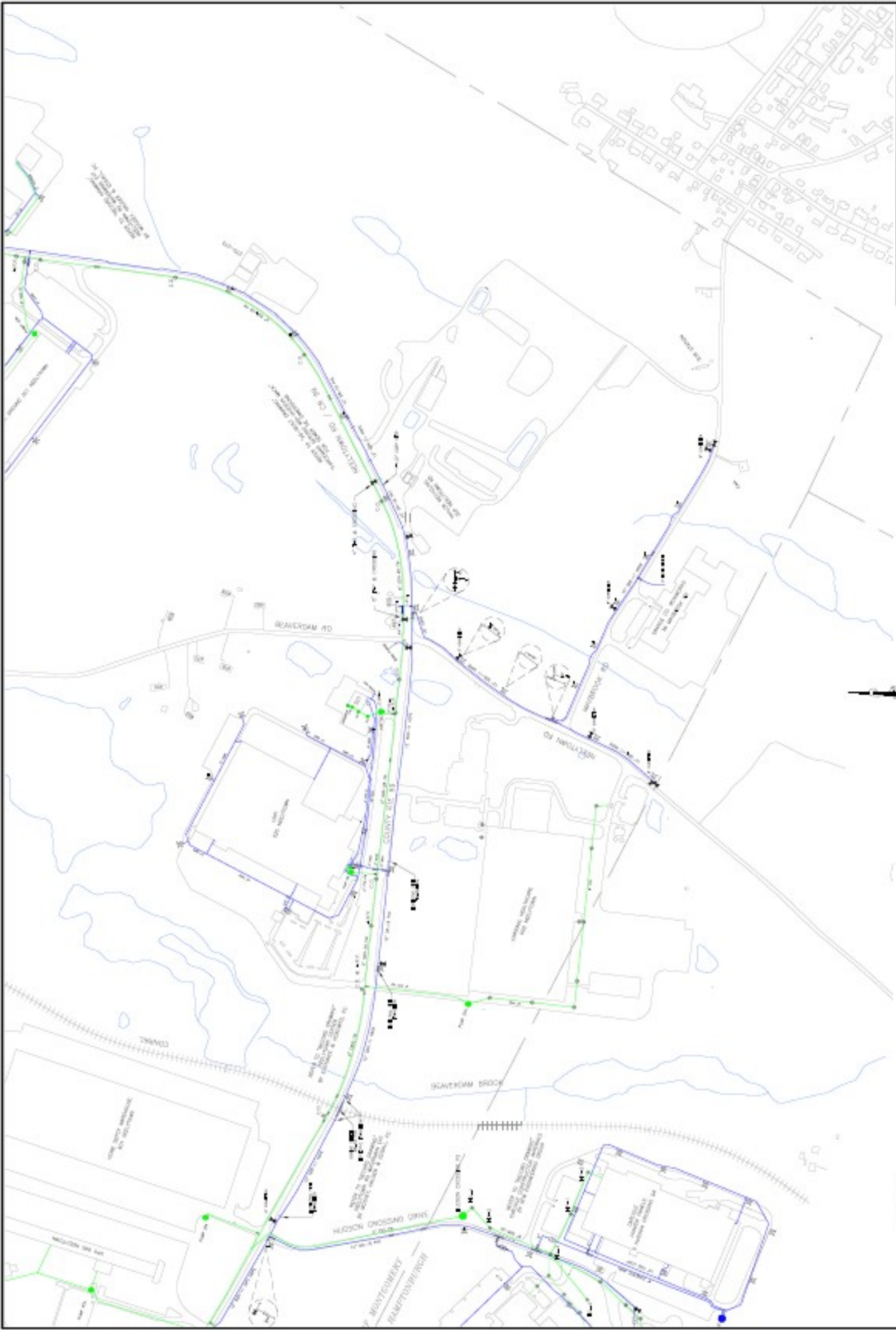
MICHAEL J. ABELLO, P.E., P.E.L.C.  
 WATER & SEWER UTILITIES  
 TOWN OF MONTGOMERY  
 10000 WOODBURN AVENUE, SUITE 100  
 MONTGOMERY, ALABAMA 36117  
 PHONE: 205-833-1100  
 FAX: 205-833-1101  
 WWW.MJAWATER.COM



PROJECT:  
 WATER & SEWER UTILITIES  
 TOWN OF MONTGOMERY

MICHAEL J. ABELLO, P.E., P.L.L.C.  
 1000 W. 10TH ST.  
 SUITE 200  
 MONTGOMERY, AL 36106  
 (205) 833-1111





DRAWN BY  
**MICHAEL J. ABELLO, P.E., P.L.L.C.**  
 WATER & SEWER UTILITIES  
 1000 W. MONTGOMERY  
 MONTGOMERY, AL 36104  
 PHONE: 205.833.1111 FAX: 205.833.1112  
 WWW.MJABELLO.COM







