

2016 ILLICIT DISCHARGE INVESTIGATIONS IN OAKLAND COUNTY'S PORTION OF THE ROUGE RIVER WATERSHED

FINAL REPORT

**PREPARED FOR:
ALLIANCE OF ROUGE COMMUNITIES**



**46036 MICHIGAN AVE., SUITE 126
CANTON, MI 48188**

WWW.ALLIANCEOFROUGECOMMUNITIES.COM

**PREPARED BY:
OAKLAND COUNTY WATER RESOURCES COMMISSIONER**



**ONE PUBLIC WORKS DRIVE
WATERFORD, MI 48066**

JANUARY 31, 2017

EXECUTIVE SUMMARY

Illicit discharge investigations were conducted in 2016 on multiple Oakland County storm drains within the Rouge River Watershed. Investigations were conducted by the Oakland County Water Resources Commissioner (WRC) as follow up to potential illicit discharges identified in 2014 and investigative work conducted in 2015. IDEP investigations to date have identified 3 illicit sanitary connections, 2 suspect septic systems and 8 additional suspect connections to be evaluated as potential illicit discharge sources on four (4) County Drains. A summary of illicit connections and additional suspect illicit discharge sources along with recommended follow-up actions are summarized in the table below. A “suspect illicit connection” is indicated in the table when *E. coli* counts exceeded 10,000 cfu/100 mL, but a specific source has not been identified. A “potential illicit discharge” is indicated when *E. coli* counts were below the 10,000 cfu/100 mL and no physical signs of sanitary sewage was found. Additional investigations will be conducted on these drains in 2017.

Summary of identified and Potential Illicit Connections

Drain Community	Identified and potential Illicit connections and discharge sources	Recommended Follow-up Actions
US-16 Farmington	Illicit sanitary connections from 3 homes identified	Elimination scheduled in 2017. Conduct follow up sampling to determine if further investigations are necessary.
Fracassi Southfield	8 potential illicit connections were identified on Seminole St., Inkster Rd. and Negaunee St.. Sampling indicates additional potential illicit connections may be present	Dye test / verify suspect connections. Conduct additional investigations to identify additional connections
Austin Southfield	Potential illicit connections along Jeanette Street west of Santa Barbara St. identified in 2014. No Investigations were conducted in 2016	Conduct additional sampling and investigations to locate the illicit connection (s)
Devonshire Bloomfield Twp.	Septic System was found built on top of the Bloomfield Highlands Drain on S. Berkshire. No additional sampling was conducted in 2016.	Septic System in the process of being relocated and permitted. Conduct additional, sampling and investigations to identify additional connections.
Claude H Stevens 3 Bloomfield Twp.	Discharge from failed Septic System on Charring Cross identified.	Failed Septic system is in the process of being eliminated. Conduct additional sampling and investigation to locate any additional connections if necessary.
Claude H Stevens 4 Bloomfield Twp.	Potential illicit connections. No additional sampling was conducted in 2016.	Conduct additional sampling to determine if further investigations are warranted.
Claude H Stevens 10 Bloomfield Twp.	Potential illicit connections. No sampling was conducted in 2016. No illicit connections found	Conduct additional sampling to determine if further investigations are warranted.

BACKGROUND

Seven (7) County Drains were identified by WRC within the Rouge River Watershed as being in need of illicit discharge investigation for the purpose of identifying and eliminating sources of sewage contamination to the drains and to the Main and Upper Branches of the Rouge River in Oakland County. Drains selected for further investigation during this project period include:

- US-16 Drain in Farmington;
- Claude H. Stevens 3, 4 and 10; and Devonshire, drains in Bloomfield Township;
- Fracassi and Austin Drains Southfield;

Drain locations are depicted in Figure 1. These drains were selected for investigation based upon historical elevated *E. coli* dry weather screening data collected by WRC under the Illicit Discharge Elimination Program (IDEP) for Oakland County and follow up sampling and IDEP investigations conducted in 2013, 2014 and 2015. Drains with elevated counts of *E. coli* bacteria can indicate that upstream illicit discharge sources are present. Therefore, additional sampling and investigations are necessary to determine if illicit discharges are occurring and to locate the source of those discharges within the drains.

These efforts support the activities required under Oakland County's municipal stormwater permit and the Alliance of Rouge Communities (ARC) draft Rouge River Collaborative Illicit Discharge Elimination Plan. This work is being funded by the ARC and carried out by the WRC.

INTRODUCTION

During the project period sampling and illicit discharge investigations were conducted on the US 16 Drain and Fracassi Drain and Claude H. Stevens No. 3 Drain. Additional sampling and investigations were not completed during this period on the Austin Drain, Claude H. Stevens No. 4 and No. 10 Drains and the Devonshire Drain. Work was not completed on these drains due to limited time constraints and focus to complete investigations on other higher priority drains before the onset of winter weather conditions in early December. Nonetheless, these drains are included in this report to track the need for follow-up work.

Maps of local connecting storm drain systems were obtained from the communities; and the drains were segmented based on manhole locations. Surveys were conducted at select manholes and evidence of sewage contamination (toilet paper, grey water, soap suds, staining, etc.) was noted. Water samples were collected at locations that exhibited dry weather flow. Samples were analyzed for *E. coli* bacteria at the Walled Lake–Novi Waste Water Treatment Facility (WWTF). Physical observation and sampling data were reviewed and used to identify segments of each drain with suspected sanitary discharges. Additional sample were collected and observations were made in order to confirm and isolate specific segments of the drain and, where possible, identify specific inlet(s) with evidence of sanitary sewage. Closed Circuit Televised (CCTV) inspections were further used to identify specific possible sanitary illicit connections. A summary of sampling results and investigations conducted on each drain is provided herein. Location maps and results of sampling and investigations are provided as figures for each drain.

Notes, observation and photos from drain surveys and investigations are included in Appendix A. Copies of CCTV and MH inspections are included in Appendix B. A complete list of *E. coli* sampling results is included in Appendix C.

US-16 DRAIN INVESTIGATION

The US-16 Drain is a large enclosed storm drain located along the northern border of Farmington and Farmington Hills. The Drain parallels Grand River Ave and Shiawassee Road and discharges to the Upper Rouge River in Shiawassee Park near Farmington Road. The Drain services local storm water road drain laterals in residential subdivisions on both the north and south side of Shiawassee Road and from businesses along Grand River Ave. west of Shiawassee. Historically the US 16 Drain was a combined sewer system with sanitary sewer overflow connections to the drain. The local storm drains were separated and overflows eliminated with the construction of a new sanitary system in the 1990s. In 2013, WRC identified high *E. coli* counts and other signs of potential illicit connections to the drain along Shiawassee Road between Grand River Ave. and the outlet. In 2014 additional sampling targeted a section of the Drain along Shiawassee Rd. for investigation. Historic Drain plans, inspection, tap records and video from a March 2000 CCTV inspection were reviewed. The drain was jetted and cleaned and manhole inspections and smoke testing was conducted in December of 2014. Results of inspection and smoke testing indicated multiple potential illicit connections from residences along Shiawassee, along with possible potential issues with sanitary bulkheads and possible connections between the sanitary and storm laterals on Hillcrest and Glenview Streets. See the “2014 Illicit Discharge Investigation in Oakland County’s Portion of the Rouge River Watershed Final Report” for details.

In March of 2015, the City of Farmington completed a CCTV inspection of the US 16 Drain and sanitary sewer system along Shiawassee. Results identified three illicit connections to the drain with evidence of sanitary sewage. Inspections of the potential leaking bulk headed, sanitary overflow connections and side street storm lateral connections identified in the 2014 report did not reveal any additional issues. In December of 2015, the City with assistance from WRC, dye tested and confirmed sanitary connections from 3 houses, 33550 and 33431 Shiawassee Rd and 33840 Grand River Ave. to the US 16 Drain.

In 2016, staff from WRC met with the City of Farmington to discuss the status of the illicit connections confirmed on Shiawassee and to discuss plans for additional IDEP activities. The homeowner’s have been notified of the illicit connections but corrective actions have not been completed. Farmington indicated that house lateral connections should have been eliminated and connected to the Farmington sanitary system during upgrades to the system in the 1990s. Farmington has decided to make the corrections themselves. Houses will be by disconnected from the US 16 Drain and reconnected to the sanitary sewer. This will require going under the US 16 Drain. The City has developed engineering plans and bids have been received. . Work is expected to be completed in conjunction with planned improvements along Shiawassee Rd. in the summer of 2017 pending approval of funding and construction schedules on Shiawassee Rd. and Grand River Ave. by MDOT. It was decided that any additional sampling and investigation of the US 16 Drain along Shiawassee Rd. should be postponed until corrective actions are completed.

After a review of the results of the smoke testing and investigations conducted in 2014 / 2015, WRC sampled and surveyed the local storm drain laterals on Hillcrest and Glenview Streets to determine if additional illicit discharge investigations were needed. Several houses had been recorded as exhibiting signs of smoke during the smoke testing but illicit connections had not been verified. WRC's inspections of the storm and adjacent sanitary manholes on Shiawassee in 2015 did not find any bulkhead or sanitary cross connection issues. It is believed that positive smoke testing results on these streets may have been a false indication due to rain and misty weather on the date of the smoke testing. Locations of sampling sites and results are included as Figure 2. Results of *E. coli* sampling are included in Appendix C.

Results

No illicit connections are suspected on Hillcrest and Glenview streets based on manhole inspections and samples for *E. coli*. The illicit connections identified on Shiawassee should be corrected by the city in summer 2017.

Recommendations

The following activities are recommended based on the inspections to date on the US-16 Drain:

- Corrective actions for illicit connections of the sanitary house leads at 3550 and 33431 Shiawassee Rd. and 33840 Grand River Ave. need to be completed.
- Follow up sampling on the US 16 Drain will need to be conducted once the illicit connections are removed to determine if any additional investigations are needed.

FRACASSI DRAIN INVESTIGATIONS

The Fracassi Drain is a series of interconnected enclosed drains located in the southwest corner of Southfield at Inkster Rd. and 8 Mile Rd. The Drain services a residential neighborhood and extends four blocks east of Inkster Rd. and from 8 Mile Rd north to Adelein St. Historically, the Fracassi Drain was part of the Hazel Drain, which is an older Chapter 4 Drain built in the 1920s servicing sub divisions west of Inkster Rd. and south of Shiawassee. The Hazel Drain connects to the Clareville Drain which discharges to Upper Branch of the Rouge River south of 8 Mile Rd in Farmington Hills. In the early 1970s, the Drain was improved by the City of Southfield and disconnected at Emmet St. and Inkster Rd. which is the community border. on The line running east to west on Emmet St. was abandoned and storm laterals on the side streets east of Inkster were connected to a new line constructed on Byron St running west to east. The Fracassi Drain currently connects to the Emily Drain on Indian St. south of Byron St. The Emily Drain discharges to Middle Branch of the Rouge River at Beech Daly Rd. just north of Shiawassee.

In 2013, elevated *E. coli* levels up to 5,412 cfu/100 mL were detected at storm drain laterals connecting to Fracassi Drain on Byron St. In 2014, additional samples were taken along the Fracassi Drain to narrow down drain segments with suspected illicit connections. Samples revealed elevated *E. coli* counts between 20,000 and 592,000 cfu/100 mL within the main trunk line along Byron St and in the drain laterals located along Seminole, Poinciana, Negaunee, and Indian Streets. Upstream sampling on the

connecting laterals was limited due to a street re-surfacing project that was occurring at the same time. See the “2014 Illicit Discharge Investigation in Oakland County’s Portion of the Rouge River Watershed Final Report” for further details.

In 2016, staff from WRC met with ECT and the City of Southfield to review the 2014 sampling results and obtain plans for local drain and sanitary systems. WRC and ECT reviewed a copy of the Southfield Sanitary Sewer Investigation Project Summary Final Report which was completed in 2012 as part of work conducted on the Evergreen Farmington Sewer Disposal System (EFSDS). The study contains manhole and CCTV inspections records of the sanitary systems within the Fracsssi Drain District area. A map of the sanitary sewer locations and CCTV inspection reports can be found in Appendix D.

In 2016, dry weather screening inspections and sampling for *E. coli* were conducted at forty eight (48) manhole locations on storm laterals connecting to Byron Street from Indian, Nagaunee, Poinciana and Seminole Streets and on Inkster Rd. at Byron, Emmett, Sedalia, Shiawassee, and Adelein Streets. Sampling and inspections were conducted on November 2 through November 14. A map of manhole sampling locations and results are included as Figure 3. A complete list of *E. coli* sampling results is included in Appendix C. Notes and photos from manhole surveys and field investigations are included in Appendix A.

Based on *E. coli* results and manhole inspections it was decided to conduct CCTV inspections of the laterals on Seminole, Negaunee, Poinciana, and Indian from Byron Street north to Adeline Street and on lateral connections from Inkster Rd. to Seminole, at Emmet, Sedalia, and Adelein Streets. An examination of manholes, connecting catch basins and road side ditches for evidence of illicit discharges was also conducted. During the project period, cleaning, CCTV and manhole inspections were completed on Seminole St., along the laterals connecting from Inkster Rd. on Adelein, Sedalia, and Emmett streets and a portion of Indian Street from November 27 to December 2. A map of proposed and completed segments of CCTV inspections and results is included as Figure 4. Copies of manhole and CCTV inspection records are included as Appendix B.

Results

A review of the EFSDS study in the project area did not find any instances of sanitary sewage impacting the storm drains. Results of CCTV inspections indicate that all properties have sanitary sewer service leads for sanitary connections. However, smoke testing of the sanitary sewer to confirm connections in this area was not conducted as part of the study. CCTV inspections also found six locations where repairs to the sanitary sewer were needed. This included a relining of the sanitary sewer on Inkster south of Emmett and spot repairs at the following five (5) locations: Inkster Rd. south of Adeline, Seminole St. south of Emmett St., Poinciana St. north of Sedalia St., Negaunee St. at Byron St, and Indian St. south of Byron St. Repairs to the areas were completed and no indication of sanitary sewage impacting the storm drain systems was reported.

Sampling of manhole structures on Byron St., storm laterals on, Indian, Nagaunee, Poinciana and Seminole and lateral connections to Inkster from Seminole at Emmet, Sedalia and Adeline revealed numerous sites with *E. coli* results concentrations exceeding 1,000 cfu/100 mL with the highest

concentration being greater than 1,002,500 cfu/100 mL at manhole 6240 located on Seminole, north of Sedalia. A summary of the results is provided in the table below. A complete table of sampling results can be found in Appendix C.

<i>E. coli</i> Concentration (CFU / 100 ML)	Number of Sites
> 1,000	7
1,000 – 10,000	16
> 10,000	25

This indicates potential sanitary connections on all street laterals.

In addition to the elevated *E. coli* counts, manhole inspections in this area also indicated evidence of potential sanitary discharges with grey water, toilet paper, grease, and/or staining found at six (6) manholes on Seminole St. (6193, 6192, 6191, 6190, 6240, 6239) and one (1) manhole on Nagaunee St. (6221). An additional catch basin sump connected to manhole 6222 on Poinciana exhibited signs of a possible laundry discharge. Examination of the drainage ditch to the north of the catch basin showed evidence of a potential connection from an older unknown drainage system, but a connection to the catch basin was not verified. Remnants of two (2) additional older unknown drainage systems were also identified connected to catch basin 13802 on Inkster Rd. and catch basin 13758 on Negaunee St. The source and extent of these drainage systems is unknown. Three (3) connections to the drain were identified at manhole locations 6193 and 6191 on Seminole and manhole 6248 on Inkster Rd. Suspect flow was identified from a local drain system connected to upper terminus manhole 6195 on Inkster Rd. A local drain connected to manhole 8219 on Indian exhibits a constant flow of water. Sampling at this location does not indicate a sewage source.

The 2016 CCTV inspections of storm drain segments located four (4) 6 inch clay tile pipe connections to the drain from residential properties at 21705, 21351, 21317 and 21159 Seminole St. No flow or sanitary debris was found at these connections. They may be connections from sump pumps, but this should be confirmed.

In addition, an examination of connections to catch basin 13703 and manhole 6193 on Seminole St. were conducted. These are both 12 inch reinforced concrete pipe (RCP) connections from the west running under the driveway at 21823 Seminole St. and through the yard at 21681 Seminole St. No visual evidence of sanitary flow was seen. It is believed these pipes are storm drains as no evidence sanitary flow was seen but their origins and connected sources are unknown and should be investigated.

No additional connections were identified from drain segments inspected on Adeline St., Emmet St., Sedalia St. Byron St. and Indian St. No additional illicit discharge issues were found during the visual examination of manholes, connected catch basins and drainage ditches. Evidence of animal feces was noted in the upper terminus manhole (6184) on Indian St.

It should be noted that only 4,573 ft. of the proposed 15,721 ft. of storm sewer was examined. Additional CCTV work could not be completed due to time constraints. Pipes contained 6-10 inches of

sediment at their base which required extensive cleaning before CCTV cameras could navigate through the system. It is believed that sediment may have been deposited from recent water main replacement and road resurfacing projects in this area.

Although sampling and observation of flow at a majority of manhole locations indicated potential illicit discharges on all street laterals connected to the Fracassi Drain, the CCTV inspections did not identify any illicit connections. It is unknown whether this is a result of extensive cleaning required for CCTV inspections or the absence of any sanitary illicit connections.

Recommendations

Table 1 below is a summary of identified manhole and connections that require further Investigation. A discussion on recommended activities follows.

Table 1. Manholes and Connections requiring further Investigation

Street	MH ID / Address	Connection	Potential Issues	Recommended Follow-up Actions
Inkster	6195	12" N	Suspect flow from local storm drain	Additional sampling and investigation needed
Inkster	6248	6" NW	Unknown inlet with staining connected to MH	Determine source, connectivity & potential for illicit connections
Inkster	6243	12" N	Unknown enclosed drain system connected to CB 13802	Determine source, connectivity, & potential for illicit connections
Seminole	6193	12" W	Unknown enclosed drain system connected to MH	Determine source, connectivity & potential for illicit connections
Seminole	6191	12" NW	Unknown enclosed drain system connected to CB 13703	Determine source, connectivity & potential for illicit connections
Seminole	21705	6 " W	Unknown lead could be sanitary	Need to verify nature of connection
Seminole	21351	6 " W	Unknown lead could be sanitary	Need to verify nature of connection
Seminole	21317	6 " W	Unknown lead could be sanitary	Need to verify nature of connection
Seminole	21159	6 " W	Unknown lead could be sanitary	Need to verify nature of connection
Poinciana	6232	CB	Suspect discharge to connected CB Sump 13779	Investigate to locate discharge source.
Negaunee	6223	6"	Unknown enclosed drain system connected to CB 13758	Determine source, connectivity, & potential for illicit connections
Indian	6209	12" E	Connection with non-sanitary flow identified	Conduct investigation to find flow source.
Indian	6184	NA	Animal feces found in MH	Consider alternative BST methods

- The Fracassi Drain and the laterals that were not already cleaned and inspected in 2016 should be cleaned to allow for additional investigations. It may also be beneficial to research alternative methods of televising the drains without having to do extensive cleaning so as to preserve evidence of sanitary discharges at the inlet structures.
- Once cleaned, target manholes should be reinspected for signs of sewage and sampled for *E. coli*. If sewage signs still exist, then the following should be completed:

- Additional sampling should be conducted at or downstream of 21705, 21351, 21317 and 21159 Seminole St and manholes 6193 and 6191 to confirm these connections as potential illicit connection sources in need of further investigation and verification.
- The detection of animal feces in manhole 6184 at the upper terminus of the drain on Indian St. is of concern. If continued sampling of the drain indicates high *E. coli* concentrations with a lack of evidence of sanitary flow or debris, an alternative Bacterial Source Tracking (BST) method may have to be considered in order to distinguish between animal and human strains of *E.coli*
- Additional sampling of flow from the local storm drain connected to manhole 6195 at the upper terminus of the drain should be conducted to determine if the local drain is a potential source of upstream illicit connections in need of investigation. Sampling indicated an *E. coli* concentration of 3,132 CFU / 100 ML and although elevated, it is not considered a priority for illicit discharge investigation at this time.
- Investigation of the source of grey water in the sump of CB 13779 connected to MH 6232 on Poinciana St. is needed. A flow source was not evident at time of inspection. Examine potential unknown older enclosed drain pipe in the drainage ditch to the north for connectivity to the drain system. Dye test 21357 Poinciana St. for possible illicit connection if needed.
- Review County and City records and conduct surveys and inspections as necessary to determine connectivity, origin and ownership, if possible of unknown enclosed drains connected at CB 13802 on Inkster Rd., CB 13802 and MH 6193 on Seminole St. and CB 13758 on Negaunee St. Determine if these are storm drains or if additional illicit discharge investigations are needed.
- An upstream investigation needs to be conducted on the local storm drain connected to MH 6209 on Indian St. to locate the source of continual flow to the drain.

AUSTIN DRAIN INVESTIGATIONS

The Austin Drain is a large enclosed storm drain system which runs west from Southfield Road along 10 Mile Road and discharges in to the storm collection system for Northwestern Highway just west of Evergreen Road in Southfield. The drain services the commercial facilities along a portion of Southfield Road north of 10 Mile, and west along 10 Mile Rd to Evergreen Road. The drain also services residential subdivisions north and south of 10 Mile Road through laterals connecting to the system on 10 Mile Road (See Figure 5). The outlet of the Austin Drain has been previously tested for *E. coli* in 2008, 2012, and 2013 during dry weather by WRC under their IDEP program. Sampling results placed the drain on a priority list to be investigated for illicit discharges.

In 2014, the drain was segment and sampled for *E. coli*. Results of sampling isolated a segment of the drain on Santa Barbara as a potential source of illicit discharges. Additional sampling and investigation

indicated a local storm drain connecting Jeanette Street west of Santa Barbara St. as a potential source of upstream illicit connections. See the “2014 Illicit Discharge Investigation in Oakland County’s Portion of the Rouge River Watershed Final Report” for details.

No additional sampling or investigations were conducted on the Austin Drain during this period. This was due to a priority focus on investigation of the Fracassi Drain along with limited time and budget constraints and the onset of winter weather conditions in early December.

Recommendations

Additional sampling and investigation of the local storm drain on Janette St.

DEVONSHIRE DRAIN INVESTIGATIONS

The Devonshire Drain is a large enclosed drain that runs along the south side of Square Lake Road generally west of Woodward Avenue in Bloomfield Twp. The drain services commercial properties along Square Lake Road and Woodward Avenue and residential properties in subdivisions south of Square Lake Road. The drain also collects flow from the Bloomfield Highlands Drain, north of Square Lake Road. The drain discharges to Rouge River just south of Devon Street downstream of Heather Lake (See Figure 6). The outlet of the drain has been previously tested for *E. coli* in 2005, 2009 and 2013 during dry weather by WRC under their IDEP program. Sampling results of 4,401 cfu /100 mL (2005), 4,472 cfu /100 mL (2010) and 1,974 cfu/100 mL (2013) placed the drain on a priority list to be further evaluated for illicit discharges.

In 2014, the drain was segmented and *E. coli* samples were collected at seven manhole locations along Wendover Street and east and west on Square Lake Road. Samples exhibited moderately high *E. coli* concentrations between 2,030 cfu /100 mL and 3,666 cfu /100 mL as shown in Figure 5. However, no physical evidence of sanitary sewage (i.e., floatables, solids, color, odor, etc.) was observed. However, the presence of illicit discharges cannot be ruled out. Additional upstream locations further east near Woodward Avenue and further west near the Bloomfield Highlands Drain confluence. Additional sampling needs to be conducted and evaluated to determine if IDEP investigation work is necessary.

In 2016, WRC Staff met with Bloomfield Twp. to review results of previous sampling and investigations and obtain maps of local storm drains and sanitary systems for the commercial corridor and sub-divisions east of Woodard Ave. A map indicating properties on septic systems in subdivisions north of Square Lake Rd. along the Bloomfield Highlands Drain was also obtained. However, no additional sampling of the Drain was conducted in 2016 due to time constraints.

However in 2016, the Oakland County Health Department evaluated the septic system at 127 S. Berkshire and found that the drain field for the system has been constructed over the top of the Bloomfield Highlands Drain. The location of the drain and property is indicated in Figure 6. Inspection of the system was the result of a permit filed with the Health Department for construction of an additional dwelling on the property. The Health Department is requiring the original septic system to be abandoned and an engineered system to be installed at an alternate location on the property. The

Health Department is in the process of reviewing and issuing the permit. The new system is expected to be installed in 2017.

Recommendations

Additional sampling and investigation of the Devonshire Drain, Bloomfield Highland Drain, and local storm drains will be scheduled in 2017 following abandoning of the septic system.

CLAUDE H. STEVENS DRAINS NO. 3, 4, & 10 INVESTIGATIONS

The Claude H. Stevens Drain is a conglomeration of 10 separate sections of enclosed storm drains located throughout Bloomfield Township. Outlets for the separate drain sections have been dry weather screened and sampled for *E. coli* by WRC under their IDEP Program. Three sections of the drain, Claude H. Stevens 3, Claude H. Stevens 4 and Claude H. Stevens 10, showed evidence of possible illicit discharges occurring and were placed on the list for additional investigations. A map of drain locations is included as figure (7). A summary of sampling and investigations conducted on each drain follows.

Claude H. Stevens 3 Drain

The Claude H. Stevens 3 drain is located east of Squirrel Road and North of Wattles Road and services residential subdivisions in this area. The drain runs east from Squirrel Road and discharges to a branch of the Rouge River just east of Farhill Street (See Figure 8). In 2013, sampling of the outlet of the drain showed an *E. coli* concentration of 7,194 cfu/100 mL.

In 2014, the Claude H. Stevens 3 drain was investigated and sampled for *E. coli* at select upstream manhole locations in order to identify potential illicit discharge sources. Segmenting and sampling of the drain at upstream road crossings indicated elevated *E. coli* counts at all manholes the highest being manhole 408 (226,500 cfu/100 mL) on Charing Cross. High *E. coli* and physical evidence of sewage at this location (floatable, soap suds, solids) indicated a likely illicit discharge. It was believed that an illicit connection is coming from a property (ies) on Charing Cross Road or from the surrounding subdivisions on Whippers Lane, Hunt Master St. or Steeple Chase St. It should be noted that manhole 7316 is the upper terminus Manhole for the County Drain system. Local storm drainage to the west is connected to this location. Bloomfield Township was contacted and indicated that subdivisions to the west of Charing Cross are private and that storm drainage was either privately owned or under the jurisdiction of the Road Commission for Oakland County (RCOC).

In 2016, staff from WRC met with Bloomfield Twp. to review previous sampling and investigation results and obtain available storm and sanitary maps for the subdivisions. A map of properties with septic systems was also obtained. At this meeting, it was noted that the property at 4158 Charing Cross located adjacent to MH 408 is on a septic system. Sampling information and photos of possible sewage contamination were forwarded to the Health Department for evaluation of the system as a possible source of contamination to the drain. An Investigation of the property was conducted by the Health Department and WRC on January 12, 2017.

Results

An examination of the property at 4158 Charring Cross indicated a sewage odor and ponding of sewage on top of the drain field. The drain field is located in the south east portion of the front yard of the property less than 50 ft. from the roadway. Soap suds were also evident in the road drainage ditch flowing into MH 408 to the north. The Health Department sampled effluent from the drain field and is in the process of notifying the Homeowner of the failing system. A location map and photo are attached as Figures 8 and 9.

Recommendations

The following follow up activities are recommended:

- OCHD is in the Process of Notifying the Homeowner of the septic system failure.
- Bloomfield Twp. has already been notified and indicated that a sanitary connection is available along the southern edge of the property and that their ordinance requires a connection to the sanitary sewer. They will send the homeowner a notice to connect to the sanitary sewer as soon as notification of the failed system is received by the homeowner.
- Additional sampling of the drain will be conducted by WRC after corrective actions have been made to determine if any additional IDEP Investigations are needed to locate other potential sources.

Claude H. Stevens 4 Drain

The Claude H. Stevens 4 drain is located south of Wattles Road east of Kensington Road and services residential subdivisions South of Wattles Road between Kensington and Adams Road. The drain runs east of Kensington Road and discharges to a branch of the Rouge River just east of Burnley Street. In 2013, sampling of the outlet of the drain showed an *E. coli* concentration of 10,909 cfu/100 mL.

In 2014, the drain was inspected and sampled for *E. coli* at the first upstream manhole location and manholes located at Tullamore and Haddington streets. All manholes had elevated *E. coli* counts ranging from 876 cfu/100 mL to 4,802 cfu/100 mL. Inspections of manholes did not find any other physical evidence of sanitary sewage in the drain. Manholes along Kensington were not sampled due to their location in the roadway and concerns of working in a lane of traffic. Based on results it is inconclusive as to whether the drain is receiving and illicit discharge, but the possibility cannot be ruled out.

No work was conducted in 2016.

Recommendations

- Additional investigations should be conducted along Kensington and any upstream local storm drains to determine if an illicit discharge is occurring, and
- Conduct follow up illicit discharge investigations as needed based on inspections and sampling results.

Claude H. Stevens 10 Drain

The Claude H. Stevens 10 is located east of Telegraph Road and south of Maple Road. The drain services private subdivisions along County Club, Birmingham Club, Fairlane and Hidden Creek Drive where it discharges to local storm drainage just south of Hidden Creek. In 2013, sampling of the outlet of the drain to the local drain showed an *E. coli* concentration of 61,128.

In 2014 drain upstream investigations and sampling for *E. coli* was conducted. Results of sampling showed *E. coli* concentrations of 4,623 cfu/100 mL and 2,524 cfu/100 mL. Although these counts were elevated, they are not extremely high and the lack of the physical evidence of sanitary sewage makes it inconclusive as to whether or not a sanitary discharge is occurring. Upstream investigations were limited due to new development in subdivisions at the north end of the drain.

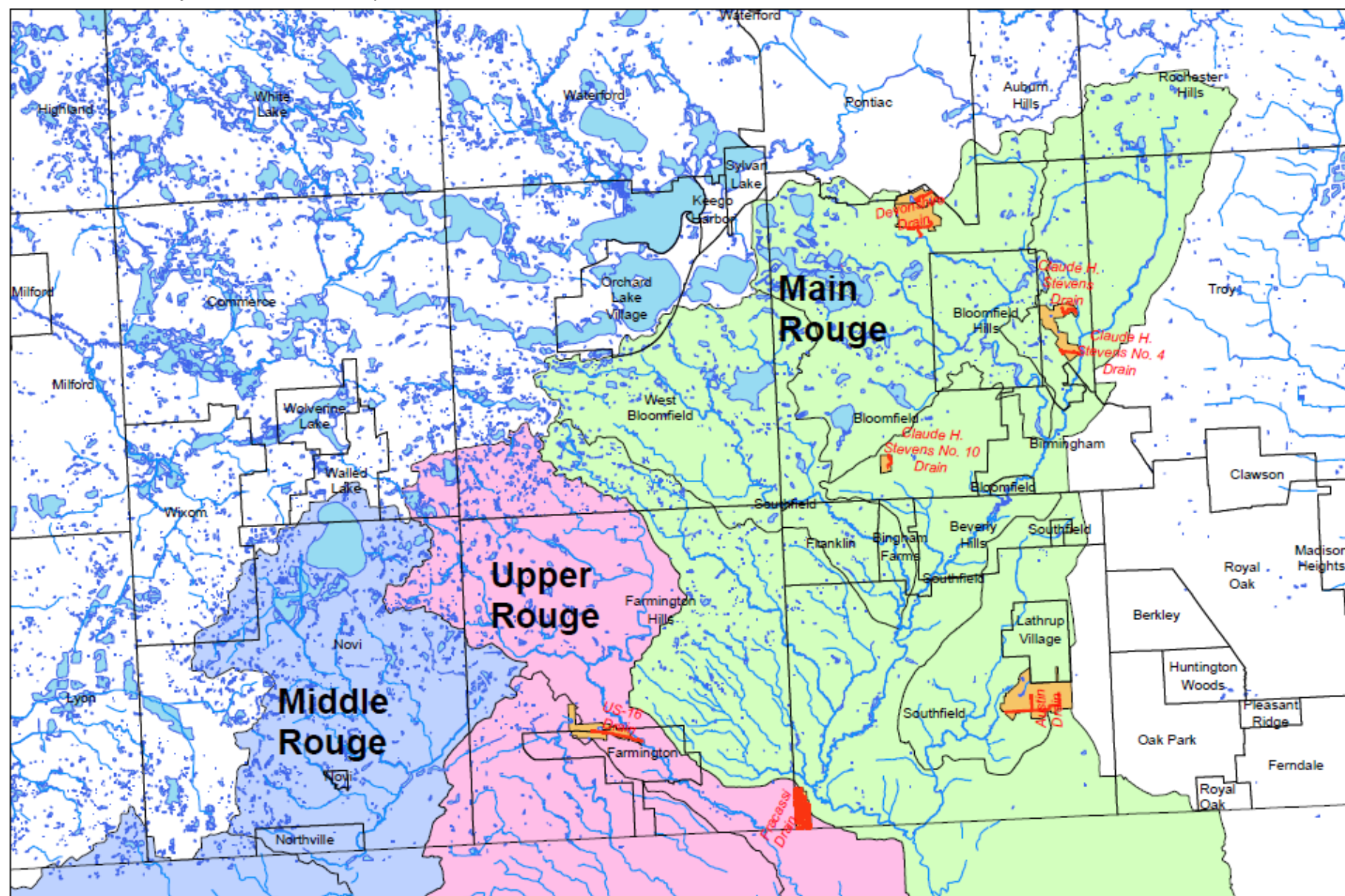
In 2016, WRC Staff met with Bloomfield Twp. to review results of previous sampling and obtain storm maps and plans for connected subdivisions. No other work was completed in 2016.

Recommendations

- Conduct upstream sampling, and
- Conduct follow up illicit discharge investigations as needed based on inspections and sampling results.

FIGURES

Figure 1: 2016 IDEP Project Area Location Map



Legend

 Main Rouge	 County Drains	 Drain District Area
 Middle Rouge	 Watercourse	 Municipal Boundaries
 Upper Rouge	 Water Body	

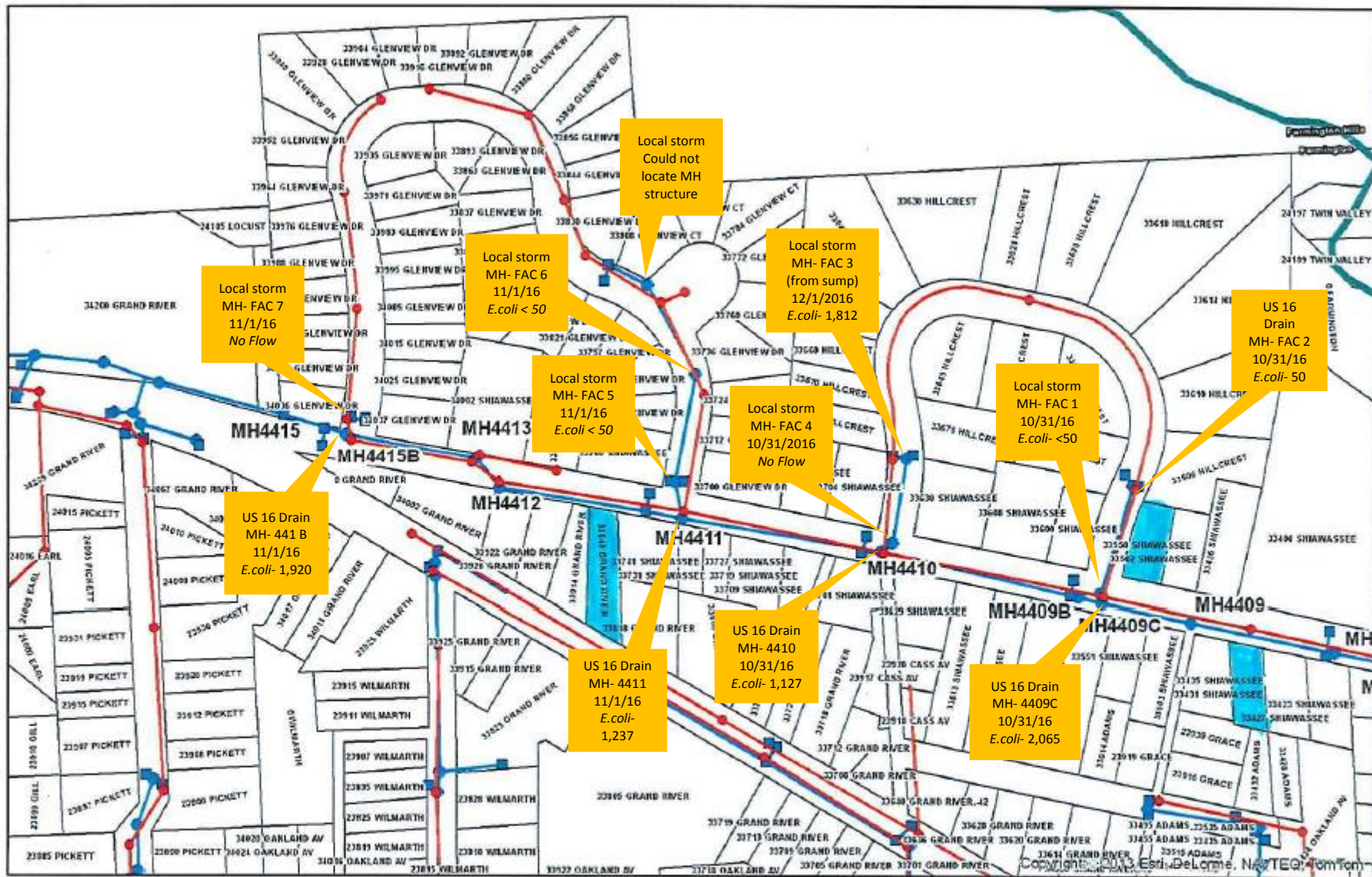
2016 IDEP Project Area Locations



Oakland County
Illicit Discharge
Elimination Program



Figure 2: US 16 Drain Sampling and Investigation Location Map



Legend

- Parcel Boundary
- Storm Sewer Line
- Sanitary Sewer Line
- Storm Sewer Manhole
- Sanitary Manhole
- Catch Basin
- Properties with Illicit Connections

City of Farmington Illicit Discharge Investigations US-16 Drain Upstream Target Area

Figure 3: Fracassi Drain Sampling Locations

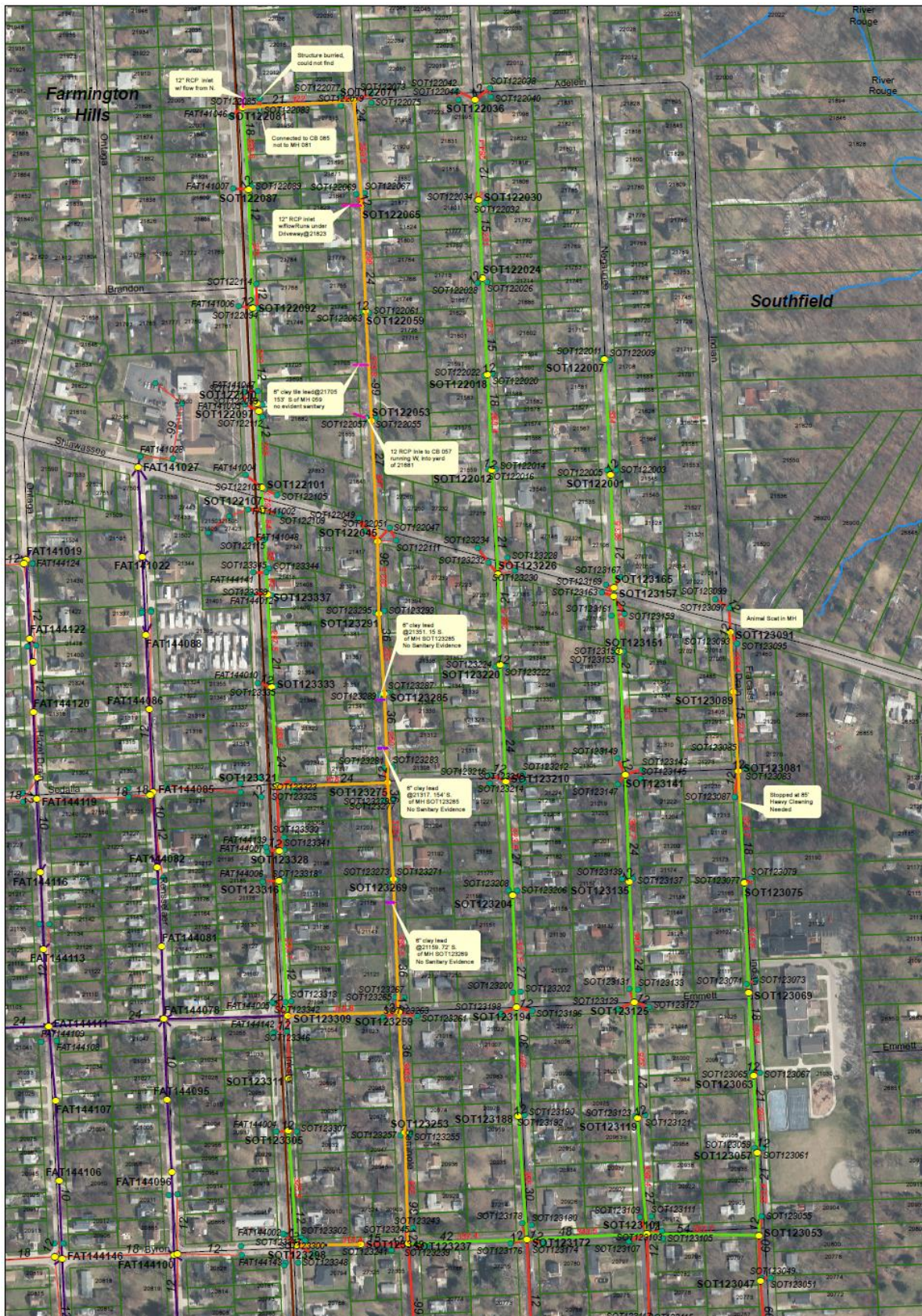


Legend

- ★ Drain Outlet
- MH Locations
- Sampling Locations
- Fracassi Drain
- Emily Drain
- Open Water Course
- Municipal Boundary



Figure 4: Fracassi Drain CCTV Locations



Fracassi Drain, 2016 IDEP Project, CCTV locations, Southfield

Legend

- MH Locations
- Road / Drainage Ditch CB Inlet Structures
- Fracassi Drain
- Empty Drain
- Completed CCTV Sections
- Open Water Course
- Proposed CCTV Locations
- Municipal Boundary

Proposed CCTV
60 Segments
Total Linear Feet= 15,721

Actual CCTV
18 Segments
Total Linear Feet= 4,573



Figure 5: Austin Drain Location Map



Austin Drain Drain, E.coli Sampling Map 11/19/14 & 12/9/14 Southfield

Legend

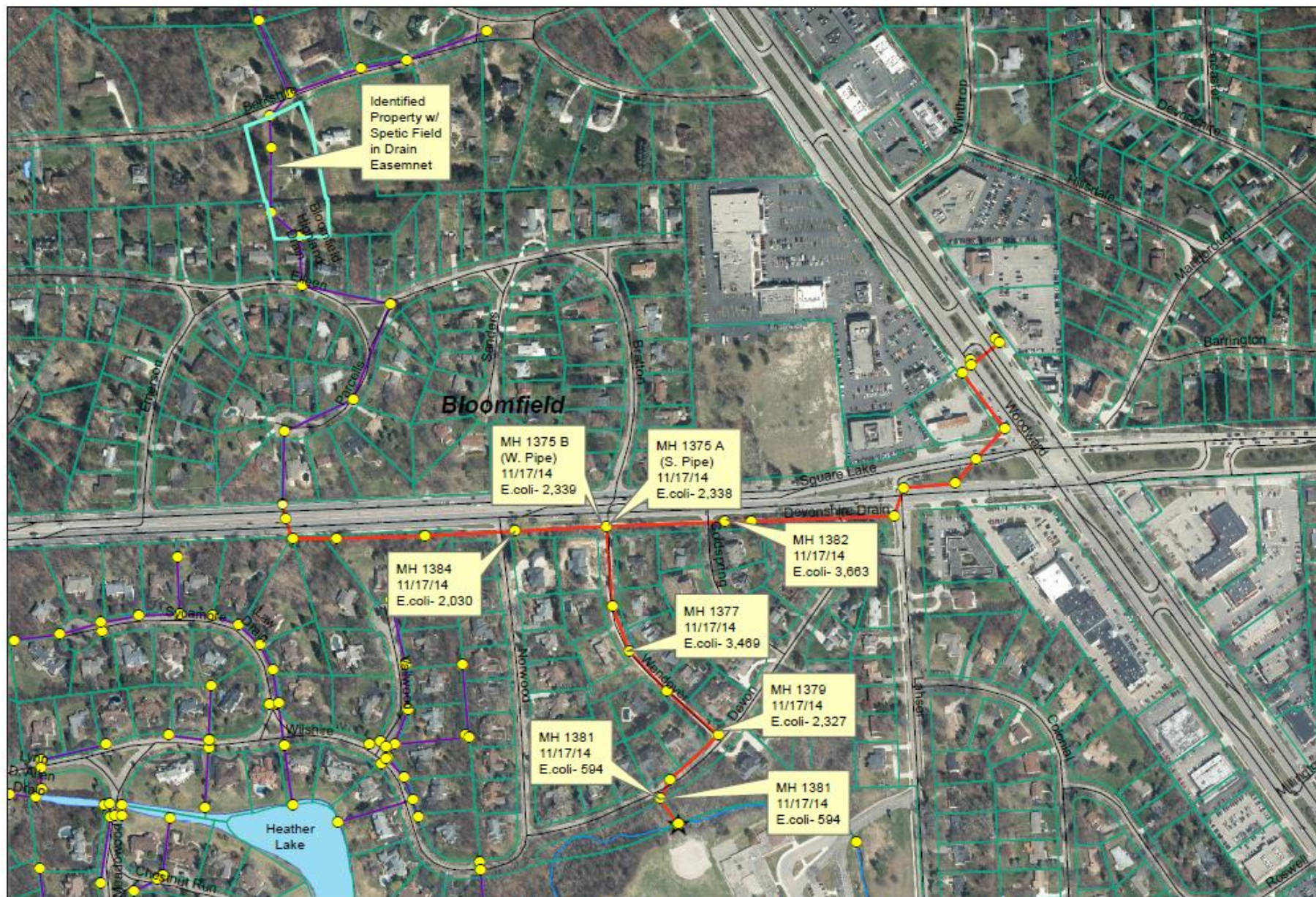
- ★ MS4 DP
- Drain Structures
- Text
- Austin Drain
- County Drains Enclosed
- Open Water Course
- Municipal Boundary



Oakland County
Illicit Discharge
Elimination Program



Figure 6: Devonshire Drain Location Map



Legend

- ★ Drain Discharge Point
- Devonshire Drain
- Open County Drains
- Drain Structure
- Enclosed County Drains
- Open Water Course

**Devonshire Drain, E.coli Sampling, 11/17/14
Bloomfield Twp.**

Oakland County
Illicit Discharge
Elimination Program








WRC
WATER RESOURCES COMMISSIONER
Jon Peck

This map illustrates the geographical layout of the Bloomfield Hills region, including its constituent towns and cities. Key features include:

- Towns and Cities:** Bloomfield Hills, Troy, Birmingham, Bloomfield, Bingham Farms, Beverly Hills, Southfield, and Royal Oak.
- Drainage Areas:** Three specific areas are highlighted in orange and labeled in red: 'Claude H. Stevens No. 14 Drain' and 'Claude H. Stevens No. 4 Drain' (located near Troy), and 'Claude H. Stevens No. 10 Drain' (located near Bingham Farms).
- Water Bodies:** Numerous lakes are depicted in blue, including Long Lake, Wing Lake, and several smaller ponds.
- Roads:** Major highways such as I-75 and I-275 are shown as thick black lines, along with a network of local roads.
- Topography:** The map uses contour lines to represent the terrain's elevation.

Legend

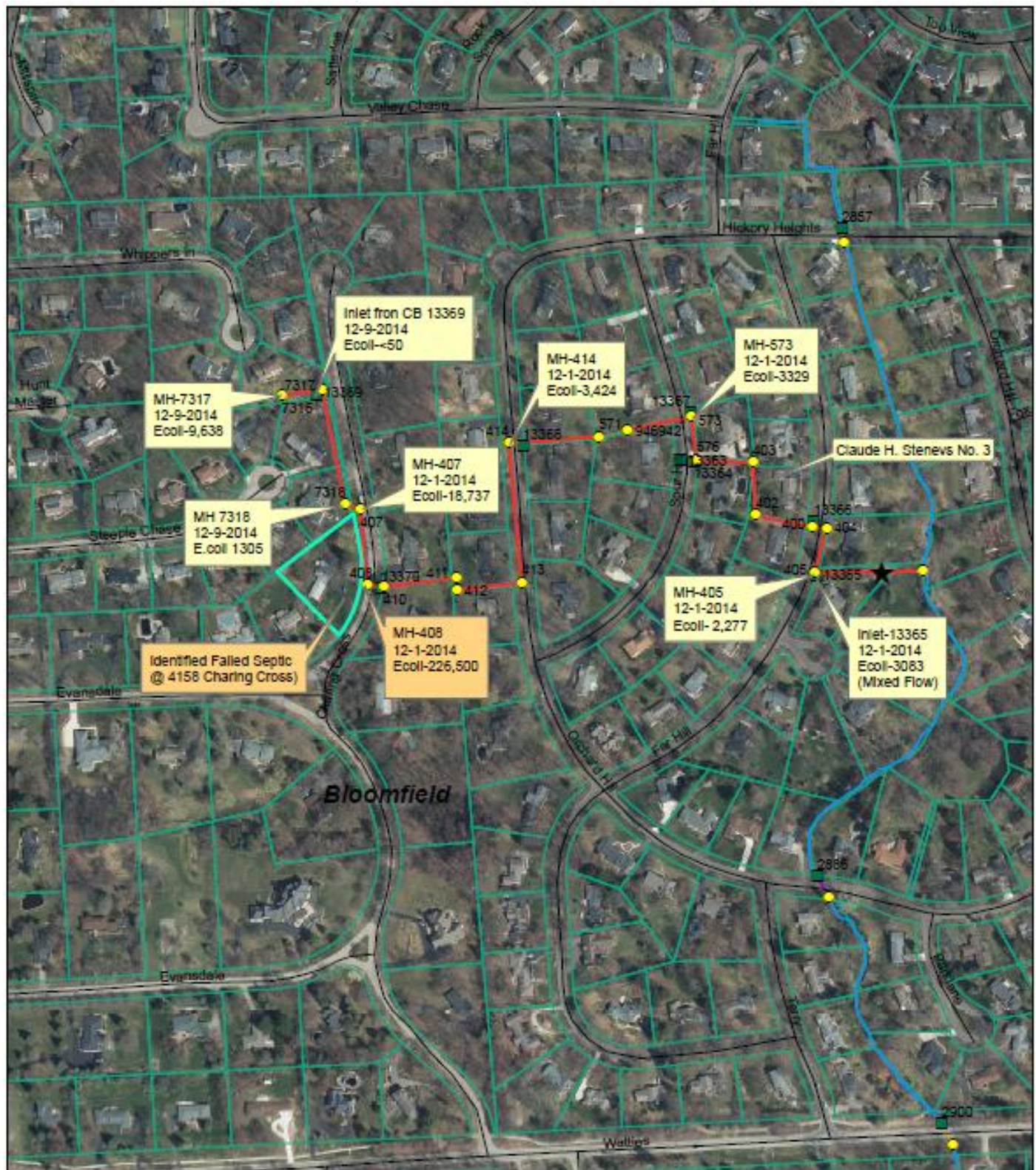
-  Claude H. Stevens Drain
  Drain District Area
-  Watercourse
  Municipal Boundaries
-  Water Body



Oakland County
Illicit Discharge
Elimination Program



Figure 8: Claude H. Stevens No. 3 Drain Illicit Discharge Investigation



Claude H. Stevens No. 3 Illicit Discharge Investigation, Bloomfield Twp.

legend

- ★ MS4 Discharge Point
- Manhole Structures
- Inlet Structures
- Enclosed County Drains
- Open Water Course
- Municipal Boundary
- Illicit Discharge



Oakland County
Illicit Discharge
Elimination Program



Figure 9: Photo of Failed Septic Field on Charing Cross



Figure 10: Claude H. Stevens No. 4 Sampling Locations and Results



Claude H. Stevens No. 4 E.coli Sampling 12/1/2014
Bloomfield Twp.

Legend

- ★ MS4 Discharge Point
- Manhole Structures
- Inlet Structures
- Enclosed County Drains
- Open Water Course
- Municipal Boundary



Oakland County
Illicit Discharge
Elimination Program



Figure 11: Claude H. Stevens No. 10 Sampling Locations and Results



Claude H. Stevens No.10 Drain, E.coli Sampling, 12/1/14
Bloomfield Twp.

Legend

- ★ MS4 Discharge Points
- Drain Structures
- Claude H. Stevens No. 5 & 10 Drains
- Open County Drains
- Open Water Course



Oakland County
Illicit Discharge
Elimination Program



APPENDIX A: FRACASI DRAIN FIELD NOTES, OBSERVATIONS & PHOTOS

Seminole St. Manhole Survey



MH 6194 (071) Seminole & Adelein. Is N terminus for Seminole. NE, NW Road drain inlets were dry. Flow from W. on Adelein. Sampled.



MH 6193 (065) @ 21847 Seminole. NW, NE road drain inlets were dry. Flow from N has grey water. Inlet from W has flow w possible sanitary pipe is under driveway at 21823 Seminole.



Tap with flow from W. tied into MH 6193 (065). Pipe runs under driveway for 21823 Seminole. May be an illicit connection



6192 (059) @ 21745 Seminole. W & E Road Drain Inlet were dry. Grey water, toilet paper, grease in flow from N. Sampled



MH 6191 (053) @ Park on E. Seminole. NW & NE road inlets were dry. Flow from N. has grey water & possible toilet paper. Sampled



MH 6190 (045) Shiawassee @ Seminole. MW,NE,SW,SE Inlets for road drain ditches were dry. Additional E&W inlets for Shiawassee Rd. (not in GIS) w staining. Flow from N .has toilet paper



MH 6241 (291) @21394 Seminole. NW, NE, road drain inlets were dry. Flow from N. on Seminole was clear. Sampled



MH 6240 (269) @ 21351 Seminole, SE, SW road drain inlets were dry, Toilet paper, grease ,sanitary, in flow from N. Sampled



Sample from MH 6240 (269) @ 21351 Seminole. Sample from MH, Toilet paper, grease, and sanitary debris

MH 6239 (275) @ Sedalia & Seminole, Inlets from W on Sedalia and from , NE,NW, SW road drains were dry. Flow with grey water from N. Sampled

MH 6238 (269) @ 21175 Seminole, Inlets SW,SE road drain were dry. Flow from N. on Seminole. Sampled

MH 6237 (259) MH @ Emmett & Seminole, Inlets SW,SE & NW Road drains were dry. Flow W. on Emmett & N. on Seminole, Sampled

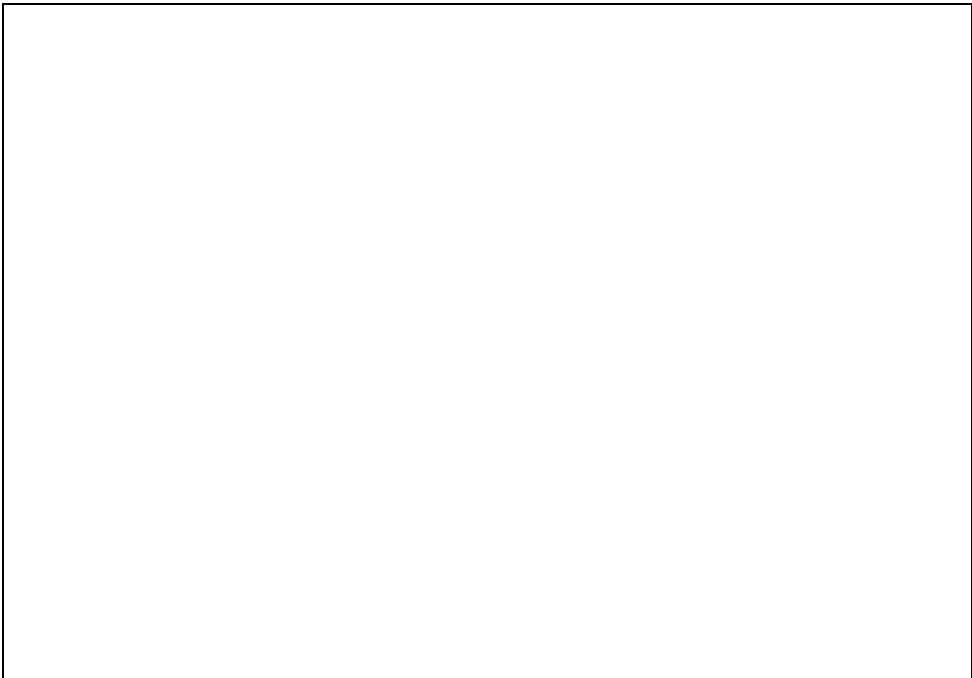


MH 6236 (253)@ 21048 Seminole connects flow N to S on Seminole. Inlets from SE, & SW road drains were dry. Sampled flow in main channel



MH 6235 (237) at Byron and Seminole connect flow from W on Byron to E on Byron. Flow in N inlet on Seminole. Inlets form NE, NW, SE, SW road drains were dry. Sample main channel

Poinciana St. Manhole Survey



MH 6189 (036). @ Adelein & Poinciana.. Upper terminus MH for Poinciana. Rd. Dry no Flow
Drain inlets were dry.



MH 6188 (030). Dry No Flow, N Inlet and E ,W Rd. drain CB Inlets were dry



MH 6187 (024) @ 21714 Poinciana. Low Flow in Main Channel, sampled. E & W Rd Drain CB
inlets were dry.



MH 6186 (018)@21596 Poinciana. Low flow in Main channel sampled. Possible grey water. E &
W Rd. drain CB inlets were dry.



MH 6185 (012) @21559 Poinciana. Low flow, sampled. W & E Rd. Drain Inlets were dry



MH 6233 (226) @ Shiawassee & Poinciana. Sampled Main Channel. Flush from SW connected CB 13781. Investigated. Sampled



CB 13781 (232) Connected to MH 6233 (226). @27207 Shiawassee Inlets W&S. S Inlet has flow, possible sump connection



Ditch line from Sump@27207 Shiawassee to CB 13781 (232)



Sump outlet from 227207 Shiawassee to ditchline



MH 6232 (220)@21349 Poinciana. W. Rd Drain CB w. flow & staining. Sampled flow in channel. Investigated CB 13179



CB 13179 Connected to MH 6232 (220). @ 21349 Poinciana. Grey water in sump. Sampled. Inlets from W & S



Road Ditch Inlet to CB 13179 from W.@ 21349 Poinciana



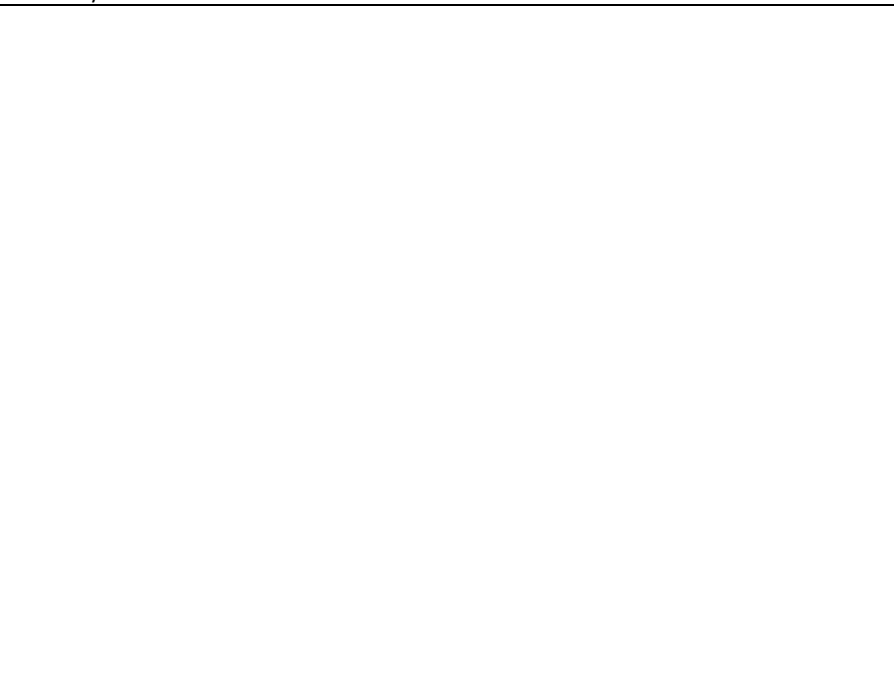
Ditch line N. of CB 13179 @ 21349 Poinciana. Possible Inlet to older drain system. Connection unknown.



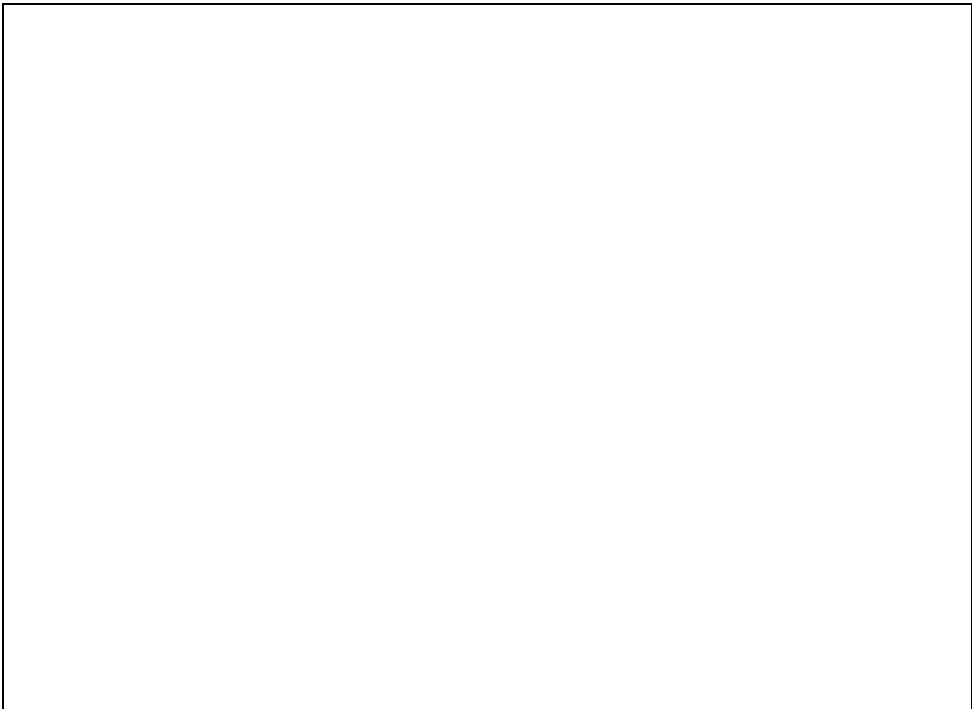
MH 6231 (210) Poinciana & Sedalia. Flow From N. sampled. Inlets from W & E Rd Drain CBs were dry



MH 6230 (204) @ 21159 Poinciana. Flow From N. possible get water & toilet paper, sampled Trickle flow from N & E Rd. Drain CB Inlets, not sampled



MH 6229 (194) Emmett & Poinciana. Flow from N. sample. W & SE. Inlets from Rd. CBs were dry



MH 6228 (188) @ 20795 Poinciana. Flow from N. sampled. N & W inlets from Rd. CBs were dry.



MH 6227(172) at Byron & Poinciana, connects flow from W on Byron to E on Byron. Flow from N. inlet on Poinciana. Inlets from NW, NE, SW & SE road drains were dry. Sampled main channel

Negaunee St. Manhole Survey



MH 6184 (007)@ 21073 Negaunee Upper. Terminus, Dry



MH 6183 (001) @21545 Negaunee,. Dry MH. Grey water pooled in outlet. Sampled



MH 6225 (165) N. Side of Shiawassee@ Negaunee. W & NE Rd. CB Inlets were Dry. Sampled flow from N. Possible sanitary debris



MH 6224 (157) S. Side of Shiawassee @Negaunee. Sampled. Flow from N. W & SE Rd CB Inlets were dry. Possible toilet paper up in pipe. Sampled



MH 6223 (151)@ 21350 Poinciana, Flow form N. Sampled and Possible flow from SE CB inlet Investigated



6223 B. CB 13779 connected to MH 6223 w inlet from N. from unknown drain. Sump sampled



6223 C. Unknown drain connectd to CB 13779 with with unknow connections from N. & S



MH 6222 (141) & Sedalia & Negaunee . Flow from N. Sampled. E, NW , SW Inlets Dry



MH 6221 (135) @ 21174 Negaunee,. Sampled flow from N. NE, NW Rd. CB Inlets were dry.



MH 6220 Emmett @ Negaunee (125) Sampled Flow from N. NE, NE, SE & SW Rd Drain inlets were Dry



MH 6219 (119) @20963 Negaunee. Sampled flow in main channel from N. Staining on E. Wall. E&W Rd. Drain Inlets were dry



MH 6216 (101) Connects flow from west on Byron to East on Byron. Flow from N on Negaunee. Inlets from NE, NW & SW Road Drain Ditches. Trickle flow in NW Pipe. Sampled flow in channel



CB 131467 (111) on E side of Negaunee, has flow from drainage ditch culvert in front of 20912 Negaunee. Sampled CB

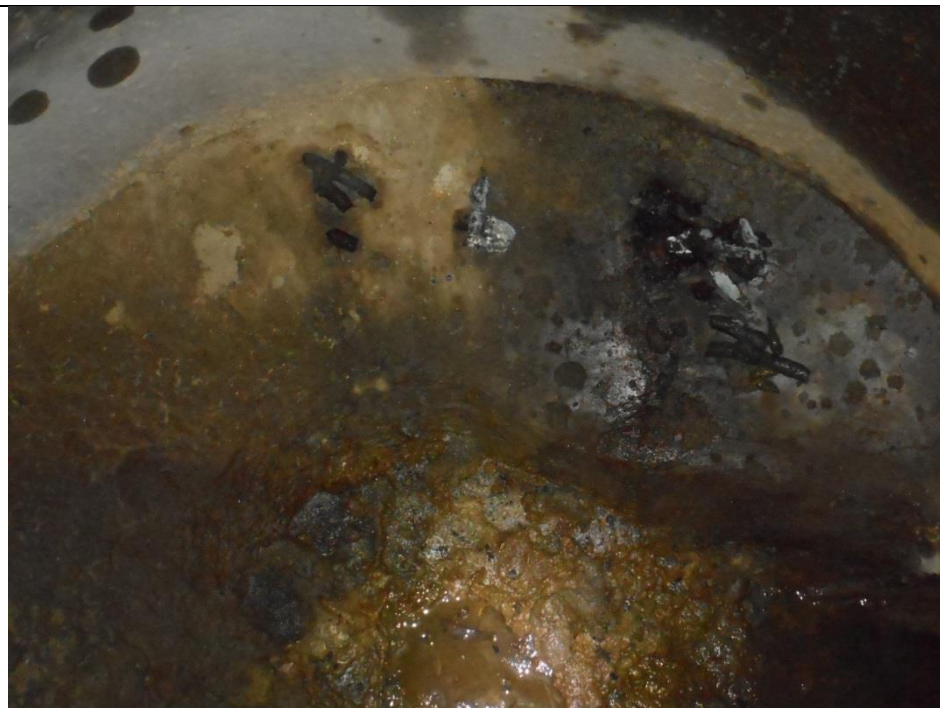


Flow from driveway culvert to ditch line S to inlet 13746 (111). Could hear gurgling sound coming from up in culvert. Flow sampled. Probably a connected sump pump. Sampled flow.

Indian St. Manhole Survey



MH 6215 (091) Indian @ Shuiawassee Upper terminus. Dry No flow. Inlet form N, & SE, SW Road Drain CB Inlets were dry.




MH 6215 (091) evidence of animal feces in MH.



MH 6214 (089) @ 21485 Indian. Low flow, sampled. SE Rd Drain Inlet was dry.

6213 (081) @ Sedalia & Indian. Flow in main channel om N. grey water w/ toilet paper. Sampled. W, NW & SW Road Drain CB Inlets were dry.

MH 6212 (075) @ 21165 Indian. Grey water , Toilet paper in Main Channel floew form N. W CB Rd. Dran inlet was dry	MH 6211 (069) at Emmett & Indian. Flow in Main Channel Sampled. Could not locate connected CB to N at 21111 Indian may be under driveway	
		
MH 6210 (063) Across fro John Grace Park. Flow in Main channel from N. Sampled. NW Road Drain CB Inlet dry	MH 6209 (057) @ 209555 Indian Flow in Main Channel from N. Sampled. Tap from W. with flow Sampled. No connecting CB. May be connection from E portion of old Hazel drain	



MH 6217 (053) On SW Corrnar of Byron & Indian. Connected flow W on Byon is N in Main channel under the Street. Conneted flow from N on Indian drops in Sampled flow in main channel. Rd CB Inlet fom NW was dry

Inkster Rd. Manhole Survey



MH 6195 (081)@ Adeiline @ Inkster Rd. Upper Terminus with latreal connection to seminole St. E. Flow from N. connected local storm sampled. SW & NE Rd. Drain CB Inlets were dry.



MH 6201 (107) @ Shiawassee & Inkster Rd.SE Corner. Flow in Main Chanel From N. Sampled. SE & W Rd. Drain CB inlets were dry.



MH 6200 (101) Shiawassee @ Inkster Rd. NE Corner. No Flow, Dry. May be wrong location



MH 6248 (321) Inkster Rd @ Sedalia. Flow From N. & S sampled. Lateral connection E. to Seminole St. unknown 6" connection with staining in NE corner of MH.



MH 6245 (309) Inkster Rd. at Emmett. N & S connections. Sampled Flow. Connection to Seminole St. Adjacent MH to W. not connected. NW, SW & NE Rd Drain CB Inlets were dry



MH 6242 (298) @ Inkster Rd & Byron. Dry, No Flow. Connects N. to E on Byron. S. SE, N, W NE, NW Rd. CB Inlets were dry.

APPENDIX B – FRACASSI DRAIN CCTV & MH INSPECTION REPORTS

INSPECTOR'S DAILY REPORT

1 of 2

Project: Fracassi Drain IDEP Project		WRC W/O #	Date: 11-28-16	Plan Sheet: SOT122.
Contractor: PIPELINE MANAGEMENT CO.			Location:	
Inspector's Signature:			Foreman: Bill Barsh (248) 318-1292	
Inspector's Printed Name: M. Ignash		Inspector's Hours Worked: From 7:00am To 3:30pm Total: 8hours		

Weather (A.M./P.M.) Cloudy / Lt. Sowers	Temp. (A.M./P.M.): 38° / 42°	Day: M T W T F S Su
---	------------------------------	----------------------------

CCTV / Cleaning Information

US MH	DS MH	Lineal Feet	Pipe Size	Kind of Pipe	Condition of Pipe	Pipe Condition/Remarks	Run WO No.
SOT 122081	SOT 122071	322' (239')	21"	RCP	1 of 5	Plan Footage: 322' Only made it 239' in from 071 before hitting large piece of concrete	578819
SOT 122071	SOT 122065	300' (20')	24"	RCP	1 of 5	Plan Footage: 300' only made it 20' before getting stuck in the sand.	578830
SOT 122065	SOT 122059	292'	24"	RCP	1 of 5	Plan Footage: 298' Made it all the way, no connections in line.	578854
Daily CCTV Totals:							CCTV total: 551'

Labor/Classification		No.	Hrs.	Equipment/Type		Model	Hrs.
1.	Foreman	1	8	1.	TV / Grout Unit	Telespector	8
2.	Operator	1	8	2.	Cargo Van		8
3.	Laborer	1	8	3.	Vactor		8
4.	Supervisor	-		4.	Supervisor truck		-
5.				5.	15-cones		
6.							Day
Hours Total (includes 1hr of drive time per)			24	Hours Total (includes 1hr of drive time per)			24
Consumable Goods:	Latex Gloves:	Rubber Gloves:		Cloth Gloves:	Tyvek suits:		0 each

JIM NASH
OAKLAND COUNTY WATER RESOURCES COMMISSIONER

09/09/13

Project: Fracassi Drain IDEP Project	Job No: Multiple	Date: 11/28/2016	Plan Sheet:SOT122
--------------------------------------	---------------------	---------------------	-------------------

Remarks

I arrived on site at 8am. Pipeline was on Seminole st, looking at the structures down the street coming up with a plan. Pipeline is filling the vactor with water. Southfield provided them with a meter. Crew is setting up on MH SOT 122071 and they are jetting to the west. Crew is going to jet and TV from the same MH because MH SOT 122081 is out in Inkster rd and would require traffic control. Crew has spent a long time cleaning the 1st line. Ron Fadoir told me the intent wasn't to clean any of the lines, just to TV the lines. I told Bill from Pipeline they are to try running the camera in the lines without any cleaning. Crew got the MH vacted out at 1130am. The vactor has broken and the crew is working on it. Crew has the vactor back together and moved at 1210pm. Crew is setting up the TV truck on MH SOT122071. Pipeline has finally started TVing the 1st line (081 to 071) at 1240pm. Pipeline made it 239' up the run from MH 071 where they ran into a large piece of concrete, crew was forced to abandon the survey. Crew is pulling the camera back at 105pm. The 1st line was still 10-15% full of sand, the camera had a hard time navigating the line. The camera feed was breaking up on the way back to the truck, crew is checking out the cord on the camera. Crew has the camera back up and are ready to TV the next line (071 to 065) at 140pm. Pipeline made it 20' up this run before getting stuck in the sand. The line was 10-20% full of sand. Pipe line is moving on to the next run (065 to 059). Crew made it through this run with no issues. There were no connection in this line. Crew is going to quit there for today, at 230pm. Crew is off site.

I have reviewed all the information and have found it to be accurate and complete.

Contractor's Representative - Print:	Sign:	Date:
--------------------------------------	-------	-------

INSPECTOR'S DAILY REPORT

1 of 2

Project: Fracassi Drain IDEP Project	WRC W/O #	Date: 11-29-16	Plan Sheet: SOT122.
Contractor: PIPELINE MANAGEMENT CO.		Location:	
Inspector's Signature:		Foreman: Bill Barsh (248) 318-1292	
Inspector's Printed Name: M. Ignash		Inspector's Hours Worked: From 7:00am To 3:30pm Total: 8hours	

Weather (A.M./P.M.) Cloudy / Lt. Sowers	Temp. (A.M./P.M.): 52° / 42°	Day: M T W T F S Su
---	------------------------------	----------------------------

CCTV / Cleaning Information

US MH	DS MH	Lineal Feet	Pipe Size	Kind of Pipe	Condition of Pipe	Pipe Condition/Remarks	Run WO No.
SOT 122059	SOT 122053	312'	24"	RCP	Good	Plan Footage:376' Made it all the way, one connection in line @ 21705 Seminole, 153 S of 059	579045
SOT 122053	SOT 122045	347'	24"	RCP	Good	Plan Footage:347' Made it all the way, no connections in line	579051
SOT 122045	SOT 123291	200'	36"	RCP	Good	Plan Footage:202' Made it all the way, no connections in line	579281
SOT 123291	SOT 123285	230'	36"	RCP	Good	Plan Footage:233' Made it all the way, no connections in line	579297
SOT 123285	SOT 123275	250'	36"	RCP	Good	Plan Footage:250' Made it through Two connections @ 21351 Seminole. 15' S of 285, @21317-154' S of 285	579298
Daily CCTV Totals:							CCTV total: 1,339'

Labor/Classification		No.	Hrs.	Equipment/Type		Model	Hrs.
1.	Foreman	1	8	1.	TV / Grout Unit	Telespector	8
2.	Operator	1	8	2.	Cargo Van		8
3.	Laborer	1	8	3.	Vactor		8
4.	Supervisor	-		4.	Supervisor truck		-
5.				5.	15-cones		
6.							
Hours Total (includes 1hr of drive time per)			24	Hours Total (includes 1hr of drive time per)			24
Consumable Goods:	Latex Gloves:	Rubber Gloves:			Cloth Gloves:		Tyvek suits: 0 each

JIM NASH
OAKLAND COUNTY WATER RESOURCES COMMISSIONER

09/09/13

Project: Fracassi Drain IDEP Project	Job No: Multiple	Date: 11/29/2016	Plan Sheet:SOT122
--------------------------------------	---------------------	---------------------	-------------------

Remarks

I arrived on site at 730am. Pipeline is continuing to work on Seminole. Crew is repairing the cord on the camera. We are starting by dropping the camera into MH 122065 to look into the 12" lateral running west out of the CB. Pipeline has the camera repaired and ready to go at 830am. We looked up the 12" line and it runs towards the rear of the property, hooking to the N. Crew is setting up at MH SOT122059 to video the next run (059 to 053). Crew is through the 1st line and they found one 6" connection at 21705 Seminole on the west side. Pipe line is continuing on through line 053-045, done at 925am. There is a pile of debris at the beginning on the run S of 122045, Pipe line is going to do some light jetting to see if we can make it past. The next run is 36", Pipeline had a concern about using the larger camera with all the dirt and debris in the line, we decided to keep with the smaller camera to try to crawl over the dirt and debris. Crew made it to MH 123291 at 11am. Crew is cleaning out the D/S MH while the TV truck breaks down and moves down to SOT123291. Pipeline is reset and are TV'ing 123291 to 123285 and 123285 to 123275 at 12pm. Crew is done with the 1st run at 1pm. Crew is continuing to jet ahead of the camera to make it passable. Crew has found another lead in the 285-275 run 15' S of 285 on the W side. A second 6" clay connection was found in the run 154' south of 285 on the west side. Crew is done TV'ing the runs at 145pm. Crew is vacing out the D/S MH.

I have reviewed all the information and have found it to be accurate and complete.

Contractor's Representative - Print:	Sign:	Date:
--------------------------------------	-------	-------

INSPECTOR'S DAILY REPORT

1 of 2

Project: Fracassi Drain IDEP Project	WRC W/O #: Multiple	Date: 11-30-16	Plan Sheet: SOT123.
Contractor: PIPELINE MANAGEMENT CO.		Location: Southfield	
Inspector's Signature:		Foreman: Bill Barsh (248) 318-1292	
Inspector's Printed Name: M. Ignash		Inspector's Hours Worked: From 7:00am To 3:30pm Total: 8hours	

Weather (A.M./P.M.) Sunny / Pt. sunny	Temp. (A.M./P.M.): 38° / 42°	Day: M T W T F S Su
---------------------------------------	------------------------------	----------------------------

CCTV / Cleaning Information

US MH	DS MH	Lineal Feet	Pipe Size	Kind of Pipe	Condition of Pipe	Pipe Condition/Remarks	Run WO No.
SOT 123275	SOT 123269	269'	36"	RCP	Good	Plan Footage:273' Made it all the way, No connections in the line	579475
SOT 123269	SOT 123259	380'	36"	RCP	Good	Plan Footage:384' Made it all the way, One 6" Connection 72' S of 269 on W side. 21159 Seminole	579482
SOT 123059	SOT 123253	346'	36"	RCP	Good	Plan Footage:348' Made it all the way, no connections in line	579484
Daily CCTV Totals:						CCTV total: 995'	

Labor/Classification		No.	Hrs.	Equipment/Type		Model	Hrs.
1.	Foreman	1	8	1.	TV / Grout Unit	Telespector	8
2.	Operator	1	8	2.	Cargo Van		0
3.	Laborer	0	0	3.	Vactor		8
4.	Supervisor	-		4.	Supervisor truck		-
5.				5.	15-cones		
6.							Day
Hours Total (includes 1hr of drive time per)			16	Hours Total (includes 1hr of drive time per)			16
Consumable Goods:	Latex Gloves:	Rubber Gloves:		Cloth Gloves:		Tyvek suits:	0 each

JIM NASH
OAKLAND COUNTY WATER RESOURCES COMMISSIONER

09/09/13

Project: Fracassi Drain IDEP Project	Job No: Multiple	Date: 11/30/2016	Plan Sheet: SOT123
--------------------------------------	---------------------	---------------------	--------------------

Remarks

I arrived on site at 730am. Crew is on site at 8am. Pipeline is continuing to work on Seminole. Crew is starting on run 123275 to 123269. Crew is continuing to jet as much as necessary to get the camera through the line. Crew has the 1st run done at 10am. There is a large pile of debris in the MH from previous construction, crew is pulling up to MH 123269 to vac out the debris pile. Crew is moving on to the run between 123269 to 123259. Crew has the camera down to 123259 at 12pm. Crew is vacing a pile of debris out of MH 259 2so they can finish TV'ing the run. Crew is done with the run at 1240pm. There was one 6" clay lead in this run 72' from the U/S MH (21159 Seminole). Crew is pulling the camera back so they can reset. TV truck is reset at 123259 at 115pm. Crew is TV'ing the run between 123259 and 123253, done at 2pm. Crew is vacing out MH253. Crew is decanting the vactor. Pipeling os done for the day and off site at 230pm.

I have reviewed all the information and have found it to be accurate and complete.

Contractor's Representative – Print:	Sign:	Date:
--------------------------------------	-------	-------

INSPECTOR'S DAILY REPORT

1 of 2

Project: Fracassi Drain IDEP Project		WRC W/O #: Multiple	Date: 12-1-16	Plan Sheet: SOT123/122
Contractor: PIPELINE MANAGEMENT CO.		Location: Southfield		
Inspector's Signature:		Foreman: Bill Barsh (248) 318-1292		
Inspector's Printed Name: M. Ignash		Inspector's Hours Worked: From 7:00am To 3:30pm Total: 8hours		

Weather (A.M./P.M.) Rain / Snow	Temp. (A.M./P.M.): 35° / 38°	Day: M T W T F S Su
---------------------------------	------------------------------	----------------------------

CCTV / Cleaning Information

US MH	DS MH	Lineal Feet	Pipe Size	Kind of Pipe	Condition of Pipe	Pipe Condition/Remarks	Run WO No.
SOT 123253	SOT 123237	317'	36"	RCP	Good	Plan Footage:316' Made it all the way, no connections in line. Heavy dirt in line.	579485
SOT 123237	Found MH	203'	15"	RCP	Good	A MH was found in the middle of the run, structure has aprox 3' drop in it. No Leads	580174
Found MH	SOT 123298	104'	15"	RCP	Good	See Above / No Leads	
SOT 123259	SOT 123309	313'	15"	RCP	Good	Plan Footage:316' Made it through, no leads	580212
SOT 122071	SOT 122065	296'	24"	RCP	Good	Plan Footage:300' Made it through, no leads	578830
Daily CCTV Totals:							CCTV total: 1,233'

Labor/Classification		No.	Hrs.	Equipment/Type		Model	Hrs.
1.	Foreman	1	8	1.	TV / Grout Unit	Telespector	8
2.	Operator	1	8	2.	Cargo Van		8
3.	Laborer	1	8	3.	Vactor		8
4.	Supervisor	-		4.	Supervisor truck		-
5.				5.	15-cones		
6.							Day
Hours Total (includes 1hr of drive time per)			24	Hours Total (includes 1hr of drive time per)			24
Consumable Goods:	Latex Gloves:	Rubber Gloves:		Cloth Gloves:		Tyvek suits:	0 each

JIM NASH
OAKLAND COUNTY WATER RESOURCES COMMISSIONER

09/09/13

Project: Fracassi Drain IDEP Project	Job No: Multiple	Date: 12/1/2016	Plan Sheet: SOT123/122
--------------------------------------	---------------------	--------------------	---------------------------

Remarks

I arrived on site at 730am, Crew is on site. Pipeline is continuing to work on Seminole. Crew is starting on run 123237 to 123253. The line has heavy silt in it, at least 10". Crew is done with the 1st line at 9am. Crew is moving the TV truck to MH 123298 and they are TV'ing the 15" line to 123237. Jetting was necessary to get through this line. An intermediate MH was found in the line 104' from the D/S MH. The structure had an aprox 3' drop in it. The casting was paved over at some point. Pipe line was able to get the camera through the found MH. Crew is done with this line at 11am. Pipeline is moving over to Emmet to TV the run between 123259 and 123309. This run required cleaning to get the camera through. Crew is moving down to the run between SOT122071 and SOT122065, this run was skipped before due to the dirt in the line. Crew is jetting the line. Pipeline is done with the line at 120pm. The vector is breaking down so they can get to the dump site. TV truck is pulling back the camera and packing up. Crew is off site at 130pm.

I have reviewed all the information and have found it to be accurate and complete.

Contractor's Representative – Print:	Sign:	Date:
--------------------------------------	-------	-------

Project: Fracassi Drain IDEP Project		WRC W/O #: Multiple	Date: 12-5-16	Plan Sheet: SOT123
Contractor: PIPELINE MANAGEMENT CO.		Location: Southfield		
Inspector's Signature:		Foreman: Bill Barsh (248) 318-1292		
Inspector's Printed Name: M. Ignash		Inspector's Hours Worked: From 7:00am To 3:30pm Total: 8hours		

Weather (A.M./P.M.) Cloudy / Cloudy	Temp. (A.M./P.M.): 35° / 38°	Day: M T W T F S Su
-------------------------------------	------------------------------	----------------------------

CCTV / Cleaning Information

US MH	DS MH	Lineal Feet	Pipe Size	Kind of Pipe	Condition of Pipe	Pipe Condition/Remarks	Run WO No.
SOT 123091	SOT 123089	166'	12"	RCP	Good	Plan Footage:170" Made it all the way, no connections in line. Heavy dirt in line.	580721
SOT 123089	SOT 081	222'	15"	RCP	Good	Plan Footage:225' Made it all the way, no connections in line.	580722
SOT 123081	SOT 123075	89'	18"	RCP	Good	Plan Footage:322' Stopped short due to debris in line.	580724
Daily CCTV Totals:							CCTV total: 473'

Labor/Classification		No.	Hrs.	Equipment/Type		Model	Hrs.
1.	Foreman	1	8	1.	TV / Grout Unit	Telespector	8
2.	Operator	1	8	2.	Cargo Van		8
3.	Laborer	1	8	3.	Vactor		8
4.	Supervisor	-		4.	Supervisor truck		-
5.				5.	15-cones		
6.							Day
Hours Total (includes 1hr of drive time per)			24	Hours Total (includes 1hr of drive time per)			24
Consumable Goods:	Latex Gloves:	Rubber Gloves:		Cloth Gloves:		Tyvek suits:	0 each

JIM NASH
OAKLAND COUNTY WATER RESOURCES COMMISSIONER

09/09/13

Project: Fracassi Drain IDEP Project	Job No: Multiple	Date: 12/5/2016	Plan Sheet: SOT123
--------------------------------------	---------------------	--------------------	-----------------------

Remarks

I arrived on site at 730am, Crew is on site. Pipeline is starting the day on Indian St, S of Shiawassee. Crew is filling the vactor as they change out the wheels on the camera. Crew is running the jet through the line because they are running upstream. MH SOT123091 has piles of animal dung in it, this may be leading to high ecoli levels. Pipeline is done with the 1st run 123091-123089 at 9am, there were no leads in the line. The next line 123089-123081 has a lot of dirt in it, crew made multiple passes with the jet to get through. Pipeline has filled the D/S MH with dirt, crew is vacing out the MH. It is taking a long time to clean the line due to the large amount of sand in the line. Crew is done with the 2nd run at 1pm. Crew is continuing on to the next run 123081-123075. This run also has heavy sand in the line. I believe the contractor who replaced the W/M in this area last year allowed the sand to enter the system, and didn't clean it up. Crew made it 89' into the next run and stopped there due to a lack of time and too much dirt in the line. Pipe line is cleaning up, off site at 3pm.

I have reviewed all the information and have found it to be accurate and complete.

Contractor's Representative - Print:	Sign:	Date:
--------------------------------------	-------	-------

Fracassi Drain IDEP MH/CB Survey				Inspector: Mike Ignash		Date: 11-28-16	Weather: 40° / Lt Showers	Page: 1 of
Street:	MH/CB ID Number:	Flow:	Evidence of Sanitary:	MH / CB / IN	Sump	Detail any Evidence of Sanitary, Illegal connections Etc.		
Inkster	SOT122081	Yes / No	Yes / No	MH / CB / IN	Yes / No	12" pipe entering MH from the N, not shown on CAMS, lines runs past where the camera could see.		
Adelein	SOT122083	Yes / No	Yes / No	MH / CB / IN	Yes / No	This inlet is connected only to 122085, not to 122081 as shown on cams		
Adelein	SOT122085	Yes / No	Yes / No	MH / CB / IN	Yes / No	Was unable to locate structure, seems to be buried in ditch line. This CB is connected to 122081 with a 12" line.		
Inkster	SOT122046	Yes / No	Yes / No	MH / CB / IN	Yes / No			
Adelein	SOT122077	Yes / No	Yes / No	MH / CB / IN	Yes / No			
Adelein	SOT122079	Yes / No	Yes / No	MH / CB / IN	Yes / No			
Adelein	SOT122073	Yes / No	Yes / No	MH / CB / IN	Yes / No			
Adelein	SOT122075	Yes / No	Yes / No	MH / CB / IN	Yes / No			
Seminole	SOT122071	Yes / No	Yes / No	MH / CB / IN	Yes / No			
Seminole	SOT122069	Yes / No	Yes / No	MH / CB / IN	Yes / No			
Seminole	SOT122067	Yes / No	Yes / No	MH / CB / IN	Yes / No			
Seminole	SOT122065	Yes / No	Yes / No	MH / CB / IN	Yes / No	There is a 12" RCP running West out of the MH that is not shown on cams, I didn't see a MH (Maybe under the driveway.)		
Seminole	SOT122059	Yes / No	Yes / No	MH / CB / IN	Yes / No			
Seminole	SOT122061	Yes / No	Yes / No	MH / CB / IN	Yes / No			
Seminole	SOT122063	Yes / No	Yes / No	MH / CB / IN	Yes / No			

Fracassi Drain IDEP MH/CB Survey			Inspector: Mike Ignash		Date: 11-29-16	Weather: 52° / Cloudy	Page: 1 of 2
Street:	MH/CB ID Number:	Flow:	Evidence of Sanitary:	MH / CB / IN	Sump	Detail any Evidence of Sanitary, Illegal connections Etc.	
Seminole	SOT122057	Yes / No	Yes / No	MH / CB / IN	Yes / No	12" Line running to the West out of the CB into the front yard of 21681	
Seminole	SOT122055	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Seminole	SOT122053	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Shiawassee	SOT122045	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Shiawassee	SOT122047	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Shiawassee	SOT122049	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Shiawassee	SOT122051	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Shiawassee	SOT122111	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Seminole	SOT123291	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Seminole	SOT123293	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Seminole	SOT123295	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Seminole	SOT123289	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Seminole	SOT123287	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Seminole	SOT123285	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Seminole	SOT123275	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Seminole	SOT123287	Yes / No	Yes / No	MH / CB / IN	Yes / No		

Fracassi Drain IDEP MH/CB Survey			Inspector: Mike Ignash		Date: 12-1-16	Weather: 36° / Rain/Snow	Page: 1 of 2
Street:	MH/CB ID Number:	Flow:	Evidence of Sanitary:	MH / CB / IN	Sump	Detail any Evidence of Sanitary, Illegal connections Etc.	
Seminole	SOT123245	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Seminole	SOT123243	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Byron	SOT123241	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Byron	SOT123239	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Seminole	SOT123237	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Byron	SOT123298	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Byron	SOT123347	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Inkster	SOT123348	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Inkster	SOT123302	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Inkster	FAT144143	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Inkster	FAT144002	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Emmet	SOT123309	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Inkster	SOT123313	Yes / No	Yes / No	MH / CB / IN	Yes / No	Structure Full If leaves and I can't see the interior	
Inkster	SOT123342	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Inkster	SOT123346	Yes / No	Yes / No	MH / CB / IN	Yes / No	Structure Full If leaves and I can't see the interior	
Inkster	FAT144142	Yes / No	Yes / No	MH / CB / IN	Yes / No	Structure Full If leaves and I can't see the interior	

Fracassi Drain IDEP MH/CB Survey			Inspector: Mike Ignash		Date: 12-5-16	Weather: 36° / Cloudy	Page: 1 of 2
Street:	MH/CB ID Number:	Flow:	Evidence of Sanitary:	MH / CB / IN	Sump	Detail any Evidence of Sanitary, Illegal connections Etc.	
Indian	SOT123099	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Indian	SOT123097	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Indian	SOT123095	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Indian	SOT123093	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Indian	SOT123091	Yes / No	Yes / No	MH / CB / IN	Yes / No	There are piles of animal dung on the Bench of the MH.	
Indian	SOT123089	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Indian	SOT123087	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Indian	SOT123085	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Indian	SOT123083	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Indian	SOT123081	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Indian	SOT123079	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Indian	SOT123077	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Indian	SOT123075	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Indian	SOT123073	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Indian	SOT123071	Yes / No	Yes / No	MH / CB / IN	Yes / No		
Indian	SOT123069	Yes / No	Yes / No	MH / CB / IN	Yes / No		

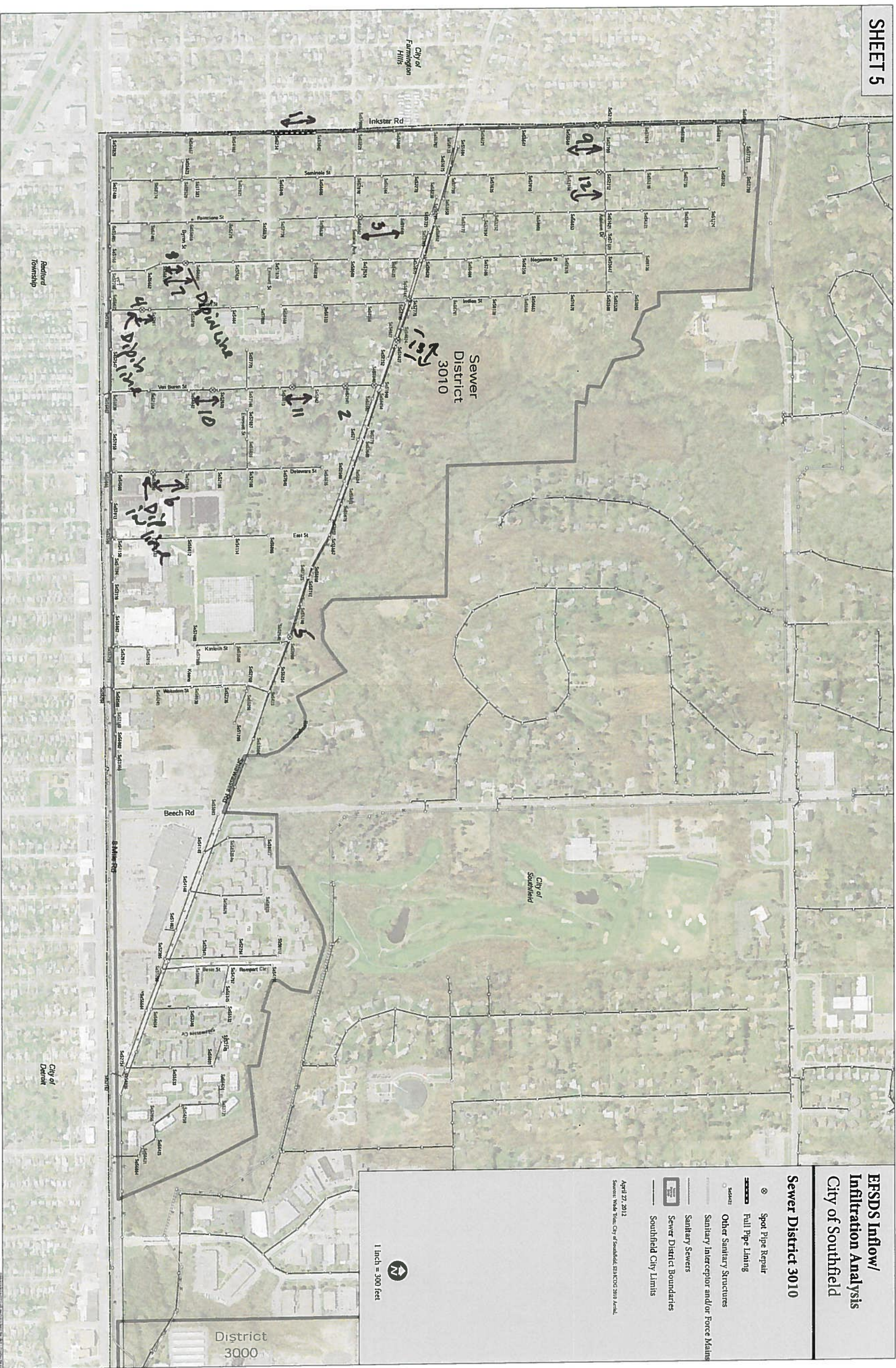
APPENDIX C – E.COLI SAMPLING RESULTS

Appendix C: *E.coli* Sampling Results

Sample Date	Sample ID	Drain Name	Location	Results	Units
10/31/2016	4409	US 16 Drain	Farmington	2065	CFU/100 ML
10/31/2016	FAC 1	Local Storm MH Hillcrest	Farmington	<50	CFU/100 ML
10/31/2016	FAC 2	Local Storm MH Hillcrest	Farmington	50	CFU/100 ML
10/31/2016	FAC 4	Local Storm MH Hillcrest	Farmington	1,812	CFU/100 ML
10/31/2016	4410	US 16 Drain	Farmington	1,127	CFU/100 ML
11/1/2016	4411	US 16 Drain	Farmington	1,237	CFU/100 ML
11/1/2016	4415	US 16 Drain	Farmington	1,920	CFU/100 ML
11/1/2016	FAC 5	Local Storm MH Glenview	Farmington	<50	CFU/100 ML
11/1/2016	FAC 6	Local Storm MH Glenview	Farmington	<50	CFU/100 ML
11/2/2016	6217A	Fracassi Drain	Southfield	5,530	CFU/100 ML
11/2/2016	6217B	Fracassi Drain	Southfield	<50	CFU/100 ML
11/2/2016	6216A	Fracassi Drain	Southfield	3,829	CFU/100 ML
11/2/2016	6216B	Fracassi Drain	Southfield	50	CFU/100 ML
11/2/2016	6216C	Fracassi Drain	Southfield	<50	CFU/100 ML
11/2/2016	6227A	Fracassi Drain	Southfield	4,505	CFU/100 ML
11/2/2016	6227B	Fracassi Drain	Southfield	1,695	CFU/100 ML
11/2/2016	6235	Fracassi Drain	Southfield	4,051	CFU/100 ML
11/7/2016	6235	Fracassi Drain	Southfield	111,000	CFU/100 ML
11/7/2016	6236	Fracassi Drain	Southfield	49,557	CFU/100 ML
11/7/2016	6237	Fracassi Drain	Southfield	37,229	CFU/100 ML
11/7/2016	6238	Fracassi Drain	Southfield	36,840	CFU/100 ML
11/7/2016	6239	Fracassi Drain	Southfield	14,940	CFU/100 ML
11/7/2016	6240	Fracassi Drain	Southfield	>1,002,500	CFU/100 ML
11/7/2016	6241	Fracassi Drain	Southfield	31,600	CFU/100 ML
11/7/2016	6190	Fracassi Drain	Southfield	35,157	CFU/100 ML
11/7/2016	6191	Fracassi Drain	Southfield	19,746	CFU/100 ML
11/7/2016	6192	Fracassi Drain	Southfield	66,433	CFU/100 ML
11/7/2016	6193	Fracassi Drain	Southfield	162,000	CFU/100 ML
11/7/2016	6194	Fracassi Drain	Southfield	25,597	CFU/100 ML
11/8/2016	6227	Fracassi Drain	Southfield	31,271	CFU/100 ML
11/8/2016	6228	Fracassi Drain	Southfield	16,811	CFU/100 ML
11/8/2016	6229	Fracassi Drain	Southfield	2,617	CFU/100 ML
11/8/2016	6230	Fracassi Drain	Southfield	612	CFU/100 ML
11/8/2016	6231	Fracassi Drain	Southfield	210	CFU/100 ML
11/8/2016	6232A	Fracassi Drain	Southfield	2,029	CFU/100 ML
11/8/2016	6232B	Fracassi Drain	Southfield	4,458	CFU/100 ML
11/8/2016	6233A	Fracassi Drain	Southfield	100	CFU/100 ML
11/8/2016	6233B	Fracassi Drain	Southfield	1,030	CFU/100 ML
11/8/2016	6185	Fracassi Drain	Southfield	6,981	CFU/100 ML
11/8/2016	6186	Fracassi Drain	Southfield	10,563	CFU/100 ML
11/8/2016	6187	Fracassi Drain	Southfield	9,158	CFU/100 ML
11/9/2016	6216	Fracassi Drain	Southfield	16,328	CFU/100 ML
11/9/2016	6219	Fracassi Drain	Southfield	89,553	CFU/100 ML

Sample Date	Sample ID	Drain Name	Location	Results	Units
11/9/2016	6220	Fracassi Drain	Southfield	98,102	CFU/100 ML
11/9/2016	6221	Fracassi Drain	Southfield	9,798	CFU/100 ML
11/9/2016	6222	Fracassi Drain	Southfield	25,166	CFU/100 ML
11/9/2016	6223A	Fracassi Drain	Southfield	890	CFU/100 ML
11/9/2016	6223B	Fracassi Drain	Southfield	515	CFU/100 ML
11/9/2016	6224	Fracassi Drain	Southfield	278	CFU/100 ML
11/9/2016	6225	Fracassi Drain	Southfield	7,969	CFU/100 ML
11/9/2016	6226	Fracassi Drain	Southfield	1,007	CFU/100 ML
11/9/2016	6245A	Fracassi Drain	Southfield	566	CFU/100 ML
11/9/2016	6545B	Fracassi Drain	Southfield	158	CFU/100 ML
11/9/2016	6248	Fracassi Drain	Southfield	69,674	CFU/100 ML
11/9/2016	6201	Fracassi Drain	Southfield	40,572	CFU/100 ML
11/9/2016	6195	Fracassi Drain	Southfield	3,132	CFU/100 ML
11/14/2016	6217	Fracassi Drain	Southfield	8,660	CFU/100 ML
11/14/2016	6209A	Fracassi Drain	Southfield	5,248	CFU/100 ML
11/14/2016	6209B	Fracassi Drain	Southfield	<50	CFU/100 ML
11/14/2016	6210	Fracassi Drain	Southfield	10,642	CFU/100 ML
11/14/2016	6211	Fracassi Drain	Southfield	22,403	CFU/100 ML
11/14/2016	6212	Fracassi Drain	Southfield	25,970	CFU/100 ML
11/14/2016	6213	Fracassi Drain	Southfield	4,346	CFU/100 ML
11/14/2016	6214	Fracassi Drain	Southfield	35,053	CFU/100 ML

APPENDIX D ESFDS STUDY- CCTV REPORTS





OCWRC
Public Works
Waterford, MI
Tel: (248) 858-1127
Fax:
E-mail:

Inspection Report / Inspection: 1

Date 6/9/2011	P/O. No.	Weather Dry	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 138
Certificate No. U-909-9354	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning Jetting	Sewer Category

Street City Loc. details Location Code	Inkster Rd. Southfield	Use of Sewer Drainage Area Flow Control Length surveyed	Sanitary 316.50 ft	Upstream MH Downstream MH Dir. of Survey Section Length	SaS3042 SaS234 Downstream 322.50 ft
---	---------------------------	--	-----------------------	--	--

Purpose of Survey Year Laid Year Rehabilitated Tape / Media No.	Infiltration/Inflow Investigation Na	Joint Length Dia./Height Material Lining Method	10 inch Concrete
--	---	--	---------------------

Add. Information :

1:750 Position

Code Observation

Grade

SaS3042

6.00

AMH Upstream Manhole, Survey Begins

6.00

MWL Water Level, 5 % of cross sectional area

M 2

41.00

TF Tap Factory Made, at 10 o'clock, 6", within 8 inches of joint: YES

123.00

TFA Tap Factory Made Active, at 10 o'clock, 6", within 8 inches of joint: YES

162.80

TF Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES

239.70

TFA Tap Factory Made Active, at 11 o'clock, 6", within 8 inches of joint: YES

281.70

DAE Deposits Attached Encrustation, 10 % of cross sectional area, from 07 to 05 o'clock, within 8 inches of joint: YES

M 2

303.70

TF Tap Factory Made, at 10 o'clock, 6", within 8 inches of joint: YES

322.50

IR Infiltration Runner, at 12 o'clock, within 8 inches of joint: YES

M 4

322.50

AMH Downstream Manhole, Survey Ends

SaS234

SAP

Comparison
report vs a
5 taps/5

119

1 Sam

200

Last 20' of inspection
was difficult due to
steam.

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
0000	4122	0	8	8	0	2.67	2.67



OCWRC
1 Public Works
Waterford, MI
Tel: (248) 859-1127
Fax:
E-mail:

2

Inspection Report / Inspection: 1

Date 8/23/2011	P/O. No.	Weather Dry	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 165
Certificate No. U-809-9354	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning Jetting	Sewer Category

Street City Loc. details Location Code	Vav Buren St. Southfield	Use of Sewer Drainage Area Flow Control Length surveyed	Sanitary 251.30 ft	Upstream MH Downstream MH Dir. of Survey Section Length	Sa68983 Sa62941 Downstream 257.30 ft
---	-----------------------------	--	-----------------------	--	---

Purpose of Survey Year Laid Year Rehabilitated Tape / Media No.	Infiltration/Inflow Investigation Na	Joint Length Dia./Height Material Lining Method	12 Inch Concrete Pipe (non-reinforced)
--	---	--	---

Add. Information :

1:270	Position	Code	Observation	Grade
				SAP
	6.00	AMH	Upstream Manhole, Survey Begins	
	6.00	MWL	Water Level, 15 %of cross sectional area	M 2
	19.70	IG	Infiltration Gusher, at 02 o'clock, within 8 inches of joint: YES	M 5
	19.70	ID	Infiltration Dripper, at 10 o'clock, within 8 inches of joint: YES	M 3
	20.10	FC	Fracture Circumferential, from 03 to 09 o'clock, within 8 inches of joint: YES	S 2
	38.80	S1 DAE	Deposits Attached Encrustation, 5 %of cross sectional area, from 09 to 03 o'clock, , within 8 inches of joint: YES, Start	M 2
	42.60	ID	Infiltration Dripper, at 12 o'clock, within 8 inches of joint: YES	M 3
	51.30	TF	Tap Factory Made, at 01 o'clock, 6", within 8 inches of joint: YES	
	51.30	F1 DAE	Deposits Attached Encrustation, 5 %of cross sectional area, from 09 to 03 o'clock, , within 8 inches of joint: YES, Finish	M 2
	60.20	FC	Fracture Circumferential, from 02 to 06 o'clock, within 8 inches of joint: YES	S 2
	60.30	CC	Crack Circumferential, from 07 to 01 o'clock, within 8 inches of joint: YES	S 1
	97.70	DAE	Deposits Attached Encrustation, 10 %of cross sectional area, from 07 to 11 o'clock, , within 8 inches of joint: YES	M 2
	99.60	TFD	Tap Factory Made Defective, at 01 o'clock, 6", within 8 inches of joint: YES	M 2
	102.40	CC	Crack Circumferential, from 02 to 04 o'clock, within 8 inches of joint: YES	S 1
	107.40	DAE	Deposits Attached Encrustation, 5 %of cross sectional area, from 07 to 05 o'clock, , within 8 inches of joint: YES	M 2

Inspection Report / Inspection: 1

Date :	P/O. No.	Weather ; Dry	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 165
Present :	Vehicle :	Camera :	Preset :	Cleaned : Jetting	Rate :

1:270	Position	Code	Observation	Rate
	115.60	DAE	Deposits Attached Encrustation, 10 %of cross sectional area, from 07 to 05 o'clock, , within 8 inches of joint: YES	M 2
	135.70	TF	Tap Factory Made, at 11 o'clock, 6", within 8 inches of joint: YES	
	135.70	ID	Infiltration Dropper, at 12 o'clock, within 8 inches of joint: YES	M 3
	161.40	DAE	Deposits Attached Encrustation, 10 %of cross sectional area, from 08 to 04 o'clock, , within 8 inches of joint: YES	M 2
	199.60	DAE	Deposits Attached Encrustation, 5 %of cross sectional area, from 07 to 10 o'clock, , within 8 inches of joint: YES	M 2
	212.60	DAE	Deposits Attached Encrustation, 10 %of cross sectional area, from 07 to 04 o'clock, , within 8 inches of joint: YES	M 2
	223.50	DAE	Deposits Attached Encrustation, 5 %of cross sectional area, from 03 to 05 o'clock, , within 8 inches of joint: YES	M 2
	236.60	DAE	Deposits Attached Encrustation, 5 %of cross sectional area, from 07 to 11 o'clock, , within 8 inches of joint: YES	M 2
	242.30	SG IF	Infiltration Runner, at 10 o'clock, within 8 inches of joint: YES	M 4
	248.30	CE	Crack Circumferential, from 07 to 05 o'clock, within 8 inches of joint: YES	S 1
5aS2941	257.30	MGO	General Observation, within 8 inches of joint: NO	
	257.30	AMH	Downstream Manhole, Survey Ends	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
2213	5141	7	42	49	1.4	2.47	2.23



OCWRC
1 Public Works
Waterford, MI
Tel: (248) 858-1127
Fax:
E-mail:

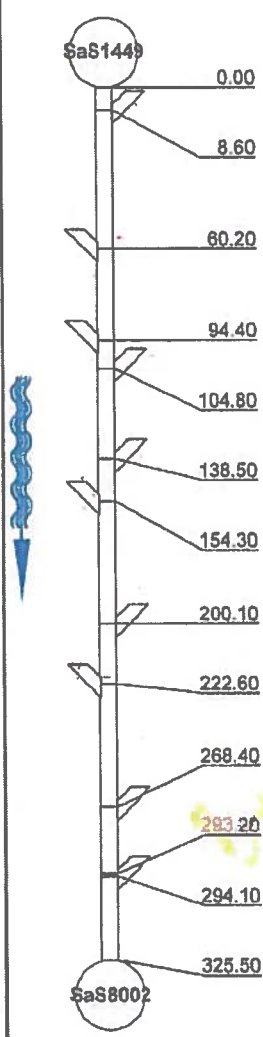
Inspection Report / Inspection: 1

Date 6/2/2011	P/O. No.	Weather 5	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 52
Certificate No. U-909-9354	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning No Pre-Cleaning	Sewer Category

Street City Loc. details Location Code	Polcianna St. Southfield	Use of Sewer Drainage Area Flow Control Length surveyed	Sanitary 325.50 ft	Upstream MH Downstream MH Dir. of Survey Section Length	SaS1449 SaS8002 Downstream 325.50 ft
---	-----------------------------	--	-----------------------	--	---

Purpose of Survey Year Laid Year Rehabilitated Tape / Media No.	Infiltration/Inflow Investigation Na	Joint Length Dia./Height Material Lining Method	10 inch Concrete
--	---	--	---------------------

Add. Information :

1:795	Position	Code	Observation	Grade			
							
	SaS1449						
	0.00	AMH	Upstream Manhole, Survey Begins, REMARK: SaS1449				
	8.60	TF	Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES, REMARK: Possible I&I from lead				
	60.20	TF	Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES, REMARK: I&I inside lead				
	94.40	TFA	Tap Factory Made Active, at 03 o'clock, 6", within 8 inches of joint: YES				
	104.80	TFA	Tap Factory Made Active, at 09 o'clock, 6", within 8 inches of joint: YES				
	138.50	TF	Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES				
	154.30	TF	Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES, REMARK: Possible I&I from lead				
	200.10	TF	Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES, REMARK: I&I inside lead				
	222.60	TF	Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES, REMARK: I&I and calcium inside lead				
	268.40	TF	Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES, REMARK: calcium inside lead				
	293.20	IR	Infiltration Runner, at 09 o'clock, within 8 inches of joint: YES	M 4			
	294.10	TB	Tap Break-In, at 10 o'clock, 4", within 8 inches of joint: YES				
	325.50	AMH	Downstream Manhole, Survey Ends, REMARK: SaS8002				
	SaS8002						
QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
0000	4100	0	4	4	0	4	4

SRI
or SAV > can't tell

10 taps / 10 hours



OCWRC
1 Public Works
Waterford, MI
Tel: (248) 858-1127
Fax:
E-mail:

Inspection Report / Inspection: 1

Date 5/16/2011	P/O. No.	Weather S	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 87
Certificate No. U-909-9354	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning No Pre-Cleaning	Sewer Category

Street City Loc. details Location Code	Indian St. Southfield	Use of Sewer Drainage Area Flow Control Length surveyed	Sanitary 63.40 ft	Upstream MH Downstream MH Dir. of Survey Section Length	Sa8201 SaS7060 Downstream 59.40 ft
---	--------------------------	--	----------------------	--	---

Purpose of Survey Year Laid Year Rehabilitated Tape / Media No.	Infiltration/Inflow Investigation Na	Joint Length Dia./Height Material Lining Method	10 Inch Concrete
--	---	--	---------------------

Add. Information :

1:150	Position	Code	Observation	Grade
	6.00	AMH	Upstream Manhole, Survey Begins	
	17.60	TFD	Tap Factory Made Defective, at 09 o'clock, 6", within 8 inches of joint: YES	M 2
	33.70	TFA	Tap Factory Made Active, at 03 o'clock, 6", within 8 inches of joint: YES	
	37.50	TF	Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES	
	57.30	MWLS	Water Level, Sag in pipe, 35 % of cross sectional area	M 2
	57.30	IR	Infiltration Runner, from 11 to 12 o'clock, within 8 inches of joint: YES	M 4 - ID
	59.40	MCU	Camera Underwater	M 4
	59.40	MSA	Survey Abandoned	

SAV or SAP

THROUGHOUT.

3 taps/3 hours



OCWRC
1 Public Works
Waterford, MI
Tel: (248) 858-1127
Fax:
E-mail:

Inspection Report / Inspection: 1

Date 6/29/2011	P/O. No.	Weather Dry	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 179
Certificate No. U-909-9354	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning Jetting	Sewer Category

Street City Loc. details Location Code	Shiawassee Rd. Southfield	Use of Sewer Drainage Area Flow Control Length surveyed	Sanitary 253.90 ft	Upstream MH Downstream MH Dir. of Survey Section Length	SaS1240 SaS1129 Downstream 259.90 ft
Purpose of Survey Year Laid Year Rehabilitated Tape / Media No.	Infiltration/Inflow Investigation Na	Joint Length Dia./Height Material Lining Method	10 inch Concrete Pipe (non-reinforced)		

Add. Information :

1:630	Position	Code	Observation	Grade			
	6.00	AMH	Upstream Manhole, Survey Begins				
	8.00	MWL	Water Level, 5 % of cross sectional area	M 2			
	6.00	TF	Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES				
	94.50	TF	Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES				
	140.70	TF	Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES				
	222.90	TF	Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES				
	228.30	IG	Infiltration Gusher, at 11 o'clock, within 8 inches of joint: YES	M 5			
	258.50	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 05 o'clock, within 8 inches of joint: YES	M 2			
	259.90	AOC	Drop Connection, Survey Ends				
QBR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
0000	5122	0	9	9	0	3	3



OCWRC
1 Public Works
Waterford, MI
Tel: (248) 858-1127
Fax:
E-mail:

6

Inspection Report / Inspection: 1

Date 6/18/2011	P/O. No.	Weather S	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 98
Certificate No. U-909-9364	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning No Pre-Cleaning	Sewer Category

Street City Loc. details Location Code	Delaware St. Southfield	Use of Sewer Drainage Area Flow Control Length surveyed	Sanitary 236.50 ft	Upstream MH Downstream MH Dir. of Survey Section Length	SaS3941 SaS5800 Downstream 236.50 ft
---	----------------------------	--	-----------------------	--	---

Purpose of Survey Year Laid Year Rehabilitated Tape / Media No.	Infiltration/Inflow Investigation Na	Joint Length Dia./Height Material Lining Method	10 inch Concrete
--	---	--	---------------------

Add. Information :

1:576	Position	Code	Observation	Grade
	0.00	AMH	Upstream Manhole, Survey Begins	
	0.00	MWL	Water Level, 5 % of cross sectional area	M 2
	1.50	TF	Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES	
	4.00	DAE	Deposits Attached Encrustation, 10 % of cross sectional area, from 07 to 05 o'clock, , within 8 inches of joint: YES	M 2
	17.60	TF	Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES	
	21.60	TF	Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES	
	56.70	ID	Infiltration Dripper, at 01 o'clock, within 8 inches of joint: YES	M 3
	91.30	TF	Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES	
	95.30	TF	Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES	
	165.10	TFD	Tap Factory Made Defective, at 09 o'clock, 6", within 8 inches of joint: YES	M 2
	165.20	ID	Infiltration Dripper, at 10 o'clock, within 8 inches of joint: YES	M 3
	186.60	TFD	Tap Factory Made Defective, at 03 o'clock, 6", within 8 inches of joint: YES	M 2
	190.60	TF	Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES	
	180.50	ID	Infiltration Dripper, at 02 o'clock, within 8 inches of joint: YES	M 3
	233.30	IG	Infiltration Gusher, at 11 o'clock, within 8 inches of joint: YES	M 5



OCWRC
1 Public Works
City: Waterford, MI
Tel: (248) 858-1127
Fax:
Email:

Inspection Report / Inspection: 1

Date :	P/O. No.	Weather : 6	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 98
Present :	Vehicle :	Camera :	Preset :	Cleaned : No Pre-Cleaning	Rate :

1:576 Position

Code Observation

Rate

TF Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES

DES Deposits Settled Other, 20 % of cross sectional area, from 04 to 08 o'clock, within 8 inches of joint: YES

M 5

MWLS Water Level, Sag in pipe, 60 % of cross sectional area

M 2

MSA Survey Abandoned

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
0000	6134	0	27	27	0	2.7	2.7





OCWRC
1 Public Works
Waterford, MI
Tel: (248) 858-1127
Fax:
E-mail:

8

Inspection Report / Inspection: 1

Date 6/11/2011	P/O. No.	Weather Dry	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 76
Certificate No. U-908-9354	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning No Pre-Cleaning	Sewer Category

Street City Loc. details Location Code	Negaunee St. Southfield	Use of Sewer Drainage Area Flow Control Length surveyed	Sanitary 206.80 ft	Upstream MH Downstream MH Dir. of Survey Section Length	Sa8601 Sa86072 Upstream 211.80 ft
---	----------------------------	--	-----------------------	--	--

Purpose of Survey Year Laid Year Rehabilitated Tape / Media No.	Infiltration/Inflow Investigation Na	Joint Length Dia./Height Material Lining Method	10 Inch Concrete
--	---	--	---------------------

Add. Information:

1:510 Position

Code Observation

Grade

SAV

Sa86072

6.00

AMH Downstream Manhole, Survey Begins

6.00

MWL Water Level, 5 % of cross sectional area

M 2

29.60

TF Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES

39.90

TFA Tap Factory Made Active, at 03 o'clock, 6", within 8 inches of joint: YES

84.90

TF Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES

100.90

TF Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES

103.20

DAE Deposits Attached Encrustation, 10 % of cross sectional area, from 02 to 05 o'clock, within 8 inches of joint: YES

M 2

140.30

TF Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES

150.40

TF Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES

210.60

JOM Joint Offset Medium

S 1

211.60

MWLS Water Level, Sag in pipe, 90 % of cross sectional area

M 2

211.60

MSA Survey Abandoned

6 taps / 6 hours

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
1100	2300	1	8	7	1	2	1.75



OCWRC
1 Public Works
Waterford, MI
Tel: (248) 858-1127
Fax:
E-mail:

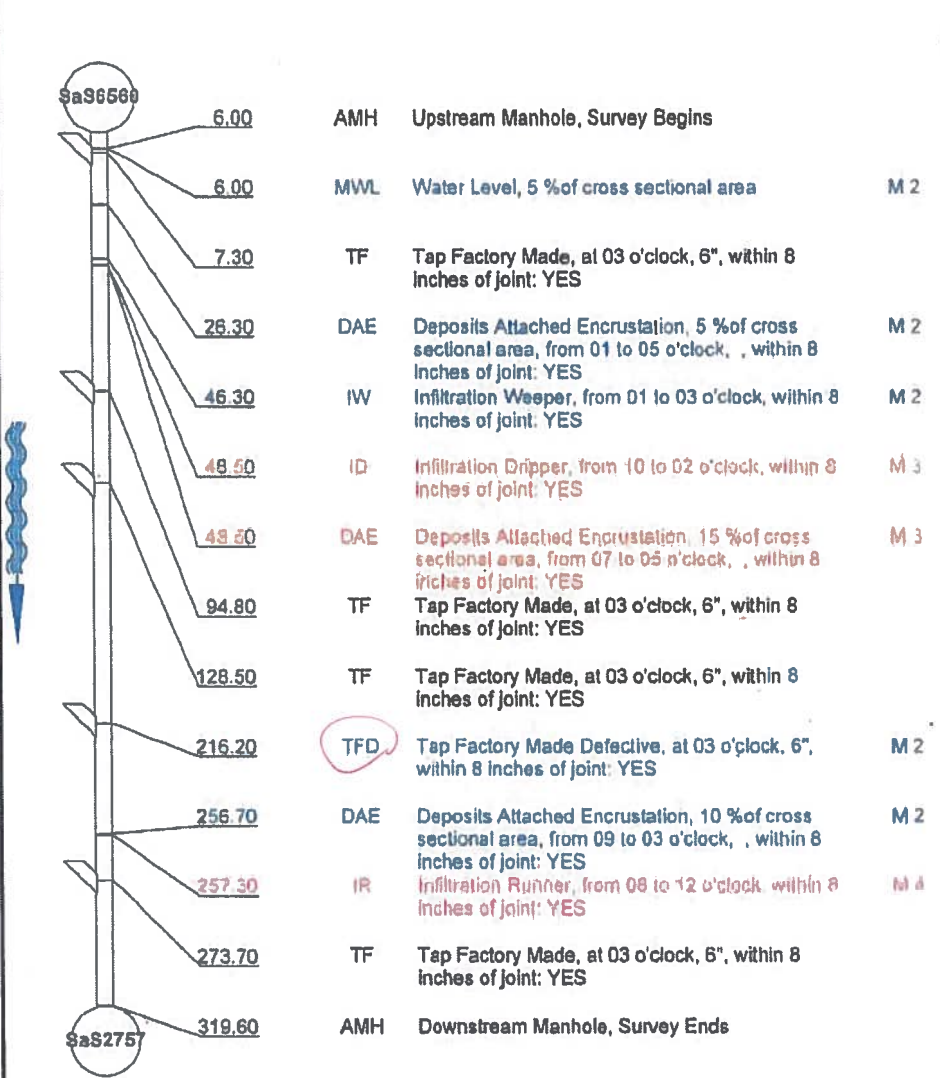
Inspection Report / Inspection: 1

Date 8/13/2011	P/O. No.	Weather Dry	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 141
Certificate No. U-909-9354	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning Jetting	Sewer Category

Street City Loc. details Location Code	Inkster Rd. Southfield	Use of Sewer Drainage Area Flow Control Length surveyed	Sanitary 313.60 ft	Upstream MH Downstream MH Dir. of Survey Section Length	SaS6560 SaS2757 Downstream 319.60 ft
---	---------------------------	--	-----------------------	--	---

Purpose of Survey Year Laid Year Rehabilitated Tape / Media No.	Infiltration/inflow Investigation Na	Joint Length Dia./Height Material Lining Method	 10 inch Concrete
--	---	--	-----------------------------

Add. Information :

1:780	Position	Code	Observation	Grade			
							
	6.00	AMH	Upstream Manhole, Survey Begins				
	6.00	MWL	Water Level, 5 % of cross sectional area	M 2			
	7.30	TF	Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES				
	26.30	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 01 to 05 o'clock, within 8 inches of joint: YES	M 2			
	46.30	IW	Infiltration Weeper, from 01 to 03 o'clock, within 8 inches of joint: YES	M 2			
	48.50	ID	Infiltration Dripper, from 10 to 02 o'clock, within 8 inches of joint: YES	M 3			
	48.50	DAE	Deposits Attached Encrustation, 15 % of cross sectional area, from 07 to 05 o'clock, within 8 inches of joint: YES	M 3			
	94.80	TF	Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES				
	128.50	TF	Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES				
	216.20	TFD	Tap Factory Made Defective, at 03 o'clock, 6", within 8 inches of joint: YES	M 2			
	256.70	DAE	Deposits Attached Encrustation, 10 % of cross sectional area, from 09 to 03 o'clock, within 8 inches of joint: YES	M 2			
	257.30	IR	Infiltration Runner, from 08 to 12 o'clock, within 8 inches of joint: YES	M 4			
	273.70	TF	Tap Factory Made, at 03 o'clock, 6", within 8 inches of joint: YES				
	319.60	AMH	Downstream Manhole, Survey Ends				
QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
0000	4132	0	20	20	0	2.5	2.5



OCWRC
1 Public Works
Waterford, MI
Tel. (248) 858-1127
Fax
E-mail

10

Inspection Report / Inspection: 1

Date 6/27/2011	P/O. No.	Weather Dry	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 171
Certificate No. U-909-9354	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning Jetting	Sewer Category

Street City Loc. details Location Code	Van Buren St. Southfield	Use of Sewer Drainage Area Flow Control Length surveyed	Sanitary 226.00 ft	Upstream MH Downstream MH Dir. of Survey Section Length	SaS2659 SaS4042 Downstream 226.00 ft
---	-----------------------------	--	-----------------------	--	---

Purpose of Survey Year Laid Year Rehabilitated Tape / Media No.	Infiltration/Inflow Investigation Na	Joint Length Dia./Height Material Lining Method	12 inch Concrete Pipe (non-reinforced)
--	---	--	---

Add Information:

1:270	Position	Code	Observation	Grade
				SAP
	0.00	AMH	Upstream Manhole, Survey Begins	
	SaS2659 0.00	MWL	Water Level, 30% of cross sectional area - maybe 40%	M 2
	2.00	DAE	Deposits Attached Encrustation, 10 % of cross sectional area, from 10 to 05 o'clock, , within 8 inches of joint: YES	M 2
	2.00	ID	Infiltration Dropper, at 02 o'clock, within 8 inches of joint: YES	M 3
	12.60	IW	Infiltration Weeper, from 07 to 10 o'clock, within 8 inches of joint: YES	M 2
	12.60	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 10 o'clock, , within 8 inches of joint: YES	M 2
	26.00	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 11 o'clock, , within 8 inches of joint: YES	M 2
	26.00	TF	Tap Factory Made, at 11 o'clock, 6", within 8 inches of joint: YES	
	31.50	TFD	Tap Factory Made Defective, at 02 o'clock, 6", within 8 inches of joint: YES	M 2
	31.50	ID	Infiltration Dropper, at 01 o'clock, within 8 inches of joint: YES	M 3
	44.40	IG	Infiltration Gusher, at 08 o'clock, within 8 inches of joint: YES	M 5
	62.50	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 12 o'clock, , within 8 inches of joint: YES	M 2
	67.20	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 02 to 05 o'clock, , within 8 inches of joint: YES	M 2
	68.20 S1	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 11 o'clock, , within 8 inches of joint: YES, Start	M 2
	78.40 F1	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 11 o'clock, , within 8 inches of joint: YES, Finish	M 2



OCWRC
1 Public Works
City: Waterford, MI
Tel: (248) 858-1127
Fax:
Email:

Inspection Report / Inspection: 1

Date :	P/O. No.	Weather : Dry	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 171
Present :	Vehicle :	Camera :	Preset :	Cleaned : Jetting	Rate :

1:270	Position	Code	Observation	Rate
	84.50	DAE	Deposits Attached Encrustation, 10 %of cross sectional area, from 07 to 05 o'clock, , within 8 inches of joint: YES	M 2
	85.90	TFD	Tap Factory Made Defective, at 02 o'clock, 6", within 8 inches of joint: YES	M 2
	90.00	DAE	Deposits Attached Encrustation, 10 %of cross sectional area, from 07 to 05 o'clock, , within 8 inches of joint: YES	M 2
	91.60	TF	Tap Factory Made, at 11 o'clock, 6", within 8 inches of joint: YES	
	96.60	IW	Infiltration Weeper, from 02 to 03 o'clock, within 8 inches of joint: YES	M 2
	145.60	TFD	Tap Factory Made Defective, at 02 o'clock, 6", within 8 inches of joint: YES	M 2
	151.60	IW	Infiltration Weeper, at 10 o'clock, within 8 inches of joint: YES	M 2
	182.20	IW	Infiltration Weeper, at 01 o'clock, within 8 inches of joint: YES	M 2
	199.00	DAE	Deposits Attached Encrustation, 10 %of cross sectional area, from 07 to 11 o'clock, , within 8 inches of joint: YES	M 2
	200.00	TF	Tap Factory Made, at 10 o'clock, 6", within 8 inches of joint: YES	
	218.00	TF	Tap Factory Made, at 02 o'clock, 6", within 8 inches of joint: YES	
	223.10	IW	Infiltration Weeper, from 02 to 04 o'clock, within 8 inches of joint: YES	M 2
	223.10	DAE	Deposits Attached Encrustation, 5 %of cross sectional area, from 01 to 05 o'clock, , within 8 inches of joint: YES	M 2
	226.00	AMH	Downstream Manhole, Survey Ends	

SaS4042

OSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
0000	8132	0	81	81	0	2.22	2.22



OCWRC
1 Public Works
Waterford, MI
Tel: (248) 858-1127
Fax:
E-mail:

Inspection Report / Inspection: 1

Date 8/27/2011	P/O No	Weather Dry	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 168
Certificate No. U-969-8364	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning Jetting	Sewer Category

Street City Loc. details Location Code	Van Buren St. Southfield	Use of Sewer Drainage Area Flow Control Length surveyed	Sanitary 252.00 ft	Upstream MH Downstream MH Dir. of Survey Section Length	SaS242 SaS6613 Downstream 252.00 ft
---	-----------------------------	--	-----------------------	--	--

Purpose of Survey Year Laid Year Rehabilitated Tape / Media No.	Infiltration/Inflow Investigation Na	Joint Length Dia./Height Material Lining Method	 12 Inch Concrete Pipe (non-reinforced)
--	---	--	---

Add. Information :

1:342	Position	Code	Observation	Grade
	0.00	AMH	Upstream Manhole, Survey Begins	SAP
	0.00	MWL	Water Level, 5 % of cross sectional area	M 2
	6.70	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 10 to 11 o'clock, , within 8 inches of joint: YES	M 2
	7.90	TFD	Tap Factory Made Defective, at 11 o'clock, 6", within 8 inches of joint: YES	M 2
	20.10	TFD	Tap Factory Made Defective, at 02 o'clock, 6", within 8 inches of joint: YES	M 2
	44.40	TF	Tap Factory Made, at 11 o'clock, 6", within 8 inches of joint: YES	
	54.40	S1 DAGS	Deposits Attached Grease, 5 % of cross sectional area, from 11 to 01 o'clock, , within 8 inches of joint: YES, Start	M 2 - or calcium.
	84.90	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 05 o'clock, , within 8 inches of joint: YES	M 2
	86.10	TF	Tap Factory Made, at 01 o'clock, 6", within 8 inches of joint: YES	
	91.50	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 08 to 05 o'clock, , within 8 inches of joint: YES	M 2 - grease? ragging?
	104.10	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 05 o'clock, , within 8 inches of joint: YES	M 2
	104.90	TF	Tap Factory Made, at 10 o'clock, 6", within 8 inches of joint: YES	
	104.90	S2 DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 05 o'clock, , within 8 inches of joint: YES, Start	M 2
	140.10	F1 DAGS	Deposits Attached Grease, 5 % of cross sectional area, from 11 to 01 o'clock, , within 8 inches of joint: YES, Finish	M 2
	140.10	F2 DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 05 o'clock, , within 8 inches of joint: YES, Finish	M 2

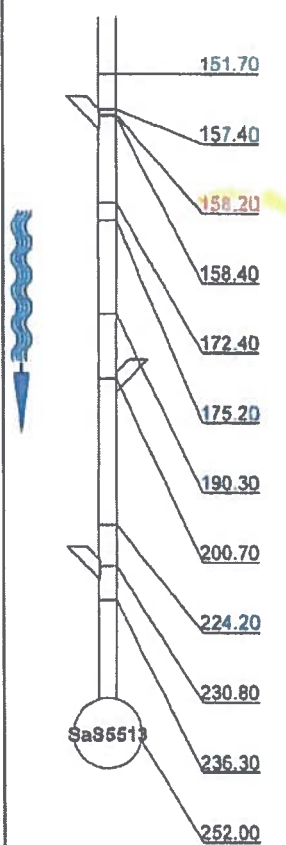


OCWRC
1 Public Works
City: Waterford, MI
Tel: (248) 858-1127
Fax:
Email:

Inspection Report / Inspection: 1

Date :	P/O. No.	Weather : Dry	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 188
Present :	Vehicle :	Camera :	Present :	Cleaned : Jetting	Rate :

1:342	Position	Code	Observation	Rate
	151.70	DAE	Deposits Attached Encrustation, 5 %of cross sectional area, from 08 to 11 o'clock, , within 8 inches of joint: YES	M 2
	157.40	DAE	Deposits Attached Encrustation, 5 %of cross sectional area, from 08 to 12 o'clock, , within 8 inches of joint: YES	M 2
	158.20	IR	Infiltration Runner, at 12 o'clock, within 8 inches of joint: YES	M 4 - maybe I G
	158.40	TF	Tap Factory Made, at 01 o'clock, 6", within 8 inches of joint: YES	
	172.40	DAE	Deposits Attached Encrustation, 5 %of cross sectional area, from 07 to 05 o'clock, , within 8 inches of joint: YES	M 2
	175.20	IW	Infiltration Weeper, at 09 o'clock, within 8 inches of joint: YES	M 2
	190.30	DAE	Deposits Attached Encrustation, 5 %of cross sectional area, from 07 to 05 o'clock, , within 8 inches of joint: YES	M 2
	200.70	TFA	Tap Factory Made Active, at 11 o'clock, 6", within 8 inches of joint: YES	
	224.20	DAE	Deposits Attached Encrustation, 5 %of cross sectional area, from 08 to 04 o'clock, , within 8 inches of joint: YES	M 2
	230.80	TFA	Tap Factory Made Active, at 02 o'clock, 6", within 8 inches of joint: YES	
	236.30	DAE	Deposits Attached Encrustation, 5 %of cross sectional area, from 02 to 05 o'clock, , within 8 inches of joint: YES	M 2
	252.00	AMH	Downstream Manhole, Survey Ends	



QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
0000	412G	0	80	80	0	2.05	2.05



OCWRC
1 Public Works
Waterford, MI
Tel: (248) 858-1127
Fax:
E-mail:

12

Inspection Report / Inspection: 1

Date 4/20/2011	P/O. No.	Weather 5	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 24
Certificate No. U-809-9354	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning No Pre-Cleaning	Sewer Category

Street City Loc. details Location Code	Seminole St. Southfield	Use of Sewer Drainage Area Flow Control Length surveyed	Sanitary 303.80 ft	Upstream MH Downstream MH Dir. of Survey Section Length	SaS3114 SaS2212 Downstream 303.80 ft
---	----------------------------	--	-----------------------	--	---

Purpose of Survey Year Laid Year Rehabilitated Tape / Media No.	Infiltration/Inflow Investigation Na	Joint Length Dia./Height Material Lining Method	10 Inch Concrete
--	---	--	---------------------

Add. Information :

1:648	Position	Code	Observation	Grade
				SAV
	SaS3114 0.00	AMH	Upstream Manhole, Survey Begins, REMARK: SaS3114	
	3.10	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 08 to 04 o'clock, within 8 inches of joint: YES	M 2
	12.10	TF	Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES	
	16.30	TF	Tap Factory Made, at 02 o'clock, 6", within 8 inches of joint: YES	
	16.30	DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 01 o'clock, within 8 inches of joint: YES	M 2
	62.10	TFA	Tap Factory Made Active, at 09 o'clock, 6", within 8 inches of joint: YES, REMARK: Possible I&I from lead	
	66.80	TF	Tap Factory Made, at 02 o'clock, 6", within 8 inches of joint: YES	
	66.80	IW	Infiltration Weeper, from 07 to 11 o'clock, within 8 inches of joint: YES	M 2
	118.00	TF	Tap Factory Made, at 02 o'clock, 6", within 8 inches of joint: YES	
	121.70	TF	Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES	
	185.70	TF	Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES	199 > both rough
	201.90	TF	Tap Factory Made, at 02 o'clock, 6", within 8 inches of joint: YES	207
	229.50	TF	Tap Factory Made, at 09 o'clock, 6", within 8 inches of joint: YES	
	263.50	TF	Tap Factory Made, at 02 o'clock, 6", within 8 inches of joint: YES, REMARK: I&I inside lead	-IG inside lead Sam 269



OCWRC
1 Public Works
City: Waterford, MI
Tel: (248) 858-1127
Fax:
Email:

Inspection Report / Inspection: 1

Date :	P/O. No.	Weather : 5	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 24
Present :	Vehicle :	Camera :	Press :	Cleaned : No Pre-Cleaning	Rate :

1:648	Position	Code	Observation	Rate
	299.80	IW	Infiltration Weeper, from 10 to 02 o'clock, within 8 inches of joint: YES	M 2
	299.80	DAE	Deposits Attached Encrustation, 10 % of cross sectional area, from 08 to 04 o'clock, , within 8 inches of joint: YES	M 2
	303.80	AMH	Downstream Manhole, Survey Ends, REMARK: SaS2212	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
0000	2500	0	10	10	0	2	2



OCWRC
1 Public Works
Waterford, MI
Tel: (248) 858-1127
Fax:
E-mail:

13

Inspection Report / Inspection: 1

Date 6/30/2011	P/O. No.	Weather Dry	Surveyor's Name Nowry	Pipe Segment Reference	Section No. 183
Certificate No. U-909-9364	Survey Customer	System Owner	Date Cleaned	Pre-Cleaning Jetting	Sewer Category

Street City Loc. details Location Code	Shlawassee Rd. Southfield	Use of Sewer Drainage Area Flow Control Length surveyed	Sanitary 166.20 ft	Upstream MH Downstream MH Dir. of Survey Section Length	SaS4824 SaS1027 Downstream 166.20 ft
---	------------------------------	--	-----------------------	--	---

Purpose of Survey Year Laid Year Rehabilitated Tape / Media No.	Infiltration/Inflow Investigation Na	Joint Length Dia./Height Material Lining Method	12 Inch Concrete Pipe (non-reinforced)
--	---	--	---

Add. Information :

1:405 Position

Code Observation

Grade

SAV

The diagram shows a vertical pipe section with two manholes: SaS4824 at the top and SaS1027 at the bottom. The pipe is marked with elevations at various points: 0.00, 0.00, 18.10, 31.80, 31.80, 55.60, 55.60, 72.20, 90.10, 97.30, 98.00, 144.10, 145.80, and 166.20. A blue wavy line on the left indicates the water level. The pipe is divided into sections by horizontal lines, and the elevations are marked on the right side of the pipe.

AMH	Upstream Manhole, Survey Begins	
MWL	Water Level, 10 % of cross sectional area	M 2
DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 01 to 05 o'clock, , within 8 inches of joint: YES	M 2
DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 10 o'clock, , within 8 inches of joint: YES	M 2
TF	Tap Factory Made, at 10 o'clock, 6", within 8 inches of joint: YES	
DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 03 to 05 o'clock, , within 8 inches of joint: YES	M 2
TFC	Tap Factory Made Capped, at 02 o'clock, 6", within 8 inches of joint: YES	
DAE	Deposits Attached Encrustation, 10 % of cross sectional area, from 10 to 05 o'clock, , within 8 inches of joint: YES	M 2
DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 11 o'clock, , within 8 inches of joint: YES	M 2
DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 10 o'clock, , within 8 inches of joint: YES	M 2
TFD	Tap Factory Made Defective, at 11 o'clock, 6", within 8 inches of joint: YES <i>SL inside</i>	M 2
DAE	Deposits Attached Encrustation, 5 % of cross sectional area, from 07 to 05 o'clock, , within 8 inches of joint: YES	M 2
TFC	Tap Factory Made Capped, at 01 o'clock, 6", within 8 inches of joint: YES	
AMH	Downstream Manhole, Survey Ends	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
0000	2900	0	18	18	0	2	2