

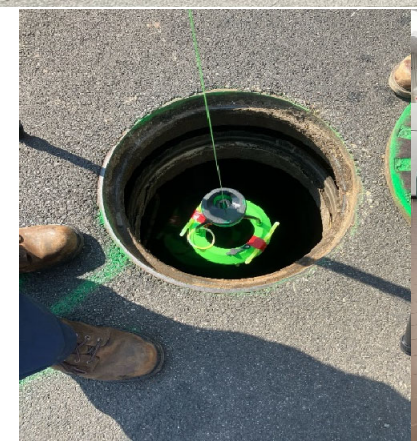



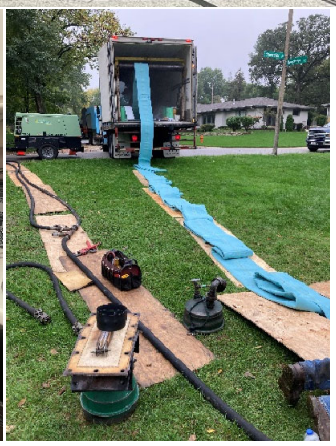

CITY OF NAPERVILLE WATER UTILITIES

CAPACITY, MANAGEMENT, OPERATIONS, AND MAINTENANCE (**CMOM**) PROGRAM

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ACRONYM LIST

CIPP – Cured in Place Pipe

CMMS – Computerized Maintenance Management System

CMOM – Capacity, Management, Operation, and Maintenance

C&P – Collection and Pumping

CWA – Clean Water Act

DIP – Ductile Iron Pipe

EPA – Environmental Protection Agency

FOG – Fats, Oils, and Grease

GIS – Geographic Information System

GNET – GraniteNet Web Solutions

H_2S – Hydrogen Sulfide

I&I – Inflow and Infiltration

IEPA – Illinois Environmental Protection Agency

LACP – Lateral Assessment Certification Program

MACP – Manhole Assessment Certification Program

MGD – Million Gallons per Day

NASSCO – National Association Sewer Service Companies

NPDES – National Pollutant Discharge Elimination System

PACP – Pipeline Assessment Certification Program

PMS – Preventative Maintenance Schedule

PVC – Polyvinyl Chloride

RCP – Reinforced Concrete Pipe

RDII – Rainfall Derived Infiltration and Inflow

R&E – Repair and Excavation

ROI – Return on Investment

SCADA – Supervisory Control and Data Acquisition

SSO – Sanitary Sewer Overflow

SUO – Sewer Use Ordinance

USEPA – United States En

VCP – Vitrified Clay Pipe

WO – Work Order

INTRODUCTION AND GOALS

The City of Naperville Department of Public Utilities – Water has developed a Capacity, Management, Operation, and Maintenance (CMOM) program to help optimize the performance of the sanitary sewer collection system. In accordance with Illinois Environmental Protection Agency (IEPA) NPDES Permit No. IL0034061, the major objectives of the City of Naperville's CMOM program include:

- Work towards the goal of achieving zero discharges from sanitary sewer overflows or basement back-ups.
- Ensure that if overflows or back-ups occur, they do not cause or contribute to violations of applicable standards or cause impairment in any adjacent receiving waters.
- Manage, operate, and maintain the sanitary sewer collection system so that the system complies with the Clean Water Act.
- Provide enough capacity for the entire sanitary sewer collection system to convey base and peak flows without sanitary sewer overflows.
- Continue the City of Naperville's successful Inflow and Infiltration program to reduce overflows in the sanitary sewer collection system.
- Provide timely notifications to the public of sanitary sewer overflows as part of the Third-Party Notification Plan.
- Provide the CMOM program to the public for review annually.
- Update the CMOM program on an annual basis. If any major changes are required, the CMOM will be updated as needed.

Sanitary sewer maintenance activities are strategically prioritized through a comprehensive evaluation of system performance and asset condition. This process integrates multiple data sources, including internal and external condition assessment tools, CMMS-generated work history, RDII analyses, flow-monitoring results, and SCADA operational data. By leveraging these resources collectively, the program ensures that maintenance decisions are data-driven, risk-focused, and aligned with long-term system reliability and regulatory compliance. Sanitary Sewer Maintenance Goals include:

- Reduce basement backups with a goal of zero basement backups every year (Not including private wastewater backups).
- Reduce wet weather storage lagoon(s) overflows with a goal of zero lagoon overflows every year.
- Reduce usage of wet weather storage lagoons (Lagoon use is tracked in the City's SCADA system).

To achieve the above goals to reduce SSO's and basement backups, sanitary maintenance and inspection goals have been developed. Below is a list of the maintenance and inspection goals.

- Sanitary sewer maintenance goal of cleaning every sewer segment every 5 years. (See Sanitary Sewer Cleaning section of the document for the entire sanitary sewer cleaning procedure).

- Sanitary sewer CCTV inspection goal of televising 10% of the collection system annually.
- Lift station inspections and maintenance are performed on a regular, proactive schedule to ensure reliable system performance and prevent service disruptions. Routine activities include mechanical, electrical, and structural assessments, equipment testing, cleaning, and verification of operational controls. By adhering to a consistent inspection and maintenance program, system integrity is preserved, asset life is extended, and potential failures are identified and addressed before they impact service delivery.
- Maintain a hydraulic model to monitor the sanitary collection system for capacity issues. This will assist with the goal of zero basement back-ups and SSOs.

All Sanitary Sewer Maintenance goals as well as work activities for the collection system are tracked in City Works, the City of Naperville's CMMS (Computerized Maintenance Management System). City Works is an enterprise asset management system that in conjunction with the City's extensive GIS network, enables us to track preventive, reactive, or planned work activities on our assets along with associated costs including labor, equipment, and materials. Data from City Works is reviewed daily and with the use of Microsoft Power BI data visualization software, the data is transformed into easy-to-read visualizations that provide real-time statuses of the programs and goals. See *Appendix GG – Sanitary Sewer Maintenance Tracking* for examples of the visualizations.

**It is important to note that private basement back-ups and lateral line issues are the sole responsibility of the property owner. The City of Naperville will assist all property owners with private back-up problems as part of the City of Naperville Ordinance 92-234, 12-15-1992.*

GENERAL INFORMATION FOR WATER & WASTEWATER

WATER:	
Supply Source:	DuPage Water Commission - Lake Michigan Water Supply System (Since March 1992 at 8 metering stations)
2025 Lake Michigan Allocation	17.089 MGD
System Capacity:	
Lake Michigan Water Supply	35.883 MGD
Emergency Standby Wells	13.60 MGD
Total	49.483 MGD
Reservoirs & Storage Tanks	15
Water Storage Volume	43.90 million gallons
Average Daily Water Usage (Calendar 2025)	13.646 million gallons
2025 Peak Day Usage (August 10)	23.874 million gallons
2025 Peak Month Usage (July)	542.689 million gallons
Historical Peak Day Usage (July 2005)	36.837 million gallons
Historical Peak Month Usage (July 2005)	895.198 million gallons
Total Water *Purchased* (Calendar 2025)	5,042.360 million gallons
Total Water *Supplied* (Calendar 2025)	4,980.847 million gallons
Total Water *Billed* (Calendar 2025)	4,778.920 million gallons
Water Mains (2025)	691.62 miles
Valves – Public & Private (2025)	19,671
Fire Hydrants – Public & Private (2025)	9,728
Customers - Total (December 2025)	45,249

Customers - Residential (December 2025)	41,698
Rates - Residential (January 1, 2026)	*Customer Charge*: $11.69 per month *Volumetric Charge:* $7.39 per 100 cubic feet *Capital Charge:* $1.38 per month
Lead Water Services Replaced (January 2026)	452
Lead Water Services Remaining (January 2026)	202
Water Utility Population Served:	
Inside (2025 Est.)	151,929
Outside	4,993
Total	156,992
WASTEWATER:	
Treatment Facility	Springbrook Water Reclamation Center
Capacity - Dry Weather Design (MGD)	26.25 million gallons/day
Capacity - Wet Weather Design (MGD)	55.13 million gallons/day
Average Daily Wastewater Flow (Calendar 2025)	18.414 million gallons/day
Average 3 Low-Flow Months (Calendar 2025)	16.893 million gallons/day
Wastewater Pump Stations (2025)	23
Sanitary Sewers – Public & Private (2025)	571.7 miles
Manholes – Public & Private (2025)	14,191
Customers - Total (December 2025)	44,328
Customers - Residential (December 2025)	40,987
Rates - Residential (January 1, 2026)	*Customer Charge*: $13.37 per month *Volumetric Charge*: $3.82 per 100 cubic feet (during summer months volume charge is based on average winter months water usage) *Phosphorus Charge:* $2.48 per month (typical residential)
Wastewater Utility Population Served:	
Naperville (2025 Est.)	155,107
Warrenville (2025 Est.)	15,363
Total	170,470

SANITARY SEWER OVERVIEW

The City of Naperville's Wastewater Collection system includes:

- 2,722,521 linear feet (517 miles) of gravity main and interceptors
- 12,209 public manholes
- 23 lift/pump stations
- 47,383 linear feet (8.97 miles) of force mains
- 44,434 customers

The diameter of sanitary sewer mains range in size from 6-inches to 60-inches, depending upon the type and location of the pipe. Sewer piping construction materials consist of vitrified clay pipe (VCP), polyvinyl chloride pipe (PVC), ductile iron pipe (DIP), reinforced concrete pipe (RCP), asbestos cement pipe, and cast-iron pipe.

The system includes two (2) permitted interceptors that convey sewage to the Springbrook Water Reclamation Center (SWRC). Each interceptor has specified tributary areas that include smaller

trunk sewers, sewer main lines, and pump stations/force mains. Both interceptors are constructed of reinforced concrete pipe (RCP).

The age, construction system/material, elevations, and other key information is recorded in the City's geographical information system (GIS). Design plans are stored in the City's OnBase records management system and all maintenance history of each section of sewer, force main, interceptor, manhole, and lift station are recorded in the City's CMMS.

Below is the current pipe material breakdown of the collection system:

Pipe Material

Asset Material	Sewer Force Main	Sewer Gravity Main
Vitrified Clay Pipe		24.23%
Steel Pipe	8.61%	
Reinforced Plastic Pipe (Truss pipe)		0.77%
Reinforced Concrete Pipe		2.51%
Polyvinyl Chloride	17.91%	42.00%
Polyethylene	1.22%	0.08%
Not Known	1.81%	0.85%
Ductile Iron Pipe	57.99%	3.41%
Cured-In-Place Pipe (CIPP)	12.39%	25.36%
Concrete Pipe (non-reinforced)		0.27%
Cast Iron	0.07%	0.10%
Asbestos Cement		0.44%

Refer to the following appendices for additional Collection System information:

Appendix A – Service Area Map (Naperville/Warrenville)
Appendix B – Sewer Basin with Pipe Sizes
Appendix C – City Wide Sanitary Sewer Mains
Appendix D – Divertible Location Maps
Appendix E – Gravity Main Age
Appendix F – Siphon Location Map

SANITARY SEWER COLLECTION SYSTEM FUNDING & BUDGET

The City of Naperville's sanitary sewer system is funded by a utility user fee which is based on potable water consumption. The utility user fee provides a dedicated source of funds for the operation, maintenance, and capital improvements of the City's sanitary sewer collection system.

In areas with no potable water consumption, wastewater customers are charged a flat rate of $65.06 (2026). See *Appendix G – Monthly Utility Rates* for a detailed list of monthly water and wastewater charges.

The 2026 annual budget for Wastewater is about $17.8 million and broken down in the two main categories of:

- Operations and Maintenance - $2,885,554.50
- Collection System Capital Improvements - $14,945,000

For more detailed information on the annual budget, please refer to:

Appendix H – 2026 Capital Improvement Budget
Appendix I – 2026 Operations & Maintenance Budget

CUSTOMER SERVICE

The City of Naperville Water Utilities prides itself on outstanding customer service. Customers or residents that experience any type of wastewater issue are encouraged to call the Water Department at (630) 420-6137 before calling a plumber. City staff are available to assist customers 24 hours a day, 7 days a week, 365 days a year. Below are the steps taken to assist customers when they notify the City of an issue:

1. A Utility Technician is dispatched and inspect the City's sanitary sewer mains to determine if the City's mains are the cause of the issue.
2. If the City's mains are clear, the Utility Technician will measure the distance of the City main to the resident's house to provide a rough distance of the service lateral for a plumber to reference.
3. The Utility Technician discusses the findings with the customer and provides a copy of the City's "Wastewater Customer Service Handout."
4. The Utility Technician educates the customer on the handout and what to look for before calling a plumber.
5. The customer is encouraged to call the City if they have any concerns or questions.

Appendix J – Customer Service Handout is a copy of the City of Naperville's customer service handout which includes information on the ordinance, registration form, survey, and frequently asked questions. Customers are also give a link to the Water Department's "Customer Service Survey Form." The Water Department's annual goal on the Customer Service Survey is 4.95 out of 5.

EMERGENCY RESPONSE PLAN (ERP)

Effective emergency management planning requires considerable coordination and forethought. There are various types of emergencies and/or disasters that can negatively impact the operation of the sanitary sewer collection system.

When a dry weather sanitary sewer back-up is confirmed by a Utility Technician, sewer cleaning equipment is immediately mobilized and used to remove the blockage from the sewer. The footage of the blockage is noted and given to the CCTV inspection crew. All dry weather main line blockages are televised to confirm full removal of the blockage, what the blockage was caused by, and if there is a structural issue with the main.

If blockage removal is unsuccessful or there is a structural issue with the main, the repair is given to the City's Repair and Excavation (R&E) crew. After emergency underground utility locates are completed, R&E makes all necessary repairs. After the repair has been completed, the TV inspection crew will televise the repaired main for our records. Once all repair work has been completed, City contractors are scheduled to restore any asphalt, concrete, and/or landscaping areas that require restoration.
When wet weather sanitary sewer overflows or basement back-ups occur, the following steps are taken:

1. A Utility Technician is dispatched to the affected area and inspects the City's manholes to determine if the City's mains are surcharged.
2. If the manholes are surcharged, the Utility Technician(s) will notify the affected customer of the issue and provide plugs to help avert the back-up.
3. A work order is created in the CMMS to document the back-up and for the follow-up with the resident(s).
4. Affected residents are provided information regarding the City's "Back-Flow Prevention Reimbursement Program." *(Appendix K – Backflow Prevention Reimbursement Program)*
5. After the wet weather event, the IEPA is notified of all back-ups and the wet weather event is evaluated by the City's flow analysis contractor.

The receipt acknowledgement from the EPA of the City of Naperville - Water Department's full Emergency Response Plan is also part of this CMOM. The ERP covers all sections of the Water Department including Water Supply, Water Distribution, Wastewater Collection & Pumping, and the Spring Brook Water Reclamation Center. This information is sensitive and private, hence its redaction from the CMOM. See *Appendix L – EPA Receipt of Emergency Response Plan (ERP).*

OVERFLOW RESPONSE PLAN

The City of Naperville is very proactive at working to prevent any release of sanitary sewage into the environment. However, it is not always possible to prevent these releases. If a sanitary sewer overflow does occur, the City of Naperville follows the "Overflow Response Plan for reporting Sanitary Sewer Overflows" as detailed in *Appendix M – Overflow Response Plan.*

The detailed Overflow Response Plan includes:

- When and who to contact at the IEPA
- When to submit the "Sanitary Sewer Overflow or Bypass Notification Summer Report"
- Instructions on how to take and document water supply overflow(s) at the DuPage River
- Springbrook Laboratory contact list and order to contact
- Bypass estimate of flow calculations
- Assisting property owners
- How a property owner can make a claim

REPORTING AND MONITORING REQUIREMENT

IEPA Reporting

The City of Naperville follows the IEPA protocol on Sanitary Sewer Overflow (SSO) reporting. All SSOs are reported in a timely manner. A full event summary report including follow-up action plans are submitted within the required ten-day time frame. Included in the full report, if applicable, are the test results of the water samples taken of the lagoon(s) overflow and samples of the DuPage River just upstream of the lagoon(s) overflow.

SSO Monitoring and Detection

The City of Naperville has an SSO (Sanitary Sewer Overflow) monitoring program that monitors 18 areas for possible SSOs. These monitors have texting and e-mail alarming capabilities which allows City staff to respond quickly to potential SSOs. All the SSO monitors are maintained by ADS and data is reviewed by ADS for the annual RDII. See *Appendix Q – SSO Monitoring Map* for locations of these monitors.

Program for tracking and reporting basement back-ups, including general public complaints

The goal of tracking basement back-ups is to establish trending and mapping of problem areas so these areas can be addressed to achieve the goals of this CMOM. Currently, the City has no known areas of basement back-ups due to the results of our current sanitary sewer maintenance and I&I reduction programs. All basement back-ups, SSOs, or any customer service calls are tracked in the City's CMMS. These items can be queried and tracked in the system for events going back to 2006. See example of CMMS tracking in *Appendix KK – SSO Work Order Tracking.*

FLOW MONITORING AND RAIN GAUGES

The City of Naperville started a comprehensive flow monitoring program in 1998. Currently, there are fifty-three (53) permanent sanitary sewer flow monitors in the collection system. The City has a contract with ADS Environmental to maintain all open channel flow monitors. ADS Environmental is also contracted to produce an annual Rainfall Derived Inflow and Infiltration (RDII) report as well as two specific rain event RDII reports as needed or requested. All thirty-eight (38) permanent open channel flow monitors have alarming which provide immediate notification to staff regarding the status of the system at those sites. All alarms are sent via text and e-mail. See *Appendix N – Permanent & Temporary Flow Monitoring Map* for locations of all the permanent flow monitors.

In addition to the permanent flow monitors, the City also has two (2) temporary flow monitors in the collection system. These monitors are used for small area flow studies and Return on Investment (ROI) data. No temporary flow monitors were used in year 2025.

Fifteen (15) of the City's wastewater lift stations have magnetic meter flow monitoring equipment. All the data is reported through the SCADA system and monitored daily by City staff to ensure stations are running as designed during dry and wet weather operations. All data is given to ADS for the annual RDII report. These flow monitors are maintained by the City of Naperville staff.

Rain gauges are a critical part of the City of Naperville flow monitoring program. Currently, there are fourteen (14) rain gauges in the system, each covering a 2-mile diameter area. These rain gauges cover 99% of the City of Naperville and 100% of the City of Warrenville. Eight (8) of the rain gauges

are maintained by the City of Naperville staff and six (6) are maintained by ADS. All rain gauge data is given to ADS for the RDII report. *Appendix P – Rain Gauge Map* shows the location and coverage of each of the rain gauges.

RAINFALL AND RIVER MONITORING

High rainfall events in Naperville can cause both localized flash flooding and river flooding along the west branch of the DuPage River. The Water Utility has invested in a monitoring system to measure rainfall and river height so to protect sanitary assets, assist with stormwater management and emergency response. The data from these rainfall and river monitors is made available to regional partners and the general public through the webpage link below.
https://data.naperville.il.us/pages/rain-and-river
Appendix RR – River Flood Monitoring Maps.

INFILTRATION AND INFLOW (I&I) PROGRAM

The City of Naperville Water Utilities has a very aggressive and successful I&I program as shown in *Appendix R – 2025 Annual CMOM and I&I Reduction Status Report.* The I&I programs include but are not limited to:

- Flow Monitoring with Annual RDII reporting
- Small Diameter & Interceptor/Trunk Sewer CIPP Lining
- Full Manhole and In-House Upper Structure Rehabilitation
- Capital Manhole Replacement
- Main Line and Service Lateral Grouting
- Dye Flooding
- Smoke Testing
- Manhole Inspections
- CCTV Program for Mains and Laterals
- Multi-Sensor Inspections of Interceptor/Trunk Sewers
- Private Property & Building Inspections

FLOW REDUCTION AND I&I PROGRAM EFFECTIVENESS

The City of Naperville has a nationally known Infiltration and Inflow (I&I) Reduction Program. The program started in the early nineties and was updated in 2003. The current Infiltration and Inflow Reduction Program is updated annually. In this CMOM program there are several examples of the effectiveness of the I&I reduction program.

Naperville's proactive approach to combatting I&I has yielded positive results. Prior to the implementation of an I&I program, the daily flow to Springbrook Wastewater Reclamation Center (SWRC) plant was 26.75 million gallons per day (MGD). Today, the current flows to SWRC average 18.4 MGD. Since 1998, the population served by the City of Naperville' has increased by roughly 34,500 people, or about 29%. Yet, when looking at the average amount of water treated at the SWRC, flows have decreased by roughly 31% over the same period.

Additional examples of how effective the I&I program is shown through the reduction in customer service calls we receive, reduction in sewer maintenance costs, and the types of maintenance activities staff performs. For example, in 2007 staff responded to 600 sewer-related customer service calls. In 2025, staff responded to only 498 calls (Note: 100% of customer calls were private issues). Less time spent on responding to customer service calls means staff can spend more time on I&I work, which reduces the chance of mainline back-ups. The I&I program has reduced the linear feet of sewer main that requires root cutting, which has saved $39,000 yearly and reduces chances of injuries to staff. Because of the I&I programs, the pump stations throughout the City operate more efficiently, cost less to operate (more electrical efficiency), require less maintenance, and require less bypass pumping during high-flow events.

WASTEWATER LIFT/PUMP STATIONS & FORCE MAINS

The City of Naperville Water Utilities operates and maintains twenty-three (23) wastewater lift/pump stations and six (6) backflow prevention stations. All stations are monitored twenty-four hours a day, seven days a week by the City's SCADA system. All stations also have alarming capabilities via the SCADA system and texting alarms by the Win911 system.

All wastewater lift/pump stations have a variety of redundancy capabilities, including:

- Back-up generators
- Bypass pumping connections
- Redundant alarming
- Back-up PLCs
- Back-up level controls
- Spare pumps on hand

Lift stations are checked daily through the SCADA system and inspected monthly. On a semi-annual basis, a more extensive preventative maintenance inspection is performed at all stations. All work is tracked through the CMMS. Examples of the inspections performed, and data collected can be found in *Appendix S – Lift Station Monthly and Semi-Annual Inspections* and *Appendix GG – Sanitary Sewer Maintenance Tracking,* respectively.

Force Mains: All wastewater lift station/pump station force mains are mapped in the City's GIS system. Maintenance and repairs are tracked in the City's CMMS. Since 2021, the City has contracted with RJN Group to inspect eleven (11) of the City owned force mains. This program was created to place all twenty-six (27) City force mains on a 5-year inspection cycle. For larger force mains, INGU pipers are used to detect air pockets, pipe restrictions, and potential leaks. This data is used to evaluate City force mains and to create rehabilitation and replacement projects as needed. See *Appendix PP – 2025 Force Main Assessments*. In 2026, RJN Group will inspect 4 City owned force mains: Aero Estates, Cinnamon Creek, NOC, & Polo Club.

Force Mains Cleaning:

The City of Naperville Water Utility utilizes several methods of cleaning wastewater water force mains. These methods include Hydraulic cleaning (In-House), Traditional Mechanical Pipping and Ice Pigging.

In fiscal year 2025, Ice Pigging was used to clean two sanitary force mains located at the Riverwoods and Summerfield lift stations. These force mains were obstructed by as much as 30%. After cleaning using the ice pigging process, pumping at both stations was restored to the original system curves. In 2026, the Water Utility plans to Ice Pig five (5) additional forcemains.

SANITARY SEWER CCTV INSPECTIONS

The City of Naperville Water Utilities currently owns and operates one mainline/lateral inspection Closed-Circuit Televising (CCTV) truck. The truck is operated with a two-man crew, which annually inspects 75,000'-90,000' of sanitary sewer per year. The yearly CCTV schedule is updated annually and is adjusted based on many factors including customer service calls, sanitary sewer cleanings, CMMS data, flow monitoring data, project planning, and RDII reports.

See *Appendix T – CCTV Inspection Schedule.*

The schedule includes:

- O&M Inspections
- CIPP Inspections
- Customer Service Inspections
- Warranty Inspections
- Utility Locates
- Infiltration and Inflow Inspections
- Cross Bore Inspections
- Miscellaneous Inspections

Starting in 2023, the City has begun contracting out CCTV services. In 2025, this amounted to 212,013 linear feet of gravity main inspected in accordance with NASSCO PACP standards. 214,729 linear feet is projected to be inspected via contract in 2026.

MANHOLES

The City of Naperville's sanitary sewer collection system has 12,209 public manholes. All manholes have been located and are in the City's GIS mapping system. Manholes are visually inspected on a regular basis during sewer cleaning activities. Also, manholes that are in an I&I focus area are inspected during saturated ground conditions. In the past, these inspections are done using NASSCO MACP type 1 format. Beginning in 2025, manhole inspections are performed using GNET with consideration to MACP standards *(Appendix U – Manhole Inspections in GNET).* Typically, a total of 1,000 to 3,000 manholes are inspected per year depending upon the sewer cleaning program. Manholes are repaired as necessary to reduce I&I into the sanitary collection system. O&M repairs are done with City crews while all Capital Improvement repairs are done by contractors.

Examples of repairs include:

- O&M Manhole Repairs
    - Frame and lid replacement
    - Upper structure repairs or replacements

    - Upper Structure Manhole Lining with CIP (Chimney Liner)
    - Upper Structure Manhole Lining with Raven581 (Chimney Liner)
    - Chemical grouting
    - Bench and channel repairs
    - Cone and barrel repairs
- Capital Manhole Rehabilitation
    - Manhole Replacement Program
    - Entire Manhole Rehabilitation (Raven405/ Sprayroq)

All manholes running along water ways or retention areas have the lids bolted down to prevent the lids from coming off during high flow events. The City also installs Parson Manhole Inserts within manholes located in low lying areas known for flooding. Inserts are used to prevent inflow from entering the system from the manhole lids. There are currently 4,500 manhole inserts in the system. The manhole inserts are maintained on an annual basis.

MONTHLY INSPECTIONS

The City of Naperville Water Department performs monthly site, equipment, and safety inspections including:

- Visual inspection of all Wastewater Lift Stations
- Visual inspection of all Back-Flow Prevention Stations
- Visual inspection of all Force Main Air Release Valves
- Full inspections of all emergency pumping and power equipment
- Safety inspections of personal safety equipment and other equipment
- Visual inspection of wastewater hot spots

All monthly inspections are tracked in the City's CMMS system and safety paperwork is sent to the City's Safety Department.

NEW CONSTRUCTION

Currently, the City of Naperville's Transportation, Engineering, & Development Business Group (TED) handles all inspection on construction of new sanitary sewer assets. The Water Utilities Civil Environmental Engineering Group (CEEC) assists with reviewing plans and videos of service lines and CCTV videos of completed work.

New construction inspections include:

- CEEC review of site and concept plans
- Manhole vacuum testing
- Sanitary mainline mandrel testing
- Leakage testing
- Air testing

Information on new construction standards and testing can be found in *Appendix V – Naperville Construction Standards & Manhole Testing New Construction*

ORGANIZATIONAL STRUCTURE

The City of Naperville's Water Utility currently has a total of 87 team members. Of these, 11 team members work in the Wastewater Collection & Pumping section, which is responsible for all wastewater collection maintenance, customer service, inspections, and infiltration and inflow programs. The Repair and Excavation section is made up of 13 team members responsible for all manhole, sanitary sewer main, and service lateral repairs. See *Appendix X – Organizational Structure* for the Water Utilities' organizational chart.

SAFETY

The City of Naperville is firmly committed to providing a safe and healthy environment for its employees, citizens, contractors, and the public. Safety is a key objective and value that must not be compromised.

The Water Utilities' team members are trained on all Illinois Department of Labor, Occupational Safety and Health Administration, and other existing Federal and State regulations. All safety training records are filed with the City of Naperville's Safety group.
All safety equipment is inspected as required by all Federal, State, and Local regulations. Annually all fall protection and confined space equipment is inspected by a certified third-party competent person(s).

TRAINING

Training Collection & Pumping staff is a key component to further the goal of zero SSOs and elimination of I&I. Training is provided year-round by subject matter experts that work withing the Utility and the City as well as external industry professionals in a variety of settings (field, shop, classroom, hands-on) that allow for a full range of learning opportunities and practice putting skills to use. To meet CMOM training goals, Collection & Pumping staff reviews or is trained on the following subjects on an annual basis:

- Emergency Response Procedures (ERP) – Staff are trained how to use the ERP and how to respond to an emergency.
- Sanitary Sewer Cleaning – Staff reviews standard operating procedures and equipment operation and adjust the SOP as needed as new technologies or equipment is incorporated into operations.
- Manhole Inspections – All C&P staff are NASSCO MACP certified and are required to get re-certified every three years. Staff receives annual refresher training on correct procedures for completing Manhole inspections using GNET.
- Lift Station Operation and Maintenance – Staff have refresher training on all lift stations and the general operation and maintenance at each station as well as a general understanding of the characteristics of each station.
- Customer Service Procedures – Staff are trained how to interact professionally with customers (residents) during any type of customer call out including those that occur during non-wet and wet weather conditions involving private sanitary sewer laterals. Staff is also familiar with promoting the City's Backflow Prevention Reimbursement Program.

- NASSCO/CCTV Training – All Collection & Pumping staff are required to be PACP, LACP, and MACP certified. This certification standardizes the coding and methods of closed-circuit televising of mainlines, service laterals, and manhole inspections. This standardization makes identifying defects that cause I&I easier. NASSCO re-certification is required every three years. Project Managers and Supervisors are required to be ITCP certified in CIPP and Manhole Rehabilitation inspections.
- Infiltration and Inflow – As part of the NASSCO training and section training, staff are trained how to recognize sources of I&I.
- Wet Weather Procedures – Staff are trained annually on how to operate pump stations, set up bypass pumping equipment, prevent overflows/backups, and on how to educate the customer on the causes of wet weather back-ups and how to prevent them.

New employees receive additional and more personalized training depending on their experience and background. On the job training consists of all new employees being partnered with an experience team member where they are trained on all job duties needed to operate the collection system in a safe and efficient manner. Job training is reviewed with all new employees several times during the six-month probationary period. New employees are trained on the following:

- Equipment Operation and Maintenance
- City, Departmental, and Section Policy and Procedures
- Safe Driving Course
- Confined Space/Fall Protection
- Electrical Safety
- Traffic/Work Zone Safety and Flagger Certification
- Fire Safety
- CPR/First Aid

Staff are continuously trained throughout the year, especially on new policies, procedures, or equipment. Training on equipment is provided by the vendor of the equipment and usually consists of a half day or more training on the equipment which includes time in the field learning how to operate the equipment correctly, efficiently, and safely. Other training opportunities available to staff are professional seminars and conferences, technical courses at local community colleges, and hands-on demonstrations of new or emerging equipment and technologies that could be incorporated into their daily operations.

All training is signed and documented.

SANITARY SEWER CLEANING

The wastewater collection system is maintained by two cleaning crews using Vactor and Vac-Con combination trucks. These combination sewer cleaners combine high-pressure water jetting and a high flow vacuum source to scour pipes clean and vacuum up the removed material to restore and maintain normal sewer flow. Specialized nozzles or root cutting equipment is utilized with high-pressure water to thoroughly clean the sanitary sewer mains. On average, over one million linear feet of sanitary sewer is cleaned annually.

The entire wastewater collection system is cleaned every five years. A flushing/cleaning schedule is updated as schedule maintenance is completed. The flushing/cleaning schedule is reviewed and updated with all operators on an annual basis and adjusted as need to maintain the system. In addition to the annual flushing schedule, there is also a Preventative Maintenance Schedule (PMS) for those areas that require additional cleanings throughout the year. The PMS schedule includes areas needing monthly, quarterly, semi-annual, and annual cleaning. The schedule also includes areas of monthly visual inspections of manholes (Hot Spots), areas cleaned for rehabilitation, and inverted siphon cleaning.

Please see the below appendices for sewer cleaning procedures and schedules:

Appendix Y – Sewer Cleaning Procedure
Appendix Z – Jet Flushing Schedule
Appendix AA – Hot Spot Checks
Appendix BB – Preventative Maintenance Schedule

UNPLANNED MAINTENANCE

Most of all wastewater collection system maintenance and repairs are planned predictive and preventative maintenance. At times, unplanned maintenance or repair may occur because of conditions discovered during the predictive or preventative maintenance program(s) or in an emergency. As with all work done in the wastewater collection system, if an unplanned maintenance or repair situation occurs, a work order is created in the City's CMMS. The work is completed and tracked with the CMMS. See *Appendix HH* for an example of an unplanned work order.

SEWER USE ORDINANCE

Chapter 2 in Title 8 of the City of Naperville's Municipal Code covers both water and wastewater ordinances. These ordinances cover installation, inspection, maintenance, and repair of the water and wastewater systems.

Section 8-2B-4 Building Sewers contains several ordinances that cover the use, permits, construction specifications, and connection to the public sewer.

Ordinance 79-127, 10-15-1979 covers Construction Specifications, Connections to the Public Sewer, Prohibited Connections to the Public Sewer, Inspections and Excavations, as well covering the Responsibility for Maintenance and Repairs.

A copy of the City of Naperville Municipal Code and Water/Wastewater ordinances can be found on the City of Naperville's website.

FATS, OILS, AND GREASE (F.O.G.)

The City of Naperville has not had an issue with a grease SSO since 2013. This is due to the Naperville Water Utilities' Sewer Cleaning Schedule and Hot Spot checks. These maintenance

practices maintain and prevent SSOs caused by FOG. PMS maps marked "Grease" show the original cause of the issue in the 1980's and 1990's. These areas are cleaned on a regular basis to prevent grease issues in the collection mains. The PMS program for FOG has prevented any issue since the original issues occurred. All areas of the collection system are reviewed annually, or when a building's usage changes or a new building is constructed, for issues with FOG. The review of the public collection system also includes sample testing for grease in various areas of the system. *Appendix CC – Grease Testing Samples and Map* is an example of the lab report for grease testing along with the map where samples were taken.

Responsibilities of Commercial Establishments for Fats, Oils, and Grease can be found in Title 4 of the Naperville Municipal Code "Commercial Grease Collections Storage."

Required Treatment and Control Facilities including Grease/Sand Interceptors, Preliminary Treatment Facilities and Control Manholes can be found in Title 8, Chapter 2 (8-2B-13) of the Naperville Municipal Code. (Ordinance 79-127, 10-15-1979)

The City of Naperville has submitted an Industrial User Inventory to USEPA in accordance with the NPDES permit. Provisions are in place to begin implementation of a pre-treatment program upon notification by USEPA that a program is required.

REIMBURSEMENT PROGRAMS

Naperville Water Utilities' "Back Flow Prevention Program" offers any wastewater customer that has experienced a wastewater back-up due to flooding a 75%-25% cost sharing program. The City of Naperville will reimburse the customer 75% of the cost of any wastewater back flow device installed at the affected property. The customer must qualify first by contacting the Collection and Pumping Supervisor to discuss eligibility. A copy of the packet can be found in *Appendix K*.

The "Storm Water Disconnection Program" is also a cost sharing program to disconnect any device that allows storm water to enter the wastewater collection system. This program is also available for any City of Naperville wastewater customer. See *Appendix DD – Stormwater Disconnection Program.*

Any storm water connection to the wastewater collections system is a violation of Ordinance 02-137, 6-4-2002. The property owner will have 60 days to make all repairs. If the repairs are not made in the time frame, water service may be affected.

WET WEATHER STORAGE LAGOONS

Naperville Water Utilities operates two wet weather storage lagoons. One lagoon is located at 1200 West Ogden Avenue and the other is located at 1800 South Washington Street. These lagoons are used for storing excess inflow and infiltration that has entered the collection system during heavy rainfall periods. After the excess storage lagoon(s) are no longer needed, the water in the lagoon(s) is drained back into the collection system for proper treatment. See *Appendix EE – Wet Weather Storage Lagoons* for the City's procedures for operating these lagoons.

Flow to both lagoons are monitored by the City's SCADA system per IEPA permit IL0034061. *Appendix EE* also shows how the lagoons are used and when flow is diverted to them.

THIRDY-PARTY NOTIFICATION PLAN

The City of Naperville is proactive in working to prevent releases of sanitary sewage into the environment. If/when a Sanitary Sewer Overflow happens, the City of Naperville's "Third-Party Notification Plan" will be followed. Below are the steps of the Third-Party Notification Plan.

IEPA Notification

The IEPA will be notified of all SSOs caused by flooding, main sewer line issues, or sanitary sewer pump station failures within 24 hours of the SSO event. The IEPA notification shall be completed electronically via Illinois - NeT Sanitary Sewer Overflow Within ten days, a "Sanitary Sewer Overflow or Bypass Notification Summary Report" with sample results shall be mailed to the IEPA.

Notification of City of Naperville Parties – All SSOs are Reported to:

Darrell Blenniss
Water Utilities Director
(630) 305-5320
Blennissd@naperville.il.us

If an SSO affects any Public Works stormwater, street, or other public right-of-way asset:

Dan Randolph
Director of Public Works
(630) 420-6752
Randolphd@naperville.il.us

Springbrook Water Reclamation Center Laboratory Notification:

Lise McNames
Regulatory Compliance Manager
(630) 420-6121
Mcnamesl@naperville.il.us

Joe Slevnik
Deputy Director – SWRC
(630) 420-6125
slevnikj@naperville.il.us

Public Notification

Determined by the affected area. All notifications are sent out by the City of Naperville Community Relations group. The Water Utilities Director and Communications Manager will review and approve all communications prior to their release via:

- City of Naperville Website
- Naper Notify
- Local Newspaper

It may be necessary to contact other parties outside of the City of Naperville, depending on the location of the SSO(s). Below is the list of other parties who may be contacted in the event of an SSO:

- Naperville Park District (630) 848-5000
- DuPage County Forest Preserve (630) 933-7200
- Will County Forest Preserve (815) 727-8700
- DuPage County (630) 407-6500
- Will County (815) 722-5515
- Naperville Township (630) 355-2786
- DuPage Township (630) 759-1317
- Lisle Township (630) 968-0057
- Wheatland Township (630) 717-0092
- Village of Bolingbrook (630) 226-8800
- Village of Plainfield (815) 436-7093

All Third-Party Notifications will include:

- Where the SSO(s) occurred
- What caused the SSO(s)
- Areas affected by the SSO(s)
- Response action for the SSO(s)
- City of Naperville contact person for any questions or concerns regarding the SSO(s)

CITY OF WARRENVILLE

The City of Naperville treats wastewater for the City of Warrenville as depicted in *Appendix A – Service Area Map. Appendix FF – City of Warrenville Contract* details the agreement between Naperville and Warrenville. Warrenville's wastewater is conveyed two ways to the Raymond Road Trunk Sewer:

- Gravity feed from the City of Warrenville.
- Pumped from the Cantera area

From the Raymond Road Trunk Sewer, the wastewater flows to the Northwest Wastewater Pump Station where it is pumped to the Springbrook Interceptor. From the Springbrook Interceptor, the wastewater is gravity fed to the Springbrook Water Reclamation Center.

- 11 sanitary lift stations
- 54.5 miles of sanitary sewer
- 2.7 miles of force main
- Pipe sizes from 8" – 24" and force main sizes from 4" – 12"
- Pipe materials include concrete, plastic, ductile iron, truss, and clay
- 1,239 precast manholes
- 15,363 customers

CITY OF WARRENVILLE I&I PROGRAM

The City of Warrenville is currently working on an eleven (11) year I&I plan in eleven (11) basins. The City of Warrenville is working with Engineering Enterprises Incorporated, RMS Utility Services, Midwest Water Group, and ADS Environmental on this program. The City of Warrenville also owns a lateral launching camera for sanitary service lateral inspections.

In 2025, the City of Warrenville successfully completed chimney sealing and grouting of 15 manholes and smoke tested 13.5 miles of sewer gravity main. Additionally, their collection system maintenance performed in 2025 includes…

- Cleaned over 25 miles of gravity sewer main
- Installed 6 missing air release valves on Cantera Lift station gravity main
- Replaced the discharge piping at the Ray St. lift station
- Upgraded the 11 lift stations SCADA to allow for us to obtain starts and stops, amps, run times, and have more remote control of stations
- Replaced the Fox Hollow lift station generator
- Purchased 4 back up pumps for the 11-lift station
- Repaired all the damaged fencing for security to the stations
- Replaced the UPS at all 11 lift stations

Warrenville Contact Information:

Zach Jardine | Utility Maintenance Superintendent
3S258 Manning Avenue, Warrenville, IL 60555
P: (630) 836-3051 | F: (630) 393-1869
zjardine@warrenville.il.us

CMOM COMMUNICATION

The City of Naperville's CMOM program can be viewed at any time on the City of Naperville's website. The CMOM program can also be viewed during normal business hours at the Naperville Water Service Center located at 1200 West Ogden Ave., Naperville.

CMOM ANNUAL REVIEW

The City of Naperville WSD&C Division will conduct an annual review of the CMOM program's performance from the previous year, identifying areas of change and improvement that will be discussed in a team meeting format. This review will also serve as the basis for the development of the annual CMOM update report to be submitted to the Illinois EPA. Additionally, WSD&C may call team meetings throughout the year as necessary to discuss and improve the CMOM program.

CMOM ANNUAL REPORT

Per the City of Naperville's NPDES permit, an annual CMOM report will be submitted to the IEPA each year. This report will contain, at a minimum, the following information:

- Summary of previous year results
- Review of system performance including a summary of all SSO events that occurred
- Asset Management Plan

- System Evaluation Plan including I&I reductions measures implemented
- Maintenance Plan including:
    - Pipe rehabilitation
    - Manhole repair, replacement, and rehabilitation
    - All CCTV inspections
    - Sanitary service lateral work/rehabilitation
    - Pump/lift station maintenance, repairs, and upgrades
    - Force main work
    - Asset management plan for ongoing development
    - Any updates to the "Overflow Response Plan"
    - Any updates to the "Third-Party Notification Plan"

Previous year's results will be reviewed to monitor the effectiveness of the CMOM program with changes made as needed. Appendices will also be updated annually or as needed.

Each November, the City will put a draft progress report out for public review similar to the initial public review process. In late December, a finalized summary will be sent to the IEPA.

SYSTEM EVALUATION PLAN

Summary of existing SSO and Excessive I&I areas in the system and sources of contribution

ADS Environmental is contracted to produce an annual Rainfall Derived Inflow and Infiltration (RDII) report. The City of Naperville uses the annual RDII report to evaluate areas of excessive I&I. *Appendix II* is a summary of the 2024 RDII excessive areas of I&I.

Figure 6 on page 15 shows net groundwater infiltration (GWI) per flow meter as a percent of the average flow during dry weather. Groundwater infiltration is not able to be measured using flow meters, so ADS uses the Mitchell Method to estimate groundwater infiltration totals for this study period. Based on these calculations reflected on the graph, meters with over 40% of net flow derived from groundwater infiltration are considered significant problems, while 20%-40% are considered marginal.

Figure 11 on page 22 shows RDII volume by percent rainfall capture per flow meter tributary. For this graph/summary the data was reflected as rainfall captured in the sanitary main divided by total rainfall to show percent rainfall captured in sanitary mains. For this value, industry rule-of-thumb for excessive percent rainfall captured is 5%.

Evaluate and execute plans to reduce I&I and eliminate SSOs (2018 to current)

In 2018, the City began executing it's ten (10) year rehabilitation plan. In 2025, due to flow meter data and condition assessments, the City re-evaluated and revised its ten (10) year rehabilitation plan. The ten (10) year rehabilitation plan will be reviewed and adjusted annually. See *Appendix TT- ten (10) year rehabilitation plan.*

In 2018, the City created a ten (10) year rehabilitation plan to target areas of high I&I. In 2026, it was recreated based on flow meter data. In 2025, the following rehabilitation projects were complete:

- 230 laterals rehabilitated with CIPP
- 31 lift station discharge manhole rehabilitations
- 4 manhole replacements
- 15,000 linear feet of collector sewer rehabilitated with CIPP
- 300+ manhole upper structure rehabilitations

Evaluate the effectiveness and performance in efforts to reduce excessive I&I in the collection system:

As stated above, the City of Naperville Water Utilities has a very aggressive I&I program. *Appendix R* displays the effectiveness of the City's I&I reduction and sanitary sewer rehabilitation plan. This includes the WWTP flow reduction showing City wide I&I reduction results, Prescott Flow Meter Basin I&I reduction results, and additional results from the I&I plan.

In addition, the RDII study shows areas of improvement due to rehabilitation and maintenance activities as well as areas where conditions may be static or worsening. The RDII is reviewed each year to better target rehabilitation and maintenance activities.

Special provisions for pump station and force main and other special components:

All information for the wastewater lift station/pump station, force mains, and special components is on pages 7 and 13 of this CMOM Report. The Capital Improvement Plan for the wastewater lift/pump stations is in the CMOM report in *Appendix H*.

Construction plans and schedules for correction to meet IEPA I&I standards:

As previously stated, the City re-evaluated it's ten (10) year wastewater collection rehabilitation plan to continue the elimination of I&I and prolong the life of the collection system assets. The plan includes costs, locations, years, and quantities. Below are the assets that have been and continue to be included in the City's 10-year rehabilitation plan:

- Interceptor/Trunk Sewers
- Gravity Mains
- Sanitary Laterals
- Lift/Pump Stations
- Manholes
- Inverted Siphons

All plans and schedules will be evaluated annually and updated to meet the needs of the collection system. The overview of the 10-year rehabilitation plan is shown in *Appendix TT*. The detailed 10-year plan has been incorporated into this CMOM.

ASSET MANAGEMENT

The City has an ongoing asset management program for sanitary sewer assets. Data from the City's GIS system, CMMS system (City Works), and CUES GraniteNet CCTV inspection records are used to assess the condition of various assets. The CMMS system also contains a database of cleaning, inspection, lining, spot repairs, and other maintenance and repair activities. Since mid-2023, the City's CUES GraniteNET software has been integrated with both the CMMS system and GIS

system, to better update and reflect changes to assets in the field as well as to update work completed.

The City uses a risk-based approach to analyze and prioritize maintenance and repairs to the sanitary sewer system. Data collected from the various systems, including GIS, City Works, CUES, and InfoSWMM is used to develop Probability of Failure (PoF) and Consequence of Failure (CoF) criteria for each sanitary sewer main. These criteria are used to calculate a Business Risk Exposure (BRE) score for each main. The BRE score is used to help target the City's resources in the most efficient way possible to optimize performance of the collection system, to eliminate SSOs, and other system problems.

The Asset Management Strategy will confirm that necessary programs and financial resources are in place to ensure the long-term sustainability of the collection system.

A draft Asset Management Strategy is provided in *Appendix MM*.

CAPACITY ASSESSMENT

The City currently has a partially completed InfoWorks ICM sanitary model, originally developed in 2010, which includes trunk sewers 10 inches in diameter and larger.
In 2026, the Water Utility is seeking professional services to develop a comprehensive InfoWorks ICM model that includes all sanitary sewers 8 inches in diameter and larger.

An Ultimate Wastewater Flow and Loading Evaluation for Springbrook Water Reclamation Center was conducted in 2019. The final study document is attached as *Appendix OO*.

APPENDICES

Appendix A – Service Area Map (Naperville/Warrenville)

Appendix B – Sewer Basin with Pipe Sizes

Appendix C – City Wide Sanitary Sewer Mains

Appendix D – Divertible Location Maps

Appendix E – Gravity Main Age

Appendix F – Siphon Location Map

Appendix G – Monthly Utility Rates and Charges

Appendix H – 2025 Capital Improvement Budget

Appendix I – 2025 Operations & Maintenance Budget

Appendix J – Customer Service Handout

Appendix K – Backflow Prevention Reimbursement

Appendix L – EPA Receipt of Emergency Response Plan (ERP)

Appendix M – Overflow Response Plan

Appendix N – Permanent & Temporary Flow Monitoring Map

Appendix P – Rain Gauge Map

Appendix Q – SSO Monitoring Map

Appendix R – 2025 Annual CMOM and I&I Reduction Status Report

Appendix S – Lift Station Monthly and Semi-Annual Inspections

Appendix T – CCTV Inspection Schedule

Appendix U – Manhole Inspections in GNET

Appendix V – Naperville Construction Standards & Manhole Testing New Construction

Appendix X – Organizational Structure

Appendix Y – Sewer Cleaning Procedure

Appendix Z – Jet Flushing Schedule

Appendix AA – Hot Spot Checks

Appendix BB – Preventative Maintenance Schedule

Appendix CC – Grease Testing Samples and Map

Appendix DD – Stormwater Disconnect Program

Appendix EE – Wet Weather Storage

Appendix FF – City of Warrenville Contract

Appendix GG – Maintenance Goal & Inspection Tracking Data

Appendix HH – Unplanned Maintenance Work Order

Appendix II – System Evaluation

Appendix KK – SSO Work Order Tracking

Appendix LL – Ten (10) Year I&I Plan Overview

Appendix MM – Draft Asset Management Strategy

Appendix OO – 2019 SWRC Ultimate Wastewater Flow and Loading Evaluation

Appendix PP – 2025 Force Main Assessments

Appendix RR – River Flood Monitoring Maps

Appendix TT – Ten (10) Year Rehabilitation Plan

Appendix UU – USEPA Checklist

Appendix A

WWTP Service Area

N

Legend

- Naperville
- Warrenville
- WTP Wastewater Treatment Plant

Service Area: 40.02 sq mi
Population Served: Naperville 153,124; Warrenville: 15,363

Gravity Main

Naperville:	515.6 mi
Warrenville:	54.5 mi
Total	570 mi

Force Main

Naperville:	9.14 mi
Warrenville:	4.7 mi
Total	13.8 mi

Pump Stations

Naperville:	23
Warrenville:	11
Total	34

DEPARTMENT OF PUBLIC UTILITIES - WATER
Water Distribution & Collection
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Appendix B

Sanitary Sewer Basins

N

N01 N02 N03 N04 N05 N06 N07 N08 N09 N10 N11 N12 N13 N14 N15 N16 N17 N18 N19 N20 N21 N22 N23 N24 N25 N26 N27 N28 N29

W01 W02 W03 W04 W05 W06 W07 W08 W09 W10 W11 W12 W13 W14 W15 W16 W17 W18 W19 W20 W21 W22 W24 W25 W26

C01 C02 C03 C04 C05 C06 C07 C08 C09 C10 C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C30 C31 C32 C33 C34 C35 C36 C37 C38 C39 C40 C41 C42 C43 C44 C45 C46 C47 C48 C49 C50 C51 C52 C53 C54 C55 C56 C57 C58 C59

S01 S02 S03 S04 S05 S06 S08 S09 S10 S11 S12 S13 S14 S15 S16 S17 S18 S20 S21 S22 S23 S24 S25 S26 S27 S28 S29 S30 S31 S32 S33 S34 S35 S36 S37 S38 S39 S40 S41 S42 S43 S44 S45 S46 S47 S48 S49 S50 S51 S52 S53 S54 S55 S56 S57 S62 S63 S64 S65

Pipe Size	Linear Feet
4"	43
6"	13,306
8"	2,035,925
10"	260,289
12"	107,319
14"	10,678
15"	58,989
16"	16,138
18"	63,856
20"	7,918
21"	3,864
24"	42,925
27"	13,412
30"	9,324
33"	1,465
36"	28,694
42"	47,723
48"	426
60"	292
UNK	597
Total	2,723,182

Legend

- Collection
- Interceptor
- Private
- Sewer Basin

Basin	Total
North	29
West	24
Central	59
South	59
Total	171

DEPARTMENT OF PUBLIC UTILITIES - WATER
Water Distribution & Collection
Created By: Emily Eichholzer, Project Manager
12/2/2025 11:18 AM

Appendix C

Sanitary Sewer System

N

FERRY RD
I-88
WINFIELD RD
DIEHL RD
WARRENVILLE RD
NAPERVILLE RD
RAYMOND DR
NORTH AURORA RD
OGDEN AV
CHICAGO AV
AURORA AV
WASHINGTON ST
NAPER BL
RICKERT DR
75TH ST
ROUTE 59
87TH ST
PLAINFIELD/NAPERVILLE RD
BOOK RD
95TH ST
WTP Springbrook Wastewater Treatment Plant
103RD ST
HASSERT BL

Legend

- WTP — Treatment Plant
- Sewer Basin
- Collector
- Interceptor
- Inverted Siphon
- Private
- Force Main

DEPARTMENT OF PUBLIC UTILITIES - WATER
Water Distribution & Collection
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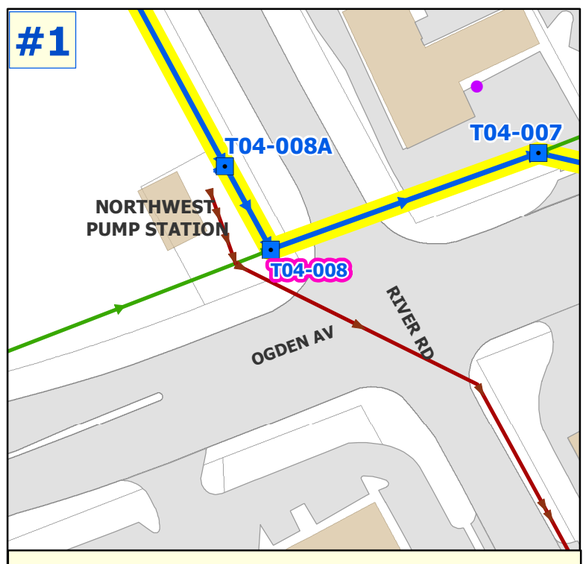
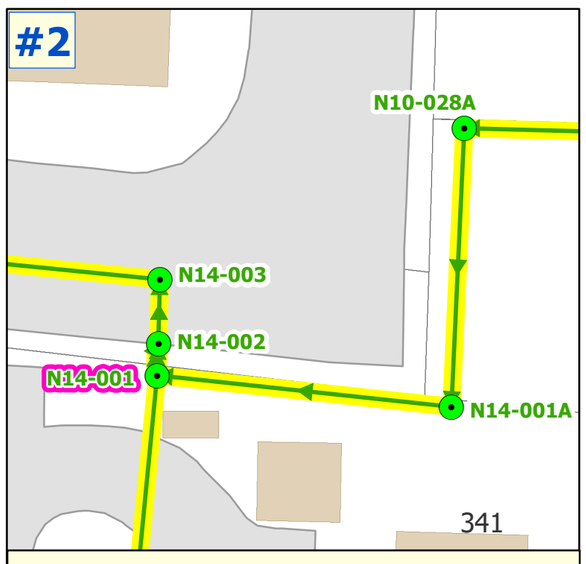
12/2/2025 11:15 AM

SANITARY SEWER DIVERTIBLES
GRAVITY MAINS, MANHOLES & VALVES

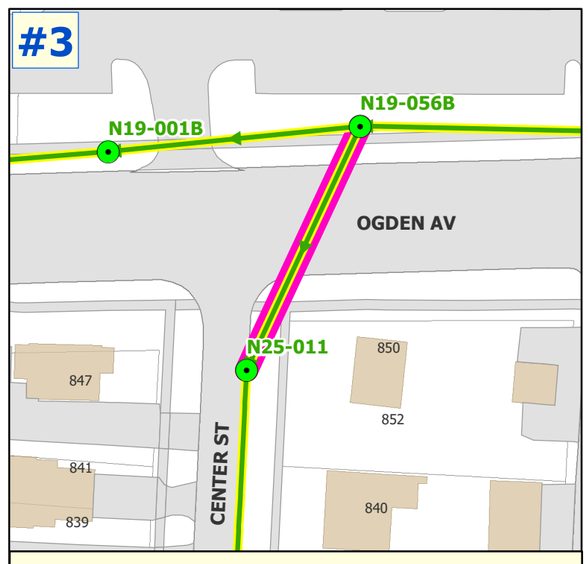
N
Not to Scale



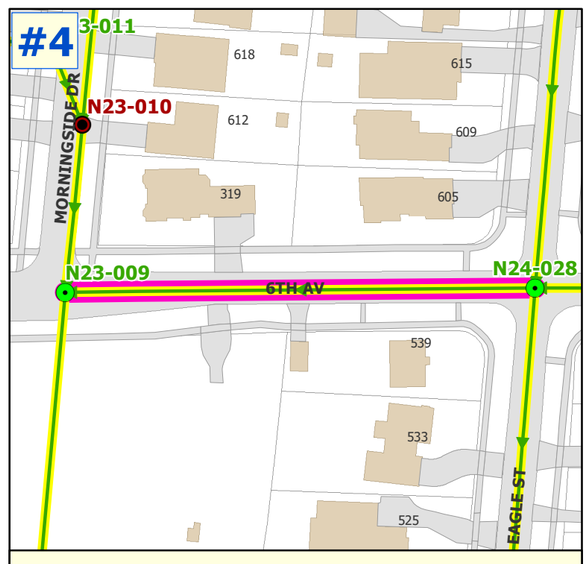
Northwest Pump-NOC
Divertible Valve in MH T04-008
Used during high flows to divert excess flow to NOC



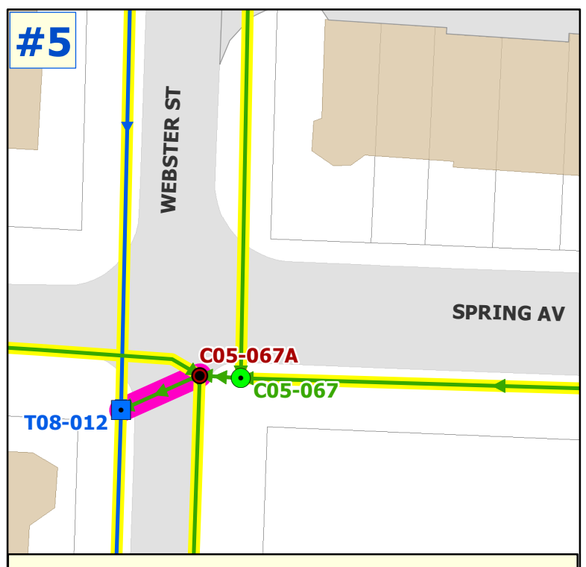
Ogden Manor
Divertible Valve in MH N14-001
Diverts flow between NOC/SOC
Approx. 400,000 gpd diverted to SOC



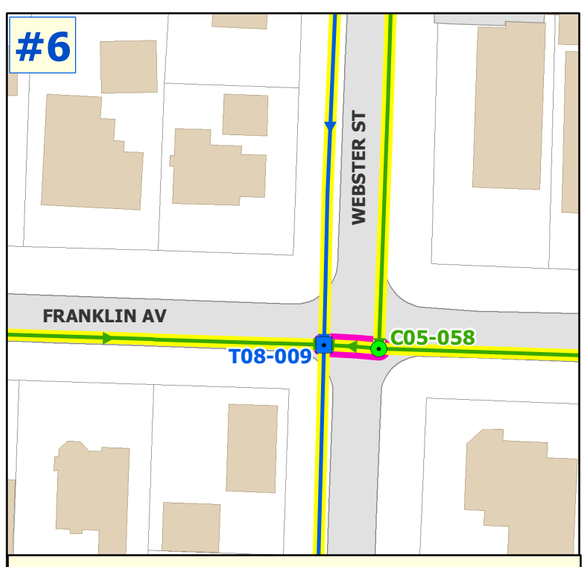
Center St - Ogden Divertible
Gravity Main
Diameter = 8" Length = 140'
Lined 2013 CIPP



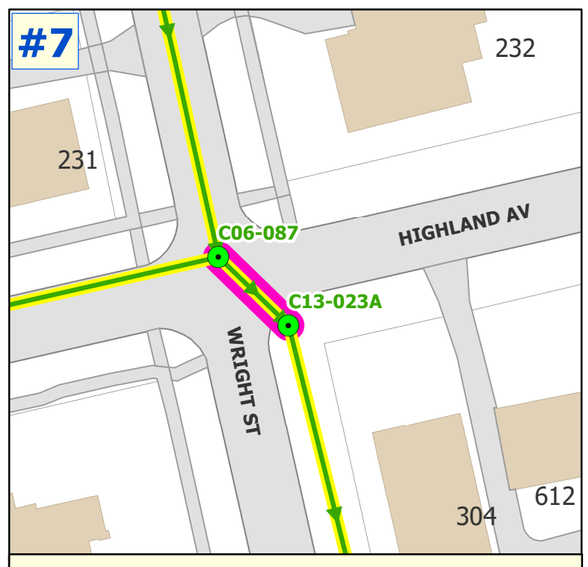
6th Av - Eagle Divertible
Gravity Main
Diameter = 8" Length = 355'
Lined 2006 CIPP



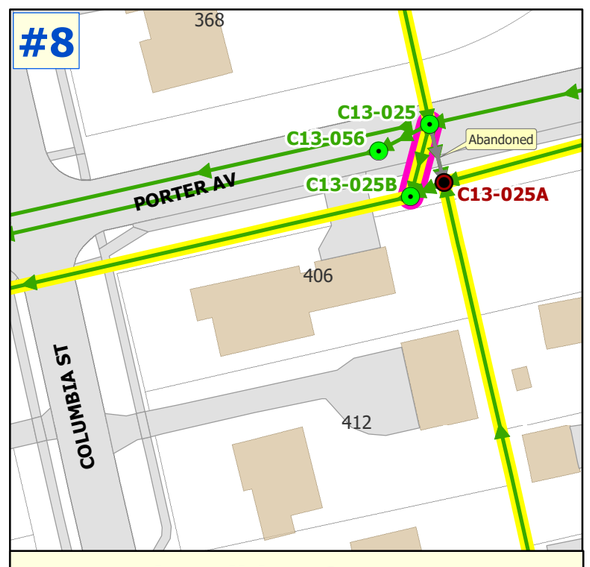
Spring - Webster Divertible
Gravity Main
Diameter = 15" Length = 30'
Clay



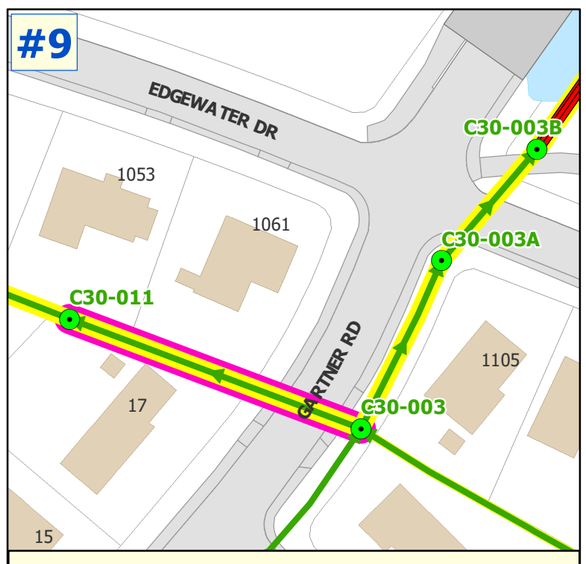
Franklin - Webster Divertible
Gravity Main
Diameter = 8" Length = 28'
Lined 2007 CIPP



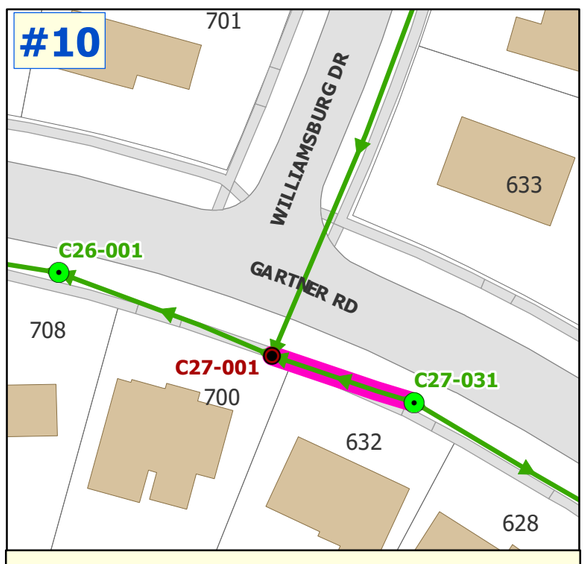
Highland Av Divertible
Gravity Main
Diameter = 8" Length = 39'
Lined 2005 CIPP



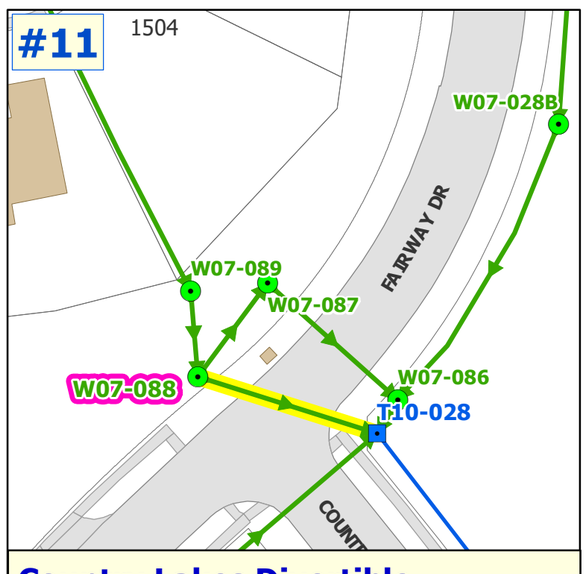
Porter Divertible #2
Gravity Main
Diameter = 12" Length = 37'
Lined 2005 CIPP



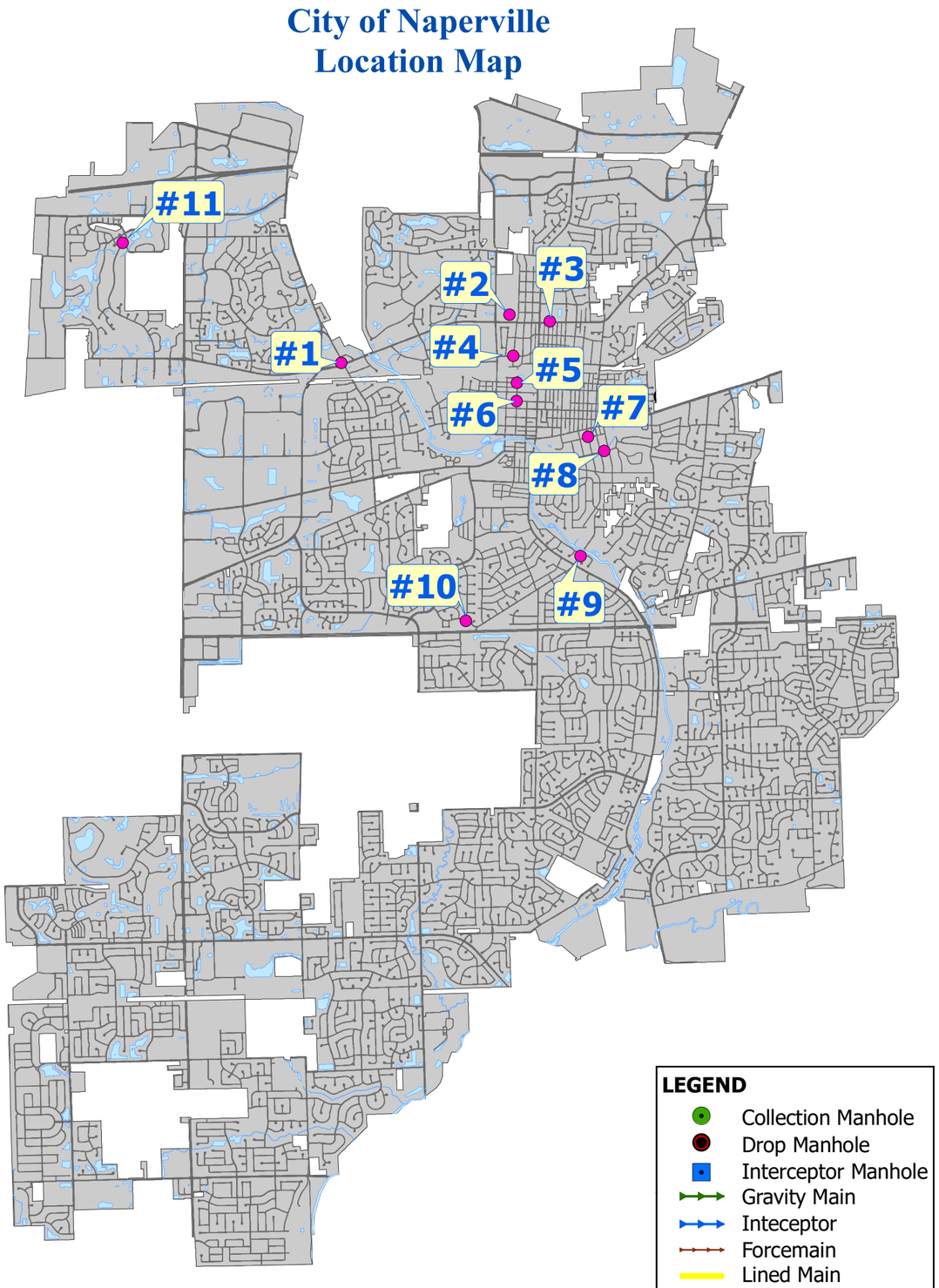
Edgewater Divertible
Gravity Main
Diameter = 12" Length = 195'
Lined 2004 CIPP



Gartner - Williamsburg Divertible
Gravity Main
Diameter = 8" Length = 70
Clay



Country Lakes Divertible
Divertible Manhole W07-088
Used to control excess flows due to pipe capacity limits



DEPARTMENT OF PUBLIC UTILITIES - WATER
Water Distribution & Collection
Created By: Kevin Steltzriede, Utility Specialist
10/16/2019

Appendix E

Sanitary Gravity Main Age

N

Sanitary Gravity Main Age		
Age	Linear Feet	Percentage
0 - 5 Yrs	26,939	0.99%
6 - 10 Yrs	56,508	2.08%
11 - 15 Yrs	49,823	1.83%
16 - 20 Yrs	68,701	2.52%
21-25 Yrs	181,230	6.66%
26 - 30 Yrs	276,313	10.15%
31 - 35 Yrs	320,500	11.77%
36 - 40 Yrs	404,861	14.87%
41 - 45 Yrs	244,396	8.97%
46 - 50 Yrs	423,839	15.56%
51 - 55 Yrs	225,324	8.27%
56 - 60 Yrs	150,848	5.54%
61 - 65 Yrs	104,828	3.85%
> 66 Yrs	189,073	6.94%
Total	2,723,182	100%

Legend

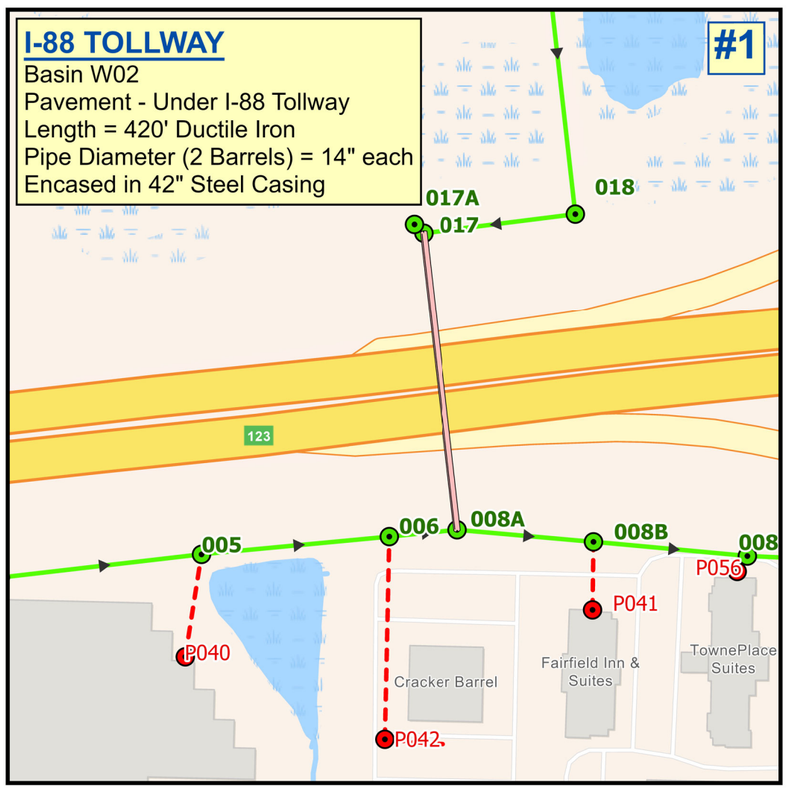
Gravity Main

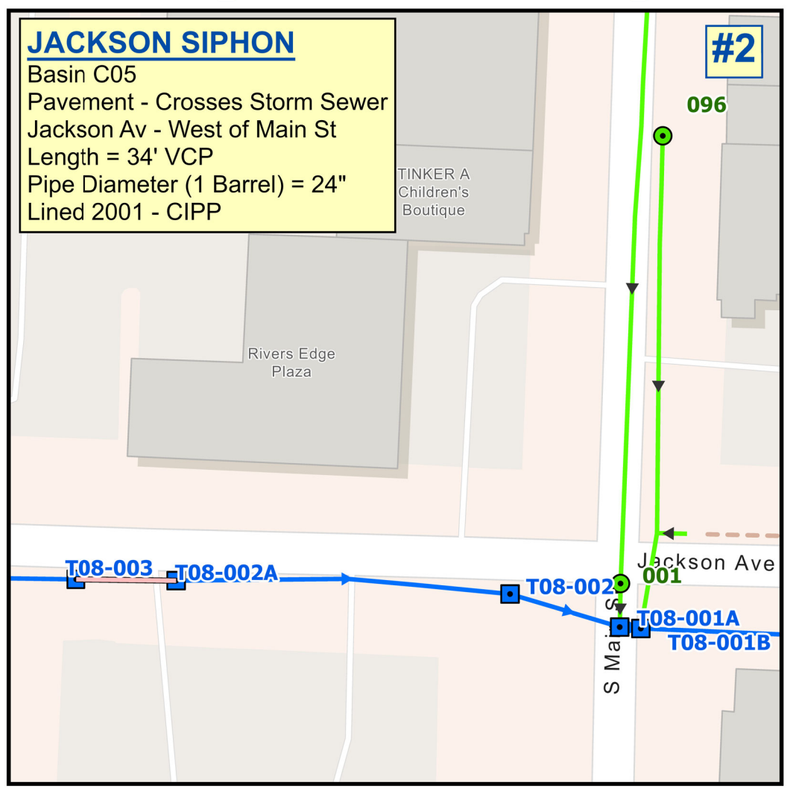
Age of Pipe

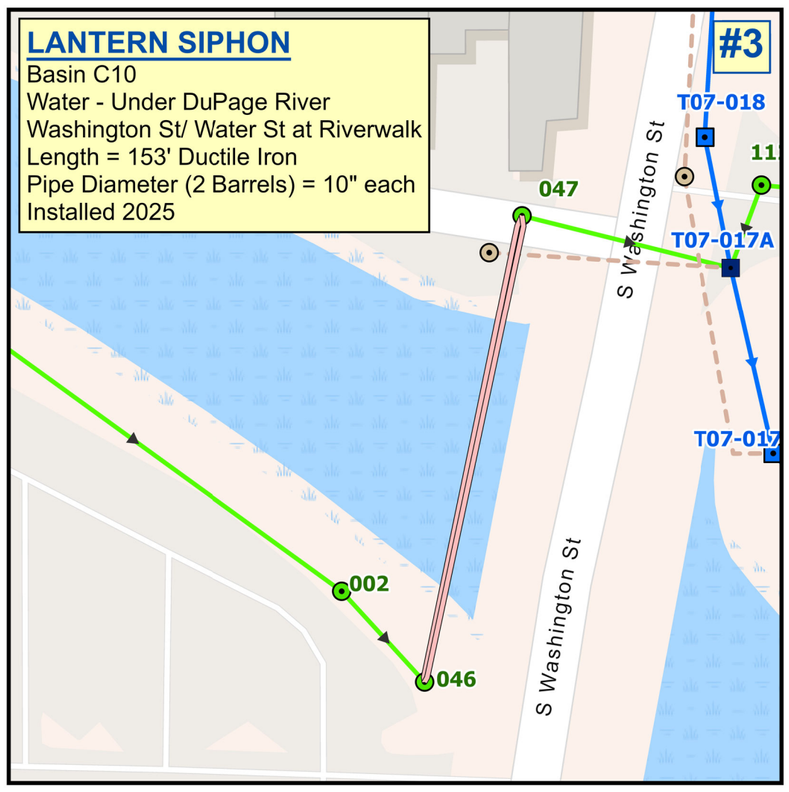
- 0 - 5 Yrs
- 6 - 10 Yrs
- 11 - 15 Yrs
- 16 - 20 Yrs
- 21 - 25 Yrs
- 26 - 30 Yrs
- 31 - 35 Yrs
- 36 - 40 Yrs
- 41 - 45 Yrs
- 46 - 50 Yrs
- 51 - 55 Yrs
- 56 - 60 Yrs
- 61 - 65 Yrs
- > 66 Yrs

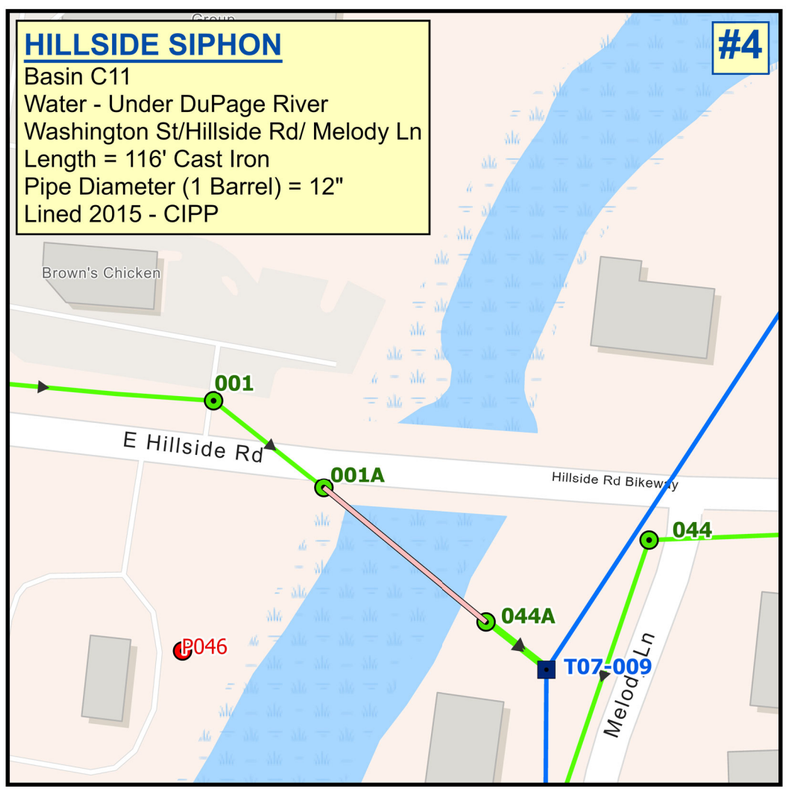
DEPARTMENT OF PUBLIC UTILITIES - WATER
Water Distribution & Collection
Created By: Emily Eichholzer, Project Manager
1/7/2026 11:14 AM

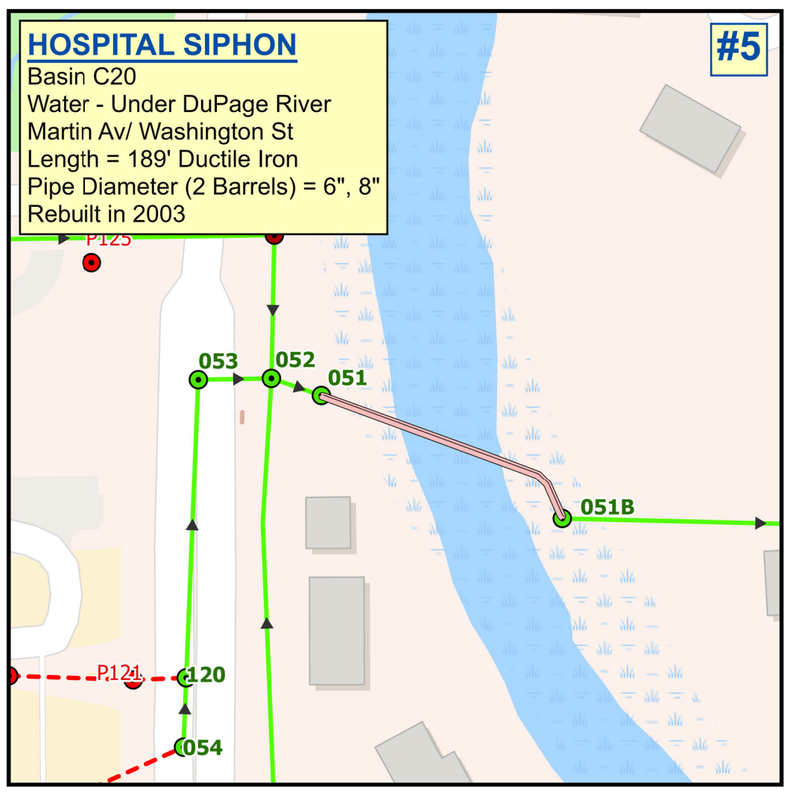
Sanitary Sewer Siphons

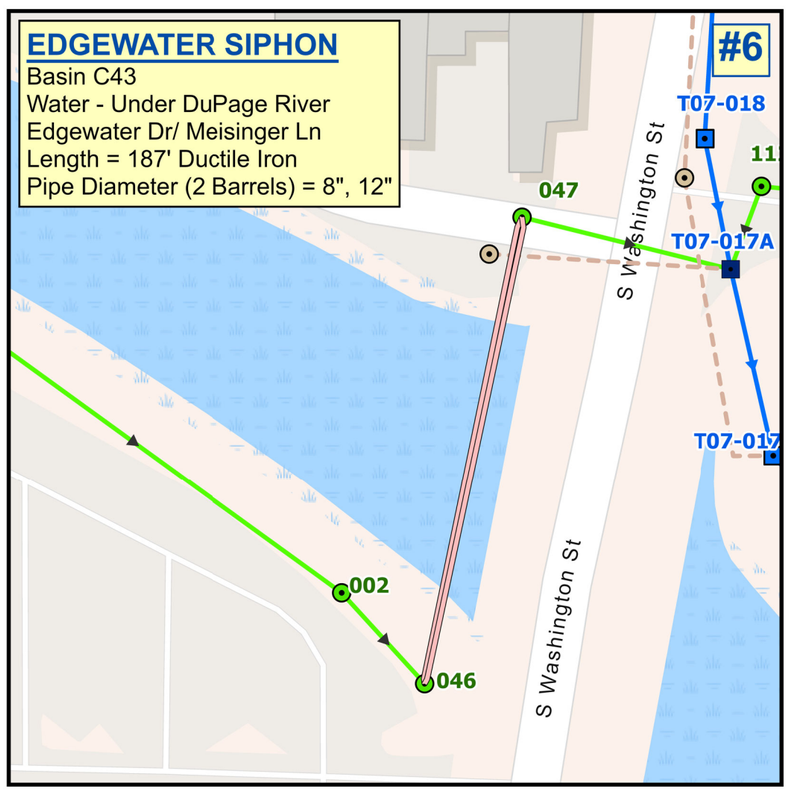


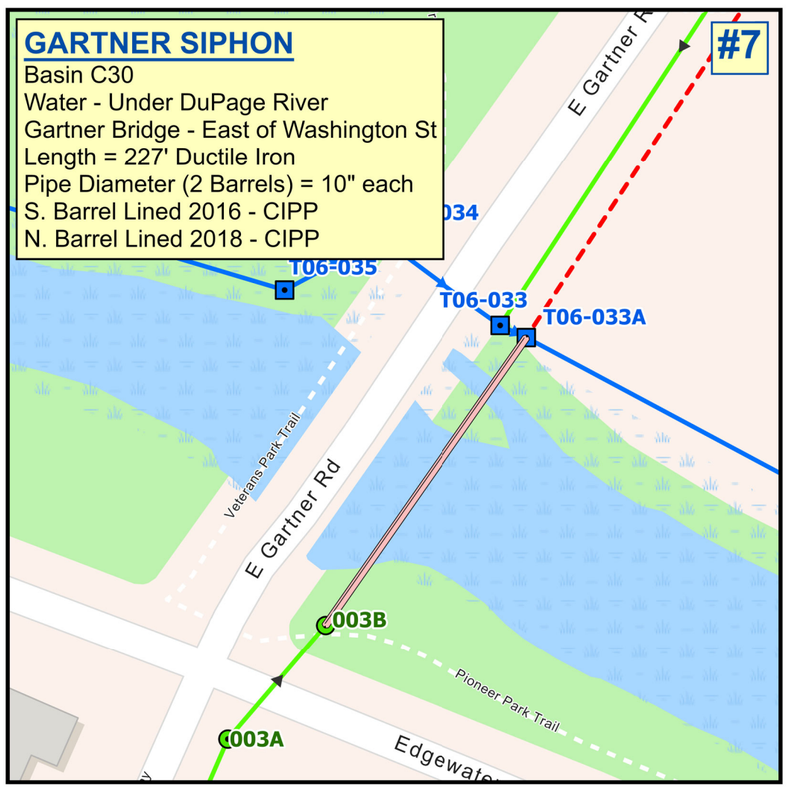


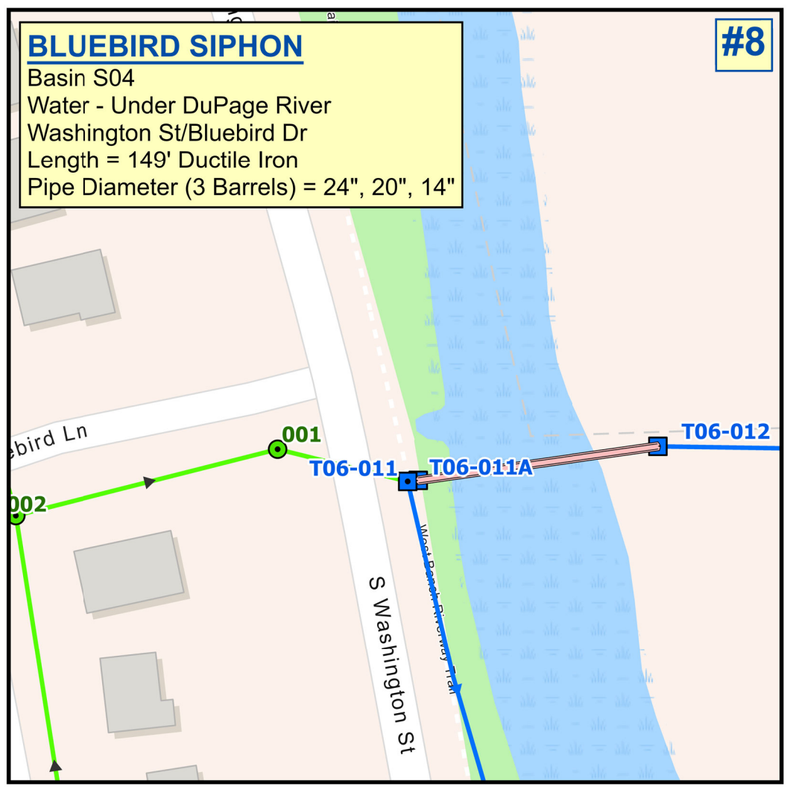


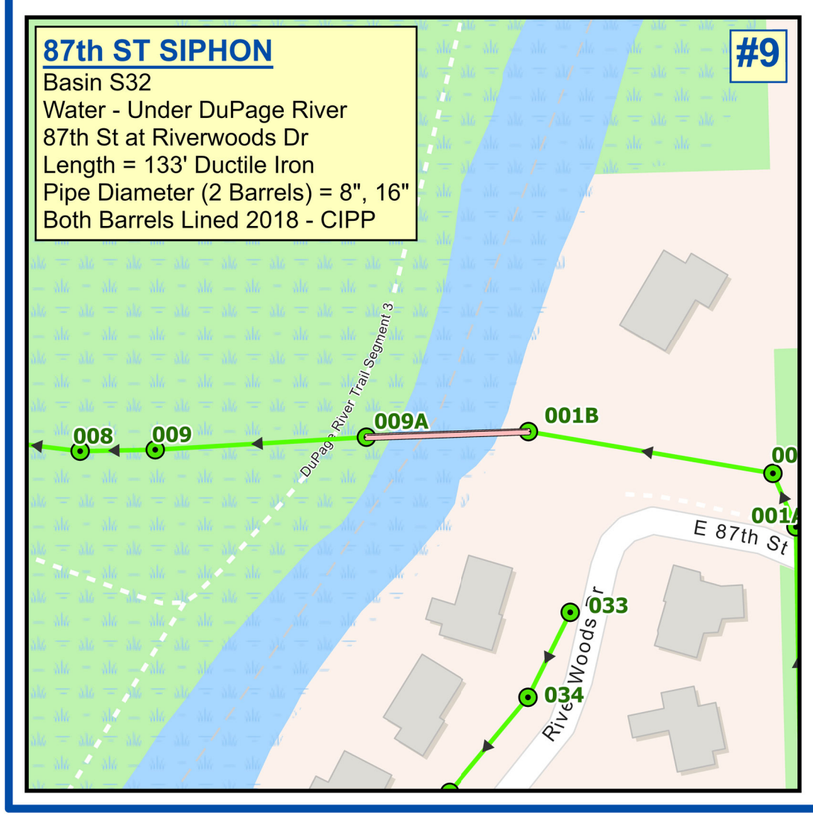




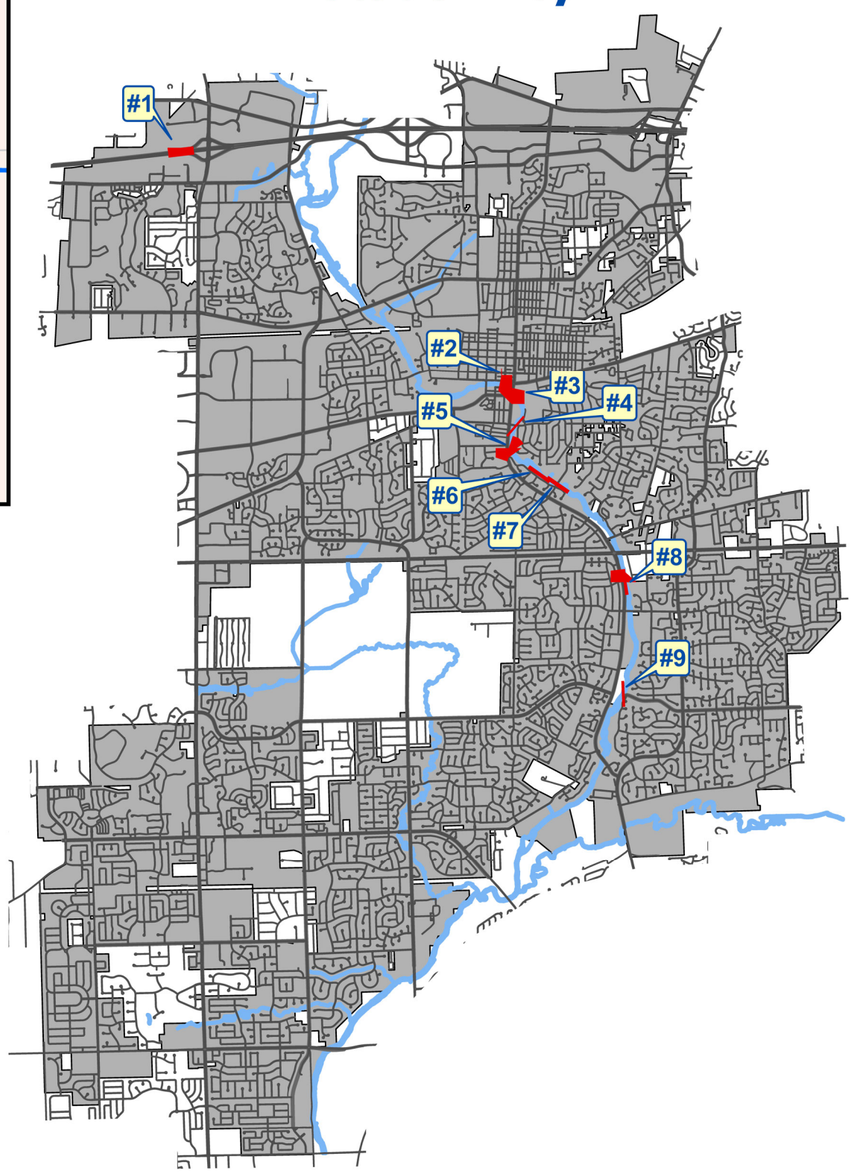








Sewer Siphon Location Key



DEPARTMENT OF PUBLIC UTILITIES - WATER
Water Distribution & Collection
Created By: Emily Eichholzer, Project Manager
3/18/2026 11:37 AM

City of Naperville

Updated Wastewater Utility Charges - Effective Annually on January 1st

Type of User Charge	2024	2025	2026
WASTEWATER CUSTOMERS WITH CITY WATER SERVICE			
Volumetric Charge (per HCF)	$3.15	$3.47	$3.82
FIXED MONTHLY CUSTOMER CHARGE (per Bill)			
Meter Size:			
5/8-inch x 3/4-inch	$11.04	$12.15	$13.37
1-inch	$18.40	$20.24	$22.27
1 1/2-Inch	$36.80	$40.48	$44.53
2-Inch	$58.88	$64.77	$71.25
3-Inch	$117.76	$129.54	$142.50
4-inch	$184.00	$202.40	$222.64
6- inch	$368.00	$404.80	$445.28
8-inch	$588.80	$647.68	$712.45
10-inch	$1,545.60	$1,700.16	$1,870.18
FIXED MONTHLY PHOSPHORUS SURCHARGE			
Meter Size:			
5/8-inch x 3/4-inch	$2.04	$2.25	$2.48
1-inch	$3.38	$3.72	$4.10
1 1/2-Inch	$6.75	$7.43	$8.18
2-Inch	$10.81	$11.90	$13.09
3-Inch	$21.61	$23.78	$26.16
4-inch	$33.75	$37.13	$40.85
6- inch	$67.50	$74.25	$81.68
8-inch	$108.00	$118.80	$130.68
10-inch	$283.48	$311.83	$343.02
12-inch	$357.71	$393.49	$432.84
WASTEWATER CUSTOMERS WITHOUT CITY WATER SERVICE *: In all cases where a residential customer is not served by the City water system, the following monthly customer, monthly phosphorus, and volumetric charges shall be charged:*			
Volume Charge (Flat for all Consumption)	$20.00	$22.00	$24.20
Monthly Customer Charge	$30.37	$33.41	$36.76
Monthly Phosphorus Surcharge	$3.38	$3.72	$4.10
Total Monthly Flat Rate	**$53.75**	**$59.13**	**$65.06**
NON-RESIDENTIAL *Customers shall be charged for wastewater volume on the basis of actual monthly water meter readings throughout the calendar year.*			
EXTRA STRENGTH SURCHARGES:			
Biochemical Oxygen Demand (per pound)	$0.5367	$0.5904	$0.6495
Total Suspended Solids (per pound)	$0.4842	$0.5327	$0.5860

Appendix H

Naperville Public Utilities - Water & Wastewater
Collection & Pumping Division
FY2026 Capital Budget
1/7/2026

	Project Number	FY2026
South Operations Center Facility Improvements	MB230	$630,000
South-Central Interceptor Bank Stabilization T06 - Phase 3	WW001	$50,000
Wastewater Utility Infrastructure Relocation - City Projects	WW005	$25,000
Sanitary Sewer System - Rehabilitation/Replacement Program - Manholes / Siphons	WW006	$690,000
Sanitary Sewer Oversizing Payments - New Developments	WW009	$10,000
Sanitary Sewer Capacity Improvements	WW010	$50,000
Site Security Improvements - Water & Wastewater Facilities	WW033	$160,000
Sanitary Sewer Lift Station Rehabilitation Program - Miscellaneous Improvements	WW034	$300,000
Springbrook Interceptor (T01) Rehabilitation - Phase 1 (Dragon Lake)	WW047	$3,180,000
Northwest Wastewater Pump Station Improvements/Upgrades	WW053	$1,155,000
Trillium Wastewater Pump Station Improvements/Upgrades	WW059	$105,000
Bonnema Woods Wastewater Pump Station Improvements/Upgrades	WW061	$950,000
East Highlands Sewer Main Replacement	WW068	$2,750,000
Springbrook Interceptor (T01) Rehabilitation - Phase 2 (Dragon Lake)	WW070	$240,000
Sanitary Sewer Service Lateral Lining & Vac-A-Tee Installation Longwood (W06) Phase 2	WW075	$2,000,000
Sanitary Lift Station Force Main Rehabilitation Rivermist Lift Station	WW079	$500,000
Small-Diameter Sanitary Sewer Main Lining Country Lakes Phase 2(W02,W04,W07)	WW084	$1,000,000
Water Facility Generator Repalcement SOC	WW085	$1,135,000
Sanitary Lift Station Force Main Rehabilitration Royce Road	WW092	$15,000
	Total	**$14,945,000**

Naperville Public Utilities - Water & Wastewater Collection & Pumping Division FY2026 O&M Budget 1/7/2026	
Description	**Amount**
COLLECTION MAIN MAINTENANCE	$33,000.00
I & I / HYDRAULIC MODELING	$5,000.00
LIFT STATION REPAIR	$5,000.00
SEWER MAIN INSPECTION	$5,000.00
LIFT STATION MAINTENANCE	$15,000.00
COLLECTION CUSTOMER SERVICE	$13,000.00
RAINFALL	$3,000.00
GENERAL OPERATIONS	$8,000.00
LOCATING SEWER LATERALS IN ROW FOR COMCAST OR GROUTING	$10,000.00
SONAR/LASER/CCTV INSPECTION OF THE SPRINGBROOK INTERCEPTOR	$150,000.00
SAFETY EQUIPMENT INSPECTION AND REPAIR	$2,500.00
EQUIPMENT REPAIRS	$25,000.00
TELEVISING INSPECTION SERVICES	$300,000.00
NOC/SOC LAGOON MAINTENENCE	$13,000.00
SEWER FORCE MAIN CONDITION ASSESTMENT	$150,000.00
LIFT STATION REPAIRS	$40,000.00
FLOW METER MAINTENANCE CONTRACT	$450,000.00
SANITARY SEWER CLEANING	$320,000.00
SEWER FORCE MAIN CLEANING	$100,000.00
SOUTH INTERCEPTOR T02 STRUCTUAL\I&I CONTROL GROUTING	$650,000.00
SCADA Maintenance Contract	$17,000.00
SHIPPING ITEMS TO VENDORS FOR REPAIR	$1,000.00
TV TRUCK RENTAL (ONE MONTH)	$15,000.00
EQUIPMENT PARTS FOR COLLECTION SYSTEM MAINTENANCE	$51,000.00
EQUIPMENT PARTS FOR COLLECTION SYSTEM REPAIR	$60,000.00
MATERIALS SUPPLIES COLLECTION SYSTEM MAINTENANCE	$55,500.00
MATERIALS SUPPLIES SAFETY	$14,000.00
MATERIALS SUPPLIES FOR COLLECTION SYSTEM REPAIR	$5,000.00
LIFT STATION LANDSCAPE SUPPLIES	$500.00
NEW FLOW MONITORS FOR RDII	$27,000.00
MATERIALS AND SUPPLIES FOR CUSTOMER SERVICE	$1,000.00
MATERIALS SUPPLIES FOR GENERAL OPERATIONS	$3,000.00
NEW LINE LOCATORS	$10,000.00
ELECTRICITY FOR EXISTING LIFT STATIONS	$309,048.00
NATURAL GAS FOR EXISTING LIFT STATION GENERATORS	$19,006.50
Total	**$2,885,554.50**

WO#_____

City of Naperville Sanitary Sewer Customer Survey/Registration Form

This form should be completed by the homeowner and plumber and submitted to DPU-Water

CUSTOMER NAME: _____

ADDRESS OF PROBLEM: _____

DATE AND TIME OF CALL: _____

DISTANCE TO THE MAIN FROM THE:_____ IS _____FEET plus distance inside house to cleanout

DISTANCE TO THE MAIN FROM THE:_____ IS _____FEET plus distance inside house to cleanout

CITY REPRESENTATIVE NAME(S): _____

Registration for rodding of sewer service line – should be filled out by the plumber

PLUMBING COMPANY: _____PHONE #:_____

OBSTRUCTION OCCURRED AT (FOOTAGE):_____FROM INSIDE OR OUTSIDE CLEANOUT (CIRCLE ONE)

LOCATION OF BLOCKAGE (CIRCLE): PRIVATE PROPERTY R.O.W

WAS DEBRIS RODDED/PUSHED ALL THE WAY INTO THE CITY MAIN (CIRCLE ONE)? YES NO

Customer Response Survey

Please indicate the circumstances under which you hired the above listed plumbing company:

☐ Partial Blockage or Intermittent Problems ☐ Total Blockage of Sewer Service

☐ Planned Maintenance Rodding ☐ Other _____

Did your plumber solve the problem? What did they do?

_____

_____

The mission of the Department of Public Utilities - Water is to provide the utmost performance and service reliability to all our Naperville customers. We value your opinion; we kindly ask that you take a moment to rate our service below or online at: www.naperville.il.us/watersurvey

Rating scale of 1-5 with 1 being lowest and 5 being highest level of satisfaction, please enter n/a if category doesn't apply.

Tangible Results	Quick Response	Performance Office	Performance Contractor	Assurance Reliability	Overall Satisfaction

Comments:

_____

_____

Please mail this entire form **and** a copy of the paid plumbing receipt(s) to:

DEPT OF PUBLIC UTILITIES – WATER, ATTN: OFFICE PERSONNEL, 1200 W OGDEN AV., NAPERVILLE, IL 60563

For assistance please call (630) 420-6137

Naperville

Dear Customer,

Every year, some Naperville residents are faced with the inconvenience and expense of sanitary sewer backups that are caused by rainwater/groundwater surcharging the sanitary sewer system. These surcharges are caused by heavy rainfall events. If you had sanitary sewage coming up through your basement floor drain you experienced a sanitary sewer backup. If you had storm water entering your basement through cracks, window wells, doors, or your sump pump couldn't handle the storm water you did not experience a sanitary sewer backup.

The City of Naperville's, Department of Public Utilities-Water is committed to reducing and eliminating the frequency and severity of these sanitary surcharges. We have an ongoing program using city crews, consultant engineers, and contractors to locate and repair the problems. This is a long term and ongoing project. This program includes dye testing, televising of sanitary sewers, building inspections, flow monitoring, dig repairs, lining and sealing of sewers.

The Department of Public Utilities has found that certain areas of the city are more susceptible to reoccurring problems. We are offering you participation in our backflow prevention program. This allows you to have a backflow prevention device of your choice installed in your home and the City will reimburse you the homeowner 75% of the cost. If you have any questions, concerns or need technical assistance you can contact us at (630) 420-6137.

This program does not replace our relentless efforts to prevent all backups due to heavy rainfall events. Installation of a backflow prevention device may give you immediate protection and peace of mind from recurring sanitary sewer backups.

For storm water concerns call (630) 420-6095. If you have a claim to file contact our Legal Department at (630) 305-5559.

Department of Public Utilities-Water
Water Distribution & Collection Division

Naperville

PAYMENT AGREEMENT FOR INSTALLATION OF
SANITARY SERVICE BACKFLOW PREVENTION DEVICE

The Department of Public Utilities-Water recognizes that certain areas of the city are more susceptible to reoccurring sanitary sewer backups due to heavy rainfall surcharges. We are committed to reducing the frequency and severity of these surcharges. We are offering you participation in our backflow prevention program. This allows you to have a backflow prevention device of your choice installed in your home and the City will reimburse you the homeowner 75% of the cost. We are doing this, although we have no direct responsibility to do so, to maximize trouble-free service to all our customers.

The conditions for this transaction are as listed below:

A) Homeowner must obtain (3) written quotes and send copies of the quotes to the Collection & Pumping Supervisor for preauthorization prior to any work beginning. These quotes must include restoration. The City will make only one payment. Once the City has given you authorization you may schedule the work. The City will normally select the lowest quote but reserves the right to reject all quotes should they exceed usual and customary charges for this type of installation.

B) Upon completion of the installation, the Homeowner must submit proof of payment for the installation to the Collection & Pumping Supervisor. Payment will then be made by the City for 75% of the agreed on quotation. This will be paid to the customer. No payment will be made to the plumber. This transaction is between the DPU Wastewater Utility and the customer, not the plumber.

C) The City assumes no responsibility for the selection, installation, maintenance or operation of the backflow prevention device. Any future costs related to maintenance or repair of the device will be paid by the Homeowner.

CUSTOMER NAME _____

ADDRESS _____

PHONE _____

QUOTE PRICE _____ PLUMBER _____

QUOTE PRICE _____ PLUMBER _____

QUOTE PRICE _____ PLUMBER _____

TYPE OF DEVICE _____

CITY'S 75% PAYMENT _____

CONDITIONS/PAYMENT AGREED TO BY:

_____ _____
Customer Signature Date

_____ _____
Collection & Pumping, Supervisor Date

Date Installation Completed _____ Plumber _____

Return to: **Dept. of Public Utilities – Water, Attn: Collection & Pumping Supervisor; 1200 W Ogden Ave, Naperville, IL 60563**

HOLD HARMLESS AGREEMENT FOR INSTALLATION OF SANITARY SERVICE BACKFLOW PREVENTION DEVICE

(Required for program participation)

In consideration for reimbursement by the CITY of costs incurred under the terms of the installation of a backflow prevention device, I the Homeowner, agree to release, waive, discharge and hold harmless the CITY, its officers, agents, servants, representatives and employees from any and all liability, claims, demands, actions, and causes of action whatsoever arising out of or related to any loss, damage, or injury, including death, that may be sustained by me or any of the property owned by me as a result of my participation in the backflow prevention program and the installation of a backflow prevention device. I further understand that my acceptance into the program by the CITY in no way implies liability by the CITY for any injury or property damage sustained by me as a result of any prior or future sanitary sewer backup.

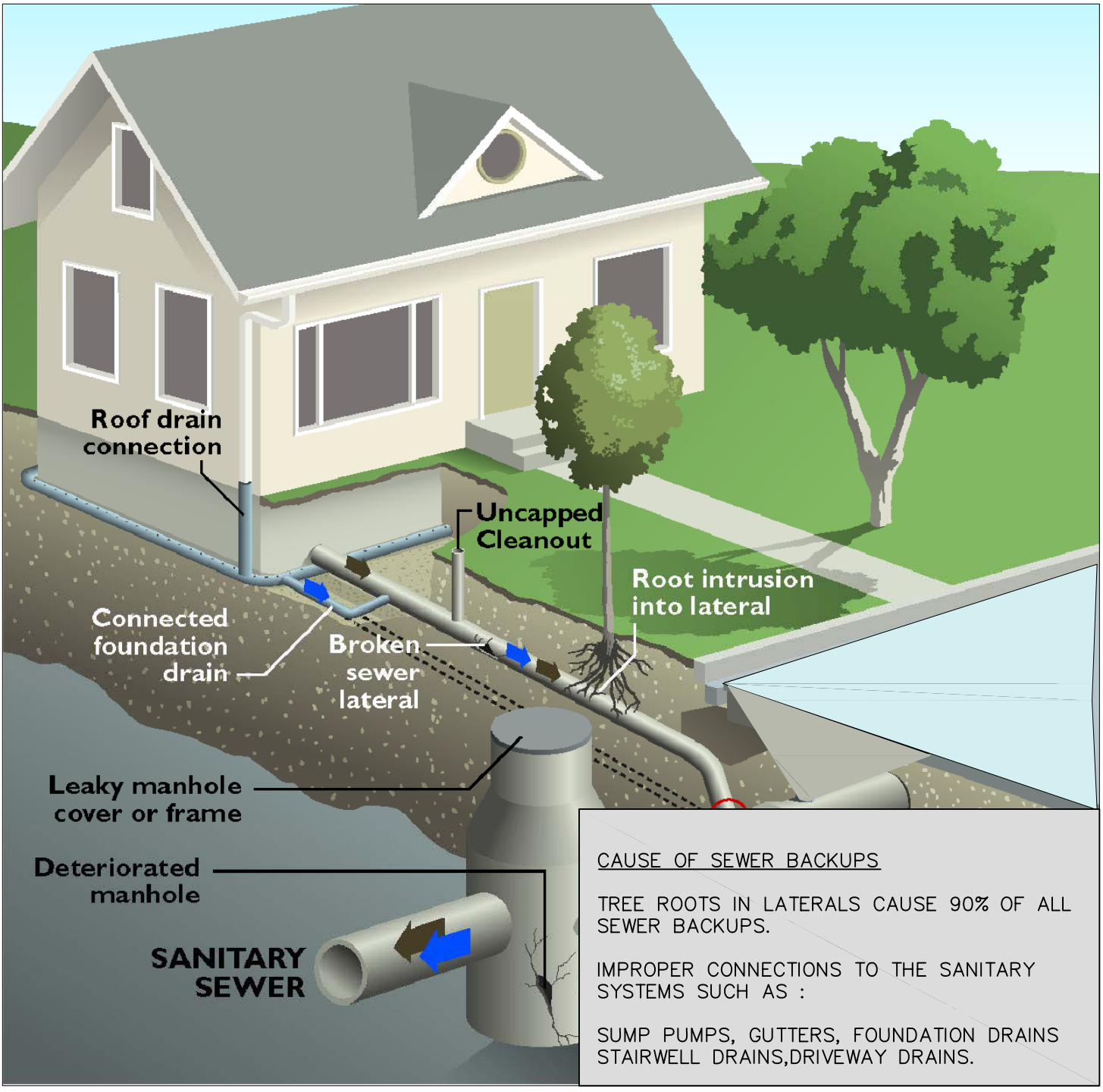
The terms set forth herein shall be in full force and effect during the installation of the device and shall survive thereafter and shall be binding upon my heirs, executors and representatives.

_____ _____

Homeowner Signature Date

Naperville

SANITARY SEWER BACKUPS: CAUSES & PREVENTION



CAUSE OF SEWER BACKUPS

TREE ROOTS IN LATERALS CAUSE 90% OF ALL SEWER BACKUPS.

IMPROPER CONNECTIONS TO THE SANITARY SYSTEMS SUCH AS :

SUMP PUMPS, GUTTERS, FOUNDATION DRAINS STAIRWELL DRAINS,DRIVEWAY DRAINS.



Stand Pipe

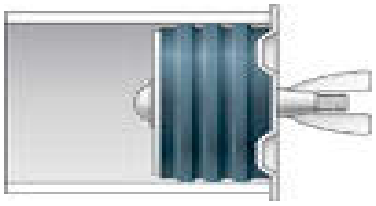
A standpipe is an inexpensive alternative to a floor drain plug. When the sewer backs up, the water moves up the pipe. If properly installed, water pressure cannot build up to blow a standpipe out of the floor drain. The system works unless the backup is so deep that it goes over the top of the pipe.



.

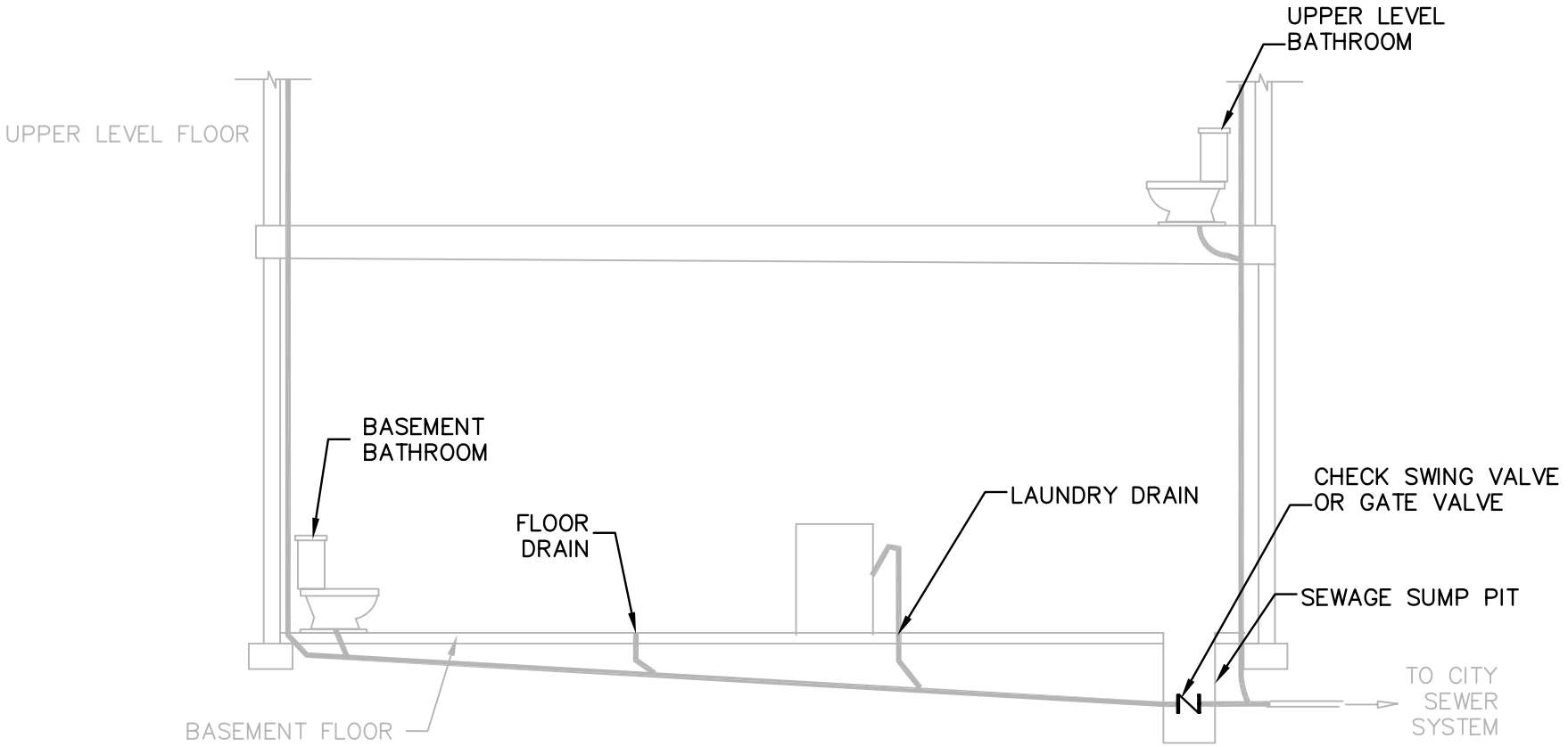
Floor Drain Float Plug

This Plug is an automatic backup valve installed to prohibit sewage backing ups. When the water level is down at (the left), the float hangs free and allows water to drain. As the water rises in the floor drain the float is pushed up into the plug effectively blocking the drain from flooding.



Mechanical Plug

A mechanical plug device for sealing pipeline drains. The plugs are installed mechanically and should only be installed in periods of heavy rains.



BACK FLOW PREVENTION OPTION 1
SWING CHECK VALVE/GATE VALVE -N.T.S.



SECTION VIEW OF A SWING CHECK VALVE

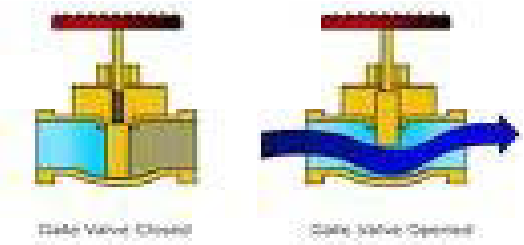
CHECK VALVES\GATE VALVES:

ADVANTAGES

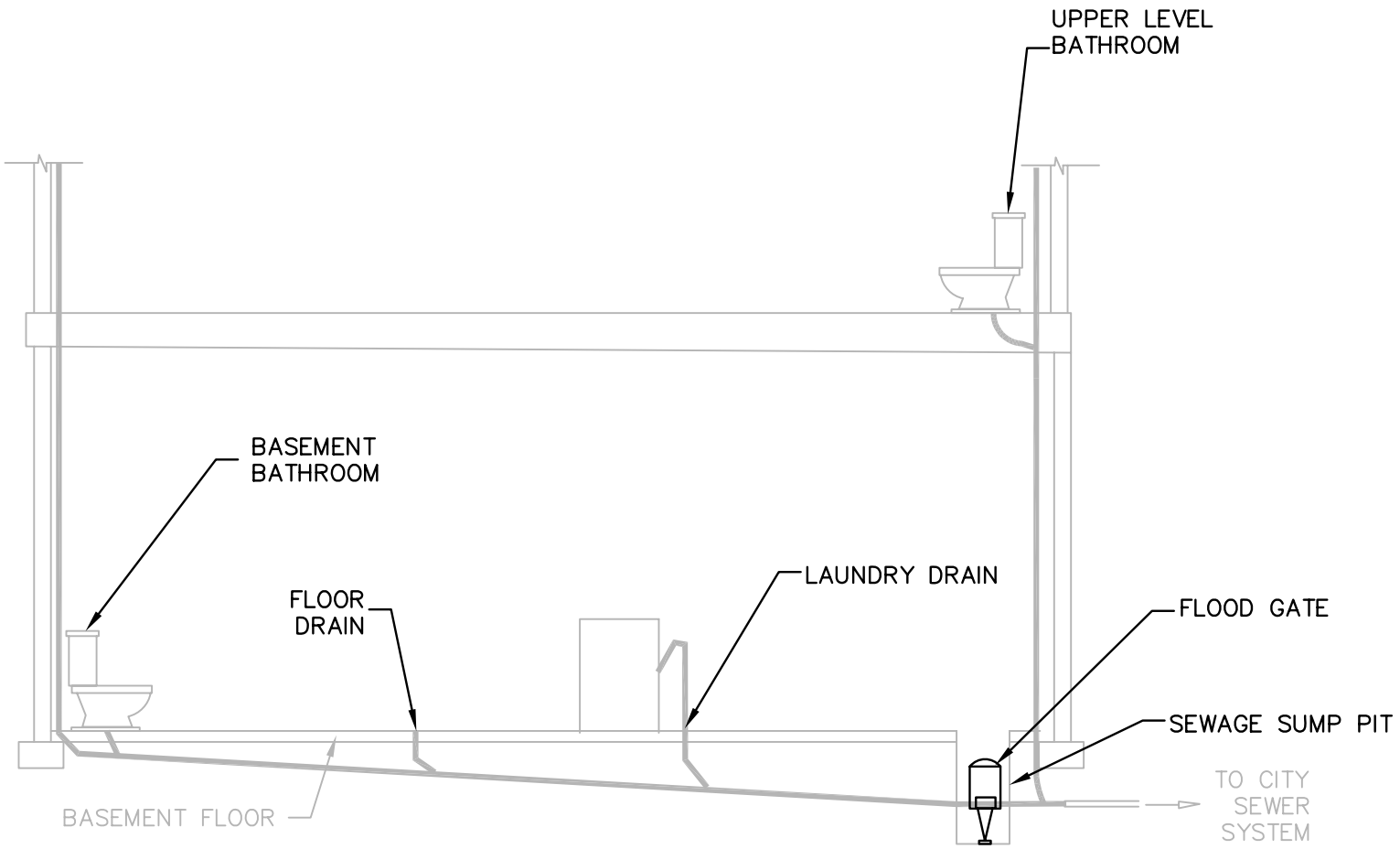
- NOTHING TO REMOVE TO RESTORE USE OF FLOOR DRAIN.
- NO PIPE PROJECTING FROM THE FLOOR DRAIN. (STAND PIPE)

DISADVANTAGES

- NEEDS ANNUAL MAINTENANCE TO OPERATE CORRECTLY AT AN ANNUAL COST.
- HOMEOWNER MUST BE HOME TO OPERATE GATE VALVE.
- CANNOT USE ANY PLUMBING IN THE HOME WHEN VALVE IS CLOSED.



SECTION VIEW OF A GATE VALVE



BACK FLOW PREVENTION OPTION 1
FLOOD GATE-N.T.S.

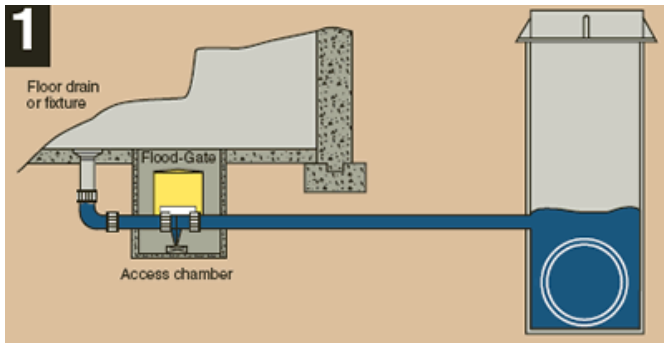
FLOOD GATE:

ADVANTAGES

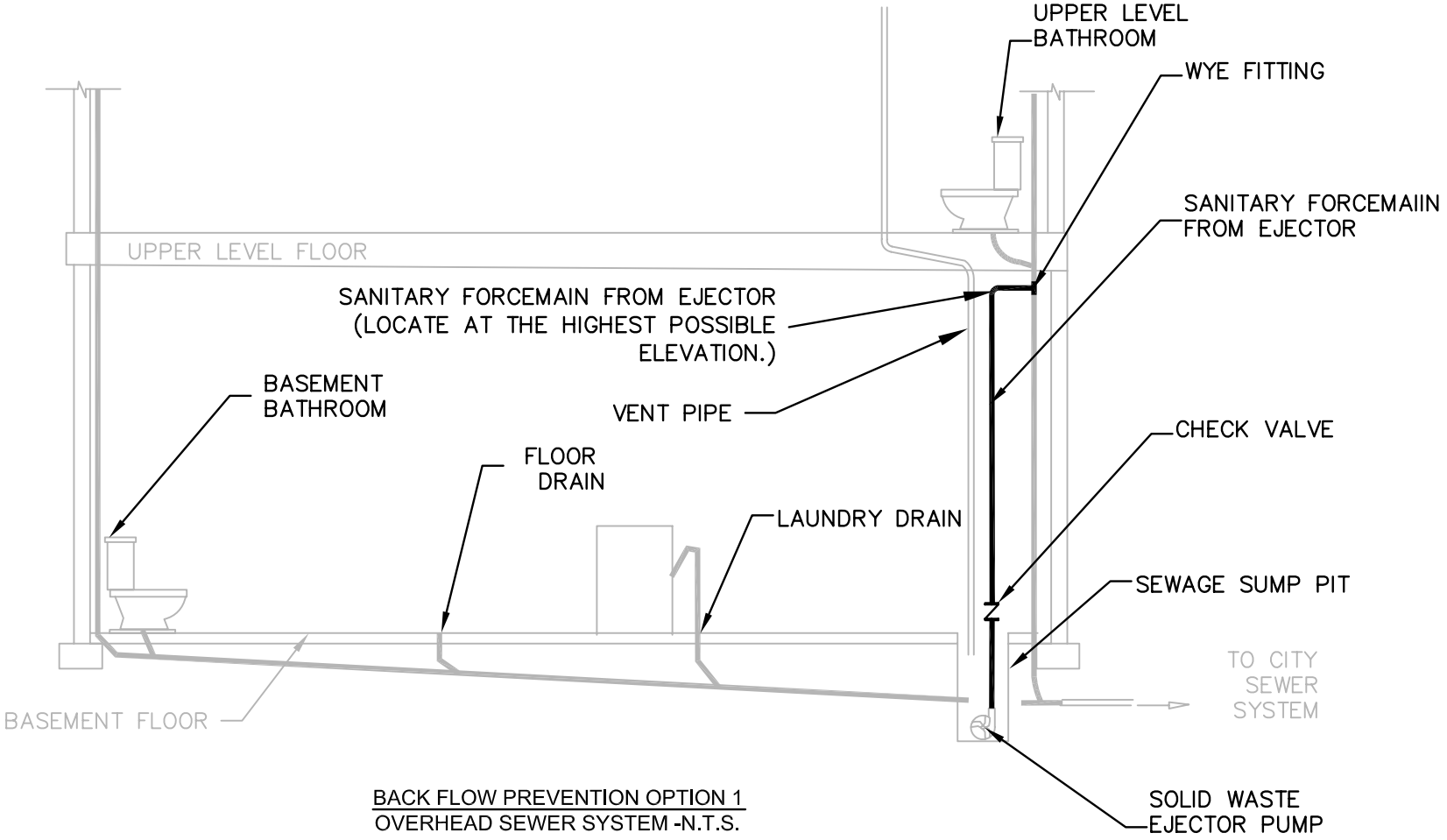
- OPERATES AUTOMATICALLY SO NO ONE HAS TO BE HOME TO OPERATE.
- OPTIONS ARE AVAILABLE TO KNOW WHEN VALVE IS OPEN OR CLOSED.

DISADVANTAGES

- NEEDS ANNUAL MAINTENANCE.
- CANNOT USE ANY PLUMBING IN THE HOME WHEN THE VALVE IS CLOSED.



FLOOD GATE



BACK FLOW PREVENTION OPTION 1
OVERHEAD SEWER SYSTEM -N.T.S.

OVERHEAD SEWER:

ADVANTAGES

- NO ONE HAS TO BE HOME TO OPERATE.
- THE SYSTEM DOES NOT RELY ON A VALVE TO CLOSE TO PREVENT A SEWER BACK UP.
- LOSS OF POWER DOES NOT AFFECT USE OF UPPER LEVEL PLUMBING.

DISADVANTAGES

- SEWAGE EJECTOR PUMP WILL BE INOPERABLE DURING A POWER FAILURE.
- USE OF LOWER LEVEL PLUMBING DURING HEAVY RAIN SHOULD BE MINIMAL.



EJECTOR PUMP AND SUMP PIT

Outlook

Emergency response plan certification receipt

From AWIAServiceDesk@epa.gov <AWIAServiceDesk@epa.gov>
Date Wed 9/10/2025 8:27 AM
To Wrigley, Amy <WrigleyA@naperville.il.us>

[You don't often get email from awiaservicedesk@epa.gov. Learn why this is important at https://aka.ms/LearnAboutSenderIdentification]

CAUTION: This e-mail originated outside of the City of Naperville (@naperville.il.us).

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EPA acknowledges on 9/10/2025 receipt of NAPERVILLE emergency response plan certification for PWSID IL0434670 with population 155156.

If you have any questions, please email us at dwresilience@epa.gov
Thank you.

CITY OF NAPERVILLE SANITARY SEWER OVERFLOW RESPONSE PLAN

Procedure: Reporting and Estimating Noncompliance Sewer Overflows
2/04/26

Noncompliance is defined as discharge of untreated sewage from the sanitary sewer collection system to a surface water and/or ground. This includes basement backups due to heavy rainfalls, mainline backups, or lift station failures.

1. When an event occurs, contact Deputy Director. If the Deputy Director is not available, contact the Collection & Pumping Supervisor. The USEPA and IEPA will be contacted within 24 hours from the time we become aware of the event using the online platform Environmental Protection Agency (EPA) Central Data Exchange (CDX) - the Agency's electronic reporting site. https://cdx.epa.gov

2. A written report must be submitted within five (5) days from the time we become aware of the event. The report titled "Sanitary Sewer Overflow or Bypass Notification Summary Report" is available at epa.state.il.us/water/forms. Submit the form electronically when completed. **See link below:** **https://epa.illinois.gov/topics/forms/water-forms/wastewater-compliance.html**

3. If the NOC and/or SOC lagoons overflow, take samples and estimate the volume using the following procedure:

   a) Immediately take two (2)– 1-liter samples to Springbrook laboratory. Sample testing must be started within 6 hours, and must be labeled with location, time and date. Samples must be kept refrigerated. Daily grab samples must be taken for the duration of the overflow. During non-working hours, contact the lab as follows:



   b) Take samples of the DuPage River just upstream of NOC and SOC lagoon discharge points.
      SOC - At the Bailey Road Bridge just east of Washington Street.
      NOC - At the Ogden Avenue Bridge just west of NOC.

   c) Keep a log of the "hours" of overflow and estimate the volume (10" flight at SOC= 288,000 gph; SOC lagoon force main valve=10,000 gpm; 6" pump= 49,500 gph; 4" pump = 24,000 gph; 8" Baker pump = 4,000 gpm). If the divertible valve at NOC is operated, SCADA will report gpm.

4. We must do everything we can to reduce and eliminate overflows. We are not authorized by Permit to discharge.
5. Wastewater backups due to maintenance issues on private sanitary service laterals are the responsibility of the property owner and are not part of the Overflow Response Plan. These issues are covered under ordinance 92-234, 12-15-1992.

**Basement backups can have multiple causes, such as maintenance issue on private service laterals, construction issues, acts of god and other causes.*

6. Overflows on private property caused by sanitary sewer main line surcharging are to be reported to the IEPA. The 24-hour notification process should be used with as much information as possible including the private property address. If the discharge enters the storm sewer system, DPW Storm Sewer personnel (630/420-6095) must be notified.

7. Send Regulatory Compliance Manager and Reclamation Deputy Director a copy of any IEPA SSO reports.

8. Drain plugs will be given to any property owner that is experiencing a basement backup during heavy rain/flooding events. The property owner will have to install any plugs. Water Utilities team members will not enter any flooded areas to install drain plugs.

9. Any claims for damage, clean-up or restoration due to basement backups during heavy rain, flooding, public main line issues or public pump station issues shall be given to the City of Naperville's Claims Administrator.

   **Submission of a claim does not mean the city is accepting liability for any damages or construed as a guarantee of payment.*

10. Third Party Notification requirements:

    a) Third party notifications may be warranted by overflows that may endanger public health due to a likelihood of human exposure.
    b) Notification must first be reviewed and approved by the Director of Public Utilities-Water.
    c) Notification must be coordinated with the City's Communication Manager.
    d) Notification shall be made to the public, health agencies, and other affected entities.
    e) Notification should include the following:
        - ✓ Reason for the discharge
        - ✓ The beginning and ending time of the discharge
        - ✓ Water or land area, or both, receiving the discharge
        - ✓ Volume and quality of the discharge

Appendix N

Permanent Closed Pipe Flow Monitors

N

CANTERA BILLING SITE
Warrenville Flows Only
(Billing Site)

NOC

NWPS

COMBO
40% NOC & 60% SOC

BARCLAY

HUFFMAN

COUNTRY LAKES

W JEFFERSON

CARROLWOOD

HOBSON OAKS

AERO ESTATES

SOC

RIVERMIST

ROYCE

SWPS

DEPARTMENT OF PUBLIC UTILITIES - WATER
Water Distribution & Collections
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2/20/2026

Closed Channel Permenant Flow Meter Data

Meter	LnFt Public Pipe <21"	LnFt Private Pipe <21"	LnFt Public Pipe ≥21"	LnFt Private Pipe ≥21"	Total LnFt Pipe	Basins	Acres
Aero Estates	1,072	0	0	0	1,072	C59	8.6
Barclay	2,565	117	0	0	2,682	C07	22
Cantera Billing Site	-	-	-	-	-		-
Carrolwood	2,960	0	0	0	2,960	C56	15
Country Lakes	17,566	11,305	0	0	28,871	W07, W08, W10	324.2
Hobson Oaks	1,343	0	0	0	1,343	C49	9.9
Huffman	2,247	0	0	0	2,247	C07	13.8
NOC	293,617	73,873	34,030	0	401,519	C01, C04, C08, C09, C42, C54, C55, C56, C58, N02, N03, N05, N06, N07, N08. N09, N11, N12, N13, N14, N17, N18, T03, T05, T09	4043.8
NOC/SOC COMBONATION	66,138	2,867	0	0	69,005	N10, N19, N20, N26, N27	531.7
NWPS	197,198	58,651	25,999	654	282,501	N01, N04, N15, N16, N28, W02, W03, W04, W05, W06, W07, W08, W09	2879.8
Rivermist	3,215	0	0	0	3,215	S31	43.6
Royce Rd	2,986	0	0	0	2,986	S34	25.9
SOC	974,181	38,626	29,133	0	1,041,940	C02, C03, C05, C06, C07, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C43, C44, C49, C50, C53, N07, N14, N20, N21, N22, N23, N24, N25, N27, S01, S03, S04, S05, S06, S08, S09, S10, S11, S12, S13, S15, S16, S18, S20, S21, S26, S27, S28, S30, S32, S33, S34, S35, S36, S37, S38, S64, T06, T07, T08, T11	8262.4
SWPS	246,126	8,379	736	0	255,242	S45, S46, S48, S50, S53, S63, W16, W19, W20, W21, W24, T14	2563.5
W Jefferson	2,002	0	0	0	2,002	C02	11.4
Total LF	*1,813,216*	*193,818*	*89,898*	*654*	*2,097,585*	*Total Acreage*	*18755.6*

Permanent Open Channel Flow Monitors

N

Warrenville Flows Only (Billing Site)

FERRY
PEBBWOOD
MCDOWELL
T04-009
N16-090
NWPS
NPSINT
T03-029
T03-028
MAYWATTS
C24-039
C45-025B
SBCOD
T01-020A
SUNDERLAND
S17-007
SOC24
COACHDRN
COACHDR2
COACHDR3
OXFORDLANE
BAILWASH
HOBSMILL
HOBSON
NCC
RVIEW
OGDENMAN
N14-001A
BURNTREE
PRESCOTT
BMILL
SHERI
SBROOK
NAPPLAIN
T14-003
T13-001
UNMETERED A
UNMETERED B

Open Channel Permenant Flow Meter Data								
Meter	LnFt Public Pipe <21"	LnFt Private Pipe <21"	LnFt Public Pipe ≥21"	LnFt Private Pipe ≥21"	Total LnFt Pipe	Basins	Acres
BAILWASH	65,170	2,741	4,871	0	72,782	C36, C40, C49, S01, S02, S03, S04, S27, S38, T06	613.6
BMILL	83,386	14,998	7,765	0	106,149	N03, N05, N06, N07, N11, N12, T05	1006
BURNTREE	9,887	0	2,639	0	12,526	N14	148.2
C24-039	16,541	0	0	0	16,541	C24, C25, C47	126.3
C45-025B	20,248	675	0	0	20,923	C45, C57	180.9
COACHDR2	34,366	219	0	0	34,585	S09, S30, S37	239.8
COACHDR3	50,788	1,271	0	0	52,060	S09, S33, S37, S64	469.6
COACHDRN	61,876	1,242	0	0	63,118	S06, S27, S30	439.5
COACHDRS	55,877	1,014	0	0	56,891	S08, S09, S15, S16	419.5
FERRY	0	5,211	0	654	5,865	City of Warrenville	-
HOBSMILL	134,968	9,734	9,583	0	154,284	C11, C20, C21, C23, C27, C28, C29, C30, C31, C35, C36, C37, C38, C39, C41, C43, T06, T07	1260
HOBSON	118,716	2,200	0	0	120,915	C19, C22, C23, C32, C33, C34, C44, C50, C53	921.5
MAYWATTS	14,244	4,151	6,924	0	25,319	C01, C24, C46, N16, N17, T01, T03, T04	241.1
MCDOWELL	38,567	10,451	5,692	0	54,710	N04, N28, W04, W06, W08, T10	416.3
N14-001A	66,022	2,867	0	0	68,888	N10, N19, N20, N26, N27	496.5
N14-003	117	0	0	0	117	N14	0.1
N16-090	26,204	3,966	0	0	30,170	N15, N16, N28	219.7
NAPPLAIN	351,288	26,962	13,153	0	391,403	S40, S43, S44, S47, S52, S54, S55, S56, S57, S62, W11, W12, W13, W14, W15, W17, W18, W22, W25, W26, T12	3622.1
NCC	121,758	5,508	0	0	127,266	C03, C07, C12, C13, C14, C15, C16, C17, C18, N21, N22	975.5
NPSINT	68,173	4,368	8,635	0	81,177	C01, C04, C08, C09, C54	598.6
NWPS	33,961	4,059	461	0	38,482	N15, N16, T10	319.9
OGDENMAN	1,243	403	0	0	1,646	N14, N23	13
OXFORD LN	42,056	2,650	0	0	44,705	C44, C49, S04, S05	340.2
PEBBWOOD	80,445	24,969	10,357	0	115,771	W02, W03, W04, W05, W06, W07, W08, W09, W10, T10	1437.2
PRESCOTT	69,588	29,292	11,764	0	110,643	N02, N08, N09, N13, N17, N18, T05, T09	1163.1
RVIEW	99,253	6,314	5,153	0	110,720	C02, C05, C06, C10, N23, N24, N25, T07, T08	857.1
S17-007	85,526	376	0	0	85,902	S17, S20, S21, S32, S34, S35, S36, S65	708.1
SBCOD	63,612	1,931	3,035	0	68,578	C24, C26, C27, C45, C51, C52, T01	528.7
SBROOK	109,668	261	9,420	0	119,349	S22, S24, S29, S39, S40, S41, S42, S49, T01	866.9
SHERI	87,529	1,454	10,206	0	99,189	S14, S17, S18, S23, S25, S29, S31, S32, T02	757.8
SOC24	43,026	1,309	4,030	0	48,365	S10, S11, S26, T11	380.5
SUNDERLAND	71,087	4,054	5,655	0	80,795	S12, S13, S15, S17, S18, S27, S28, T02, T06, T11	537.4
T01-020A	64,755	5,799	9,839	0	80,393	C51, C57, C59, S22, S38, T01	791
T03-028	12,274	3,839	0	72	16,185	C08, C42, C58	153.2
T03-029	48,373	18,124	2,550	0	69,048	C42, C55, C56, C58, T03	868.4
T04-009	35,585	21,300	9,489	0	66,374	N01, N16, N28, T04	795.4
T13-001	101,419	2,832	1,600	0	105,851	S43, S45, S46, S47, S49, S51, S53, S63, T13, T14	1034
T14-003	175,302	6,246	0	654	182,203	S48, S50, S51, W16, W19, W20, W21, W24, T14	1800.4
UNMETERED A	8,586	118	7,196	0	15,900	S25, S29, S49	161.7
UNMETERED B	2,901	0	0	0	2,901	S25	26.7
Total LF	*2,574,385*	*232,908*	*150,017*	*1,380*	*2,958,689*	*Total Acreage*	*25935.5*

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Water Distribution & Collections
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2/12/2026

Appendix P

ADS Rain Gauge Coverage

Williams

North Pump Station (NOC)

Country Commons

South Pump Station (SOC)

Summerfield

Southwest Pump Station

Legend

- Municipal Boundary
- 2 Mile Rainfall Zone

Rain Gauges			
Pump Stations	Address	Type	Size
COUNTRY COMMONS	136 N HUFFMAN ST	TIPPING BUCKET	N/A
NORTH PUMP STATION (NOC)	1200 W OGDEN AV	TIPPING BUCKET	6"
SOUTH PUMP STATION (SOC)	1800 S WASHINGOTN ST	TIPPING BUCKET	6"
SOUTHWEST PUMP STATION	1870 E 111TH	TIPPING BUCKET	6"
SUMMERFIELD	1939 SKYLANE DR	TIPPING BUCKET	6"
WILLIAMS	2S603 WILLIAMS RD, WARRENVILLE, IL	TIPPING BUCKET	6"

N

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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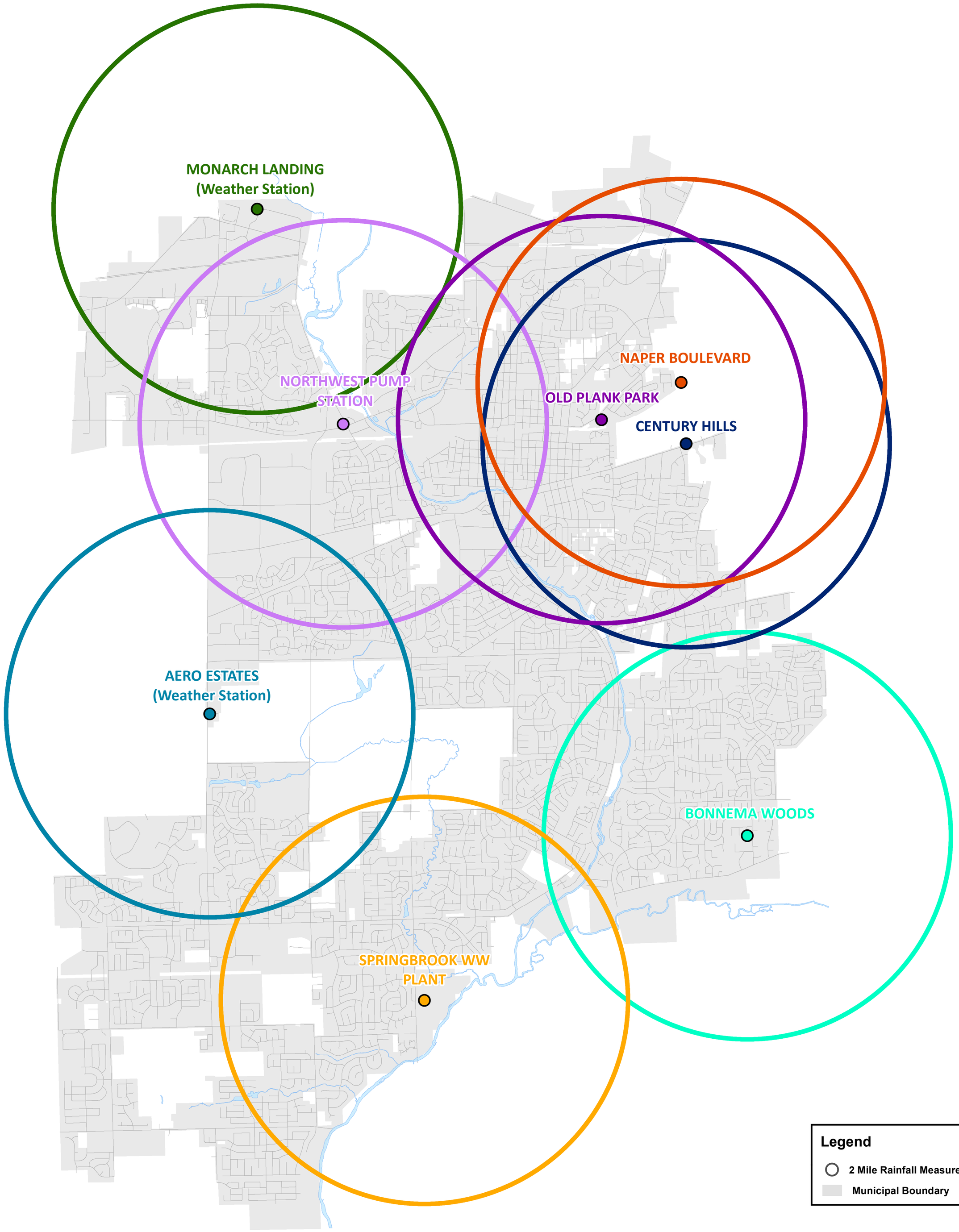
City Rain Gauge Coverage



Rain Gauges				
	Pump Statoins	ADDRESS	TYPE	SIZE
○	BONNEMA WOODS LS	2315 BILL CT	TIPPING BUCKET	6"
○	AERO ESTATES LS	2920 79th ST	RAIN SENSOR	6"
○	CENTURY HILLS LS	25W344 CHICAGO AV	TIPPING BUCKET	6"
○	MONARCH LANDING	2403 CORPORATE DR	RAIN SENSOR	8"
○	NAPER BOULEVARD PUMP STATION	NAPER BOULEVARD @ BNSF RR	TIPPING BUCKET	N/A
○	NORTHWEST PUMP STATIPON	511 N RIVER RD	TIPPING BUCKET	8"
○	OLD PLANK PARK PUMP STATION	1000 PLANK RD	TIPPING BUCKET	N/A
○	SPRINGBROOK WW PLANT	3712 PLAINFIELD/NAPERVILLE RD	TIPPING BUCKET	6"

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Appendix Q

SSO ALARMING SITES

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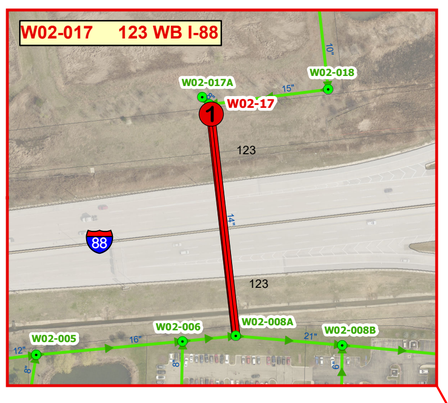



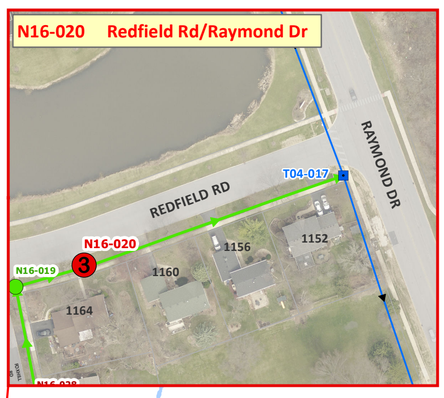

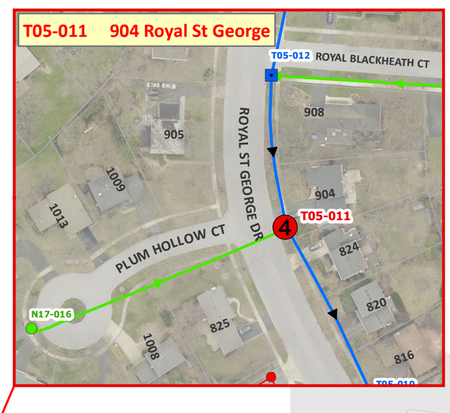



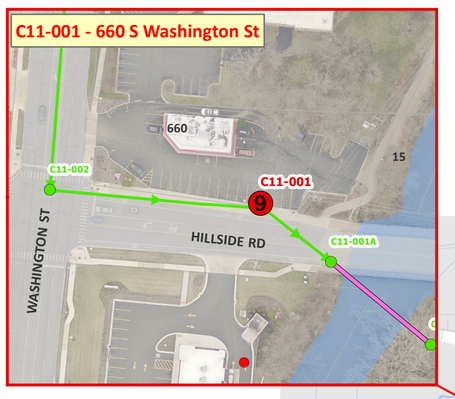

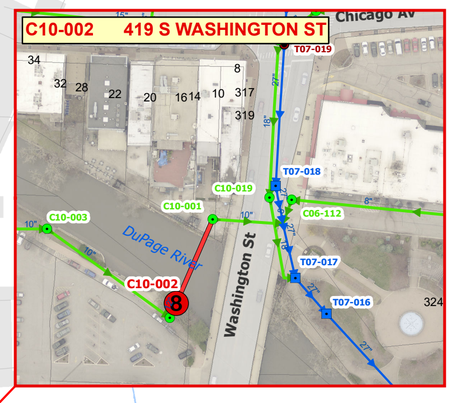



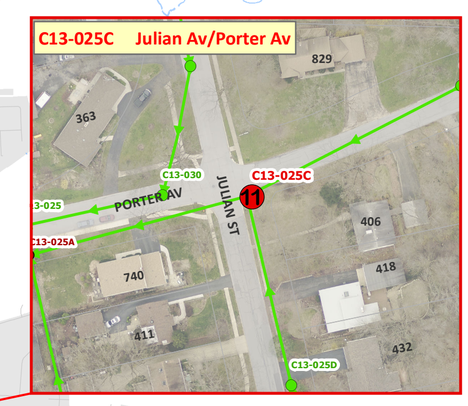

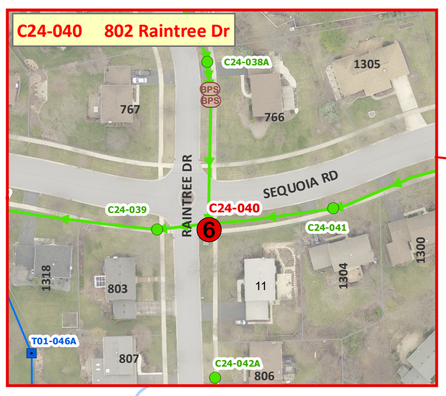

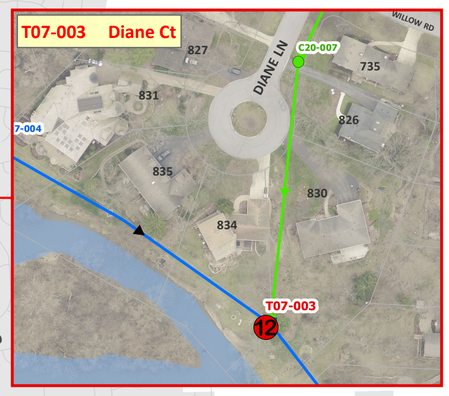

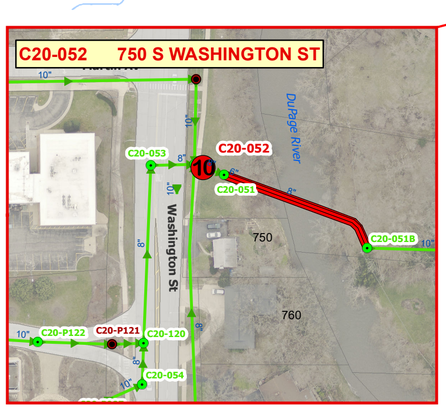



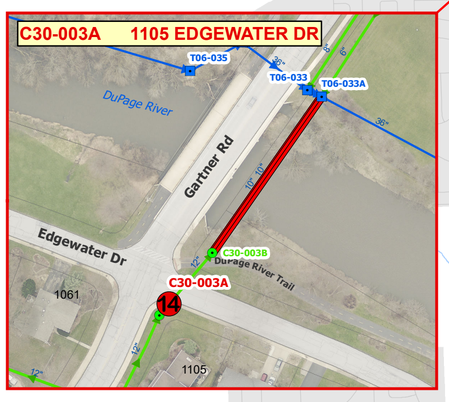

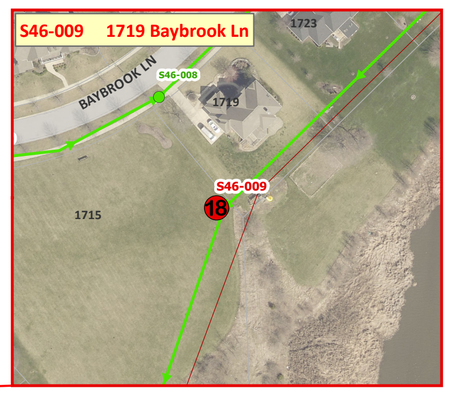

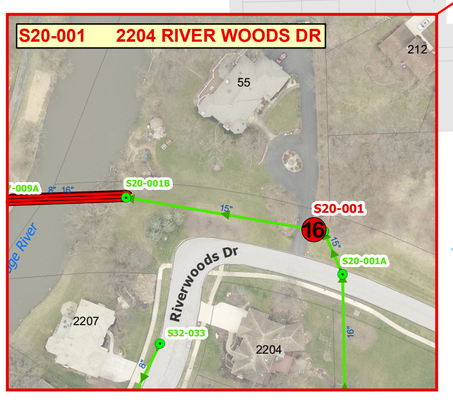

ROUTE 59
RAYMOND DR
OGDEN AV
AURORA RD
JEFFERSON AV
AURORA AV
WASHINGTON ST
CHICAGO AV
CHARLES AV
OGDEN AV
HOBSON RD
75TH ST
PLAINFIELD/NAPERVILLE RD
87TH ST
ROYCE RD
95TH ST
ROUTE 59
PLAINFIELD/NAPERVILLE RD
HASSERT BL

Legend

- SSO Alarming Site
- **Manholes**
  - Collection
  - Drop
  - Interceptor
  - Lined Thru
  - Private
- **Sewer Main**
  - Collection
  - Interceptor
  - Siphon
  - Private
  - Forcemain

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Water Distribution & Collection
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Updated: 3/25/2022

CITY OF NAPERVILLE
MEMORANDUM

DATE: March 4, 2026

TO: Darrell Blenniss, Director, Water Utilities

FROM: Tony Conn, Deputy Director (Water Operations), Water Utilities

SUBJECT: 2025 CMOM Status and I&I Reduction Report.

2025 Annual CMOM and I&I Reduction Status Report:

The City of Naperville Water Utility implements a proactive sanitary sewer maintenance program along with an aggressive infiltration and inflow reduction strategy. The I&I reduction program started in the early 1990's and was updated in 2003. The current "Infiltration and Inflow Reduction Program" and "CMOM" are updated annually. In 2025, the City of Naperville Water Utility continued its current CCTV inspection program with the goal of completing CCTV inspections of 10% of the collection system annually. During the 2025 calendar year, an additional 8,843' of sanitary sewer and 62 sanitary manholes were added to the collection system. Also, there were 3 additional Preventive Maintenance (PMS) areas added to the sanitary sewer cleaning schedule.

In 2025, the force mains for the Riverwood and Summerfield Lift Stations were cleaned using Ice Pigging. This cleaning resulted in a 20% reduction in run times at each station. Also, Water Utility staff, with the assistance of RJN Group, inspected the force mains for the Paddock and Century Hill Lift stations using the INGU floating ball technology. INGU force main inspections utilize Pipers, which are baseball-sized, free-floating multi-sensor tools designed to inspect the internal conditions of pressurized sewer pipelines without requiring a system shutdown. Conditions of these force mains were added to the "Force Main Condition Matrix" for future O&M or Capital work.

Below is a status report of all O&M work completed on the sanitary sewer collection system and the progress of the current I&I program.

O&M

CMOM Operations & Maintenance (O&M) Status:

2025 CMOM Actives are listed below:

1. Number of Sanitary Sewer Overflows: *0*
2. Number of Wastewater Lift Station Failures: *0*
3. Number of Collection System Work Order Created: *1,742*
4. Number of Planned Work Orders: *1,480 (85%)*
5. Number of Unplanned Work Orders: *262 (15%)*
6. Number of Main Line Repairs*: 1*
7. Number of Lateral Repairs: *15*

Wastewater Collections Inspection and Maintenance Status:

1. CCTV Inspections: 214,028'
2. Sanitary Sewer Cleaning: 1,908,966'
3. Sanitary Manhole Inspections: 10,024

Lift Stations:

1. All inspections completed for 2025

Lift Station Force Main:

1. Force Main Inspections: *2 (total length 1,745')*
2. Force Main Cleaning: *2 cleaned using ice pigging (total length 2,402')*
3. Force Main Air Release Valves (ARV) O&M: *all ARVs have been inspected and operating as designed*

Wet Weather Lagoons:

1. No usage for 2025

Number of Defects Located in 2025:

1. Manhole Defects: 93
2. Main Line Defects: 200
   Total Defects: 293

**Any main line roots observed we're added to the "Root Removal Schedule".*

Safety/Training:

1. No safety concerns for 2025
2. Hours Spent on training: 1045

Capital Improvement (CIP)

Capital Improvement (CIP)Status:

1. Manhole Rehabilitations (Entire): *33*
2. Manhole Rehabilitations (Upper Structure):
   - Upper Structure CIP Liners: *50*
   - Upper Structure Epoxy Liners: *95*
3. Manhole Replacements: *3*
4. Sanitary Sewer Main Rehabilitation (CIPP): *15,000'*
5. Chemical Grouting of Lateral Connections: *195*
6. Lateral Rehabilitation: *229*
7. Force Main Rehabilitation (CIPP): *5,067'* (Northwest Wastewater Pump Station)
8. Force Main Replacement: *144'* (Barclay Lift Station)
9. New ARVs: *5*
10. Lift Station: *Trillium Lift Station rehabilitations is currently under construction.*

I&I Status

During 2025, two additional open channel flow meters were installed as recommend in 2024's Rain-Dependent Infiltration and Inflow report (RDII). These two-additional meter were installed to reduce the size of the Burning Tree and Ogden Manor flow basins.

Below is an estimated amount of I&I produced by the defects found in 2025.

Estimated I&I Produced by the Defect(s)

- 93 manhole defects = .133 MGD of estimated I&I
- 195 leaking lateral connections= .702 MGD of estimated I&I
- **Total estimated I&I = .844 MGD.**

Number of Wastewater Collection O&M Defects Repaired completed in 2025.

- 125 O&M defects were repaired in the fiscal year 2025.

Work Completed	2025	Estimated I&I (MGD)
Cleanout Repairs	50	.007200
Manhole Lid Replacement	3	.004320
Pressure Grout Manholes	15	.043200
Manhole frame and Ring repairs	14	.010080
Bench Repairs	22	0
Sanitary Lateral Repairs	15	.108000
Sanitary Main Line Repairs	1	0
Lids Missing Bolts	5	.007200
Totals	125	.180000

Number Wastewater Collection Capital Rehabilitation Repairs completed in 2025.

The City of Naperville completed the below work as part of the "Ten-Year Wastewater Rehabilitation Plan". This work was completed in the calendar year 2025.

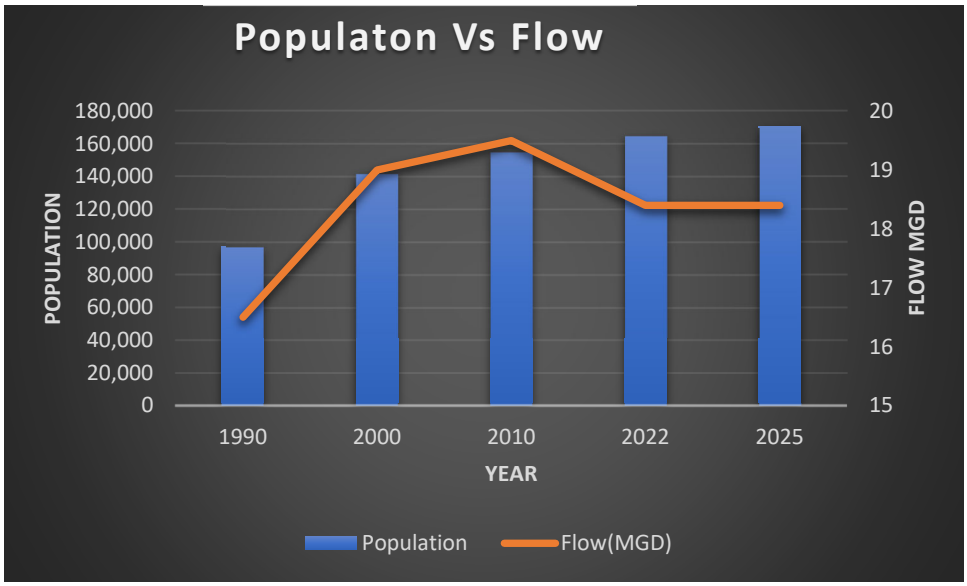
Work Completed	2025	Estimated I&I (MGD)
Manhole Replacement	3	.043200
Manholes Rehabilitation (Raven 405)	32	.230400
Manhole Upper Structure CIPP Lining	50	.036000
Manhole Upper Structure Spray Lining (Raven581)	95	.068000
Small Diameter Sanitary Sewer CIPP Lining	15,000'	.500000
Grouted Lateral Connections	195	.702000
Sanitary Lateral Lined	229	.824400
Total		2.4

Estimated I&I Removed from the System after Repairs and Rehabilitation Projects for calendar year 2025.

- 2.40 MGD of estimated I&I removed after CIP Rehabilitation.
- .180 MGD of estimated I&I removed after O&M Repairs.
  Total Estimated I&I Removed from the Wastewater Collection System for 2025
  2.50 MGD

Results of The City of Naperville's Infiltration and Inflow Reduction Program. (Some results in flow reduction may take several years).

- Since the early 1900's, Naperville has committed significant resources towards the goal of reducing I&I using the techniques mentioned in this report. City staff take a holistic approach when planning and completing rehab projects, taking care to match the proper technique with the existing field conditions and desired outcome.
- **Reduced Customer Service Calls -**
  2007: Responded to 600 Calls; 2025: Responded to 417 Calls. ***(All calls were private property issues)***
  *Less time on Customer Service means crews can spend more time on I&I work and O&M tasks.
- **Reduced Sewer Maintenance Cost -** Yearly Root Cutting is now Jet Flushing only every four years. **$90,000 Yearly Savings**
- **The graph below compares current population growth vs. wastewater treatment flow reductions**.



Above graph represents total Wastewater Flow to the Springbrook Water Reclamation Center
(City of Naperville Plus the City Of Warrenville)

Below is a comparison of 2015 vs 2024 system wide RDII. Using the same dates and basins from the RDII comparison, Table 10 below shows the difference in Net Groundwater Infiltration (GWI) between 2015 and 2024.

TABLE 10: Net GWI Comparison between 2015 and 2024

	2015	2024	Did GWI decrease between 2015 and 2024?
Basin ID	Net GWI (MGD)	Net GWI (MGD)	
BAILWASH	0.00	0.04	No
BMILL	0.11	0.13	No
BURNTREE	0.17	0.13	Yes
COACHDRN	0.16	0.14	Yes
COACHDRS	0.33	0.24	Yes
FERRY	0.37	0.44	No
HOBSMILL	0.18	0.00	Yes
HOBSON	0.06	0.14	No
MAYWATTS	0.10	-0.55	Yes
MCDOWELL	0.11	0.16	No
NAPPLAIN	0.44	0.41	Yes
NCC	0.19	0.17	Yes
NWPS_14	0.10	0.06	Yes
OGDENMAN	0.11	0.12	No
PEBBWOOD	0.21	0.16	Yes
PRESCOTT	0.45	0.21	Yes
RVIEW	0.54	0.23	Yes
SBCOD	0.39	0.20	Yes
SBROOK	0.00	0.14	No
SHERI	0.00	0.19	No
SUNDLAND	0.00	0.07	No

Out of the 21 basins compared between 2014 and 2024 for GWI, 12 showed a decrease.

Conclusion:

The implementation of a proactive Inflow and Infiltration (I&I) program, combined with a dedicated collection system maintenance program, has proven to be a cornerstone for sustainable wastewater infrastructure. By reducing extraneous water through targeted sewer main, laterals, and manhole rehabilitation, the City of Naperville's wastewater collection system has successfully maximized existing capacity, minimized costly wet-weather backups, and eliminated Sanitary Sewer Overflows (SSOs). This comprehensive approach not only ensures regulatory compliance and protects public health by preventing environmental contamination but also provides a superior return on investment by extending the life of the infrastructure and reducing treatment costs. As a result, the sewer system remains robust, resilient, and capable of efficiently serving the community.

LIFT STATION MONTHLY INSPECTION

STATION NAME: AERO ESTATES *be scanned: return to folder.*

MONTH/YEAR: _____

Start INITIALS/DATE: _____ **Finish INITIALS/DATE:** _____

CONTROL PANEL:	Initials	Pump #1	Pump #2	Mixer
1. VFD Inspection / Amp Readings				
8. Check control panel lights				
10. Clean out cabinet				
11. Visual of cabinet outside/inside				
12. Do generator Monthly Inspection				
15. VFD Inspection				

DRY/ WET WELL/BYPASS PUMPING PIT:	INITIALS
3. Clean floats & transducer	
5. Inspect guide rails	
6. Inspect hatches	
8. Check Valve inspection/maintenance	
10. Check discharged manhole	
11. Check ladder	
12. Inspect all wiring and conduit going into wet well	
13. Inspect guide chain	
14. Check for pump vibrations	
15. Inspect float bracket	
17. Inspect wet well vent	
18. Clean wet well when needed	
19. Lube hatch hinges	
20. Inspect transducer/Backup Float System	
21. Inspect flow meter pit	
22. Inspect check valve	

LIFT STATION SITE:	
23. Pick-up trash	
24. Clean up landscaping	
25. Spray for weeds	

NOTES:

LIFT STATION SEMI- ANNUAL INSPECTION

STATION NAME: NWPS

Document will be scanned: return to folder.

MONTH/YEAR: _____

Start INITIALS/DATE: _____ **Finish INITIALS/DATE:** _____

CONTROL PANEL:	Initials			
1. Amp readings		Pump #1	Pump #2	Pump #3
L1				
L2				
L3				
2. Voltage test				
3. Exercise breakers				
4. Check/tighten all electrical connections				
5. Check relays				
6. Check overload relays/heater elements				
7. Check control panel lights				
8. Exercise main breaker/disconnect switch				
9. Clean out cabinet				
10. Visual of cabinet outside/inside				
11. Do generator PMS				
12. Inspect anode system				
13. Inspect cabinet mounting bolts				
15. VFD Inspection				

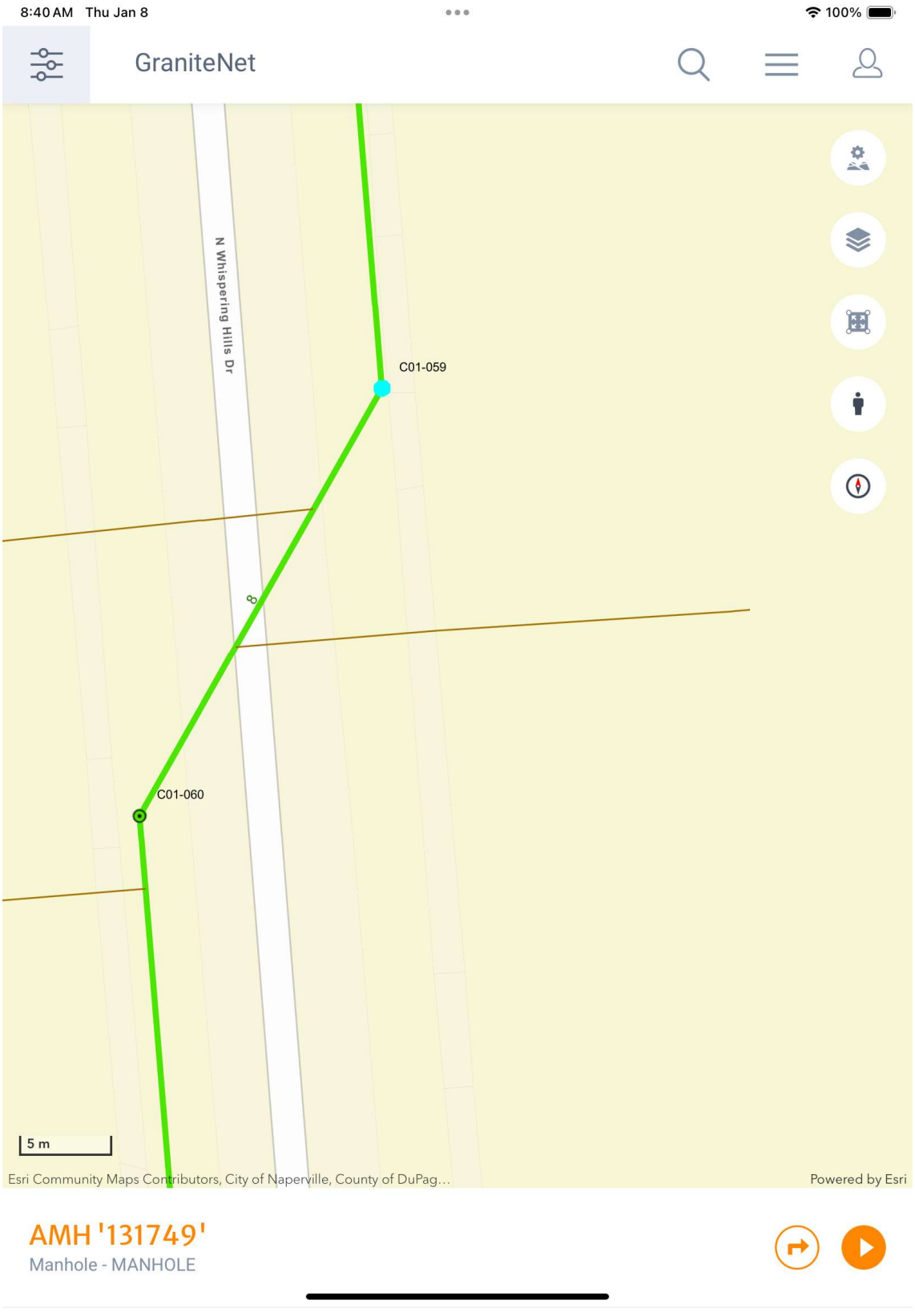
DRY/ WET WELL PIT:	INITIALS
1. Exercise all valves	
2. Check all bolts	
3. Remove Rags From influent bar screen	
4. Clean float switches	
5. Inspect guide rails	
6. Inspect hatches	
7. Clean inside/outside of station	
8. Check Valve inspection/maintenance	
9. Check all flange connections for leaks	
10. Check discharged manhole	
11. Check ladder	
12. Inspect all wiring and conduit going into wet well	
13. Inspect guide chains	
14. Check for pump vibrations	
15. Inspect float bracket	
16. Spray WD-40 on check valves and valves	
17. Inspect wet well vent	
18. Clean wet well when needed	
19. Lube hatch hinges	
20. Inspect transducer/Backup Float System	
21. Discharge PSI	
22. Crane Inspection	
23. Clean Transducer	

Appendix T

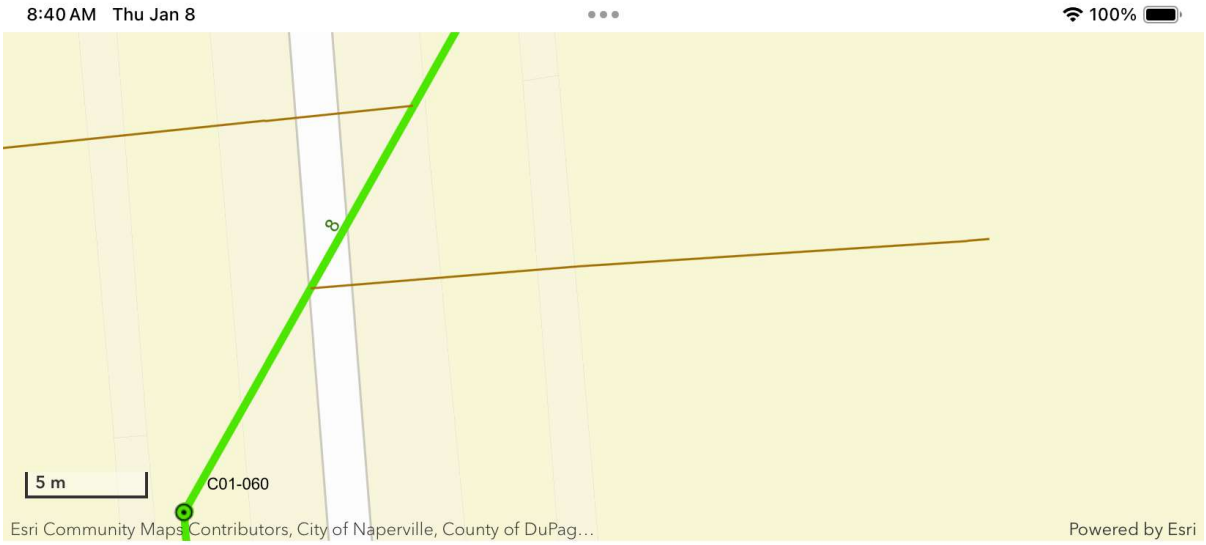
CITY OF NAPERVILLE - 2026 C&P CCTV SCHEDULE								
	Project	**City Works**	**Units**	**Completed**	**Total**	**Start Date**	**Finish Date**	**Progress %**
1	2026 Lining Warranty Inspection	314003	Feet	7,040	16,115	1/9/2026	-	43.69%
2	Contracted CCTV Inspection	320010	Feet	-	124,729	-	-	0.00%
3	Future Small Diameter Lining Investigation (T04-009 Tributaries)	307186	Feet	5,636	10,260	7/21/2025	-	54.93%
4	2026 Watermain Improvements	320526	Feet	-	26,469	-	-	0.00%
5	C01 Basin Inspection	320470	Feet	1,165	28,202	3/13/2026	-	4.13%

Appendix U

Manhole Inspection – Digital Form



Appendix U



MANHOLE INSPECTION

MH/Access point no. (Node)
131749

Type
AMH

Legacy ID
C01-059

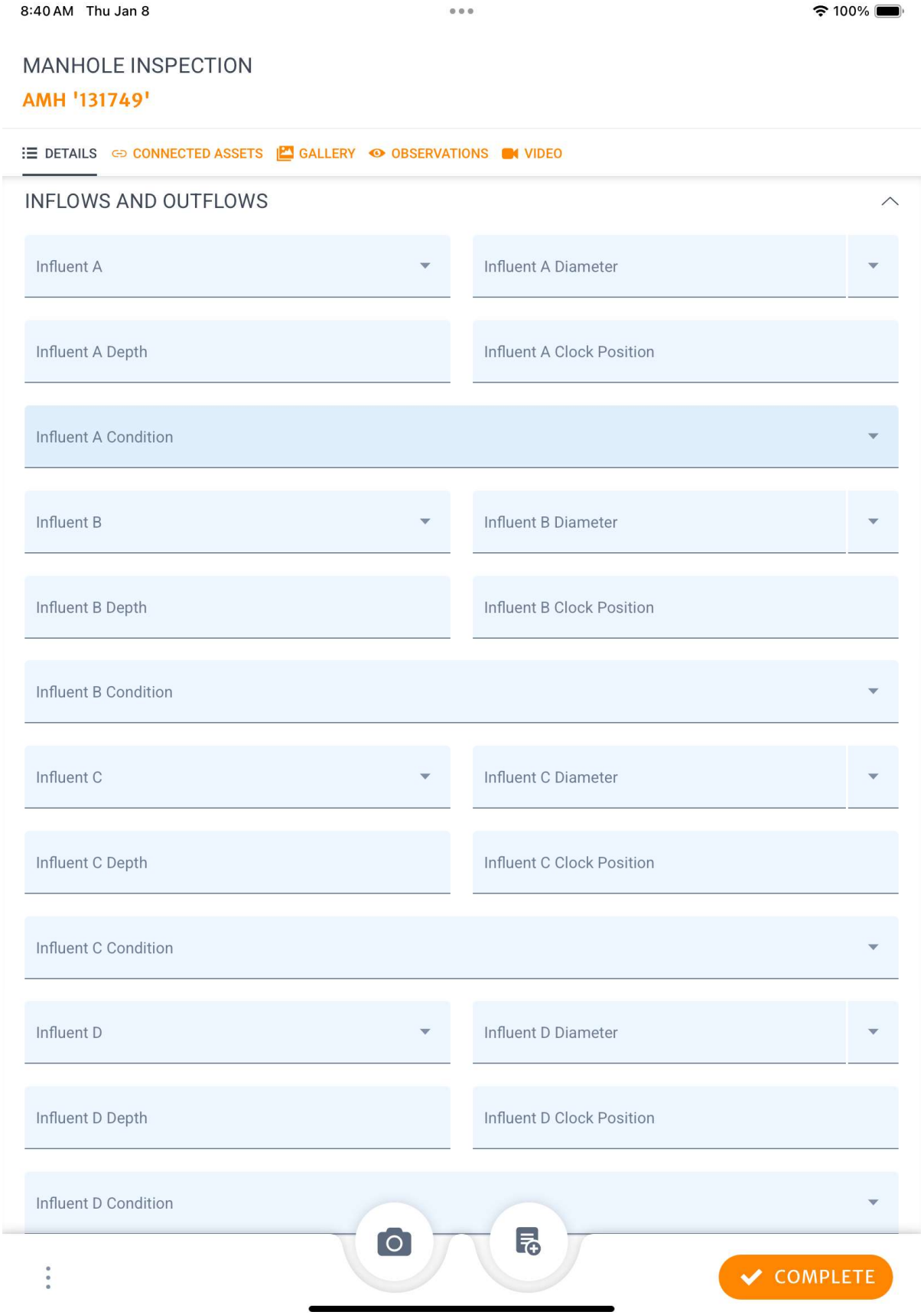
Surveyed by
EICHHOLZER, EMILY

Project name

Work order no.

CANCEL

CONTINUE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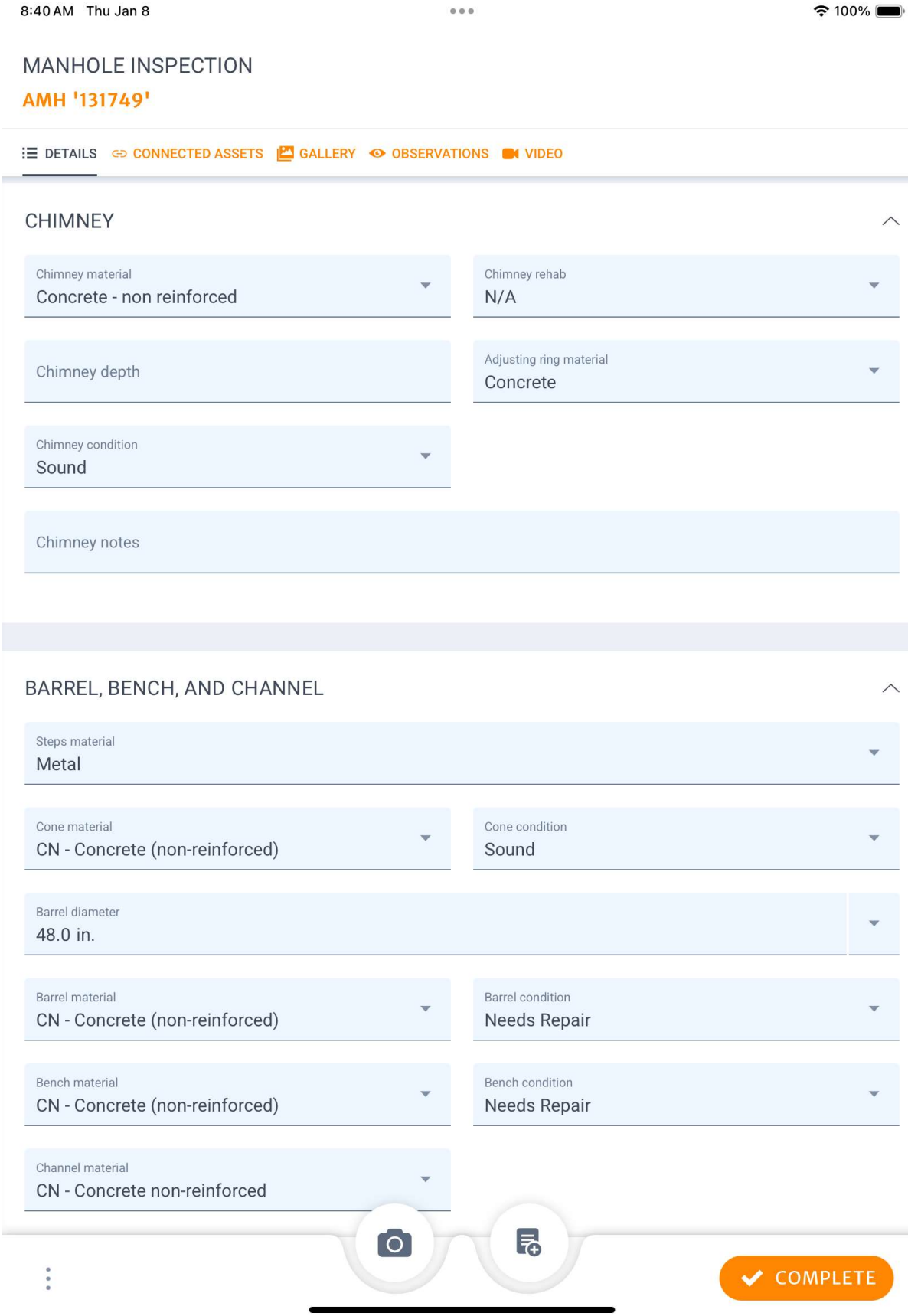
MANHOLE INSPECTION
AMH '131749'
DETAILS
CONNECTED ASSETS
GALLERY
OBSERVATIONS
VIDEO
INFLOWS AND OUTFLOWS
Influent A
Influent A Diameter
Influent A Depth
Influent A Clock Position
Influent A Condition
Influent B
Influent B Diameter
Influent B Depth
Influent B Clock Position
Influent B Condition
Influent C
Influent C Diameter
Influent C Depth
Influent C Clock Position
Influent C Condition
Influent D
Influent D Diameter
Influent D Depth
Influent D Clock Position
Influent D Condition
COMPLETE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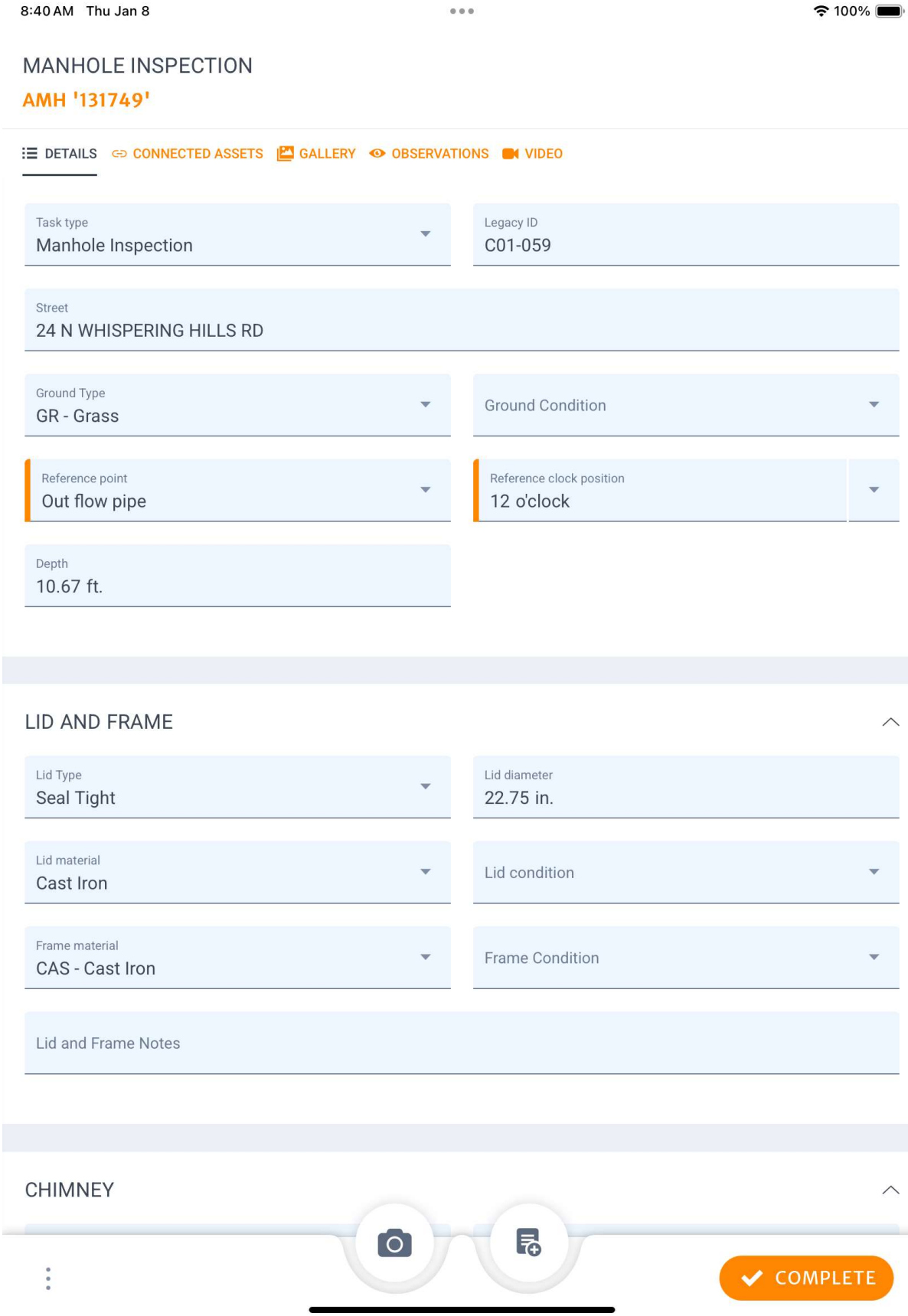
MANHOLE INSPECTION
AMH '131749'
DETAILS
CONNECTED ASSETS
GALLERY
OBSERVATIONS
VIDEO
CHIMNEY
Chimney material
Concrete - non reinforced
Chimney rehab
N/A
Chimney depth
Adjusting ring material
Concrete
Chimney condition
Sound
Chimney notes
BARREL, BENCH, AND CHANNEL
Steps material
Metal
Cone material
CN - Concrete (non-reinforced)
Cone condition
Sound
Barrel diameter
48.0 in.
Barrel material
CN - Concrete (non-reinforced)
Barrel condition
Needs Repair
Bench material
CN - Concrete (non-reinforced)
Bench condition
Needs Repair
Channel material
CN - Concrete non-reinforced
COMPLETE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AMH '131749'
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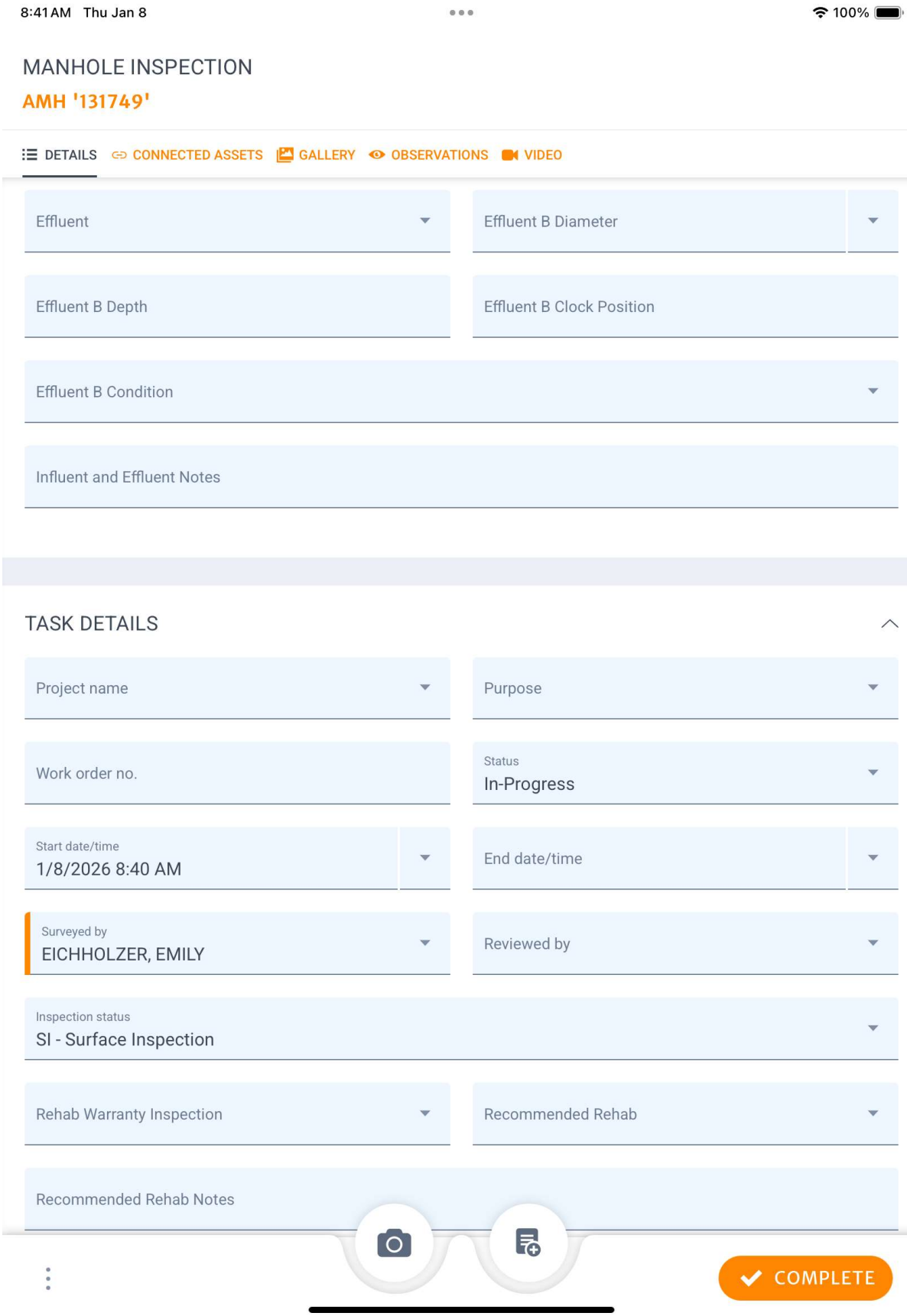
CONNECTED ASSETS
GALLERY
OBSERVATIONS
VIDEO
Task type
Manhole Inspection
Legacy ID
C01-059
Street
24 N WHISPERING HILLS RD
Ground Type
GR - Grass
Ground Condition
Reference point
Out flow pipe
Reference clock position
12 o'clock
Depth
10.67 ft.
LID AND FRAME
Lid Type
Seal Tight
Lid diameter
22.75 in.
Lid material
Cast Iron
Lid condition
Frame material
CAS - Cast Iron
Frame Condition
Lid and Frame Notes
CHIMNEY
COMPLETE

Appendix U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DETAILS
CONNECTED ASSETS
GALLERY
OBSERVATIONS
VIDEO
Effluent
Effluent B Diameter
Effluent B Depth
Effluent B Clock Position
Effluent B Condition
Influent and Effluent Notes
TASK DETAILS
Project name
Purpose
Work order no.
Status
In-Progress
Start date/time
1/8/2026 8:40 AM
End date/time
Surveyed by
EICHHOLZER, EMILY
Reviewed by
Inspection status
SI - Surface Inspection
Rehab Warranty Inspection
Recommended Rehab
Recommended Rehab Notes
COMPLETE

SECTION 300:
SANITARY SEWER
CONSTRUCTION STANDARDS

Page No.	Description
300-2	**301 GENERAL**
300-2	301.1 SEWAGE COLLECTION AND TREATMENT
300-2	301.2 SPECIFICATIONS
300-2	301.3 REGULATIONS
300-2	301.4 START OF CONSTRUCTION
300-2	301.5 UTILITY IDENTIFICATION
300-4	**302 MATERIALS**
300-4	302.1 MANHOLES
300-5	302.2 PIPE TO MANHOLE CONNECTOR
300-5	302.3 PIPES
300-7	302.4 CONNECTING DISSIMILAR PIPE MATERIALS
300-7	302.5 CASING PIPES
300-7	302.6 BEDDING, HAUNCHING AND INITIAL BACKFILL
300-7	302.7 SELECTED GRANULAR BACKFILL
300-8	**303 CONSTRUCTION REQUIREMENTS**
300-8	303.1 GENERAL REQUIREMENTS
300-8	303.2 MANHOLES
300-8	303.3 TRENCHING
300-9	303.4 PIPE BEDDING AND BACKFILL
300-10	303.5 PIPE INSTALLATION
300-12	303.6 BRANCH FITTINGS
300-13	**304 INSPECTION AND TESTING**
300-13	304.1 MANHOLES
300-13	304.2 FLEXIBLE PIPE
300-19	**390 STANDARD DETAILS**

301 GENERAL

The standards and requirements found in this article are for the materials and construction of sanitary sewers within the City of Naperville, Illinois.

301.1 SEWAGE COLLECTION AND TREATMENT

All sanitary sewage of domestic and other water borne wastes shall be collected and conveyed in a sanitary sewer pipe system to a point of discharge into an existing sanitary sewer system, City of Naperville interceptor, or sewage treatment plant. No sanitary sewage shall be allowed to enter any storm sewer system or discharge onto the ground or into receiving streams without first being treated in accordance with city, county, state and federal regulations.

301.2 SPECIFICATIONS

These specifications cover pipe for sanitary sewers and service connections, sewer fittings, manholes and all appurtenances normally used for sanitary sewer collection systems. Special considerations will be covered in the detailed plans and special provisions covering the proposed construction. Sanitary sewers shall be installed in accordance with the "Standard Specifications for Water and Sewer Main Construction in Illinois", latest edition, and applicable ordinances of the City of Naperville, except as modified herein.

301.3 REGULATIONS

Additional rules and regulations governing the construction of sanitary sewers in the City of Naperville are:

a) The Sewer Permit Ordinance

b) The Sewage and Wastewater Control Ordinance

c) The restrictions, policies, and instructions that may be adopted or issued by the City of Naperville

d) The Illinois Pollution Control Board Regulations

e) The Environmental Protection Act

301.4 START OF CONSTRUCTION

The contractor shall not begin construction until all required permits have been obtained. Copies of all permits obtained by outside agencies must be provided to the city prior to the start of construction.

301.5 UTILITY IDENTIFICATION

A wood stake (4 inch by 4 inch by 6 foot) stake with not less than the top 2 feet painted green shall be installed next to each sanitary sewer manhole, clean-out, and at the end of each sewer stub (termination at the end of the line). The 4 inch by 4 inch by 6 foot stake shall be maintained in a plumb position until City acceptance of the utility structures.

When newly poured curbs are installed, the contractor shall use a City approved stamp to indent the wet concrete with an "S" to identify the location of each sanitary manhole and sewer stub. The letter "S" shall be indented at the top of the curb 1-1/2 inches to two 2 inches in height and width at a depth of 3/8 inches.

In areas where new curbs are not present or if the developer and/or the contractor fail to indent the curbs as outlined above, the City will then require that identification symbols as approved by the City Engineer be cut into the curb.

302 MATERIALS

302.1 MANHOLES

Manholes for sanitary sewers shall have a minimum inside diameter of 48 inches and shall be constructed of precast concrete units in accordance with ASTM C478-05 (or latest edition) and Section 32 of the "Standard Specifications for Water and Sewer Main Construction in Illinois," and shall follow the City of Naperville sanitary sewer standards. All manholes shall be water-tight. All visible leaks shall be sealed in a manner acceptable to the City Engineer.

302.1.1 FRAME AND COVER

Manholes shall be furnished with a self-sealing frame and solid cover (Neenah Foundry R-1772, East Jordan Iron Works 1022-Z3, or equal approved by the City Engineer) with the word "Sanitary" imprinted on the cover in raised letters (see Naperville Standard Detail 390.03). All frames and lids shall meet or exceed AASHTO H-20 loading specifications. Frames shall be shop painted with asphaltic base paint.

Both the manhole frame and cover shall have machined horizontal and vertical bearing surfaces. Inverted manhole frames are not allowed.

Pick holes shall not create openings in the manhole cover.

302.1.2 WATER-TIGHTNESS

Bolt-down frames shall be used in areas subject to flooding and where indicated on the plans. Bolt-down frames and covers shall be Neenah Foundry R-1916-F, East Jordan Iron Works 1040 ZPT or equal approved by the City Engineer. Frames are to be bolted to cone and cover to frame using stainless steel anchor bolts.

A continuous layer of non-hardening, preformed bituminous mastic material, Conseal 102B or approved equal, shall be applied to each manhole barrel cone and top section to provide a watertight seal.

Rubber boots/seals must be used where pipes enter manholes. The internal connection shall be dressed up with non-shrink hydraulic cement. Hydraulic cement, mortar, and concrete must be of the strength and water-tightness quality as specified in the ASTM standards.

Lifting holes that extend through the wall of manhole shall not be allowed.

302.1.3 FRAME ADJUSTMENTS

Adjustments may be necessary to ensure that frames match the elevation of the surrounding pavement or ground surface. Preformed adjusting rings of the proper dimensions needed to mate the frame to the precast structure shall be used. No more than 12 inches of vertical adjustment may be made using the minimum practical number of individual rings.

All rings shall be High Density Polyethylene Plastic (HDPE), Recycled Rubber, High Density Expanding Polystyrene, Expanded Polypropylene (EPP), or other material as

approved by the City Engineer. Precast concrete rings, bricks, rocks, shims, or concrete blocks will not be allowed. Tapered adjusting rings shall be required when the frame will need to match the slope of the roadway.

A resilient, flexible, non-hardening, preformed bituminous mastic material, Conseal 102 B or approved equal, shall be used between the cone or top barrel section of the structure and the adjusting rings. A thick bead of non-hardening elastomeric joint sealant conforming to ASTM C-920, Type S, Grade NS, shall be applied between all individual rings, and between the adjusting rings and the frame. The sealant or mastic material shall be applied in such a manner that no surface water or ground water inflow can enter the structure. No dressing or tuckpointing mortar is allowed on rings.

Frame adjustments shall be completed in accordance with Sections 602 and 603 of Standard Specifications for Road and Bridge Construction, prepared by the Illinois Department of Transportation, latest edition, except as noted herein.

302.1.4 STEPS

Manhole steps on maximum 16 inch center shall be furnished with each manhole, securely anchored in place, true to vertical alignment, in accordance with the Naperville Standard Details. Steps shall be copolymer polypropylene reinforced with ½ inch A615/A615M-05a (or latest edition) Grade 60 steel reinforcement, meeting or exceeding ASTM C 478-05 (or latest edition) and OSHA standards.

302.2 PIPE TO MANHOLE CONNECTOR

A flexible pipe-to-manhole connector shall be used for the connection of the sanitary sewer to precast concrete manholes. The connector shall meet ASTM C923-02 and ASTM A167-99(2004), or latest edition, and be constructed of EPDM rubber with 304 or 316 series stainless steel connectors (KOR-N-SEAL by NPC, PSX by Press-Seal Gasket Corporation, or approved equal).

302.3 PIPES

All sanitary sewer pipe materials shall conform to the latest applicable ANSI, ASTM, AWWA, AASHTO, or other nationally accepted standards. Only the following sanitary sewer pipe and joint materials are approved for use in the City of Naperville, Illinois:

a) Class 50 ductile iron pipe conforming to ANSI/AWWA C151/A.21.51-02 (or latest edition) with joints conforming to ANSI/AWWA C111/A.21.11-00 (or latest edition). Ductile shall be encased in polyethylene encasement in accordance with ANSI/AWWA C105/A21.5-99 (or latest edition).

b) Polyvinyl chloride (PVC) pipe (6 inch -16 inch) conforming to ASTM D2241-05 (or latest edition) (SDR 26 – sewer depth between 4-20 feet and SDR 21 for depths between 20-25 feet) with joints conforming to ASTM D3139-98 (2005) or latest edition.

c) Also acceptable in lieu of ASTM D2241-05 are C900 (SDR 18) for 12 inch diameter sewers and C905 (SDR 25) for 14 inch through 18 inch sewers.

302.3.1 PVC PIPE

This specification is appropriate for PVC pipe (6 inch - 16 inch) complying with ASTM D2241-05 and ASTM D3139-98 (2005) or latest edition. Any proposed PVC pipe greater than 16 inches in size must be approved by City Engineer prior to use. PVC pipe cannot be used in Class V soils (i.e. organic silt, organic clay and peat) as defined according to the Unified Soil Classification System in ASTM D2487-00 (or latest edition). Solvent cement joints will not be allowed in the City of Naperville.

Pipe shall be clearly marked as follows at intervals of 5 feet or less:

a) Manufacture's name or trademark and code

b) Nominal pipe size

c) The PVC cell classification, for example 12454-B

d) The legend "Type IPS SDR-26 PVC 1120 Sewer Pipe"

e) This designation "Specification D-2241"

PVC Pipe shall be SDR 26. For sewer depths between 20 and 25 feet, SDR 21 shall be provided. Higher SDR numbers will only be allowed with the approval of the City Engineer.

302.3.2 PVC FITTINGS

All PVC fittings shall comply with ASTM F1970-05 (or latest edition) and fittings shall be clearly marked as follows:

a) Manufacturer's name or trademark

b) Nominal size

c) The material designation PVC or IPS (iron pipe size), and this designation “Specification D2241”

Fitting shall be molded for pipe sizes between 6 inches and 8 inches in diameter, and fabricated fittings for 10” to 16” in diameter. A minimum of 150 psi pressure class shall be provided.

PVC fittings shall be SDR 26. Higher SDR numbers will only be allowed with the approval of the City Engineer. Fittings shall be required to pass the same inspection and testing requirements of the PVC pipe.

302.3.3 SANITARY SERVICE LATERALS

A minimum size of 6" pipe is required for all sanitary service laterals. Pipe shall conform to section 302.3 and the standard details contained in this specification. Connection to a CIPP lined sanitary main shall be installed per Standard Detail 390.21. Re-use of an existing Vitrified Clay Pipe (VCP) sanitary service lateral shall not be approved unless it is CIPP lined from the main to the cleanout including the main line connection per DPU-W/WW requirements, televised after installation, and approved by DPU-W/WW staff. The main line CIPP connection must be full circumference. The CIPP lateral lining must meet the requirements of ASTM F2561-20 and ASTM F3240-17, as manufactured by LMK Technologies or approved equal.

302.4 CONNECTING DISSIMILAR PIPE MATERIALS

Joints connecting dissimilar pipe materials shall be made with sewer clamp non-shear type couplings; Cascade CSS, Romac LSS, Fernco, Inc. Shear Ring, or approved equal. When available, a standard joint with a transition gasket may be used. The name of the manufacturer, class, and date of issue shall be clearly identified on all sections of pipe. The contractor shall also submit bills of lading, or other quality assurance documentation when requested by the City Engineer.

302.5 CASING PIPES

All steel casing pipe shall be bituminous coated, a minimum of 30 mils thickness inside and out, shall be of leak proof construction and capable of withstanding the anticipated loadings. The minimum wall thickness for the casing pipe shall be in accordance with Table 300-1. The steel casing pipe shall have minimum yield strength of 35,000 psi and shall meet the requirements of A139/A139M-04 (or latest edition), Grade B. Ring deflection shall not exceed 2% of the nominal diameter. The steel casing pipe shall be delivered to the jobsite with beveled ends to facilitate field welding

TABLE 300-1
REQUIRED CASING PIPE WALL THICKNESS

Steel Casing Diameter	Minimum Wall Thickness (Inches)
20"- 22"	0.344
24"	0.375
28"	0.438
30"	0.469
32"	0.501
34"- 36"	0.532

302.6 BEDDING, HAUNCHING AND INITIAL BACKFILL

The material used for pipe bedding, haunching and initial backfill shall consist of gravel, crushed gravel, or crushed stone conforming to the requirements of Article 1004.01 of the "Standard Specifications for Road and Bridge Construction", prepared by the Illinois Department of Transportation. The gradation shall conform to gradation CA-7 or CA-11 of the Standard Specifications.

302.7 SELECTED GRANULAR BACKFILL

Selected granular backfill, or trench backfill, shall consist of gravel, crushed gravel, or crushed

stone conforming to the requirements of Article 1004.01 of the "Standard Specifications for Road and Bridge Construction", prepared by the Illinois Department of Transportation. The gradation shall conform to gradation CA-6 of the Standard Specifications.

303 CONSTRUCTION REQUIREMENTS

303.1 GENERAL REQUIREMENTS

303.1.1 RESPONSIBILITY FOR MATERIALS

The contractor shall be responsible for the acceptability and storage of all materials furnished by him and shall assume responsibility for the replacement of all such material found damaged in shipping or on job site or defective in manufacture. This shall include the furnishing of all material and labor required for the replacement of installed material discovered to be defective prior to the final acceptance of the work.

303.1.2 STORAGE OF PIPING MATERIALS

The interior, as well as all sealing surfaces of all pipe, fittings, and other accessories shall be kept free from dirt and foreign matter. Store pipe bundles on flat surfaces with uniform support. Pipe stored outside and exposed to prolonged periods of sunlight should be covered with canvas or other opaque material. Clear plastic sheets shall not be used. Air circulation shall be provided under covering. Keep gaskets away from oil, grease, electric motors (which produce ozone), excessive heat and direct rays of the sun. Consult the manufacturer for specific storage recommendations.

303.1.3 HANDLING OF PIPING MATERIALS

Piping materials shall be unloaded, hauled and distributed at the site of the project by the contractor. Materials shall at all times be handled properly to prevent damage in accordance with manufacturer's recommendations. Pipe and fittings shall not be thrown, dropped, or dragged. Damaged or defective material on the job site shall be rejected and replaced to the satisfaction of the City Engineer. Methods of construction conducive to the damage of sewer pipe shall be corrected when called to the attention of the contractor. All pipe and fittings shall be examined by the contractor above grade before placement in the trench.

303.2 MANHOLES

303.2.1 PIPE CONNECTIONS

Where a connection is made to an existing manhole, the manhole shall be cored, and a flexible pipe-to-manhole connector installed. The existing manhole bench shall be reworked as required by City Engineer.

Inverts shall be made to conform accurately to the sewer grades with smooth, well rounded junctions and transitions satisfactory to the City Engineer. If the invert is to be poured in place, the sanitary sewer pipe shall be extended through the manhole, the concrete poured and formed, and the pipe then sawed out through the manhole.

303.3 TRENCHING

Trench construction shall be done in accordance with Sections 20 and 31 of the Standard Specifications for Water and Sewer Main Construction in Illinois, except as modified herein.

303.3.1 WIDE TRENCH

Wide trenches are classified as trenches whose width at the top of the pipe is greater than 2 1/2 pipe diameters on each side of the pipe or a total of 6 pipe diameters. Although there is no width of trench beyond which the load on a flexible pipe exceeds the prism load, accepted installation practices usually dictate narrow trench construction. In isolated circumstances it may be more cost effective to use wide trench construction, i.e., in areas where narrow trench walls cannot be maintained. If trench width at the top of a small diameter pipe (4 inch - 10 inch diameter) must exceed 6 pipe diameters, the embedment up to the pipe spring line should be compacted to a point approximately 2 1/2 pipe diameters from each side of the pipe. For large diameter PVC pipe (12 inch - 48 inch diameter) installed in wide trenches, the embedment up to the pipe spring line should be compacted to a point at least one pipe diameter or 2 feet from side of the pipe, whichever is greater.

303.3.2 ROCK SUB-GRADE

Ledge rock, hard pan, cobbles, boulders or stones larger than 1 1/2 inches shall be removed from the trench bottom to permit a minimum bedding thickness of 6 inches.

303.4 PIPE BEDDING AND BACKFILL

Granular pipe bedding and haunching shall be required on all sanitary sewers installed in the City of Naperville. Initial backfill shall be required for all sanitary sewers constructed of PVC or other flexible pipe material.

303.4.1 PIPE BEDDING

Granular pipe bedding shall be provided so that the pipe will be uniformly supported and the entire length of the pipe barrel will have full bearing. No blocking of any kind shall be used to adjust the pipe to grade except when used with embedment concrete. Bedding shall be required for all sewer construction, and shall be of a thickness equal to 1/4 of the outside diameter of the sewer pipe with a maximum thickness of eight inches. Granular pipe bedding shall be a minimum of 4 inches in earth excavation and a minimum of 6 inches in rock excavation.

Where unsuitable material is encountered at the grade established, all such unsuitable soil shall be removed under the pipe and for the width of the trench, and shall be replaced with well compacted bedding material. The size range and resulting high voids ratio of bedding material make it suitable for use to dewater trenches during pipe installation. This permeable characteristic dictates that its use be limited to locations where pipe support will not be lost by migration of fine grained natural material from the trench walls and bottom or migration of other materials into the bedding material. When such migration is possible, the material's minimum size range should be reduced to finer than 1/4 inch and the gradation properly designed to limit the size of the voids.

Bedding materials shall be placed to provide uniform and adequate longitudinal support under the pipe. Bell holes at each joint shall be provided to permit the joint to be assembled properly while maintaining uniform pipe support. When the joint has been made, the void under the bell will be filled with bedding or haunching material.

303.4.2 HAUNCHING

The most important factor affecting pipe performance and deflection is the haunching material and its density. Place and consolidate the material under the pipe haunch to provide adequate side support to the pipe while avoiding both vertical and lateral displacement of the pipe from proper alignment. Place haunching up to the pipe spring line.

303.4.3 INITIAL BACKFILL FOR FLEXIBLE PIPE

Initial backfill begins above the spring line of the pipe and extends to a point 6 inches above the top of the pipe. This material shall be carefully placed so as to completely fill the space around the pipe, in 8 inch layers, loose measurements, and compacted to the satisfaction of the City Engineer.

303.4.4 SELECTED GRANULAR BACKFILL (TRENCH BACKFILL)

The backfill for trenches and excavation made in existing or under proposed pavements where the inner edge of the trench is within 2 feet of the edge of the pavement, curb, gutter, curb and gutter, or sidewalk, shall be made with compacted selected granular material. Selected granular backfill shall be placed in uniform layers not exceeding 6 inches (loose measure) and compacted with mechanical equipment to 95% of the standard proctor density in accordance with the applicable AASHTO or ASTM requirements.

303.4.5 DEPTH OF PIPE COVER

All pipe shall be laid to a minimum depth of 7 feet measured from the proposed ground surface to the top of the pipe, unless specifically allowed otherwise in special circumstances by the City Engineer. If allowed, sanitary sewer and services with ground cover less than 4 feet or more than 25 feet must be constructed of ductile iron class 50 pipe. PVC pipe installed for sewer depths between 20-25 feet shall have a SDR 21 rating. All sanitary sewers and services with less than 4 feet of cover shall have insulation.

303.5 PIPE INSTALLATION

303.5.1 LAYING OF PIPE

Sanitary sewer pipe shall be laid true to line and grade as set forth in Section 31 paragraph 31-1.02 of the “Standard Specifications for Water and Sewer Main Construction in Illinois.” Dirt and other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations.

Any pipe or fitting that has been installed with dirt or foreign material in it shall be cleaned and re-inspected. At times when pipe laying is not in progress, and at the end of each working day, the open end of the pipe shall be closed with a water tight plug to ensure absolute cleanliness inside the pipe. The City Engineer may request mechanical cleaning (jet flushing) and/or televising if necessary to ensure clean, acceptable pipes, at the contractor's expense.

303.5.2 LAYING OF PIPE ON CURVES

The curvature of sanitary sewers is allowed for sewers 8 inches to 12 inches in diameter. Alignments must follow the general alignment of streets. Only a simple curve design is acceptable. The minimum allowable radius of curvature is 300 feet. Compression type pipe joints are required and manholes are required at the beginning and end of all curves. Maximum joint deflection shall not exceed the manufacturer's recommendations.

303.5.3 INSTALLING PIPE THROUGH CASINGS

This work shall be in conformance with Section 20-2.19 of the Standard Specifications for Water and Sewer Main Construction in Illinois, except as modified herein. Encasements for pipes under highways or railroads shall conform to the requirements of the City of Naperville, or the owner of the highway or railroad. Manufactured non-metallic or non-corrosive casing spacers, adjustable runners, or cradles shall be used to support the pipe in the casing and shall be installed per manufacturer's recommendations. A minimum of two supports shall be used per joint of pipe for lengths up to 12.5 feet, and a minimum of three supports shall be used per joint for lengths greater than 12.5 feet. The annular space shall be filled with pea gravel, low-strength grout, or cellular foam concrete and provisions shall be made so that no voids are left. Contractor shall make arrangements to have a City of Naperville representative witness the annular spacing filling operations.

303.5.4 CUTTING AND BEVELING PIPE

For shorter than standard pipe lengths, field cuts may be made with either hand or mechanical saws or plastic pipe cutters. Ends shall be cut square and perpendicular to the pipe axis. Spigots shall have burrs removed and ends smoothly beveled by a mechanical bevel or by hand with a rasp or file. Field spigots shall be stop-marked with felt tip marker or wax crayon for the proper length of assembly insertion. The angle and depth of field bevels and lengths to stop-marks shall be comparable to factory pipe spigots.

303.5.5 ASSEMBLY OF JOINTS

Assemble all joints in accordance with recommendations of the manufacturer. If a lubricant is required to facilitate assembly it shall have no detrimental effect on the gasket or on the pipe when subjected to prolonged exposure. Proper jointing may be verified by rotation of the spigot by hand or with a strap wrench. If unusual joining resistance is encountered or if the insertion mark does not reach the flush position, dissemble the joint, inspect for damage, re-clean the joint components and repeat the assembly steps. Note that fitting bells may permit less insertion depth than pipe bells (NOTE: When mechanical equipment is used to assemble joints, care should be taken to prevent over insertion.)

303.5.6 BUILDING SERVICES

When main line bedding, haunching, initial and final backfill must be disturbed to install fittings and service lines, the contractor is directly responsible to ensure that the bedding, haunching, initial and final backfill with appropriate compaction are restored properly to eliminate the possibility of deflection or movement causing future pipe failure.

303.5.7 PIPE CAPS AND PLUGS

All caps and plugs shall be braced, staked, anchored, wired or otherwise secured to the pipe to prevent leakage under the maximum anticipated thrust from internal abnormal operating conditions or test pressures from water or air.

303.6 BRANCH FITTINGS

Fittings for service branches in new construction shall be molded for 6 inch and 8 inch pipe and fabricated for 10 inch to 16 inch diameter with all gasketed connections. Clay/plastic pipe connections must be watertight. The contractor will be permitted to use fittings which include factory molded saddles and tees with alignment rings, and factory molded wyes. When connecting to an existing sewer main by means other than an existing wye or tee, one of the following methods shall be used:

a) For PVC existing lines only, a sewer tap into the existing main shall be allowed. This would include a circular saw-cut of the sewer main by proper tools ("Shewer Tap" machine or similar) and proper installation of hub-wye saddle or hub-tee saddle. Holes for wye saddles shall be laid out with a template and shall be de-burred and carefully beveled where required to provide a smooth hole shaped to conform to the fitting.

b) A typical connection would involve a PVC "T" fitting, another 1' (or more) extension of PVC pipe, depending on location of existing joint, the non-shear coupling and the existing clay or PVC pipe. With pipe cutter or appropriate equipment, neatly and accurately cut out desired length of pipe for insertion of proper fitting, using non-shear reinforced banded style repair coupling with 300 series stainless steel shear ring as manufactured Fernco, Inc. or Mission Rubber Company, Inc., or approved equal, connect the sewer pipes and maintain matching flow line elevations. All couplings shall bear the manufacturer’s identifying mark and size.

The contractor shall provide details of direct connections to City interceptors greater than 18 inches in diameter and show construction procedure for protecting City structures.

All proposed bypass pumping of sanitary flow shall be approved by Department of Public Utilities prior to performing this work.

304 INSPECTION AND TESTING

All projects shall be inspected and tested upon completion of installation. The City Engineer will designate the locations of tests and extent of the system to be tested, and extent of recording test results. Equipment for performing tests and making measurements shall be furnished by the contractor. Sections of sewer which fail to pass the tests shall have defects located and repaired or replaced and be retested until within the specified allowance

304.1 MANHOLES

All manholes shall be thoroughly cleaned of dirt and debris and all visible leakage eliminated before final inspection and acceptance.

304.1.1 VACUUM TESTING OF SANITARY MANHOLES

All manholes shall be tested for leakage by vacuum testing. A vacuum of 10 inches Hg shall be placed on the manhole and the time shall be measured for the vacuum to drop to 9 inches Hg. The vacuum shall not drop below 9 inch Hg for the time indicated for each size of manhole as shown in Table 300-2.

TABLE 300-2
REQUIREMENTS FOR MANHOLE VACUUM TESTING

Manhole Diameter (inches)	Max. time for 9” Drop (seconds)
48	60
60	75
72	90
84	105

Any manholes that fail the test shall be sealed and re-tested until acceptable. The testing shall be done after backfilling. Leaks found shall be fixed externally unless approved by City Engineer. The manhole frame and adjusting rings shall be in place at finished grade prior to testing.

304.2 FLEXIBLE PIPE

Prior to other tests all sanitary sewer pipes shall be cleaned and inspected for major defects. Pre-cleaning by appropriately sized sewer cleaning ball or by high velocity jet or other method shall be performed. Any debris, grit, etc. shall be removed and shall not be allowed to enter the existing system.

304.2.1 VISUAL TEST

The City of Naperville may require that sewer lines be inspected visually to verify accuracy of alignment and freedom from debris and obstructions. The percentage of sewer lines inspected will be designated by the City Engineer. The full diameter of the pipe for straight alignments shall be visible when viewed between consecutive manholes. The method of test shall be either photography or closed circuit television, unless a specific method is required by the special provisions and approved by the City Engineer.

304.2.2 DEFLECTION TESTING

A mandrel test is required by the City of Naperville. The City Engineer shall randomly select portions of the project to be deflection tested. Such portions shall consist of the manhole intervals for the initial sewer construction up to 1,200 linear feet and not less than 20% of the remainder of the sewer project. The City of Naperville reserves the right to test more or less pipe if considered appropriate by the City Engineer.

The 5% deflection test for pipe sizes 6 inches to 18 inches in diameter is to be run using a nine-arm mandrel having a diameter equal to 95% of the inside diameter of the pipe as established in ASTM D-2241-96b. Table 300-3 was developed for various pipe sizes using the equations outlined in Section 31-1.11C of the Standard Specifications for Water and Sewer Main Construction in Illinois.

TABLE 300-3
REQUIRED MANDREL SIZE FOR SDR 26 PIPE
(ASTM D2241)

Nominal Pipe Size, Inches	Average Inside Diameter	Required Mandrel Size, Inches
6	6.08	5.68
8	7.92	7.38
10	9.87	9.23
12	11.71	10.98
14	12.86	12.02
16	14.70	13.65

TIME OF TESTING

The individual lines to be tested shall be tested no sooner than 30 days after they have been installed by the contractor. During the first year of implementation, additional testing may be performed by the City of Naperville.

SEQUENCE OF TESTING

Wherever possible and practical, the testing shall initiate at the downstream lines and proceed towards the upstream lines.

TESTING OF ENTIRE PROJECT

In the event that the deflection exceeds the 5% limit in 10% or more of the manhole intervals tested, the total sewer project shall be tested.

RETEST OF FAILED SECTIONS

Where deflection is found to be in excess of 5% of the base inside diameter, the contractor shall excavate to the point of excess deflection and carefully compact around the point where excess deflection was found. The line shall then be retested for deflection. However, if the

deflected pipe fails to return to the original size (inside diameter) after the initial testing, the affected segment shall be replaced.

304.2.3 LEAKAGE TEST

Methods of test which are suitable for various conditions are low pressure air exfiltration or water exfiltration. Explicit instructions for the following methods of test will be supplied by the project design engineer. Plugs, caps, and branch connections must be secured against blow-off during leakage test.

AIR TESTING SAFETY

The contractor is required to follow OSHA rules for trench safety and confined space requirements.

PLUG RESTRAINT

All plugs shall be installed and braced in such a way that blowouts are prevented. Every plug shall be positively braced against the manhole walls, and no one shall be allowed in the manhole adjoining a line being tested so long as pressure is maintained in the line.

RELIEF VALVE

All pressurizing equipment used for low-pressure air testing shall include a regulator or relief valve set no higher than 9 psig to avoid over-pressurizing and displacing temporary or permanent plugs. As an added safety precaution pressure in the test section should be continuously monitored to make certain that it does not at any time exceed 9 psig.

PLUG DESIGN

Either mechanical or pneumatic plugs may be used. All plugs shall be designed to resist internal testing pressures without the aid of external bracing or blocking. However, the contractor shall internally restrain or externally brace the plugs to the manhole wall as an added safety precaution throughout the test.

SINGULAR CONTROL PANEL

To facilitate test verification by the City Engineer, all air used shall pass through a single, above ground control panel.

EQUIPMENT CONTROLS

The above ground air control equipment shall include a shut-off valve, pressure regulating valve, pressure relief valve, input pressure gauge, and a continuous monitoring pressure gauge having a pressure range from 0 to at least 10 psi. The continuous monitoring gauge shall be no less than 4 inches in diameter with minimum divisions of 0.10 psi and an accuracy of 0.04 psi.

SEPARATE HOSES

Two separate hoses shall be used to (1) connect the control panel to the sealed line for inducing low-pressure air, and (2) a separate hose connection for constant monitoring of air

pressure build-up in the line. This requirement greatly diminishes any chance for over-pressurizing the line.

PNEUMATIC PLUGS
If pneumatic plugs are utilized, a separate hose shall also be required to inflate the pneumatic plugs from the above ground control panel.

LINE PREPARATION - LATERALS, STUBS AND FITTINGS
During sewer construction, all service laterals, stubs, and fittings into the sewer test section shall be properly capped or plugged so as not to allow for air loss that could cause an erroneous air test result. It may be necessary and is always advisable to restrain gasketed caps, plugs, or short pipe lengths with bracing stakes, clamps and tie-rods, or wire harnesses over the pipe bells.

PLUG INSTALLATION AND TESTING
After a manhole to manhole reach of pipe has been back-filled to final grade and prepared for testing, the plugs shall be placed in the line at each manhole and secured.

It is advisable to seal test all plugs before use. Seal testing may be accomplished by laying one length of pipe on the ground and sealing it at both ends with the plugs to be checked. The sealed pipe should be pressurized to 9 psig. No persons shall be allowed in the alignment of the pipe during plug testing.

It is required to plug the upstream end of the line first to prevent any upstream water from collecting in the test line.

When plugs are being placed, the pipe adjacent to the manhole shall be visually inspected to detect any evidence of shear in the pipe due to differential settlement between the pipe and the manhole.

LINE PRESSURIZATION
Low pressure air shall be slowly introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any ground water above the pipe, but not greater than 9.0 psig. If ground water is present, refer to 'Determination of Ground-Water Elevation and Air Pressure Adjustment'.

PRESSURE STABILIZATION
After a constant pressure of 4.0 psig (greater than the average ground water back pressure), is reached, the air supply shall be throttled to maintain that internal pressure for at least 4 minutes. This time permits the temperature of the entering air to equalize with the temperature of the pipe wall.

TIMING PRESSURE LOSS
When temperatures have been equalized and the pressure stabilized at 4.0 psig (greater than the average ground water back pressure), the air hose from the control panel to the air supply

shall be shut off or disconnected. The continuous monitoring pressure gauge shall then be observed while the pressure is decreased to no less than 3.5 psig (greater than the average back pressure of any ground water over the pipe). At a reading of 3.5 psig, or any convenient observed pressure reading between 3.5 psig and 4.0 psig (greater than the average ground water back pressure), timing shall commence with a stop watch or other timing device that is at least 99.8% accurate.

DETERMINATION OF LINE ACCEPTANCE

If the time shown in Table 2, for the designated pipe size length (which includes main line sewers and laterals), is achieved before the air pressure drops 0.5 psig; the section undergoing test shall have passed and shall be presumed to be free of defects. The test may be discontinued once the prescribed time has elapsed even though the 0.5 psig drop has not occurred.

DETERMINATION OF LINE FAILURE

If the pressure drops 0.5 psig before the appropriate time shown in Table 3 has elapsed, the air loss rate shall be considered excessive and the section of pipe has failed the test.

LINE REPAIR OR REPLACEMENT

If the section fails to meet these requirements, the contractor shall determine at his own expense, the source or sources of leakage and he shall repair or replace all defective materials and/or workmanship to the satisfaction of the City Engineer. The extent and type of repair which may be allowed, as well as the results, shall be subject to the approval of the City Engineer. The completed pipe installation shall then be retested and required to meet the requirements of this test.

304.2.4 LEAKAGE TESTING – ADJUSTMENTS FOR GROUND WATER

The requirements of this section shall only apply where ground water is known to exist or is anticipated above the sewer line to be tested.

AIR PRESSURE ADJUSTMENT

The air pressure correction, which must be added to the 3.5 psig normal testing starting pressure, shall be calculated by dividing the average vertical height, in feet of ground water above the invert of the sewer pipe to be tested, by 2.31. The result gives the air pressure correction in pounds per square inch to be added. (For example, if the average vertical height of ground water above the pipe invert is 2.8 feet the additional air pressure required would equal 2.8 divided by 2.31 or 1.2 psig. This would require a minimum starting pressure of 3.5 psig plus 1.2 psig or 4.7 psig.) The allowable pressure drop of 0.5 psig and the timing in Table 300-4 are not affected and shall remain the same.

MAXIMUM TEST PRESSURE

In no case should one starting test pressure exceed 9.0 psig If the average vertical height of ground water above the pipe invert is more than 12.7 feet, the section so submerged may be tested using 9.0 psig as the starting test pressure.

SPECIFIED TIME TABLES

To facilitate the proper use of this required practice for air testing, Table 300-4 is provided. Table 300-4 contains specified minimum times required for a 0.5 psig pressure drop from a starting pressure of at least 3.5 psig greater than the average back pressure of any ground water above the pipe's invert.

TABLE 300-4

SPECIFIED TIME REQUIRED FOR A 0.5 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015

(1) Pipe Dia.	(2) Min. Time	(3) Length For Min. Time	(4) Time For Longer Length	Specification Time for Length (L) Shown (min:sec)								
(in)	min:sec	(ft)	(sec)	100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft	500 ft
4	1:53	597	0.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12	3:34
8	3:47	298	0.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42	6:20
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54	9:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50	14:15
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02	22:16
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51	32:03
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16	43:38
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17	56:59
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	46:54	72:07
30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07	89:02
33	15:35	72	12.926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57	107:43
36	17:00	66	15.384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23	128:12

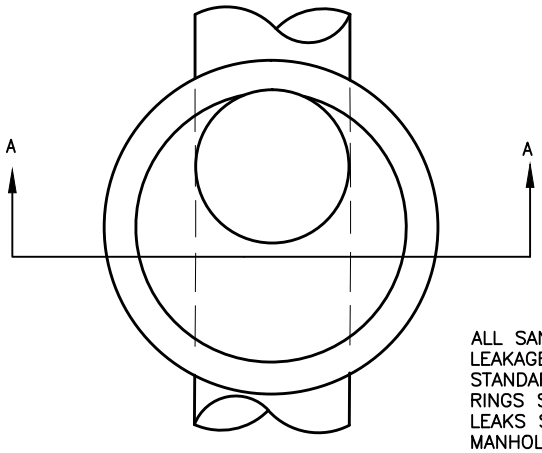
390 STANDARD DETAILS

390.01 Sanitary Sewer Manhole
390.02 Sanitary Manhole – Exterior Drop Connection
390.03 Sanitary Manhole – Interior Drop Connection
390.04 Sanitary Manhole – Drop Connection to Ex. Manhole
390.05 Sanitary Manhole – Dog House Connection
390.06 Sanitary Manhole - Frame and Cover

390.10 Trench Section for PVC Pipe

390.20 Riser for Service Lateral
390.21 Sanitary Sewer Service Connection
390.22 Sanitary Sewer Pipe Insulation
390.23 Sanitary Sewer Cleanout

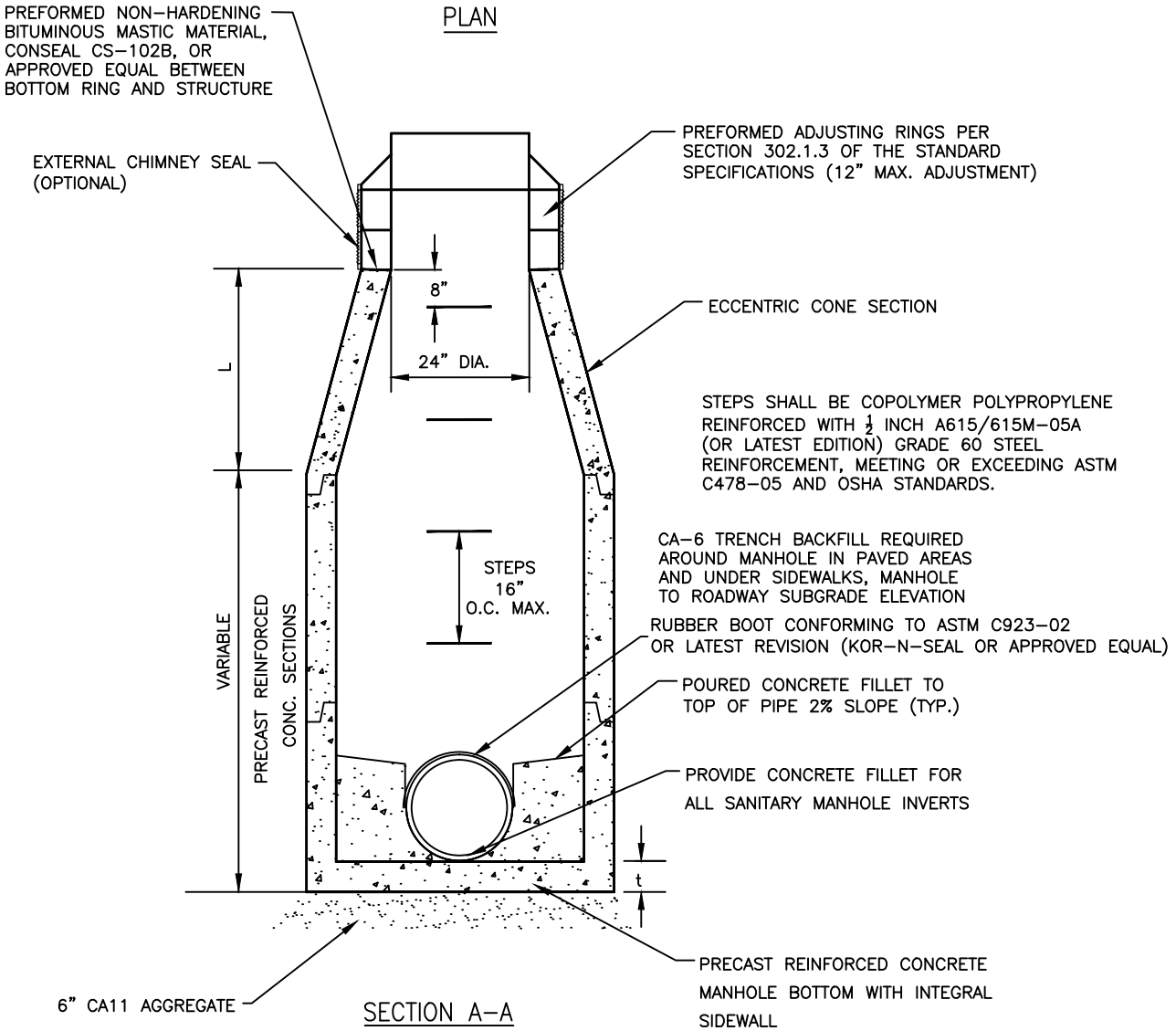
390.99 COMMON NAMES
All standard details in this section may be referred to by a common name in associated construction documents. The common name shall be "SANITARY xx" where the xx is the section of the detail number to the right of the decimal point. For instance, *Detail #390.01 Sanitary Sewer Manhole* may also be referred to as "SANITARY 1".



PLAN

Inside MANHOLE. DIAMETER.	48"	60"
Pipe DIAMETER.	≤21"	>21"
Wall Thickness	5"	6"
Ecc. Cone Sec.(L)	2'-6"	3'-9"
MANHOLE DEPTH	≤12'	>12'
t	8"	10"

ALL SANITARY MANHOLES SHALL BE TESTED FOR LEAKAGE BY VACUUM TESTING PER CITY STANDARDS. THE MANHOLE FRAME AND ADJUSTING RINGS SHALL BE IN PLACE WHEN TESTING. ANY LEAKS SHALL BE REPAIRED FROM EXTERIOR OF MANHOLE – PATCHING INSIDE OF MANHOLE SHALL NOT BE ACCEPTABLE.



SECTION A-A

City of Naperville

STANDARD DETAIL

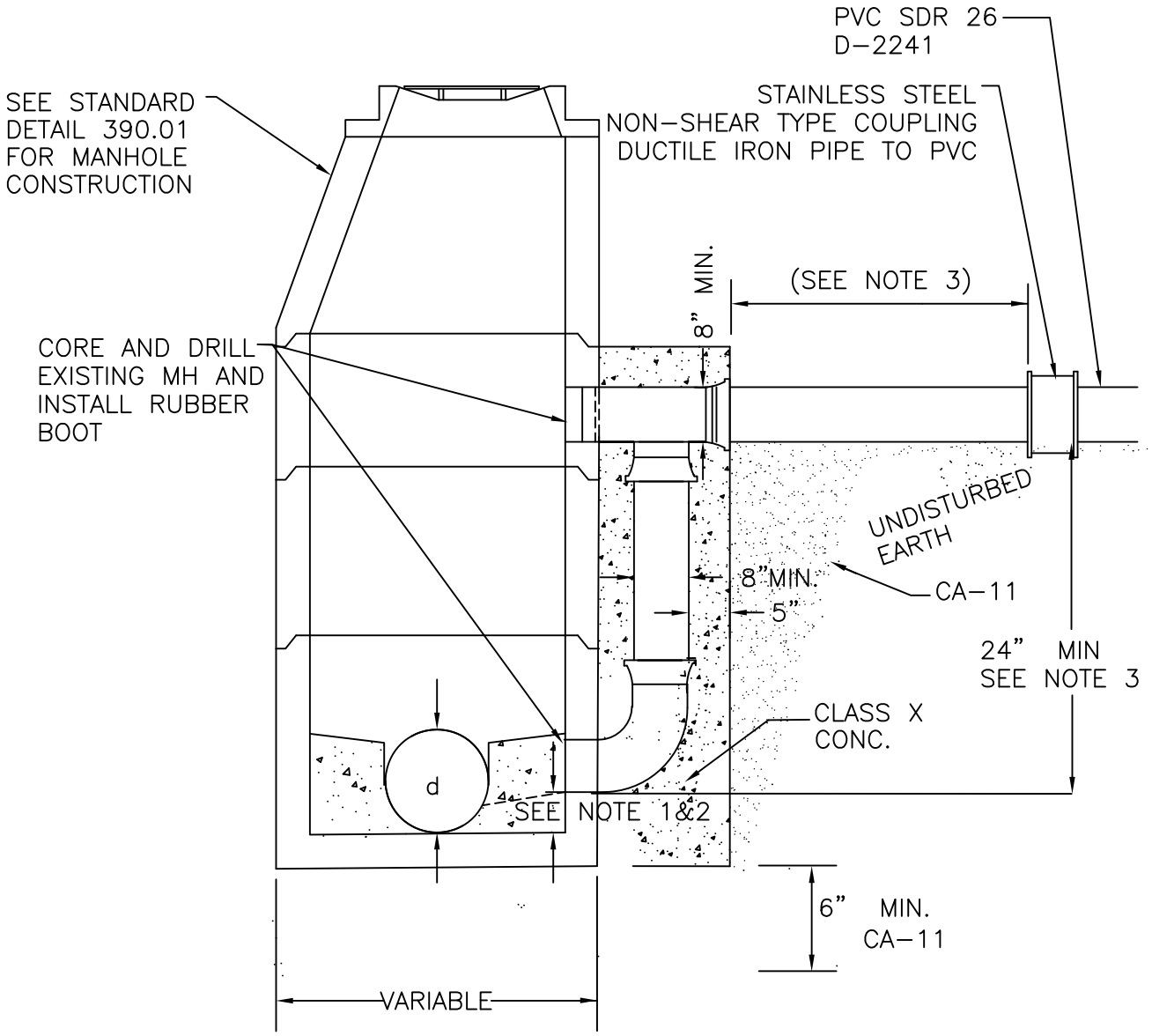
SANITARY SEWER MANHOLE

REVISED: 08/01/2018

SHEET 1 OF 1

SANITARY 1

390.01

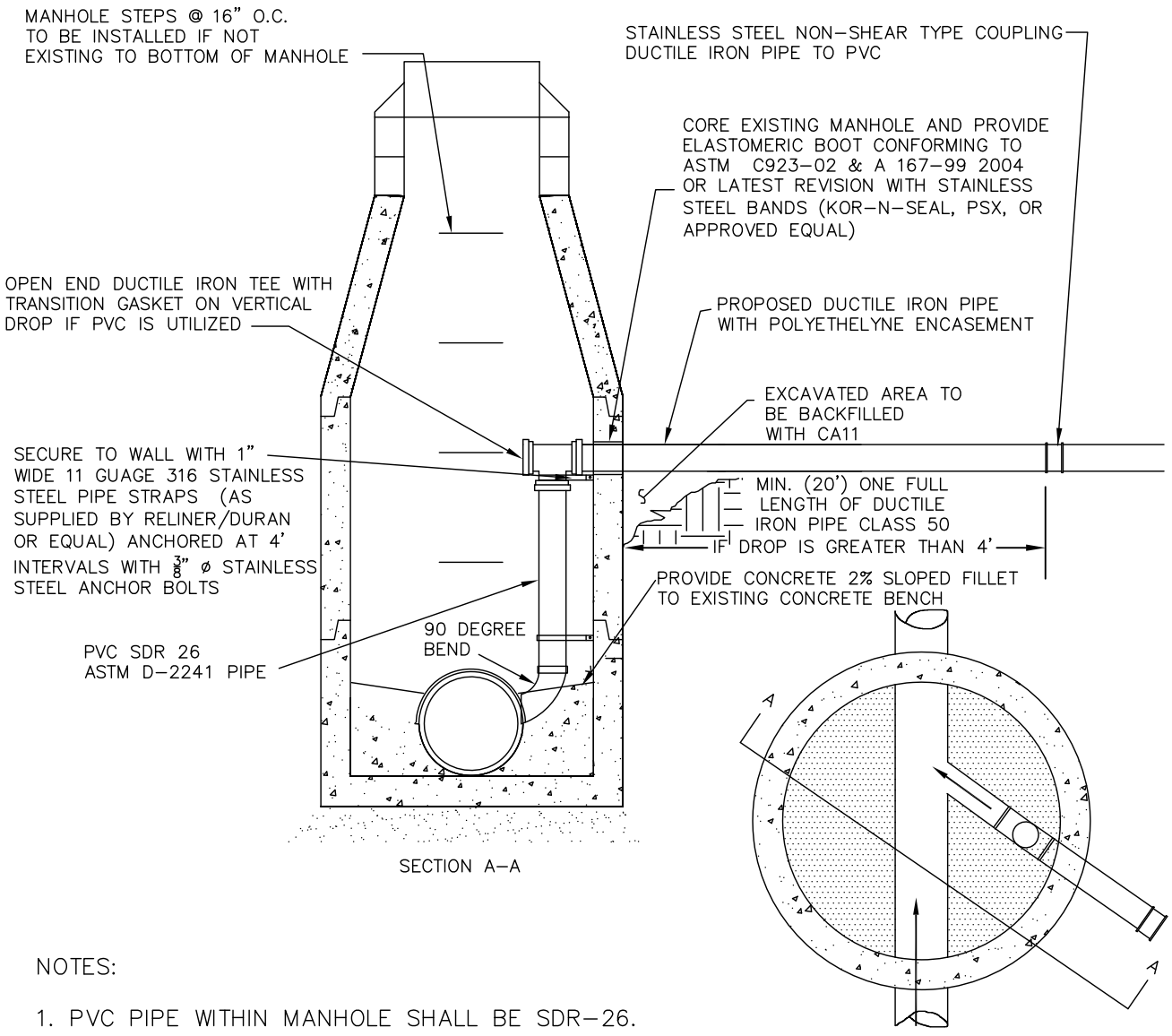


1. NOTE DROP INVERT TO BE $\frac{1}{4}$d TO $\frac{1}{2}$d
   d= DIAMETER OF LOWER EXISTING PIPE

2. CONCRETE BENCH TO PROVIDE SMOOTH TRANSITION

3. PVC SDR 26, ASTM 2241 MAY BE USED FOR DROPS 2' TO 4'; FOR DROPS GREATER THAN 4' USE DUCTILE IRON PIPE SCH 50 MIN ONE FULL LENGTH.

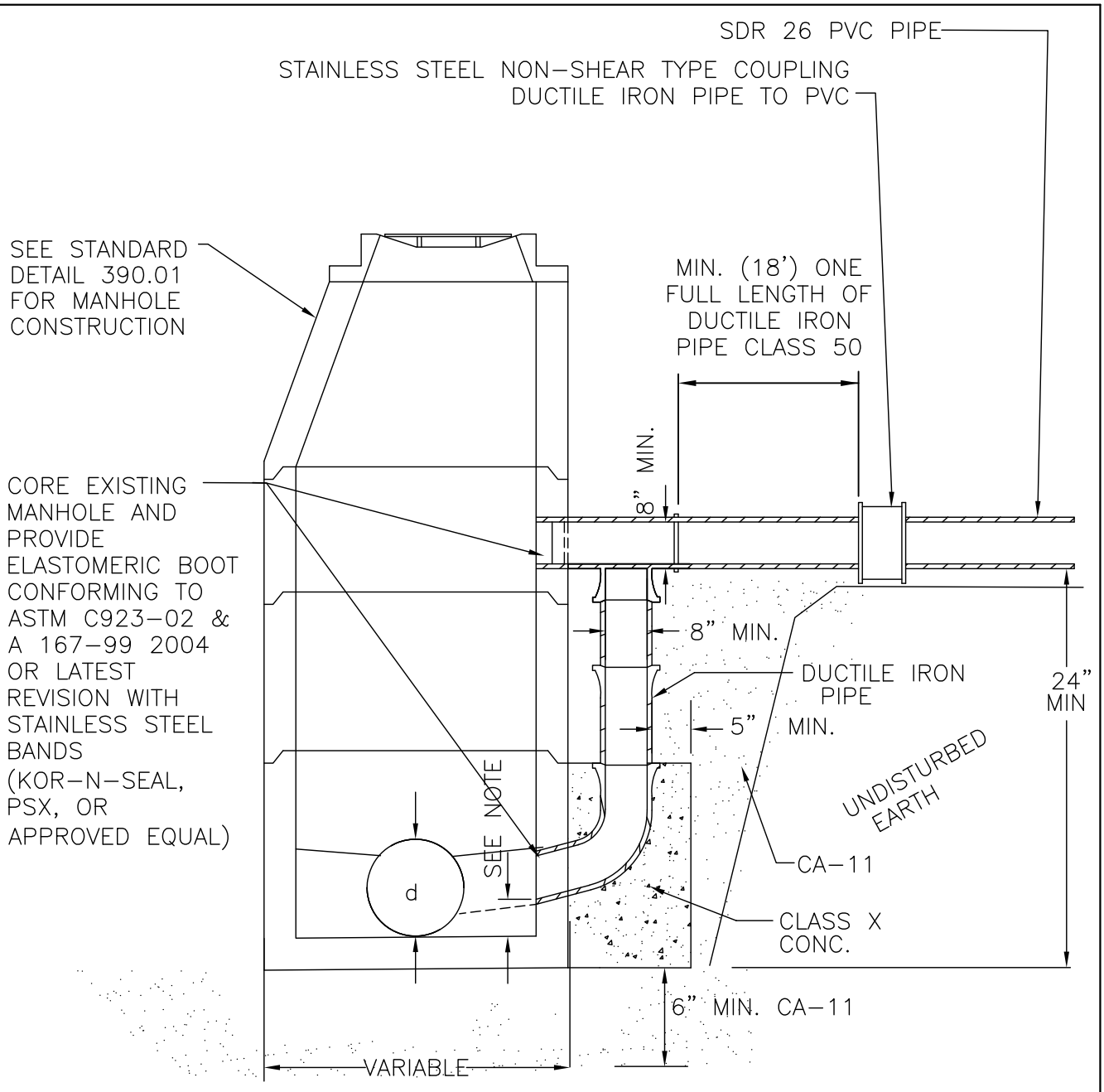
City of Naperville STANDARD DETAIL	SANITARY MANHOLE - EXTERIOR DROP CONNECTION	REVISED: 01/01/2013	SHEET 1 OF 1	SANITARY 2 390.02



NOTES:

1. PVC PIPE WITHIN MANHOLE SHALL BE SDR-26.
2. FLOWLINE OF DROP SHALL BE LOCATED BETWEEN SPRINGLINE AND TOP OF SEWER MAIN.
3. EXISTING FLOW THROUGH MANHOLE SHALL BE UNOBSTRUCTED DURING CONSTRUCTION OR BYPASS PUMPED PER CITY APPROVAL.
4. ALL HARDWARE WITHIN MANHOLE SHALL BE 316 STAINLESS STEEL
5. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH CITY OF NAPERVILLE DESIGN STANDARDS. INTERIOR DROP AND PROPOSED ELEVATIONS MUST BE APPROVED BY DEPARTMENT OF PUBLIC UTILITIES.
6. FLEXIBLE COUPLING CONNECTING DUCTILE IRON. PIPE TO PVC PIPE SHALL BE A SHEAR RING TYPE COUPLING AS MANUFACTURED BY FERNCO, SERIES 1056R OR APPROVED EQUAL.

City of Naperville STANDARD DETAIL	SANITARY MANHOLE - INTERIOR DROP CONNECTION	SANITARY 3 390.03
	REVISED: 01/01/2013 | SHEET 1 OF 1	



NOTE:

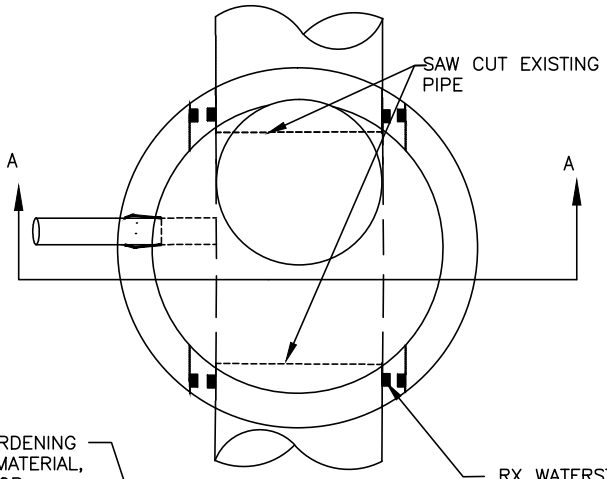
1. INVERT OF DROP CONNECTION TO BE 1/4 TO 1/2 OF "d" UNLESS OTHERWISE NOTED ON PLANS (d= DIAMETER OF LOWER EXISTING PIPE)

2. EXISTING CONCRETE BENCH REWORKED TO PROVIDE SMOOTH TRANSITION.

3. ALL DUCTILE IRON PIPE TO BE CONCRETE ENCASED.

City of Naperville **STANDARD DETAIL**	**SANITARY MANHOLE - DROP CONNECTION TO EX MANHOLE**	SANITARY 4 **390.04**
	REVISED: 01/01/2013	SHEET 1 OF 1

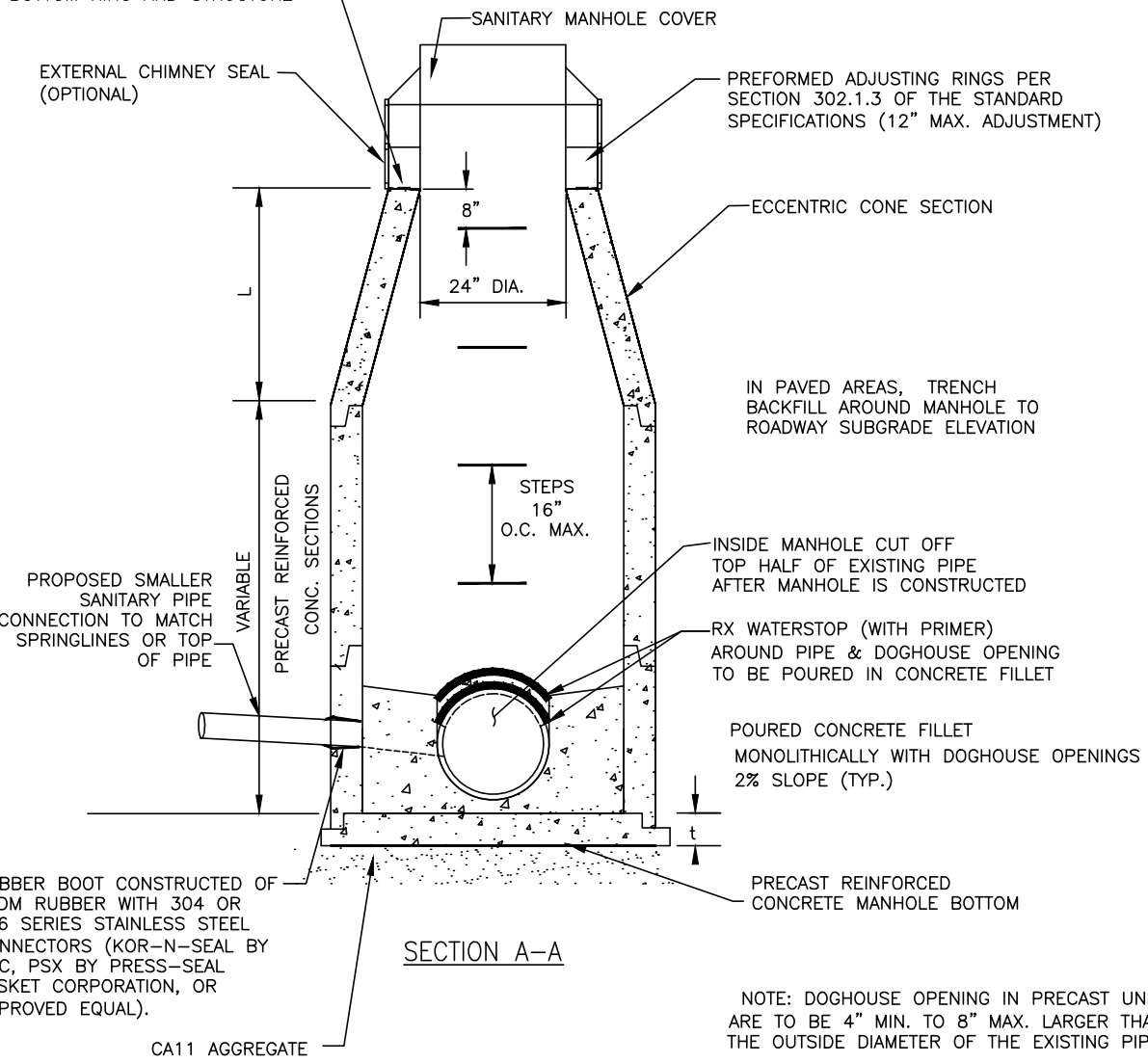
INSIDE MANHOLE. DIAMETER.	48"	60"
PIPE DIAMETER.	≤21"	>21"
WALL THICKNESS	5"	6"
ECC. CONE SEC.(L)	2'-6"	3'-9"
MANHOLE DEPTH	≤12'	>12'
T	8"	10"



PLAN

PREFORMED NON-HARDENING BITUMINOUS MASTIC MATERIAL, CONSEAL CS-102B, OR APPROVED EQUAL BETWEEN BOTTOM RING AND STRUCTURE

RX WATERSTOP OR APPROVED EQUAL INSTALLED PER MANUFACTURERS RECOMMENDATIONS. (ONLY ONE SIDE SHOWN FOR CLARITY.)



SECTION A-A

NOTE: DOGHOUSE OPENING IN PRECAST UNIT ARE TO BE 4" MIN. TO 8" MAX. LARGER THAN THE OUTSIDE DIAMETER OF THE EXISTING PIPE.

City of Naperville

STANDARD DETAIL

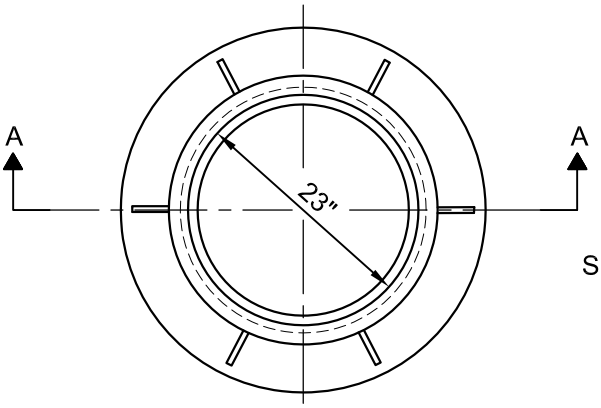
SANITARY MANHOLE - DOG HOUSE CONNECTION

REVISED: 08/01/2018

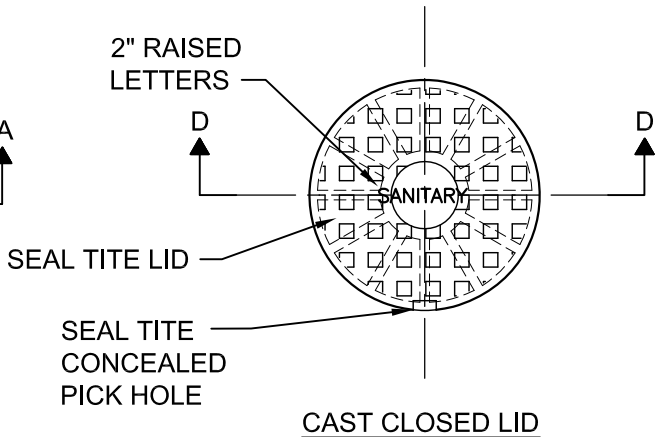
SHEET 1 OF 1

SANITARY 5

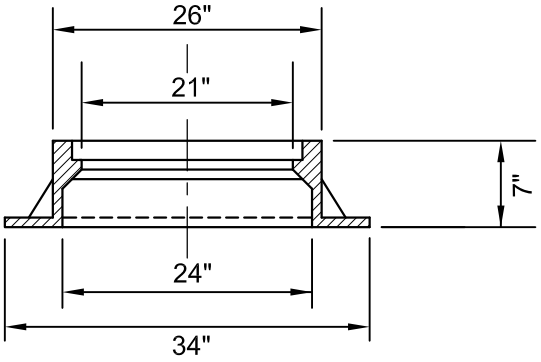
390.05



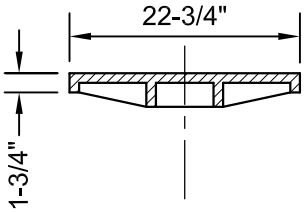
CAST FRAME



CAST CLOSED LID



SECTION A-A



SECTION D-D

NOTES:

1) DUCTILE IRON SHALL BE GRADE 65-45-12 AND SHALL BE TESTED IN ACCORDANCE WITH FEDERAL SPECIFICATIONS.

2) ALL FRAMES AND COVERS SHALL HAVE MACHINED HORIZONTAL AND VERTICAL BEARING SURFACES. PICK HOLES SHALL NOT CREATE OPENINGS IN THE COVER.

3) THE MANHOLE COVERS SHALL HAVE 2" RAISED LETTERS AS SHOWN.

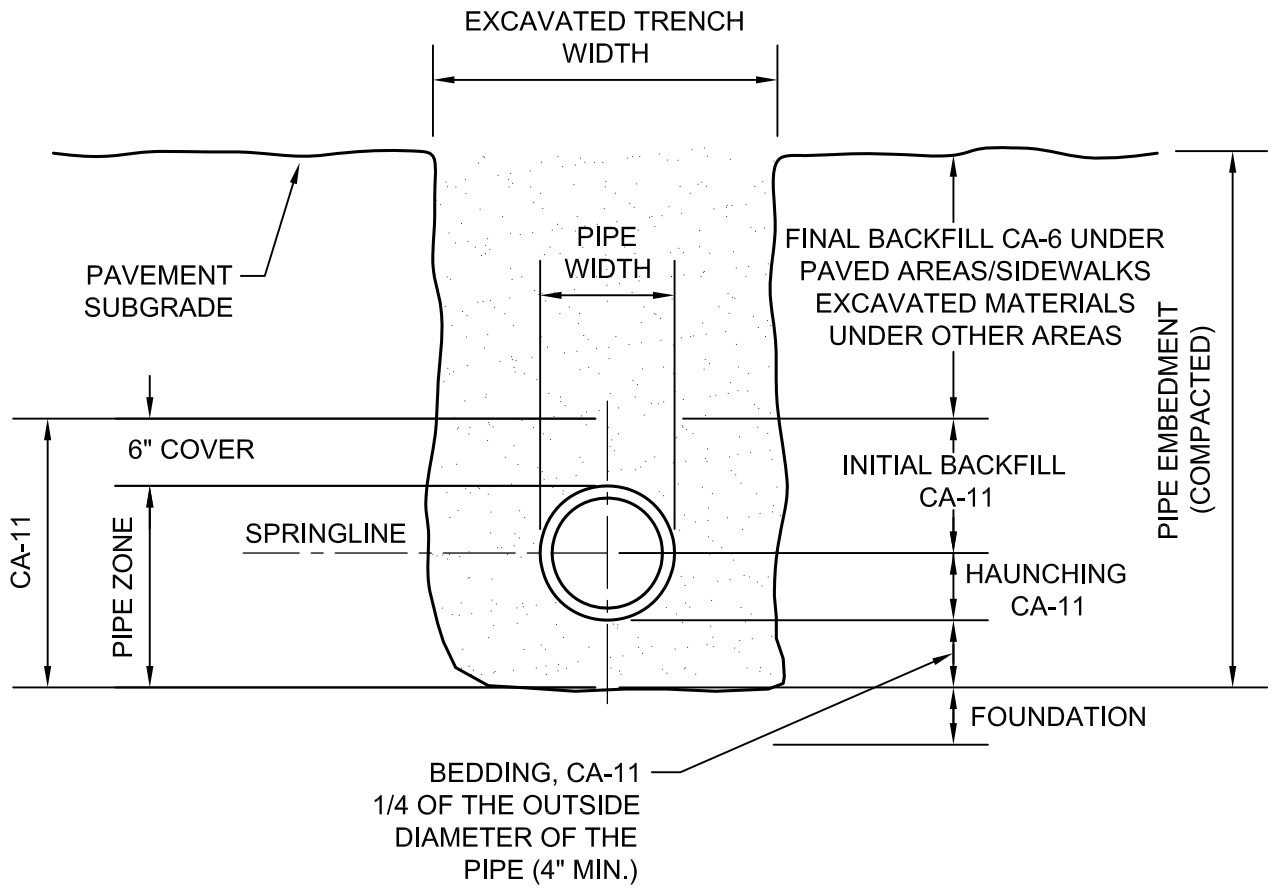
4) ALTERNATIVE TO DUCTILE IRON LID, GREY IRON CL 35 LID MAY BE USED.

5) CASTINGS ARE SHALL BE EAST JORDAN 1022-Z3; NEENAH R-1772 OR APPROVED EQUAL.

6) WATERPROOF, BOLTDOWN FRAME AND COVER SHALL BE USED IN FLOOD PLAIN AREA, AND AS NOTED ON THE PLANS. NEENAH R-1916-F1, EAST JORDAN IRON WORKS 1022-Z1PT OR APPROVED EQUAL.

7. LIDS AND FRAMES TO MEET ASSHTO M306 PROOF LOADING SPECIFICATIONS

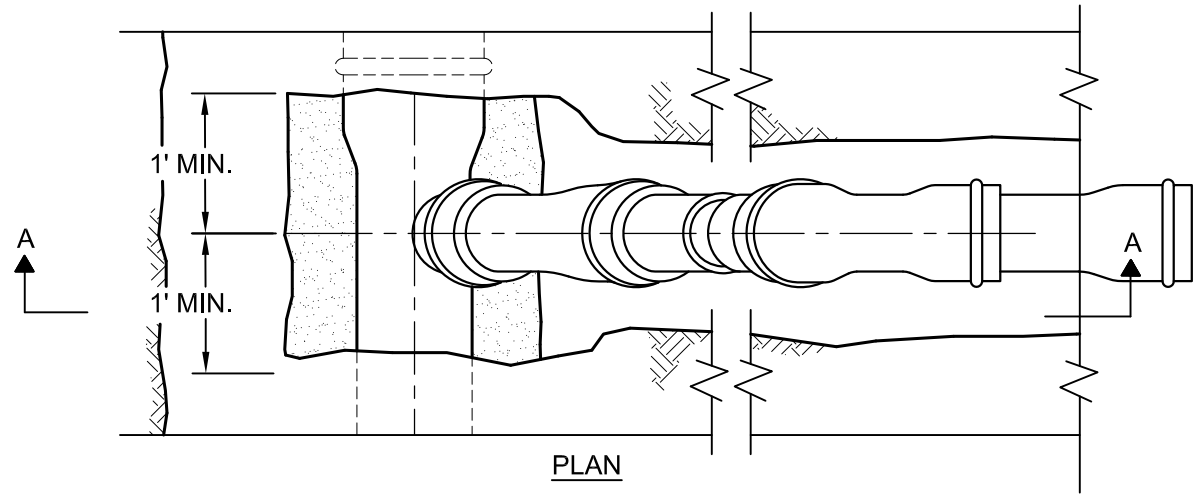
City of Naperville STANDARD DETAIL	**SANITARY MANHOLE - FRAME & COVER** REVISED: 01/01/2013 | SHEET 1 OF 1	SANITARY 6 **390.06**



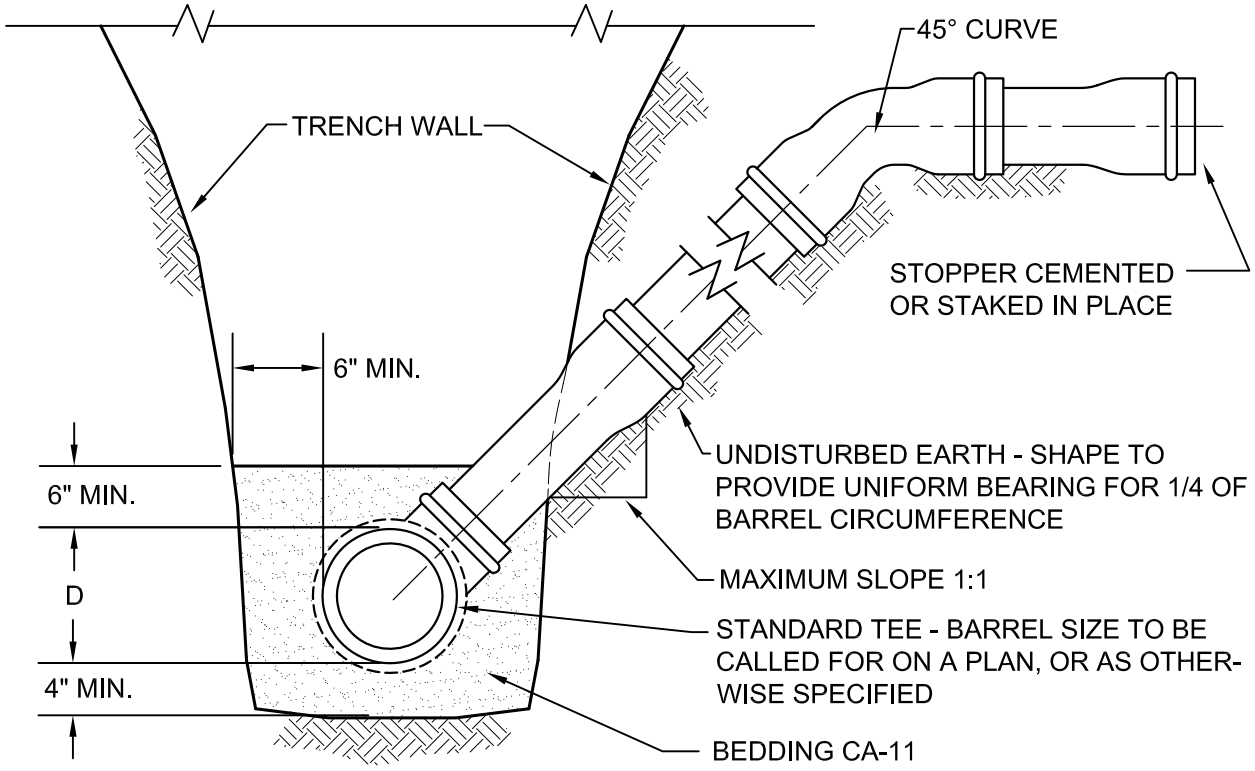
NOTES:

1. IN PAVED AREAS, ALL TRENCHES MUST BE COMPACTED IN CONFORMANCE WITH SECTION 550.07 OF THE IDOT STANDARD SPECIFICATIONS FOR ROAD & BRIDGE CONSTRUCTION.

2. IF FOUNDATION IS UNSUITABLE TO BED PIPE, UNDERCUTS MAY BE REQUIRED AS DIRECTED BY THE ENGINEER.



PLAN



SECTION A-A

1. THE OPEN ENDS SHALL BE PROTECTED FROM DEBRIS AND GROUNDWATER ENTERING THE LATERAL WITH AN APPROVED PLUG.

2. MAXIMUM SLOPE SHALL BE LESS THAN 1:1 WHEN IT IS NECESSARY TO SECURE BEDDING IN UNDISTURBED EARTH.

3. WHEN A SERVICE CONNECTION IS TAPPED INTO PVC MAIN, THEN A SEWER SADDLE SHALL BE USED. GENECO TYPE "SEALTITE" OR APPROVED EQUAL. BANDS, NUTS AND BOLTS MUST BE 304 STAINLESS STEEL.

4. SDR 26 PVC PIPE MEETING REQUIREMENTS OF ASTM D-2241-05 AND JOINTS CONFORMING TO ASTM D-3139-98(2005) OR LATEST EDITIONS.

City of Naperville STANDARD DETAIL	RISE FOR SERVICE LATERAL REVISED: 01/01/2013 — SHEET 1 OF 1	SANITARY 20 390.20

FIGURE 1
STANDARD TEE CONNECTION
EXISTING CLAY ON PVC

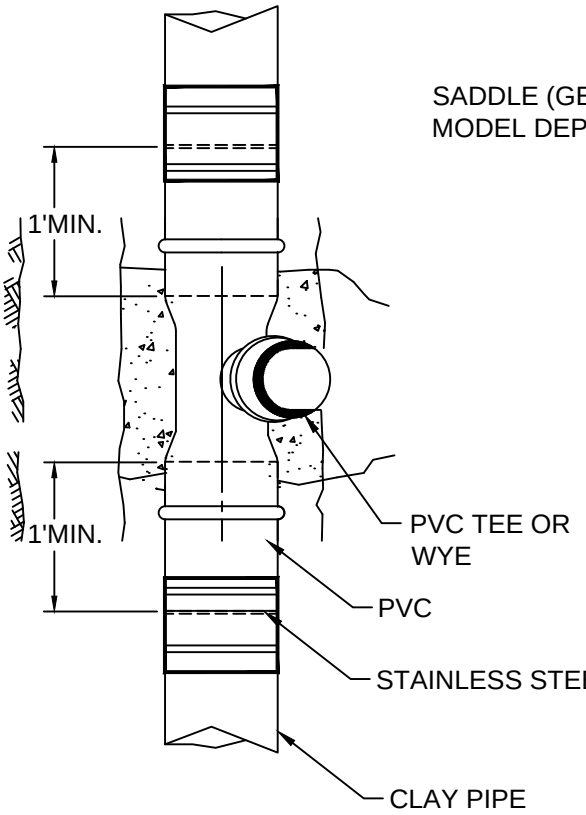
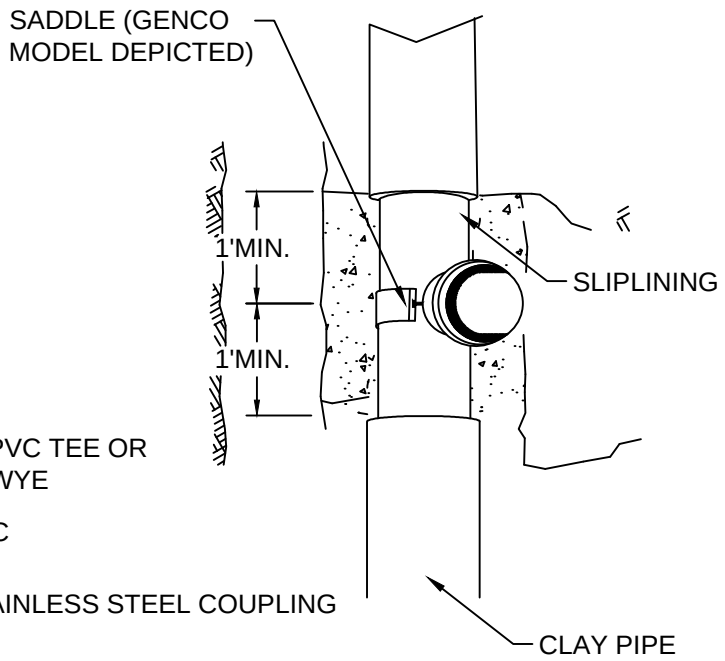


FIGURE 2
STANDARD SADDLE CONNECTION
EXISTING PVC OR LINED PIPE



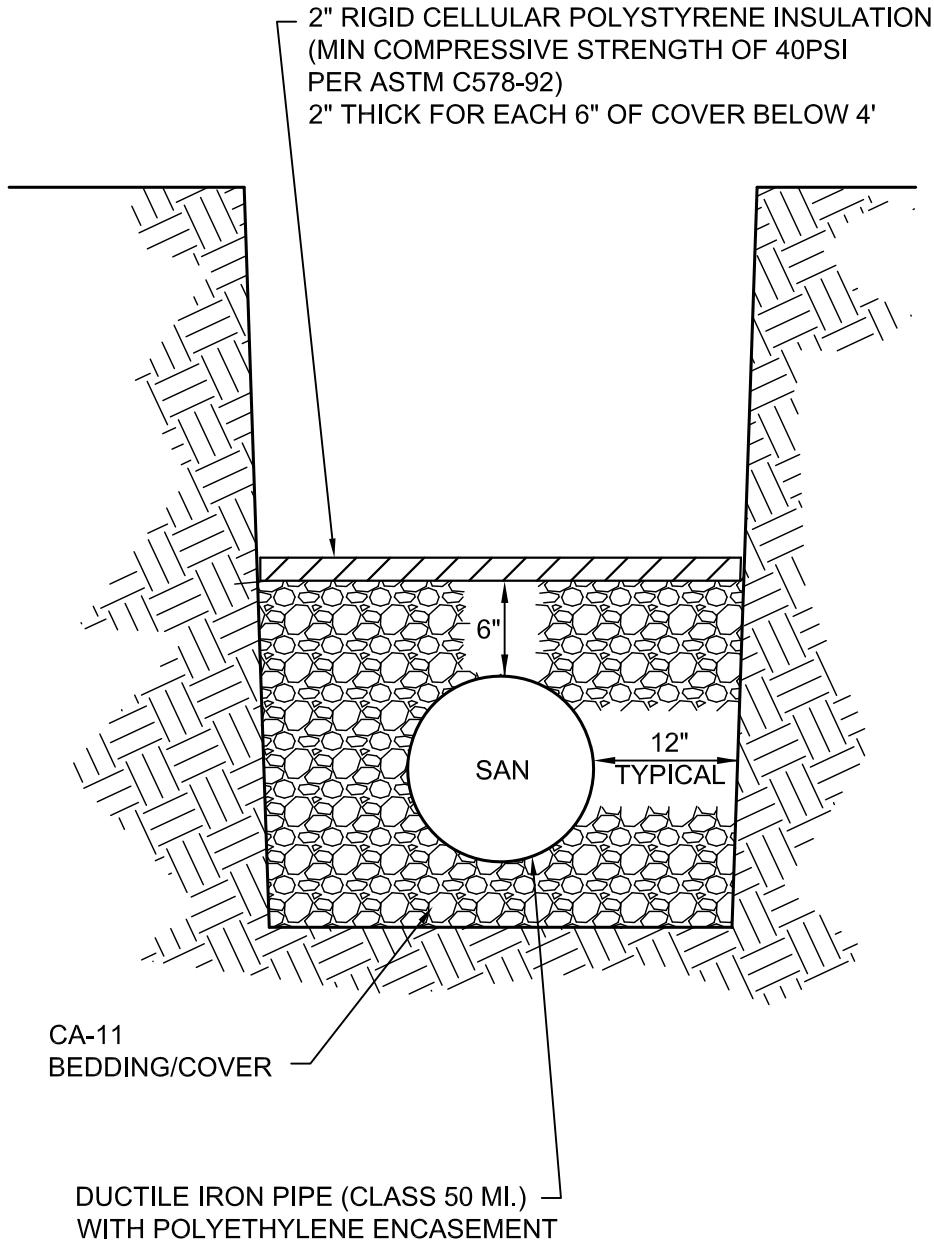
STANDARD TEE CONNECTION-FIGURE 1

1. BYPASS OR RESTRICT FLOW IN PIPE AS REQUIRED.
2. SAW CUT AND REMOVE EXISTING PIPE TO MINIMUM EXTENT SHOWN IN FIGURE 1.
3. INSTALL STANDARD PVC TEE AND PIPE AS SHOWN, PVC SHALL BE SDR26, ASTM 2241.
4. FLEXIBLE COUPLING SHALL BE A NON-SHEARING TYPE TRANSITION COUPLING: FERNCO STRONG BACK RC 1000 SERIES, CASCADE STYLE CSS COUPLING, OR APPROVED EQUAL.

STANDARD SADDLE CONNECTION FIGURE 2

1. FOR LINED PIPE CAREFULLY REMOVE OLD CLAY PIPE TO MINIMUM EXTENT SHOWN WITHOUT DAMAGING LINER PIPE.
2. HOLES FOR SADDLE INLET SHALL BE LAID OUT USING SADDLE AS TEMPLATE AND CUT WITH APPROPRIATE EQUIPMENT NOT DAMAGE THE PIPE TO REMAIN. HOLE TO BE BE DE BURRED AND BEVELED WHERE REQUIRED TO PROVIDE HOLE SLOPE TO CONFORM TO THE FITTING.
3. SADDLE SHALL BE SEALTITE TEE "U" MODEL 40 BY GENCO, CASCADE STYLE CSWRY OR CSWRT, OR APPROVED EQUAL.

THE INSTALLATION OF THIS APPLICATION MUST BE APPROVED IN WRITING BY THE DEPARTMENT OF PUBLIC UTILITIES WATER CIVIL ENVIRONMENTAL ENGINEERING DIVISION



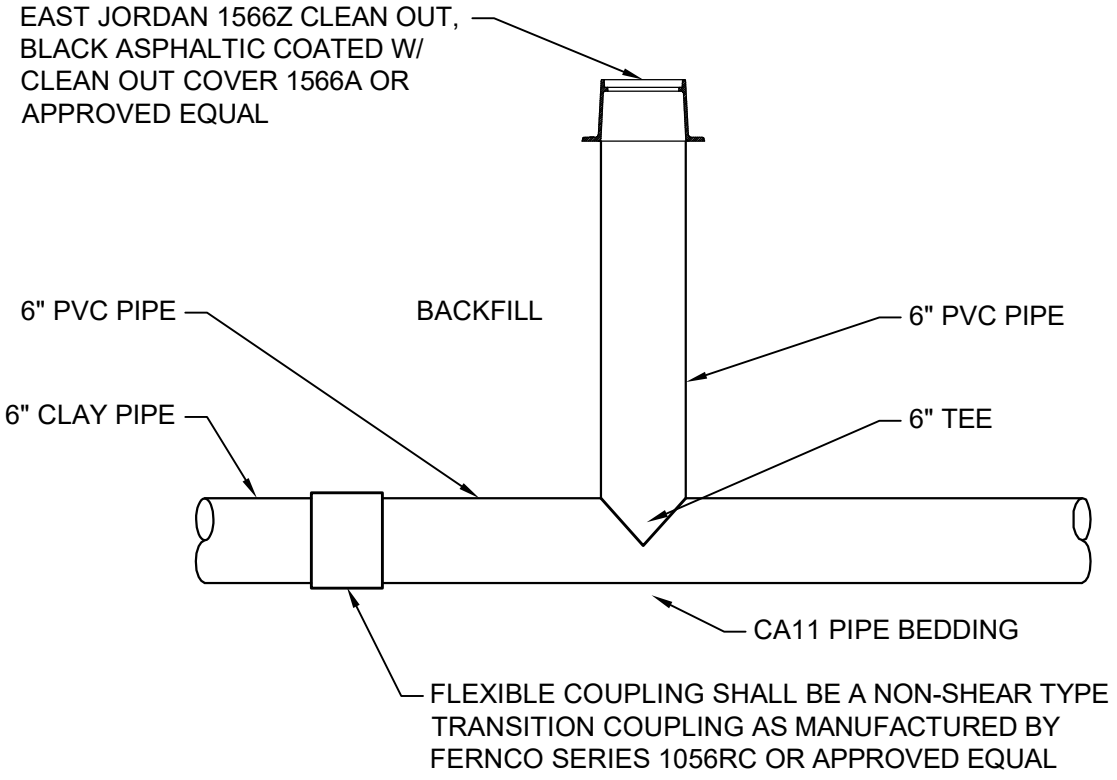
City of Naperville
STANDARD DETAIL

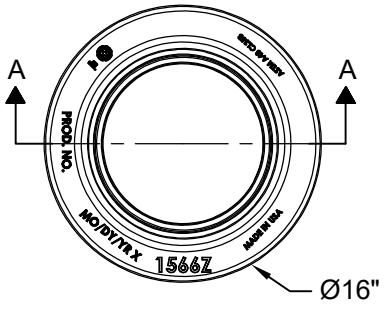
SANITARY SEWER PIPE INSULATION

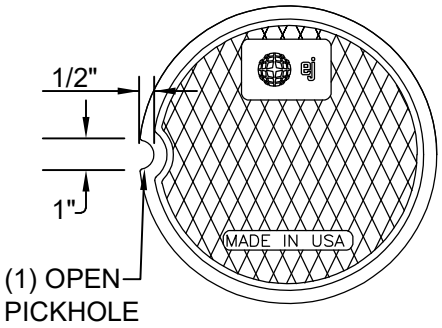
REVISED: 01/01/2013 | SHEET 1 OF 1

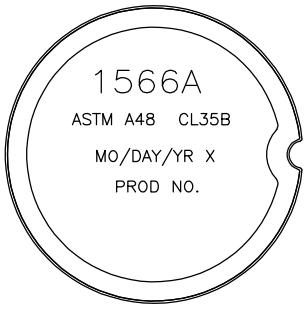
SANITARY 22

390.22

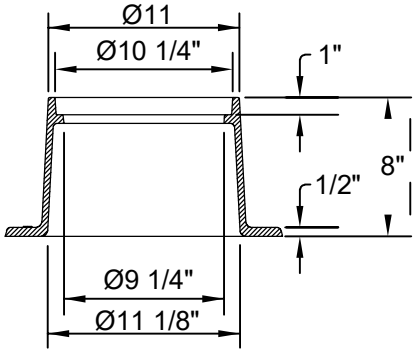






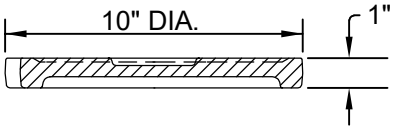


COVER BACK



SECTION A-A

1566Z CLEAN OUT BOX FRAME



COVER SECTION

1566A CLEAN OUT/MONUMENT BOX COVER

City of Naperville
STANDARD DETAIL

SANITARY SEWER CLEANOUT

REVISED: 10/04/2023 | SHEET 1 OF 1

SANITARY 23

390.23

Department of Public Utilities - Water & Wastewater

DIRECTOR'S OFFICE (ADMINISTRATION)

6701 **Director of Public Utilities - Water** — **Darrell Blenniss, Jr.**

WATER RECLAMATION DIVISION (23.5)

3712 Plainfield/Naperville Rd

MANAGER'S OFFICE (3)

6702 **Deputy Director**	**Joe Slevnik**
6704 **Assistant Division Manager**	Amy Wrigley
6505 **Technical Specialist**	Cole Tilford

WATER LABORATORY SECTION (3.5)

6703 **Regulatory Compliance Manager**	**Lisa McNames**
6501 **Chemist**	Jill Thiel
3071 **Senior Utility Technician - Lab**	Bill Goerich
9019 **Lab Intern** (temporary)	Emily Nies

WATER RECLAMATION SECTION (17)

6529 **Wastewater Operations Supervisor**	**Tom Greybill**
6516 **Wastewater Operations Field Spvsr**	Carl Christensen
	Samantha Blake
3063 **Senior Utility Technician** (8)	
Vacant	Rick Flaar
Mark Walton	Ryan Laman
Jeff Johnson	Brent Frantzen
Bill Powers/**L**	Gary Almeroth
6509 **Wastewater Maintenance Spvsr**	**Rob Yagoda**
6504 **Wastewater Maintenance Field Spvsr**	Harry Schultz III
3071 **Senior Utility Technician** (4)	Rodney Studdard
	Izzy Pasillas
	Sam Olivo
	Michael Waters

WATER SUPPLY, DISTRIBUTION & COLLECTION DIVISION (44)

1200 West Ogden Av

MANAGER'S OFFICE (5)

6513 Deputy Director	**Tony Conn**
6502 Water Supply Project Manager	Shannon McNelis
6503 Automation & Communication Technician	Anthony Lotarski
6503 Automation & Communication Technician	Coty Reigh
6526 Collection & Pumping Project Manager	Emily Eichholzer

WATER DISTRIBUTION & METERING SECTION (9)

6518 Water Distribution & Metering Supervisor		**Chad Young**
6526 Technical Specialist		Angie Keller
6521 Water D&M Field Supervisor		David Sloan
3070 Utility Technician (5)	James Lenert	Bill Rehr
Josh Rogers	Jack McClernon	Ray Warren
3071 Sr Utility Technician (1)		Joe O'Malley/**L**

WATER SUPPLY SECTION (6)

6511 Water Supply Supervisor		**Joe King**
6506 Water Supply Field Supervisor		Carter Szok
3071 Sr Utility Technician (4)	Sam Isleib	Shawn Novotney
	Jamie Antich	Steve Subat

REPAIR & EXCAVATION SECTION (13)

6520 Repair & Excavation Supervisor		**Chris Myers**
6523 Repair & Excavation Field Supervisor		Brett Johnson
3070 Senior Utility Technician (8)		
Angel Montelongo	Mike Szopinski	Luke Lopez
Max Nerison	Micky Nicholas	Dariusz Rafacz
Jarrett Ripsky	Tom Sargis	
3071 Senior Utility Tech (3)	Pete Kovacs/**L**	Darryl Vance
	Jeremy Abel	

WW COLLECTION & PUMPING SECTION (11)

6519 WW C&P Supervisor		**Jason Tranchitella**
6522 WW C&P Field Supervisor		Jeff Nier
3070 Utility Technician (6)	Nick Moscatello	Roderick Polk
	Jordan Garcia	Patryk Pabian
	Luis Macias	John Corrales
3071 Senior Utility Tech (3)	Greg Jachymiak	Keith Chilicki/**L**
	Nate VerHoef	

ADMINISTRATION (7)

1200 West Ogden Av

MANAGER'S OFFICE (7)

6513 Budget, Administrative and Technolc	**Doug Splitt**
9020 Project Manager	Katy Librizzi
7078 GIS Specialist	Tyler Weszt
2706 Sr Administrative Assistant	Andrea Rolfe
5509 Administrative Supervisor	Margie Schlueter
2702 Administrative Assistant	Julie Heidank
2702 Administrative Assistant	Vacant 01/02/2026

CIVIL-ENVIRONMENTAL ENGINEERING & CONSTRUCTION MANAGEMENT DIVISION (12)

3612 Plainfield/Naperville Rd

MANAGER'S OFFICE (2)

6025 **Utility Engineering Manager**	**Joshua Strait**
6025 **Utility Engineering Manager**	**Jian (Jason) Xi**

CONSTRUCTION ENGINEERING & PROJECT MANAGEMENT (6)

6525 **Sr Civil-Environmental Engineer**	Alex Bielawa
6525 **Sr Civil-Environmental Engineer**	Luying Li
6530 **Civil-Environmental Engineer**	Katie Snyder
6530 **Civil-Environmental Engineer**	Vacant
6526 **Water Main Construction Inspector**	Zach Billings
6526 **Water Main Construction Inspector**	Mike Sanalitro
Intern	Ellie Bergeron

UTILITY LOCATING, INSPECTIONS & MAPPING (4)

6524 **Utility Inspection Supervisor**	**Jeff Burger**
3071 **Senior Utility Technician**	Dave Lesac/**L**
3070 **Water Utility Technician** (2)	Enrique Garcia
	Wally Thome

date & initial when updating

WRC	1/8/26 AR rev no edits
CEECM	1/8/26 AR rev no edits
WSD&C	01/0/2026 kl, ms
Mgr's Office	01/08/2026 ms kl

L =Leadman

Naperville

COLLECTION & PUMPING

Sewer Cleaning Guidelines

I. Before Leaving the Shop

- Perform a daily CDL safety and fluid check on your vehicle.
- Gather all necessary supplies for the day, including your basin map, flushing forms, complaint forms, safety cones, safety vest, and traffic control signs. Don't forget your personal protective equipment (PPE), charged batteries for the flashlight, gas meter.
- Ensure all confined space gear, such as gas meters and a winch tripod, is working correctly.
- Inspect other essential equipment, including nozzles, a basket, hard hat, and rain gear. Be sure to have a large roll of black tape to secure vactor clamps.
- Take your assigned cell phone, computer, and personal headset with you.
- Bring paper towels and cleaning products in case you need to assist with cleaning up a customer's floor due to blow-back.
- Pack a spare root saw motor and blades, along with any other miscellaneous items needed for the root saws.
- During cold weather, bring a 5-gallon bucket of salt to spread on icy sidewalks and crosswalks to prevent slips and falls.

II. Filling the Flusher

- Review your basin flushing map for any filling restrictions.
- Before connecting the hose to the hydrant, open the hydrant to check for sand or rust. If it takes more than two minutes to clear, notify your Field Supervisor.
- If you find mechanical problems with a hydrant or water quality issues, contact your Field Supervisor.
- In freezing weather, make sure there is no trapped water in the caps and that the hydrants are fully closed and draining.
- In freezing weather, use the recirculatoron both flushers.
- Schedule breaks around fill-ups whenever possible.
- At the end of each day, ensure the flusher is half-full of fuel, the water tanks are full, the debris tank is empty, and all paperwork is turned in to your Field Supervisor.
- Inspect the leader hose and flusher hose, and change out the water filter as needed.
- When cleaning interceptors, clean the water filter at the end of every day.

III. Cleaning Lines

- Position the flusher and tender trucks to cause the least disruption to traffic.
- Utilize traffic control devices as needed.
- Avoid driving off paved surfaces. If you need traffic control assistance, contact your Field Supervisor.
- Clean all lines thoroughly, removing all debris from the lines and manholes. When removing debris from manholes, follow proper confined space procedures.
- If you need assistance removing debris, contact your Field Supervisor.
- Always use a manhole roller assembly unless you're positioned directly over the manhole.
- Use a tiger tail at all times.
- When using **bullet-style nozzles**, don't exceed 1,500 PSI when going upstream. Don't exceed 1,000 PSI when retrieving the nozzle.
- For low-pressure sets, use no more than 1,000 PSI going up the line and no more than 700 PSI coming back down.
- When root cutting, use no more than 1,500 PSI going up the line and 1,200 PSI coming back down.
- Pull the flusher hose back slowly to avoid vacuum pressure problems, which can cause water to spray out of toilets and floor drains.
- When flushing double sets, inspect both manholes while jet flushing to ensure no debris is left behind.
- Check that the nozzle makes it through each manhole. Be aware that dead-end manholes might have service lines in them.
- Catch all debris before interceptors; do not allow debris to enter an interceptor or trunk sewer.
- Check the basin map for low-pressure sets and flow meter locations. Remove clean-out caps as needed and notify the homeowner.
- The **ENZ spinning nozzle** is used for everyday cleaning. Use 1,200 PSI going up the line and 1,000 PSI coming back.
- Ensure the nozzle is in the pipe before starting the pump or any pressure. If a nozzle won't move, turn off the water pump and pressure before looking into the manhole.
- Cleaning interceptors and trunk sewers requires larger nozzles and higher pressure. Consult with your Field Supervisor before using them.
- Do not reverse flush any set without consulting your Field Supervisor.
- Always check upstream manholes when jet flushing.

IV. Root Control

- Review basin maps to see if root cutting or jet flushing is required. Some maps require both.
- Root removal is done with a rootsaw motor and the proper size blade or brushes for the pipe size.
- Inspect all manholes while cleaning the sewer. Use the supplied tools to remove roots in a manhole.
- Note any roots found in manholes on the basin map.

V. FOG (Fats, Oil, Grease)

- Review basin maps and PMS maps for grease routes.
- Use an ENZ spinning nozzle on all grease routes and follow the above procedures.
- Root sawing may be necessary for excessive grease and hardened deposits.

VI. Paperwork

- List each set separately, even when flushing double sets or PMS.
- Note the condition of the lines, problems, and debris.
- Note the total footage at the bottom of the page. Do not add additional footage for lines flushed twice or more.
- Mark your field basin map as sets are completed. Turn in the map with your flushing reports at the end of each day.
- Note any changes observed in the field on the map.
- Note any equipment problems or extra time needed in writing for the workday.
- Write up manholes for any repairs in City Works, write the work order number on the map, and notify your Field Supervisor.
- Fill out flushing complaint forms as needed. Include the customer's name, phone number, address, manhole set, and work order number on the paperwork.

VII. Maintenance

- Spray nozzles with penetrating oil at the end of every day.
- Keep root saw motors lubricated to prevent rust buildup.
- Keep all tools and vehicles clean and in good working condition.

VIII. Vacing

- When vacing, you always use earmuffs, a hard hat, safety glasses, safety toe boots, gloves, and personal radio headsets.
- Inspect vac tubes for damage before and after every use.
- **Vactor tube clamps:**
  - Inspect all clamps before use. If a clamp is damaged, do not use it.
  - Line up the clamps so latches are in the same position for the entire length of the vac tube.
  - Tape all clamps with duct tape or electrical tape to prevent them from opening.

IX. Safety

- Always wear the following when flushing:
  - Safety glasses
  - Safety vest
  - Gloves
- When vacing, always wear:
  - A hard hat
  - Earmuffs or headset radios
  - Safety glasses
  - A safety vest
  - Gloves
  - Tape on vac tube clamps
- Pants must be warned while in tall grass or wooded areas.
- **Traffic Control:**
  - Consult your Field Supervisor about the traffic plan and what will be needed.

- Notify your Field Supervisor of any problems, and if you need anything, write it down or email them.
- Mark your map with any low-pressure sets that are not already noted on a flushing map.

Department of Public Utilities - Water
COLLECTION & PUMPING

Appendix Z

2026 SANITARY GRAVITY MAIN CLEANING SCHEDULE: JANUARY - DECEMBER

PMS

Month	Quarterly Semiannual	LnFt	Complete
Jan	---	15,708	
Feb	Quart 2	33,358	
Mar	Quart 1 Semi 1	45,821	
Apr	Semi 2	56,285	
May	Quart 2	33,358	
Jun	Jun-Q	38,233	
Jul	---	15,708	
Aug	Quart 2 N07	33,358	
Sept	Quart 1 Semi 1	45,821	
Oct	Semi 2	56,285	
Nov	Quart 2	33,358	
Dec	Quart 1	38,233	
	YEARLY TOTAL	445,526	

INTERCEPTOR - CLEAN

Interc	LnFt	Who	Comp
Total	0		

*NOTES:

1. W06 do in winter months.
2. C05/C06/C11/C12/C13 do in summer months or weekends due to school traffic.
3. C12/C13 recon basins week prior to flushing.
4. C13 4 man crew and use hydrant while flushing.
5. N07 complete with Aug PMS.
6. Some sets are rootsaw marked on flushing maps

BASIN CLEANING

	Basin	LnFt	Complete
1	C32	11,649	
2	C33	13,303	
3	C36	9,471	
4	S14	10,222	
5	C47	3,084	
6	C53	9,854	
7	C49	18,272	
8	C56	21,588	
9	W04	4,722	
10	N03	14,127	
11	N01	13,489	
12	N02	4,156	
13	N06	12,404	
14	N07*	18,438	
15	N11	9,476	
16	N15	35,736	
17	N19	18,380	
18	N20	12,267	
19	N24	12,246	
20	N25	10,184	
21	N26	9,156	
22	W02	12,788	
23	W03	8,102	
24	W05	16,005	
25	W07	30,255	
26	W06	30,750	
27	W08	7,634	
28	W09	3,546	
	Total	377,758	

	Basin	LnFt	Complete
29	W10	7,017	
30	C01	23,131	
31	C02	14,500	
32	C03	4,665	
33	C04	20,259	
34	C05	26,750	
35	C06*	28,409	
36	C07	21,717	
37	C08	17,541	
38	C09	7,423	
39	C11*	10,146	
40	C12*	5,341	
41	C13*	11,688	
42	C14	6,354	
43	C15	4,773	
44	C16	7,428	
45	C17	14,893	
46	C30	4,352	
47	C41	7,174	
48	C43	3,157	
49	C54	5,619	
50	S01	17,794	
51	S02	8,677	
52	S05	13,594	
53	S06	18,029	
54	S08	13,215	
55	S09	30,993	
56	S10	13,331	
	Total	310,431	

	Basin	LnFt	Complete
57	S13	22,681	
58	S15	23,436	
59	S17	20,542	
60	S18	11,672	
61	S28	14,421	
62	S34	15,445	
63	C25	11,392	
64	C28	18,285	
65	C29	8,486	
66	C35	11,767	
67	C37	2,895	
68	C38	6,940	
69	C39	8,747	
70	S03	11,736	
71	S11	14,673	
72	S12	6,765	
73	S27	11,556	
74	S30	44,175	
75	S37	25,359	
76	S41	24,173	
77	W25	17,225	
78	W26	16,082	
79	N14	11,443	
80	N16	34,410	
81	C51	23,022	
82	C57	23,034	
83	S35	11,752	
84	S36	9,910	
	Total	359,896	

	Basin	LnFt	Complete
85	C18	7,245	
86	C19	25,366	
87	C22	3,991	
88	C26	16,816	
89	S04	13,328	TV/FLUSH
90	S20	20,496	TV/FLUSH
91	S21	13,101	TV/FLUSH
92	S22	17,224	TV/FLUSH
93	S24	14,021	TV/FLUSH
94	S25	22,732	TV/FLUSH
95	S29	14,579	TV/FLUSH
96	S31	15,746	TV/FLUSH
97	S39	19,015	FLUSH
98	S40	36,395	FLUSH
99	S44	11,783	FLUSH
100	S45	30,193	FLUSH
101	S46	8,263	FLUSH
102	S48	16,975	FLUSH
103	S52	17,959	FLUSH
104	S54	18,133	FLUSH
105	S55	25,336	FLUSH
106	S56	21,602	FLUSH
107	S57	19,845	FLUSH
108	S62	22,315	FLUSH
109	S65	3,665	FLUSH
110	W11	7,273	FLUSH
111	W13	5,181	FLUSH
112	W14	15,140	FLUSH
	Total	463,718	

PROJECTED TOTALS

Clean	Ln Ft
Flush/ Rootsaw	1,494,815
PMS	428,538
Interceptor	0
Siphons	16,988
TOTAL LF	1,940,341

CLEANING IN MILES

Flush/ Rootsaw	283
PMS	81
Interceptor	0.0
TOTAL MILES	364.3

CIPP LINING

Large Diameter	0
Small Diameter	0
TOTAL LF	0
TOTAL MILES:	0.00

KEY	ACTIVITY
every 1 yr	Rootsaw
every 2 yr	Flush
every 3 yr	TV/FLUSH
every 4 yr	131,227
every 5 yr	Done By Contractor
	279,119

YEAR TO DATE (LF)

Flushed	
To Be Flushed	1,957,329

last edited 12/30/2025

HOT SPOTS INSPECTION SHEET

MONTH_____WO#_____

DESIGNATION:	LOCATION:	COMMENTS	INSP BY & DATE
HS-7	Cheshire/Kent Ct		
HS-10	644 N Eagle		
HS-14	Indian Trail Dr/(dead end MH)		
HS-15	12th Ave and Washington		
HS-17	44 Fremont (on Cottage)		
HS-19	Avis + Budget-Naper West Plaza		
HS-20	Operate Ogden Manor Divertible valve		
HS-21	Fort Hill - 75th, 3 Farms, Audrey Dr		
HS-28	Ring Rd & Kingsley Ct		
HS-33	McCartney Dr		
HS-37	Chinaberry (Ashwood Park)		
HS-41	NE Corner Aurora & Rt 59 (Fruitful Yield)		
HS-42	High Grove Ln (Loaves & Fishes)		
HS-44	Ashley Furniture/Staples - Route 59		
HS-45	Cardinal Ln		
HS-46	Ambelside Cir		
HS-47	Plainfield/Naperville Rd		

DOCUMENT ALL FLUSHING ON A FLUSHING REPORT.
SUBMIT COMPLETED FLUSHING FORMS IN THE HOT SPOT FOLDER

Employee/Truck #	TASK (inspection, flush, rootsaw)	DATE	HOURS

HS-7 CHESHIRE AV & KENT CT (1 MH)
MH C17-026

N

1224
1228
318
321
322
325
324
1235
C17-031
225'
8"
C17
329
KENT CT
C17-026
87'
8"
C17-027
122'
8"
402'
8"
C17-028
CHESHIRE AV
1234
253'
8"
1230
1226
1222
C17-023A
1218

HS-10 644 N EAGLE ST (1 MH)
N24-026A

N

N23

665

659

655

649

N24

645

639

635

629

625

664

660

656

648

644

642

636

630

N24-024

N24-025

N24-026

N24-026A

N24-027

86' 8"

88' 8"

22' 6"

188' 8"

300' 8"

HS-14 INDIAN TRAIL DR (DEAD END MH) (2 MH)
S06-17 > S06-016
BRING HOSE AND RUN WATER

N

TOWPATH CT

1708

224' 8"

S06-010

1712

1716

1717

1717

1725

141' 8"

S06-013

125' 8"

S06-014

1720

137' 8"

1729

Remove C/O Cap

S06

1733

S06-015

1724

86' 8"

1737

S06-016

MILLRACE LN

INDIAN TRAIL DR

833

125' 8"

1749

828

299' 8"

S06-018

1736

86' 8"

S06-019

1752

S06-017

1740

832

836

1748

1744

S08

1759

1760

1759

1758

S08-012

211' 8"

1765

1764

HS-15 12TH AV & WASHINGTON ST (3 MH)
N19-003 > N10-018 > N10-017
Grease collecting in belly just upstream restricting flow

N

1220
1216
1217
1231
1225
1213
N19-004
1212
WASHINGTON ST
SUFFOLK ST
1209
1215
1211
5
1204
9
N10
N10-020
N19
12TH AV
N10-017
N19-003
12
10
104
N10-018
10
1131
1125
1119
1115

369' 8"
286' 10"
40' 8"
39' 8"
297' 8"
271' 8"
201' 8"
367' 8"

HS-17 COTTAGE AV & WEST ST (2 MH)
C05-031B - C05-031A

N

324' 8"
C02-038
C02
630
128
131
127
300' 8"
693
123
603
257' 8"
FREMONT ST
COTTAGE AV
C05-031B C05-031B
C05
WEST ST
C05-031
272' 6"
C02-037
44
628
55
42' 8"
C05-031A
27
202' 8"
196' 8"
FRANKLIN AV
24
23
20
19
C05-030
532
243' 8"
14

HS-19 NAPER PLAZA (AVIS + BUDGET) (5 MH)
C56-046A > C56-046 > C56-045 > C56-044 > C56-047

N

AURORA AV

127'
15"

C56-024

352'
8"

C56-025

189'
10"

55'
6"

P048

C56-046A

C56-046

139'
10"

C56-045

32'
10"

C56-044

52'
10"

C56-047

169'
8"

C56-123

504

C56

506

2768

510

370'
10"

512

C56-043

341'
10"

HS-20 OGDEN MANOR DIVERTABLE VALVE
N14-001
Valve is reverse threaded; Left is tighter, Right is looser
71 turns = fully open



HS-21 FORT HILL DR - 75TH ST, THREE FARMS AV, AUDREY DR (3 MH)
C59-009, C59-011, C59-012

N

2546 2548 2552 2556 2506
2536
2534
2532
2512
2514
25282526 25222520
2524
2518
C59-131
138'

AUDREY AV

C59-008
358' 12"
358' 12"
C59-009
34' 6"
P099
41' 6"
P098
75' 6"
P100

2519 2517 2515 2511

C59

349' 12"

THREE FARMS AV

C59-010
58' 18"
C59-011
447' 18"

2424

FORT HILL DR

343' 12"

2503

P106
47' 6"
15' 12"
C59-013A
118' 12"
C59-012
244' 8"
297' 8"
C59-093
240' 12"

HS-28 RING RD & KINGSLEY CT (1 MH)
S14-087

N

KINGSLEY CT

122' 6"

P080

151' 6"

397' 8"

P079

107' 9"

S14

474' 8"

RING RD

S14-087

S14-076

KINGSLEY DR

2424

2410

S31

2414

2418

S31-001

WENDOVER DR

131' 8"

296' 8"

HS-33 McCARTNEY DR (2 MH)
S14-062, S14-063

N

2277
2279
2281
2285
2287
2289
81
2274
2276
2278
2280
2282
2284
2286
2288
2290

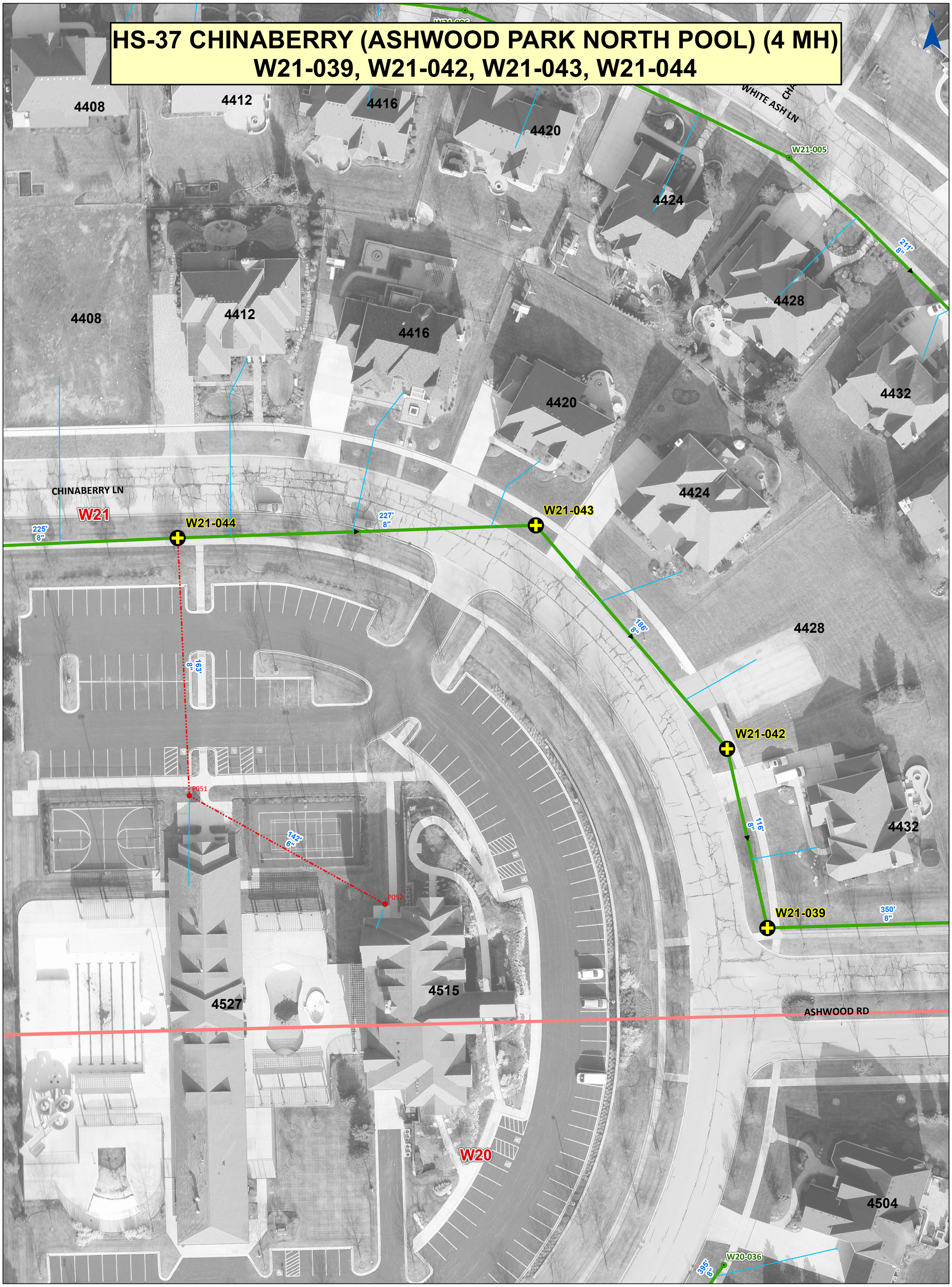
79' 8"
161' 8"
279' 8"

S14-062
S14-063

S14

MCCARTNEY DR
TOWNSEND CR

HS-37 CHINABERRY (ASHWOOD PARK NORTH POOL) (4 MH)
W21-039, W21-042, W21-043, W21-044



HS-41 NE corner of Aurora & Rt 59 (6 MH)
C56-023, C56-023A, C56-023B, C56-023C, C56-023D, C56-023E

404
428
448
460
484
476
2835
2827
2781
2819
2775
2768
504
506
510
512
618
WESTRIDGE CT
AURORA AV
C55
C56
C55-015
C55-014
C55-013
C55-012
C56-023C
C56-023D
C56-023E
C56-023B
C56-023A
C56-024
C56-025
C56-026
C56-043
P138
P137
P136
P135
P134
P140
P139
P048
184' 8"
19' 8"
242' 8"
24' 8"
110' 8"
61' 8"
120' 8"
264' 8"
132' 8"
303' 8"
144' 8"
139' 8"
553' 10"
445' 15"
127' 15"
352' 8"
351' 8"
358' 8"
189' 10"
370' 10"
341' 10"
169' 8"
52' 10"
32' 10"
139' 10"
28' 10"
55' 6"
223' 8"
293' 8"
347' 8"
339' 8"

HS-42 HIGH GROVE LN--LOAVES & FISHES (5 MH)
C55-050, C55-049, C55-048, C55-047, C55-046
If flushing is needed, must be done on Monday or Friday

N

1871

C55-049

276' 8"

1855

C55

1887

1879

1835

P088

P056

93' 6"

93' 6"

183' 8"

P083

C55-048

29' 8"

C55-047

162' 8"

C55-046

156' 8"

C55-050

73' 8"

HIGH GROVE LN

C55-046A

362' 8"

P086

1864

HS-44 ASHLEY FURNITURE/STAPLES - ROUTE 59 (2 MH)
C59-079, C59-086

N

1440

C59-077

145' 8"

C59-078

214' 8"

ROUTE 59

C59

C59-079

77' 6"

P089

12' 6"

1552

187' 8"

C59-086

127' 8"

P087

216' 8"

P088

1584

79TH ST

HS-45 CARDINAL LN (4 MH)
C40-038 > C40-038A > C40-039 > C40-027B

N

C39

1109

228' 10"

1120

1124

C40-039

1113

SANDPIPER LN

220' 10"

1117

1117

C40-027B

230' 8"

1121

191' 10"

1121

1129

1120

C40-038A

1133

1125

C40

1129

1128

1136

1140

277' 8"

C40-030

1137

1132

CARDINAL LN

DOVE CT

1141

216' 8"

C40-038

1136

109

45' 8"

C40-036

117

133

125

245' 8"

HS-46 Ambleside Cir (4 MH)
C45-037 > C45-036 > C45-028 > C45-015

N

AMBLESIDE
WINDRIDGE CT
SEQUOIA RD
MEADOWLAND DR
CHEPSTOW CT
SANCTUARY LN
CHADWICKE CR

C45-015
C45-017
C45-027
C45-028
C45-029
C45-030
C45-036
C45-037
C45-038
C45-042
C45-043
C45-045
C45-046
C45-055
C45-056
C45-058
C45

1461 1465 1469 1464 1468 627 631 622 1529 1525 1521 1517 701 705
415' 8" 401' 8"
1501 1608 1548 1544 1540 1536 1532 1528 1524
332' 12" 337' 12" 452' 12"
189' 8" 329' 8"
708 1505 1509 1510 1541 1537 1533 1529 1525 1521 1517
712 716 1513 1517 1542 1536 1532 1528 1524 1520 1516
353' 8" 301' 8"
318' 8" 157' 8"
720 724 1521 1525 1528 1523 1519 1515
255' 8" 252' 9"
804 808 812 816 820 824 828 832 836
1703 1704 1708 1784 1788 1780
1533 1537 1541 1545 1600 1604
1536 1540 1544 1611 1617 1621 1625
1527 1522 1518
415' 8" 386' 8" 197' 8" 448' 8" 332' 8" 118' 8" 262' 8" 475' 8"
815 1787 1612 1616 1620 1624 1628

HS-47 Plainfield/Naperville Rd (3 MH)
S22-055, S22-056, S22-057

N

1211

528'
42"

T01-016

LEVERENZ RD

532'
42"

2523

S22-055

S22

178'
8"

2547

S22-056

PLAINFIELD/NAPERVILLE RD

212'
8"

2575

S22-057

96'
10"

T01-015

540'
42"

S24

951

947

244'
10"

290'
8"

S41-086

71'
10"

S41-090

2403

S41

2407

383'
10"

LITCHFIELD CT

2411

2415

S41-091

163'
10"

2419

S41-092

S39

PREVENTATIVE MAINTENANCE SCHEDULE

	JANUARY	WO#	REASON
Designation:	**Location:**	**Date Completed:**	
FM 2	Washington St: 5th Av - 6th Av		Low Flow
FM 3	Dean's/Heaven on 7		Grease
FM 4	Chicago Av: Washington St - Main St		Grease
FM 5	Latern Siphon & Hillside Siphon (bi-monthly)		Grease & Low Flow
FM 6	Willow Rd/Golden Larch Ct		Low Flow
FM 7	Hillside Rd: Julian St - Wright St		Low Flow
FM 8	Victoria Ct - **Low Pressure Set** **Notify Resident @ 360 Prairie Av**		Low Flow
FM 9	Spencer Ct - Low Pressure Set (bi-monthly)		Low Flow
FM 10	Watercress Ct		Grease & Low Flow
FM 11	2559 Bangert Ln (Basin S63)		Low Flow
FM 13	North Aurora Rd/Railway/Amerisale		Grease
FM 14	Comstock Ct		Low Flow
FM 16	SE corner Bond & Brookdale (Silverado Senior Living)		Low Flow
FM 17	1603 77th St		Low Flow
FM 18	Abriter Ct, Diehl Rd, Centre Pointe Dr		Grease
FM 19	5th Av Station		Low Flow
FM 20	Bourbon Ct/Elyse Ln		Flat/Low Flow
FM 21	Santa Maria Ct		Flat/Low Flow
FM 22	Cottage Av & West St		Flat/Low Flow
FM 23	Shumard Ln		Flat/Low Flow
FM 24	NW Corner of Route 59 & 111th St		Grease
FM 25	1396 Rt 59 - McDonalds		Grease
FM 26	Washington St & Olympus Dr		Flat/Low Flow
FM 27	Behind Ace Hardware - 5035 Ace Ln		Grease

PREVENTATIVE MAINTENANCE SCHEDULE

	FEBRUARY	WO#	REASON
Designation:	**Location:**	**Date Completed:**	
FM 2	Washington St: 5th Av - 6th Av		Low Flow
FM 3	Dean's/Heaven on 7		Grease
FM 4	Chicago Av: Washington St - Main St		Grease
FM 5	Latern Siphon & Hillside Siphon (bi-monthly)		Grease & Low Flow
FM 6	Willow Rd/Golden Larch Ct		Low Flow
FM 7	Hillside Rd: Julian St - Wright St		Low Flow
FM 8	Victoria Ct - **Low Pressure Set** **Notify Resident @ 360 Prairie Av**		Low Flow
FM 9	Spencer Ct - Low Pressure Set (bi-monthly)		Low Flow
FM 10	Watercress Ct		Grease & Low Flow
FM 11	2559 Bangert Ln (Basin S63)		Low Flow
FM 13	North Aurora Rd/Railway/Amerisale		Grease
FM 14	Comstock Ct		Low Flow
FM 16	SE corner Bond & Brookdale (Silverado Senior Living)		Low Flow
FM 17	1603 77Th st		Low Flow
FM 18	Abriter Ct, Diehl Rd, Centre Pointe Dr		Grease
FM 19	5th Av Station		Low Flow
FM 20	Bourbon Ct/Elyse Ln		Flat/Low Flow
FM 21	Santa Maria Ct		Flat/Low Flow
FM 22	Cottage Av & West St		Flat/Low Flow
FM 23	Shumard Ln		Flat/Low Flow
FM 24	NW Corner of Route 59 & 111th St		Grease
FM 25	1396 Rt 59 - McDonalds		Grease
FM 26	Washington St & Olympus Dr		Flat/Low Flow
FM 27	Behind Ace Hardware - 5035 Ace Ln		Grease
FQ 4	Ogden Mall, Freedom Commons, Diehl Rd		Grease
FQ 15	Rt 59/95th St LaCrosse @ Rt 59		Grease
FQ 17	Showplace - Rt59, north of 95th St		Grease
FQ 22	Tall Grass		Grease
FQ 23	1907 / 1913 Coach Drive		Low Flow
FQ 24	Hillcrest - Carillon Club		Flat/Low Flow
FQ 25	Walgreens - Wehrli & 75th		Grease
FQ 26	114 E Van Buren Av		Flat/Low Flow
FQ 27	Commons Rd		Low Flow
FQ 28	Brookdale Rd		Grease

PREVENTATIVE MAINTENANCE SCHEDULE

	MARCH	WO#	REASON
Designation:	**Location:**	**Date Completed:**	
FM 2	Washington St: 5th Av - 6th Av		Low Flow
FM 3	Dean's/Heaven on 7		Grease
FM 4	Chicago Av: Washington St - Main St		Grease
FM 5	Latern Siphon & Hillside Siphon (bi-monthly)		Grease & Low Flow
FM 6	Willow Rd/Golden Larch Ct		Low Flow
FM 7	Hillside Rd: Julian St - Wright St		Low Flow
FM 8	Victoria Ct - **Low Pressure Set** Notify Resident @ 360 Prairie Av		Low Flow
FM 9	Spencer Ct - Low Pressure Set (bi-monthly)		Low Flow
FM 10	Watercress Ct		Grease & Low Flow
FM 11	2559 Bangert Ln (Basin S63)		Low Flow
FM 13	North Aurora Rd/Railway/Amerisale		Grease
FM 14	Comstock Ct		Low Flow
FM 16	SE corner Bond & Brookdale (Silverado Senior Living)		Low Flow
FM 17	1603 77th St		Low Flow
FM 18	Abriter Ct, Diehl Rd, Centre Pointe Dr		Grease
FM 19	5th Av Station		Low Flow
FM 20	Bourbon Ct/Elyse Ln		Flat/Low Flow
FM 21	Santa Maria Ct		Flat/Low Flow
FM 22	Cottage Av & West St		Flat/Low Flow
FM 23	Shumard Ln		Flat/Low Flow
FM 24	NW Corner of Route 59 & 111th St		Grease
FM 25	1396 Rt 59 - McDonalds		Grease
FM 26	Washington St & Olympus Dr		Flat/Low Flow
FM 27	Behind Ace Hardware - 5035 Ace Ln		Grease
FQ 1	Downtown Jefferson/Main/Jackson Pottery Barn - EARLY AM ONLY		Low Flow
FQ 3	Hobson Mill/Interceptor		Grease & Low Flow
FQ 5	Siphons - 6 Total Hospital/Edgewater/I-88 Cracker Barrel/87th St **Gartner/Bluebird - TAKE BIKE PATH SIGNS**		Grease and Low Flow
FQ 6	Springdale/Windemere/Gateshead/Fireside Ct Notify and/or Open outside cleanout: 2620 Springdale (R. Garavalia 630-778-8155) 1259 Windemere (L. Gallagher 630-428-7621) 1251 & 1304 Windemere - open outside c/o		Grease
FQ 7	Alley on 4th St		Low Flow
FQ 9	Factory Card Outlet		Low Flow
FQ 11	Washington/Ogden		Grease & Low Flow
FQ 13	W06- Allister		Low Flow
FQ 14	Modaff/Gartner		Grease & Low Flow
FQ 16	W25- Idelwild		Low Flow
FQ 18	Massachusets		Grease
FQ 19	American Drive		Grease
FQ 20	South Loomis		Grease & Bellies
FQ 21	Wehrli/Wright		Grease
FS 15	Caputo's Grease Run		Grease
FS 17	Ranchview Dr - Near Cinnamon Creek Lift Station		Grease

PREVENTATIVE MAINTENANCE SCHEDULE

	APRIL	WO#	REASON
Designation:	**Location:**	**Date Completed:**	
FM 2	Washington St: 5th Av - 6th Av		Low Flow
FM 3	Dean's/Heaven on 7		Grease
FM 4	Chicago Av: Washington St - Main St		Grease
FM 5	Latern Siphon & Hillside Siphon (bi-monthly)		Grease & Low Flow
FM 6	Willow Rd/Golden Larch Ct		Low Flow
FM 7	Hillside Rd: Julian St - Wright St		Low Flow
FM 8	Victoria Ct - Low Pressure Set **Notify Resident @ 360 Prairie Av**		Low Flow
FM 9	Spencer Ct - Low Pressure Set (bi-monthly)		Low Flow
FM 10	Watercress Ct		Grease & Low Flow
FM 11	2559 Bangert Ln (Basin S63)		Low Flow
FM 13	North Aurora Rd/Railway/Amerisale		Grease
FM 14	Comstock Ct		Low Flow
FM 16	SE corner Bond & Brookdale (Silverado Senior Living)		Low Flow
FM 17	1603 77th St		Low Flow
FM 18	Abriter Ct, Diehl Rd, Centre Pointe Dr		Grease
FM 19	5th Av Station		Low Flow
FM 20	Bourbon Ct/Elyse Ln		Flat/Low Flow
FM 21	Santa Maria Ct		Flat/Low Flow
FM 22	Cottage Av & West St		Flat/Low Flow
FM 23	Shumard Ln		Flat/Low Flow
FM 24	NW Corner of Route 59 & 111th St		Grease
FM 25	1396 Rt 59 - McDonalds		Grease
FM 26	Washington St & Olympus Dr		Flat/Low Flow
FM 27	Behind Ace Hardware - 5035 Ace Ln		Grease
FS 1	Highland/Brainard>Chicago		Low Flow
FS 2	Ogden Grease Route also 1st American Bank Set **Notify Phillips Flowers @ 1007 E Ogden**		Grease
FS 3	Naper West Plaza/Fox River Commons **Notify Bank prior to flushing** - Low Pressure Set		Grease
FS 4	Remington/Arlington/Barkdoll		Grease
FS 5	Webster, Main, Porter, Washington, Hillside		Grease & Low Flow
FS 7	Boswell Ln - S40-103>S40-101		Low Flow
FS 8	Market Meadows-Fox River Sq		Grease
FS 9	Bauer at Wedgefield (Cress Creek)		Grease
FS 10	River Bend (C54) to Jefferson		Grease
FS 11	C55 - Westridge Court		Grease
FS 12	Commons-William Penn		Grease
FS 13	C28-050>049 (Rose) Flush -Low Pressure Set		Low Flow
FS 14	12th and Washington - SPINNER NOZZLE		Grease
FS 18	Charles at Cheshire- Offset Joint **Notify Resident @ 1036 Elizabeth**		Grease
RS 1	Douglas/Eagle - 6" blade		Low Flow

PREVENTATIVE MAINTENANCE SCHEDULE

	MAY	WO#	REASON
Designation:	**Location:**	**Date Completed:**	
FM 2	Washington St: 5th Av - 6th Av		Low Flow
FM 3	Dean's/Heaven on 7		Grease
FM 4	Chicago Av: Washington St - Main St		Grease
FM 5	Latern Siphon & Hillside Siphon (bi-monthly)		Grease & Low Flow
FM 6	Willow Rd/Golden Larch Ct		Low Flow
FM 7	Hillside Rd: Julian St - Wright St		Low Flow
FM 8	Victoria Ct - **Low Pressure Set** **Notify Resident @ 360 Prairie Av**		Low Flow
FM 9	Spencer Ct - Low Pressure Set (bi-monthly)		Low Flow
FM 10	Watercress Ct		Grease & Low Flow
FM 11	2559 Bangert Ln (Basin S63)		Low Flow
FM 13	North Aurora Rd/Railway/Amerisale		Grease
FM 14	Comstock Ct		Low Flow
FM 16	SE corner Bond & Brookdale (Silverado Senior Living)		Low Flow
FM 17	1603 77Th st		Low Flow
FM 18	Abriter Ct, Diehl Rd, Centre Pointe Dr		Grease
FM 19	5th Av Station		Low Flow
FM 20	Bourbon Ct/Elyse Ln		Flat/Low Flow
FM 21	Santa Maria Ct		Flat/Low Flow
FM 22	Cottage Av & West St		Flat/Low Flow
FM 23	Shumard Ln		Flat/Low Flow
FM 24	NW Corner of Route 59 & 111th St		Grease
FM 25	1396 Rt 59 - McDonalds		Grease
FM 26	Washington St & Olympus Dr		Flat/Low Flow
FM 27	Behind Ace Hardware - 5035 Ace Ln		Grease
FQ 4	Ogden Mall, Freedom Commons, Diehl Rd		Grease
FQ 15	Rt 59/95th St LaCrosse @ Rt 59		Grease
FQ 17	Showplace - Rt59, north of 95th St		Grease
FQ 22	Tall Grass		Grease
FQ 23	1907 / 1913 Coach Drive		Low Flow
FQ 24	Hillcrest - Carillon Club		Flat/Low Flow
FQ 25	Walgreens - Wehrli & 75th		Grease
FQ 26	114 E Van Buren Av		Flat/Low Flow
FQ 27	Commons Rd		Low Flow
FQ 28	Brookdale Rd		Grease

PREVENTATIVE MAINTENANCE SCHEDULE

	JUNE	WO#	REASON
Designation:	**Location:**	**Date Completed:**	
FM 2	Washington St: 5th Av - 6th Av		Low Flow
FM 3	Dean's/Heaven on 7		Grease
FM 4	Chicago Av: Washington St - Main St		Grease
FM 5	Latern Siphon & Hillside Siphon (bi-monthly)		Grease & Low Flow
FM 6	Willow Rd/Golden Larch Ct		Low Flow
FM 7	Hillside Rd: Julian St - Wright St		Low Flow
FM 8	Victoria Ct - Low Pressure Set **Notify Resident @ 360 Prairie Av**		Low Flow
FM 9	Spencer Ct - Low Pressure Set (bi-monthly)		Low Flow
FM 10	Watercress Ct		Grease & Low Flow
FM 11	2559 Bangert Ln (Basin S63)		Low Flow
FM 13	North Aurora Rd/Railway/Amerisale		Grease
FM 14	Comstock Ct		Low Flow
FM 16	SE corner Bond & Brookdale (Silverado Senior Living)		Low Flow
FM 17	1603 77th St		Low Flow
FM 18	Abriter Ct, Diehl Rd, Centre Pointe Dr		Grease
FM 19	5th Av Station		Low Flow
FM 20	Bourbon Ct/Elyse Ln		Flat/Low Flow
FM 21	Santa Maria Ct		Flat/Low Flow
FM 22	Cottage Av & West St		Flat/Low Flow
FM 23	Shumard Ln		Flat/Low Flow
FM 24	NW Corner of Route 59 & 111th St		Grease
FM 25	1396 Rt 59 - McDonalds		Grease
FM 26	Washington St & Olympus Dr		Flat/Low Flow
FM 27	Behind Ace Hardware - 5035 Ace Ln		Grease
FQ 1	Downtown Jefferson/Main/Jackson Pottery Barn - EARLY AM ONLY		Low Flow
FQ 3	Hobson Mill/Interceptor		Grease & Low Flow
FQ 5	Siphons - 6 Total Hospital/Edgewater/I-88 Cracker Barrel/87th St **Gartner/Bluebird - TAKE BIKE PATH SIGNS**		Grease & Low Flow
FQ 6	Springdale/Windemere/Gateshead/Fireside Ct Notify and/or Open outside cleanout: 2620 Springdale (R. Garavalia 630-778-8155) 1259 Windemere (L. Gallagher 630-428-7621) 1251 & 1304 Windemere - open outside c/o		Grease
FQ 7	Alley on 4th St		Low Flow
FQ 9	Factory Card Outlet		Low Flow
FQ 11	Washington/Ogden		Grease & Low Flow
FQ 13	W06- Allister		Low Flow
FQ 14	Modaff/Gartner		Grease & Low Flow
FQ 16	W25- Idelwild		Low Flow
FQ 18	Massachusets		Grease
FQ 19	American Drive		Grease
FQ 20	South Loomis		Grease & Bellies
FQ 21	Wehrli/Wright		Grease

PREVENTATIVE MAINTENANCE SCHEDULE

	JULY	WO#	REASON
Designation:	**Location:**	**Date Completed:**	
FM 2	Washington St: 5th Av - 6th Av		Low Flow
FM 3	Dean's/Heaven on 7		Grease
FM 4	Chicago Av: Washington St - Main St		Grease
FM 5	Latern Siphon & Hillside Siphon (bi-monthly)		Grease & Low Flow
FM 6	Willow Rd/Golden Larch Ct		Low Flow
FM 7	Hillside Rd: Julian St - Wright St		Low Flow
FM 8	Victoria Ct - **Low Pressure Set** **Notify Resident @ 360 Prairie Av**		Low Flow
FM 9	Spencer Ct - Low Pressure Set (bi-monthly)		Low Flow
FM 10	Watercress Ct		Grease & Low Flow
FM 11	2559 Bangert Ln (Basin S63)		Low Flow
FM 13	North Aurora Rd/Railway/Amerisale		Grease
FM 14	Comstock Ct		Low Flow
FM 16	SE corner Bond & Brookdale (Silverado Senior Living)		Low Flow
FM 17	1603 77th St		Low Flow
FM 18	Abriter Ct, Diehl Rd, Centre Pointe Dr		Grease
FM 19	5th Av Station		Low Flow
FM 20	Bourbon Ct/Elyse Ln		Flat/Low Flow
FM 21	Santa Maria Ct		Flat/Low Flow
FM 22	Cottage Av & West St		Flat/Low Flow
FM 23	Shumard Ln		Flat/Low Flow
FM 24	NW Corner of Route 59 & 111th St		Grease
FM 25	1396 Rt 59 - McDonalds		Grease
FM 26	Washington St & Olympus Dr		Flat/Low Flow
FM 27	Behind Ace Hardware - 5035 Ace Ln		Grease

PREVENTATIVE MAINTENANCE SCHEDULE

	AUGUST	WO#	REASON
Designation:	**Location:**	**Date Completed:**	
FM 2	Washington St: 5th Av - 6th Av		Low Flow
FM 3	Dean's/Heaven on 7		Grease
FM 4	Chicago Av: Washington St - Main St		Grease
FM 5	Latern Siphon & Hillside Siphon (bi-monthly)		Grease & Low Flow
FM 6	Willow Rd/Golden Larch Ct		Low Flow
FM 7	Hillside Rd: Julian St - Wright St		Low Flow
FM 8	Victoria Ct - **Low Pressure Set** **Notify Resident @ 360 Prairie Av**		Low Flow
FM 9	Spencer Ct - Low Pressure Set (bi-monthly)		Low Flow
FM 10	Watercress Ct		Grease & Low Flow
FM 11	2559 Bangert Ln (Basin S63)		Low Flow
FM 13	North Aurora Rd/Railway/Amerisale		Grease
FM 14	Comstock Ct		Low Flow
FM 16	SE corner Bond & Brookdale (Silverado Senior Living)		Low Flow
FM 17	1603 77Th st		Low Flow
FM 18	Abriter Ct, Diehl Rd, Centre Pointe Dr		Grease
FM 19	5th Av Station		Low Flow
FM 20	Bourbon Ct/Elyse Ln		Flat/Low Flow
FM 21	Santa Maria Ct		Flat/Low Flow
FM 22	Cottage Av & West St		Flat/Low Flow
FM 23	Shumard Ln		Flat/Low Flow
FM 24	NW Corner of Route 59 & 111th St		Grease
FM 25	1396 Rt 59 - McDonalds		Grease
FM 26	Washington St & Olympus Dr		Flat/Low Flow
FM 27	Behind Ace Hardware - 5035 Ace Ln		Grease
FQ 4	Ogden Mall, Freedom Commons, Diehl Rd		Grease
FQ 15	Rt 59/95th St LaCrosse @ Rt 59		Grease
FQ 17	Showplace - Rt59, north of 95th St		Grease
FQ 22	Tall Grass		Grease
FQ 23	1907 / 1913 Coach Drive		Low Flow
FQ 24	Hillcrest - Carillon Club		Flat/Low Flow
FQ 25	Walgreens - Wehrli & 75th		Grease
FQ 26	114 E Van Buren Av		Flat/Low Flow
FQ 27	Commons Rd		Low Flow
FQ 28	Brookdale Rd		Grease

PREVENTATIVE MAINTENANCE SCHEDULE

	SEPTEMBER	WO#	REASON
Designation:	**Location:**	**Date Completed:**	
FM 2	Washington St: 5th Av - 6th Av		Low Flow
FM 3	Dean's/Heaven on 7		Grease
FM 4	Chicago Av: Washington St - Main St		Grease
FM 5	Latern Siphon & Hillside Siphon (bi-monthly)		Grease & Low Flow
FM 6	Willow Rd/Golden Larch Ct		Low Flow
FM 7	Hillside Rd: Julian St - Wright St		Low Flow
FM 8	Victoria Ct - **Low Pressure Set** Notify Resident @ 360 Prairie Av		Low Flow
FM 9	Spencer Ct - Low Pressure Set (bi-monthly)		Low Flow
FM 10	Watercress Ct		Grease & Low Flow
FM 11	2559 Bangert Ln (Basin S63)		Low Flow
FM 13	North Aurora Rd/Railway/Amerisale		Grease
FM 14	Comstock Ct		Low Flow
FM 16	SE corner Bond & Brookdale (Silverado Senior Living)		Low Flow
FM 17	1603 77th St		Low Flow
FM 18	Abriter Ct, Diehl Rd, Centre Pointe Dr		Grease
FM 19	5th Av Station		Low Flow
FM 20	Bourbon Ct/Elyse Ln		Flat/Low Flow
FM 21	Santa Maria Ct		Flat/Low Flow
FM 22	Cottage Av & West St		Flat/Low Flow
FM 23	Shumard Ln		Flat/Low Flow
FM 24	NW Corner of Route 59 & 111th St		Grease
FM 25	1396 Rt 59 - McDonalds		Grease
FM 26	Washington St & Olympus Dr		Flat/Low Flow
FM 27	Behind Ace Hardware - 5035 Ace Ln		Grease
FQ 1	Downtown Jefferson/Main/Jackson Pottery Barn - EARLY AM ONLY		Low Flow
FQ 3	Hobson Mill/Interceptor		Grease & Low Flow
FQ 5	Siphons - 6 Total Hospital/Edgewater/I-88 Cracker Barrel/87th St **Gartner/Bluebird - TAKE BIKE PATH SIGNS**		Grease and Low Flow
FQ 6	Springdale/Windemere/Gateshead/Fireside Ct Notify and/or Open outside cleanout: 2620 Springdale (R. Garavalia 630-778-8155) 1259 Windemere (L. Gallagher 630-428-7621) 1251 & 1304 Windemere - open outside c/o		Grease
FQ 7	Alley on 4th St		Low Flow
FQ 9	Factory Card Outlet		Low Flow
FQ 11	Washington/Ogden		Grease & Low Flow
FQ 13	W06- Allister		Low Flow
FQ 14	Modaff/Gartner		Grease & Low Flow
FQ 16	W25- Idelwild		Low Flow
FQ 18	Massachusets		Grease
FQ 19	American Drive		Grease
FQ 20	South Loomis		Grease & Bellies
FQ 21	Wehrli/Wright		Grease
FS 15	Caputo's Grease Run		Grease
FS 17	Ranchview Dr - Near Cinnamon Creek Lift Station		Grease

PREVENTATIVE MAINTENANCE SCHEDULE

	OCTOBER	WO#	REASON
Designation:	**Location:**	**Date Completed:**	
FM 2	Washington St: 5th Av - 6th Av		Low Flow
FM 3	Dean's/Heaven on 7		Grease
FM 4	Chicago Av: Washington St - Main St		Grease
FM 5	Latern Siphon & Hillside Siphon (bi-monthly)		Grease & Low Flow
FM 6	Willow Rd/Golden Larch Ct		Low Flow
FM 7	Hillside Rd: Julian St - Wright St		Low Flow
FM 8	Victoria Ct - Low Pressure Set **Notify Resident @ 360 Prairie Av**		Low Flow
FM 9	Spencer Ct - Low Pressure Set (bi-monthly)		Low Flow
FM 10	Watercress Ct		Grease & Low Flow
FM 11	2559 Bangert Ln (Basin S63)		Low Flow
FM 13	North Aurora Rd/Railway/Amerisale		Grease
FM 14	Comstock Ct		Low Flow
FM 16	SE corner Bond & Brookdale (Silverado Senior Living)		Low Flow
FM 17	1603 77th St		Low Flow
FM 18	Abriter Ct, Diehl Rd, Centre Pointe Dr		Grease
FM 19	5th Av Station		Low Flow
FM 20	Bourbon Ct/Elyse Ln		Flat/Low Flow
FM 21	Santa Maria Ct		Flat/Low Flow
FM 22	Cottage Av & West St		Flat/Low Flow
FM 23	Shumard Ln		Flat/Low Flow
FM 24	NW Corner of Route 59 & 111th St		Grease
FM 25	1396 Rt 59 - McDonalds		Grease
FM 26	Washington St & Olympus Dr		Flat/Low Flow
FM 27	Behind Ace Hardware - 5035 Ace Ln		Grease
FS 1	Highland/Brainard>Chicago		Low Flow
FS 2	Ogden Grease Route also 1st American Bank Set **Notify Phillips Flowers @ 1007 E Ogden**		Grease
FS 3	Naper West Plaza/Fox River Commons **Notify Bank prior to flushing** - Low Pressure Set		Grease
FS 4	Remington/Arlington/Barkdoll		Grease
FS 5	Webster, Main, Porter, Washington, Hillside		Grease & Low Flow
FS 7	Boswell Ln - S40-103>S40-101		Low Flow
FS 8	Market Meadows-Fox River Sq		Grease
FS 9	Bauer at Wedgefield (Cress Creek)		Grease
FS 10	River Bend (C54) to Jefferson		Grease
FS 11	C55 - Westridge Court		Grease
FS 12	Commons-William Penn		Grease
FS 13	C28-050>049 (Rose) Flush -Low Pressure Set		Low Flow
FS 14	12th and Washington - SPINNER NOZZLE		Grease
FS 18	Charles at Cheshire- Offset Joint **Notify Resident @ 1036 Elizabeth**		Grease
RS 1	Douglas/Eagle - 6" blade		Low Flow

PREVENTATIVE MAINTENANCE SCHEDULE

	NOVEMBER	WO#	REASON
Designation:	**Location:**	**Date Completed:**	
FM 2	Washington St: 5th Av - 6th Av		Low Flow
FM 3	Dean's/Heaven on 7		Grease
FM 4	Chicago Av: Washington St - Main St		Grease
FM 5	Latern Siphon & Hillside Siphon (bi-monthly)		Grease & Low Flow
FM 6	Willow Rd/Golden Larch Ct		Low Flow
FM 7	Hillside Rd: Julian St - Wright St		Low Flow
FM 8	Victoria Ct - **Low Pressure Set** **Notify Resident @ 360 Prairie Av**		Low Flow
FM 9	Spencer Ct - Low Pressure Set (bi-monthly)		Low Flow
FM 10	Watercress Ct		Grease & Low Flow
FM 11	2559 Bangert Ln (Basin S63)		Low Flow
FM 13	North Aurora Rd/Railway/Amerisale		Grease
FM 14	Comstock Ct		Low Flow
FM 16	SE corner Bond & Brookdale (Silverado Senior Living)		Low Flow
FM 17	1603 77Th st		Low Flow
FM 18	Abriter Ct, Diehl Rd, Centre Pointe Dr		Grease
FM 19	5th Av Station		Low Flow
FM 20	Bourbon Ct/Elyse Ln		Flat/Low Flow
FM 21	Santa Maria Ct		Flat/Low Flow
FM 22	Cottage Av & West St		Flat/Low Flow
FM 23	Shumard Ln		Flat/Low Flow
FM 24	NW Corner of Route 59 & 111th St		Grease
FM 25	1396 Rt 59 - McDonalds		Grease
FM 26	Washington St & Olympus Dr		Flat/Low Flow
FM 27	Behind Ace Hardware - 5035 Ace Ln		Grease
FQ 4	Ogden Mall, Freedom Commons, Diehl Rd		Grease
FQ 15	Rt 59/95th St LaCrosse @ Rt 59		Grease
FQ 17	Showplace - Rt59, north of 95th St		Grease
FQ 22	Tall Grass		Grease
FQ 23	1907 / 1913 Coach Drive		Low Flow
FQ 24	Hillcrest - Carillon Club		Flat/Low Flow
FQ 25	Walgreens - Wehrli & 75th		Grease
FQ 26	114 E Van Buren Av		Flat/Low Flow
FQ 27	Commons Rd		Low Flow
FQ 28	Brookdale Rd		Grease

PREVENTATIVE MAINTENANCE SCHEDULE

	DECEMBER	WO#	REASON
Designation:	**Location:**	**Date Completed:**	
FM 2	Washington St: 5th Av - 6th Av		Low Flow
FM 3	Dean's/Heaven on 7		Grease
FM 4	Chicago Av: Washington St - Main St		Grease
FM 5	Latern Siphon & Hillside Siphon (bi-monthly)		Grease & Low Flow
FM 6	Willow Rd/Golden Larch Ct		Low Flow
FM 7	Hillside Rd: Julian St - Wright St		Low Flow
FM 8	Victoria Ct - Low Pressure Set **Notify Resident @ 360 Prairie Av**		Low Flow
FM 9	Spencer Ct - Low Pressure Set (bi-monthly)		Low Flow
FM 10	Watercress Ct		Grease & Low Flow
FM 11	2559 Bangert Ln (Basin S63)		Low Flow
FM 13	North Aurora Rd/Railway/Amerisale		Grease
FM 14	Comstock Ct		Low Flow
FM 16	SE corner Bond & Brookdale (Silverado Senior Living)		Low Flow
FM 17	1603 77th St		Low Flow
FM 18	Abriter Ct, Diehl Rd, Centre Pointe Dr		Grease
FM 19	5th Av Station		Low Flow
FM 20	Bourbon Ct/Elyse Ln		Flat/Low Flow
FM 21	Santa Maria Ct		Flat/Low Flow
FM 22	Cottage Av & West St		Flat/Low Flow
FM 23	Shumard Ln		Flat/Low Flow
FM 24	NW Corner of Route 59 & 111th St		Grease
FM 25	1396 Rt 59 - McDonalds		Grease
FM 26	Washington St & Olympus Dr		Flat/Low Flow
FM 27	Behind Ace Hardware - 5035 Ace Ln		Grease
FQ 1	Downtown Jefferson/Main/Jackson Pottery Barn - EARLY AM ONLY		Low Flow
FQ 3	Hobson Mill/Interceptor		Grease & Low Flow
FQ 5	Siphons - 6 Total Hospital/Edgewater/I-88 Cracker Barrel/87th St **Gartner/Bluebird - TAKE BIKE PATH SIGNS**		Grease & Low Flow
FQ 6	Springdale/Windemere/Gateshead/Fireside Ct Notify and/or Open outside cleanout: 2620 Springdale (R. Garavalia 630-778-8155) 1259 Windemere (L. Gallagher 630-428-7621) 1251 & 1304 Windemere - open outside c/o		Grease
FQ 7	Alley on 4th St		Low Flow
FQ 9	Factory Card Outlet		Low Flow
FQ 11	Washington/Ogden		Grease & Low Flow
FQ 13	W06- Allister		Low Flow
FQ 14	Modaff/Gartner		Grease & Low Flow
FQ 16	W25- Idelwild		Low Flow
FQ 18	Massachusets		Grease
FQ 19	American Drive		Grease
FQ 20	South Loomis		Grease & Bellies
FQ 21	Wehrli/Wright		Grease

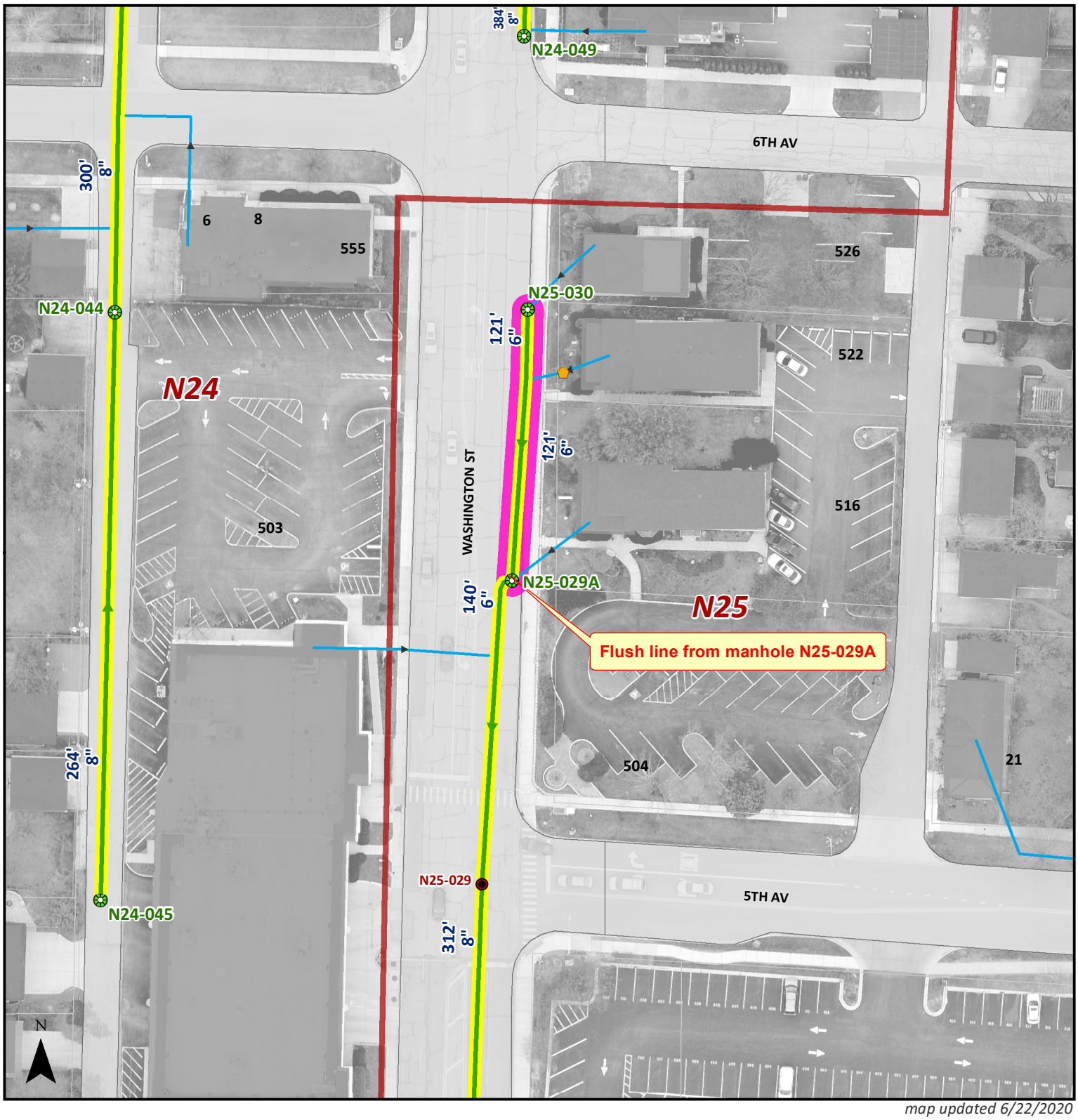
SANITARY FLUSHING PMS

PMS CHECK: FM-2 **Location: Washington - 6th Av to 5th Av**

Sets: N25-030>N25-029A

Description and Procedures

Set- up facing west on the NE corner of 6th Av/ Washington St (Stay off Washington). Pull hose with no nozzle to manhole N25-030 (526 S. Washington St). Run water into manhole until line flows clear. If line won't clear, contact Field Supervisor and flush from Washington/5th.



map updated 6/22/2020

SANITARY FLUSHING PMS

PMS CHECK: FM-3 **Location: 224 - 226 S. Main St**

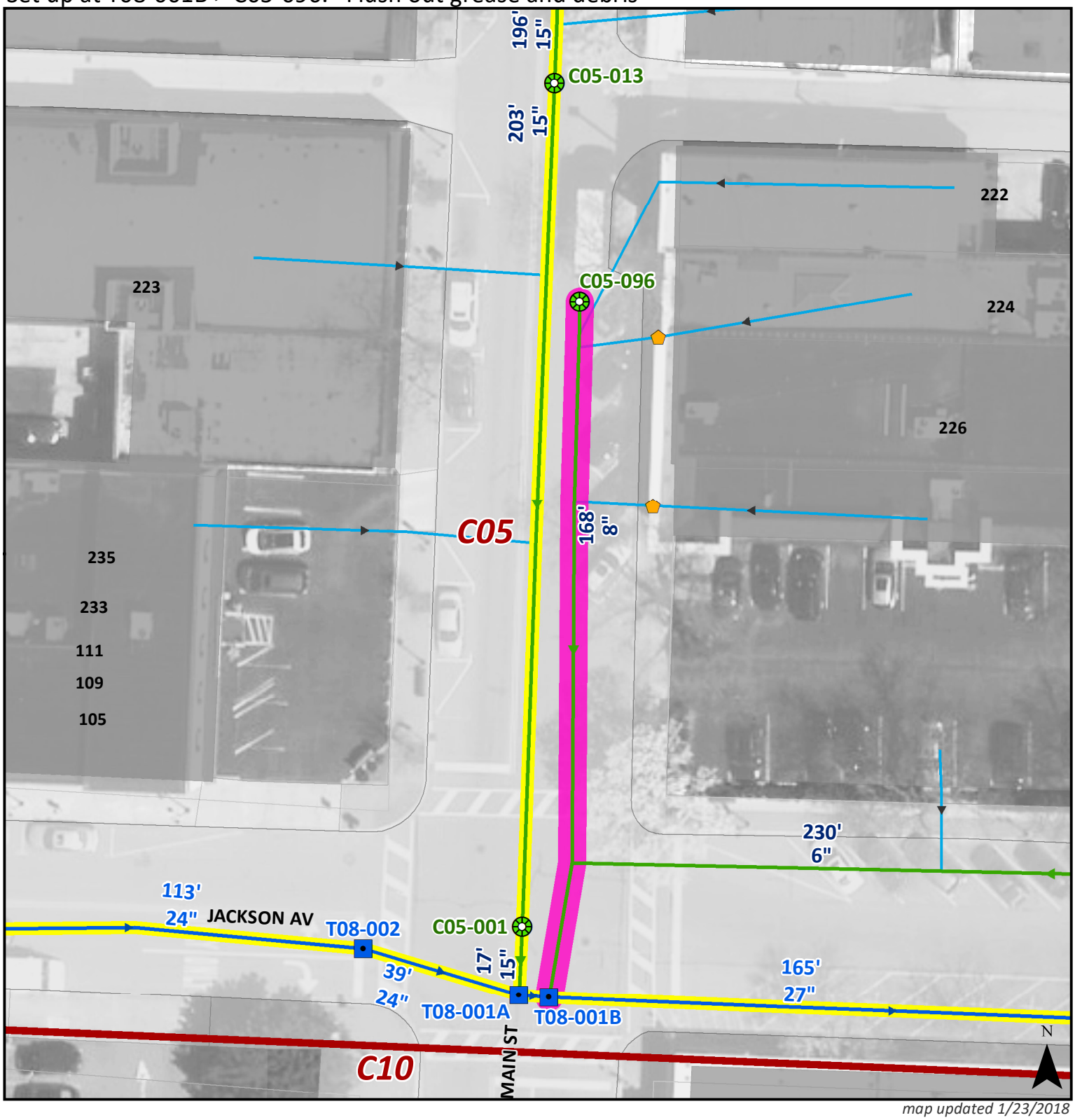
(7 on Heaven Restaurant and Dean's Clothing Store)

Sets: C05-096>C05-T08-001B

Description and Procedures

They share a common service. Need to flush out grease and debris.

Set up at T08-001B > C05-096. Flush out grease and debris



map updated 1/23/2018

SANITARY FLUSHING PMS

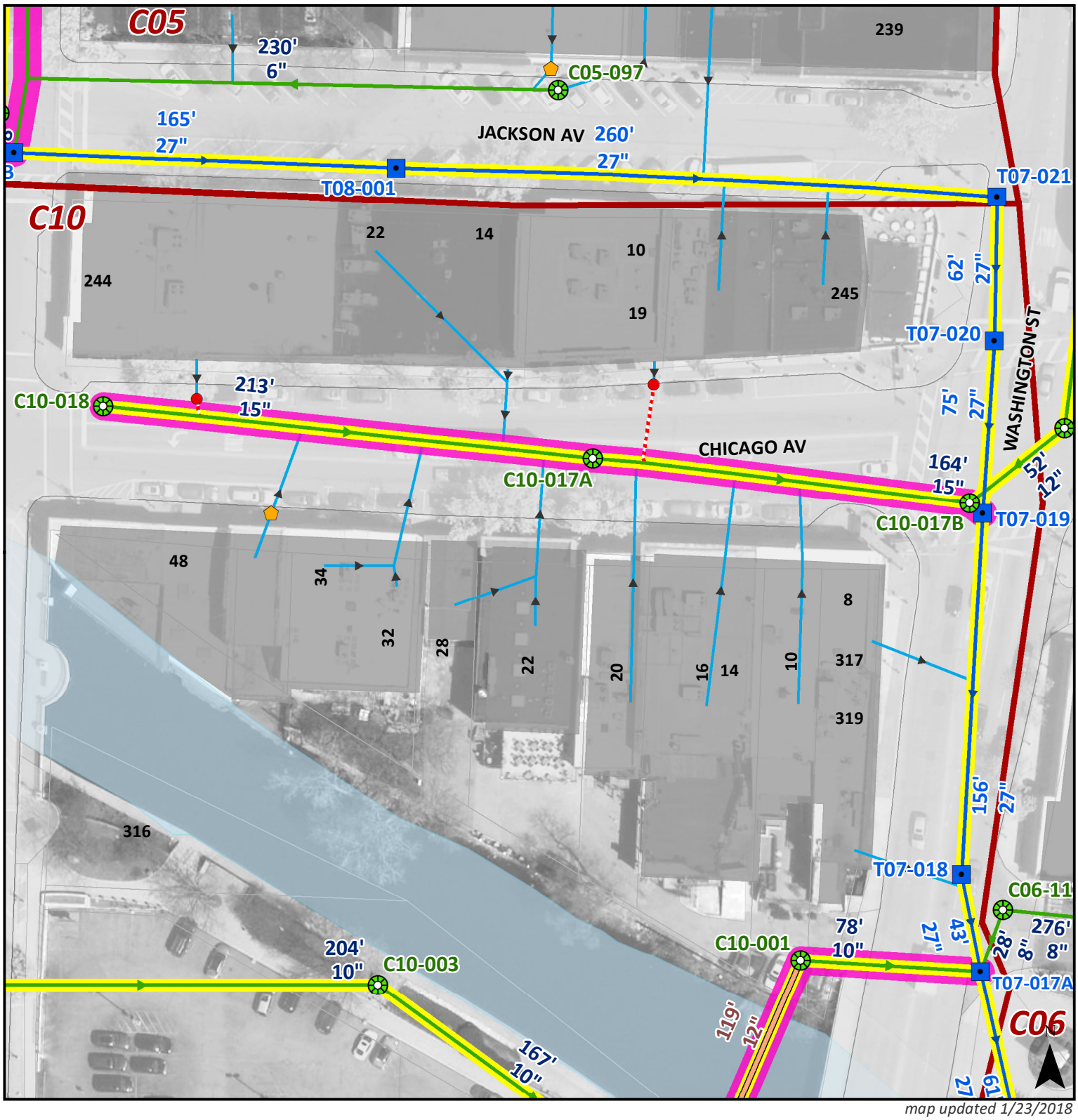
PMS CHECK: FM-4 Location: Chicago Av - Washington St to Main St

Sets: C10-018 to C10-017A C10-017A to C10-017B C10-017B to T07-019

Description and Procedures

USE #777 DUE TO TRAFFIC

Set up on Southbound Washington St, and flush 3 sets to the west. Flush during low traffic hours. Use arrow board, cones, and flagman. **Heavy Grease**



map updated 1/23/2018

SANITARY FLUSHING PMS

PMS CHECK: FM-5 **Location: Hillside Siphon**

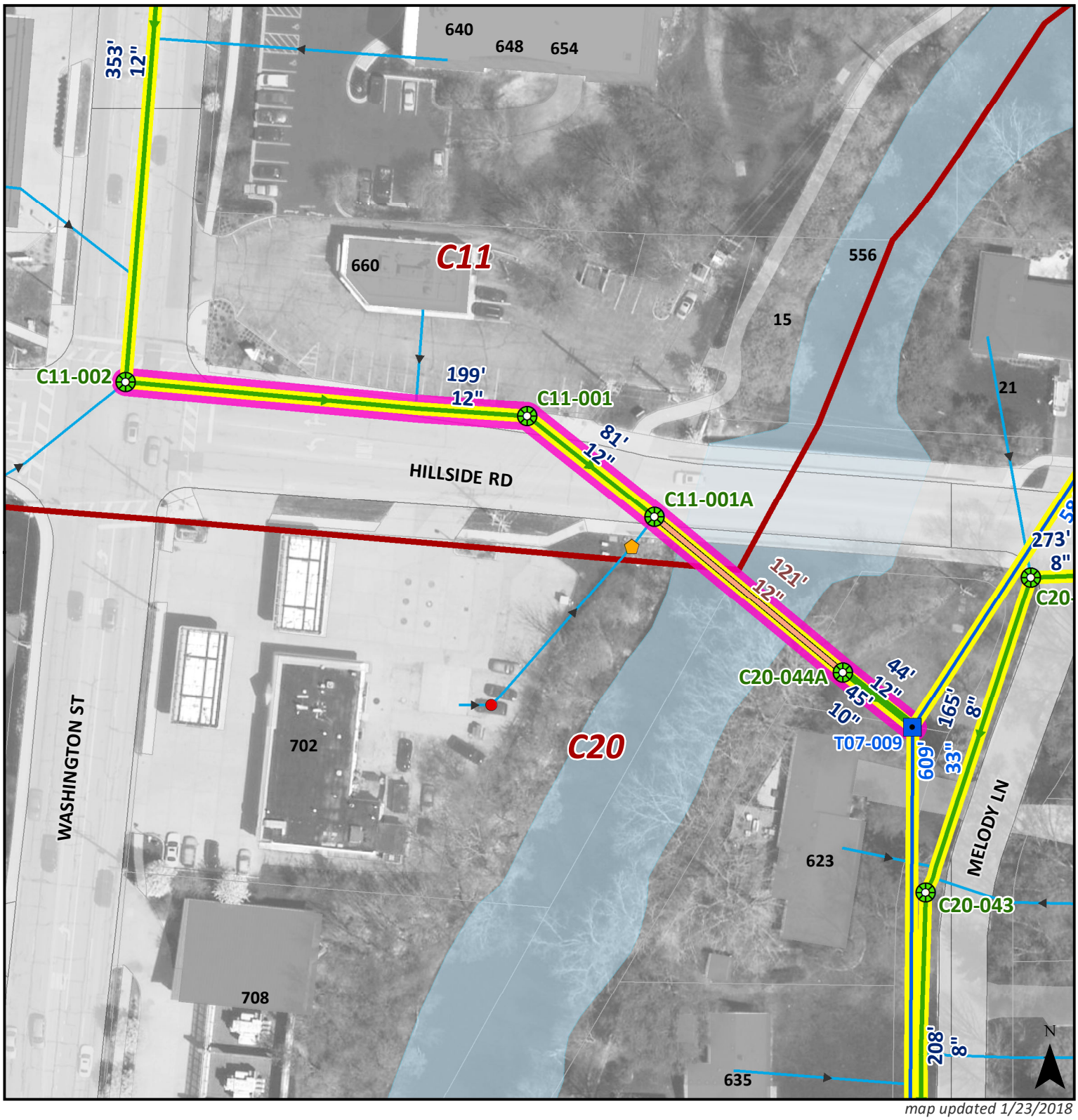
Sets: C11-002 >C11-001 C11-001>C11-001A C11-001A>C20-044A C20-044A>T07-009

Description and Procedures

****FLUSH EVERY TWO WEEKS****

Vac Manhole C11-001A

Mix up Manhole C20-044A - 2 barrels



map updated 1/23/2018

SANITARY FLUSHING PMS

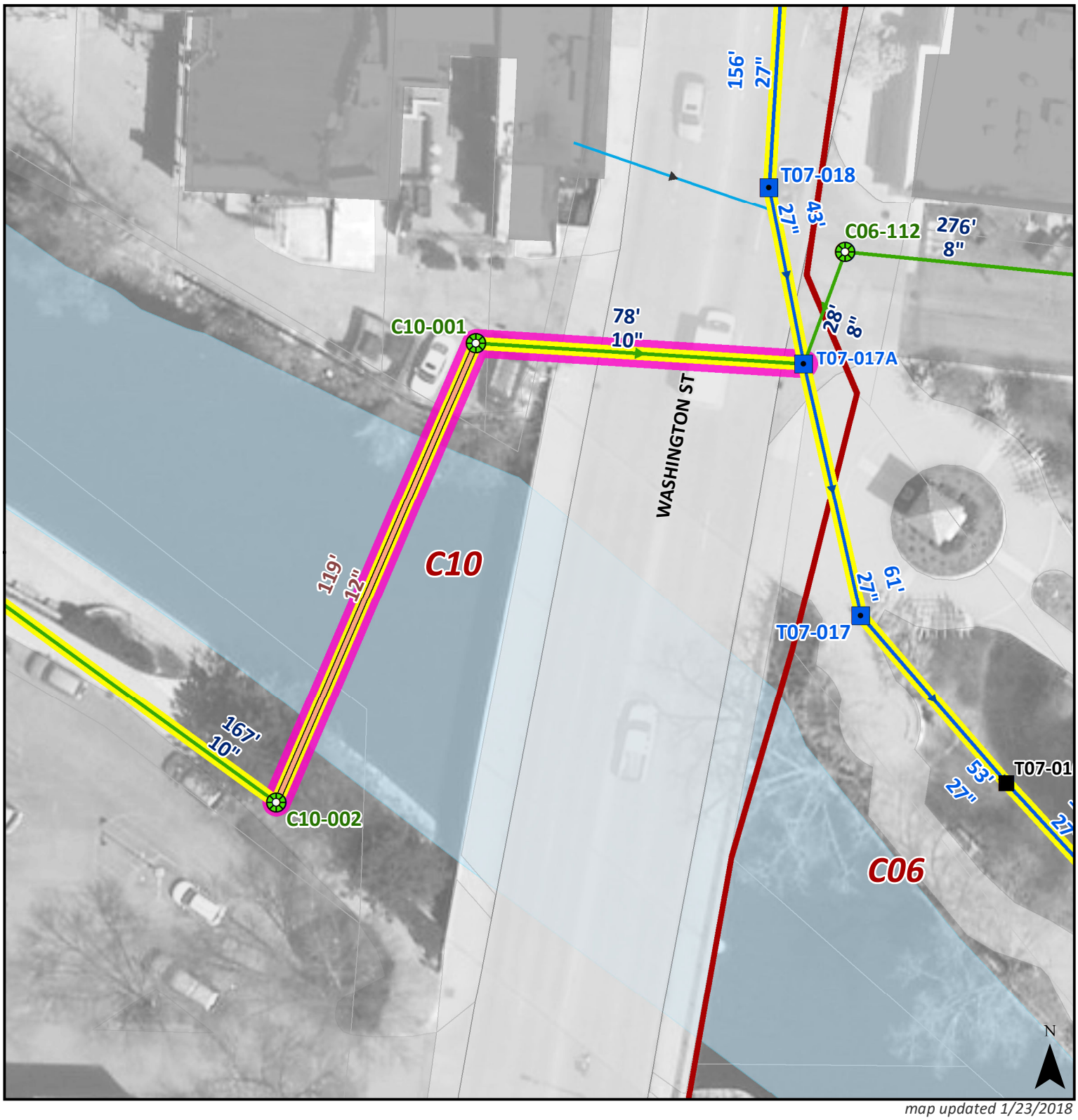
PMS CHECK: FM-5

Location: Lantern Siphon (Washington St - Behind Lantern)

Sets: C10-002>C10-001 C10-001>T07-017A

Description and Procedures

Washington St, behind the Lantern at the river



map updated 1/23/2018

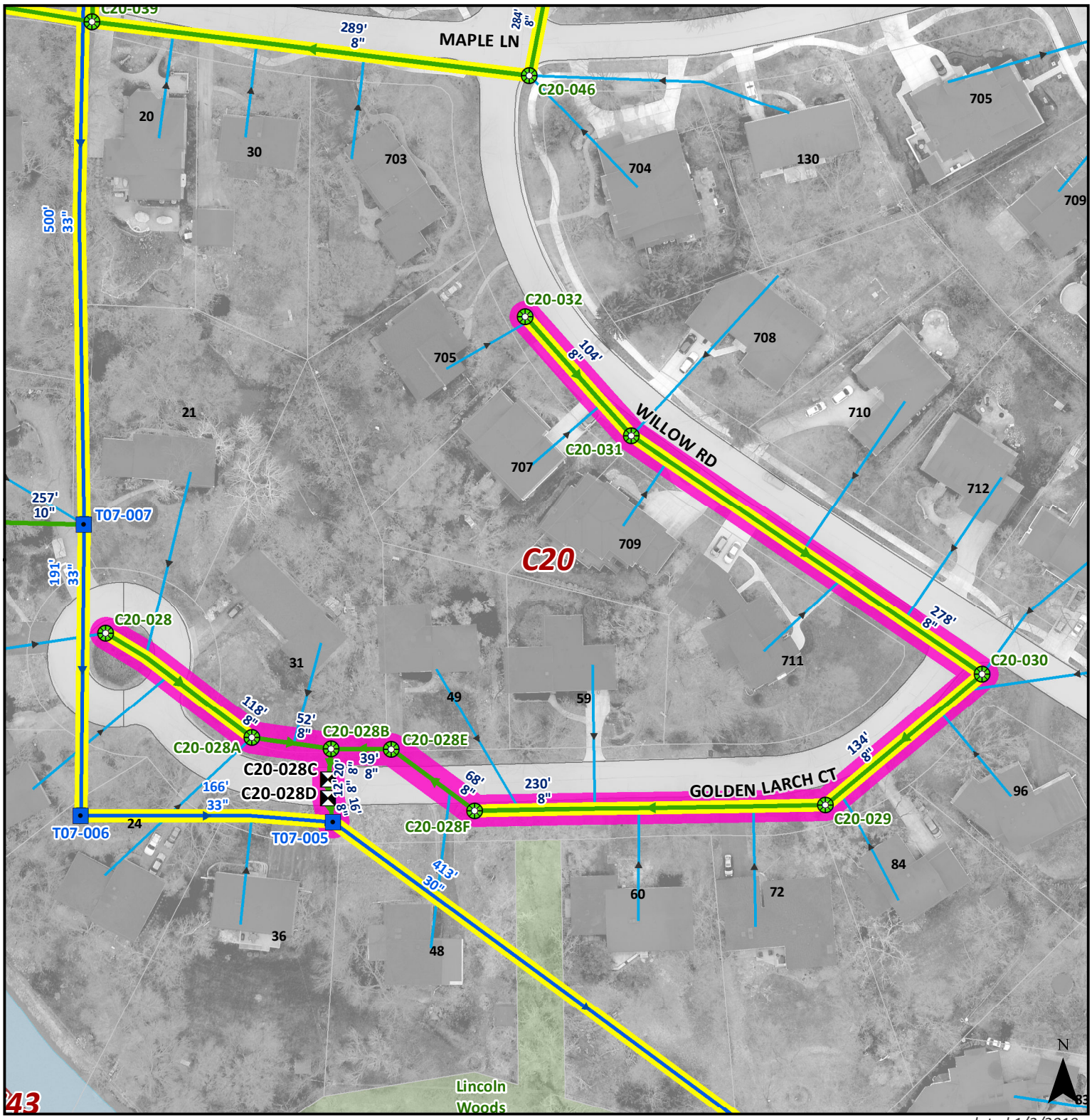
SANITARY FLUSHING PMS

PMS CHECK: FM-6 **Location: Willow/Golden Larch**

Sets: C20-032>031
031>030
030>029
029>028F
028F>028E
028E>028B
028>028A
028A>028B
028B>028C/028D (BPS - Eveready MHs ⊠)
028D>T05-005

Description and Procedures

Run Flusher until pump pits (028C and 028 D) at Golden Larch and Eveready System are clear



map updated 1/2/2019

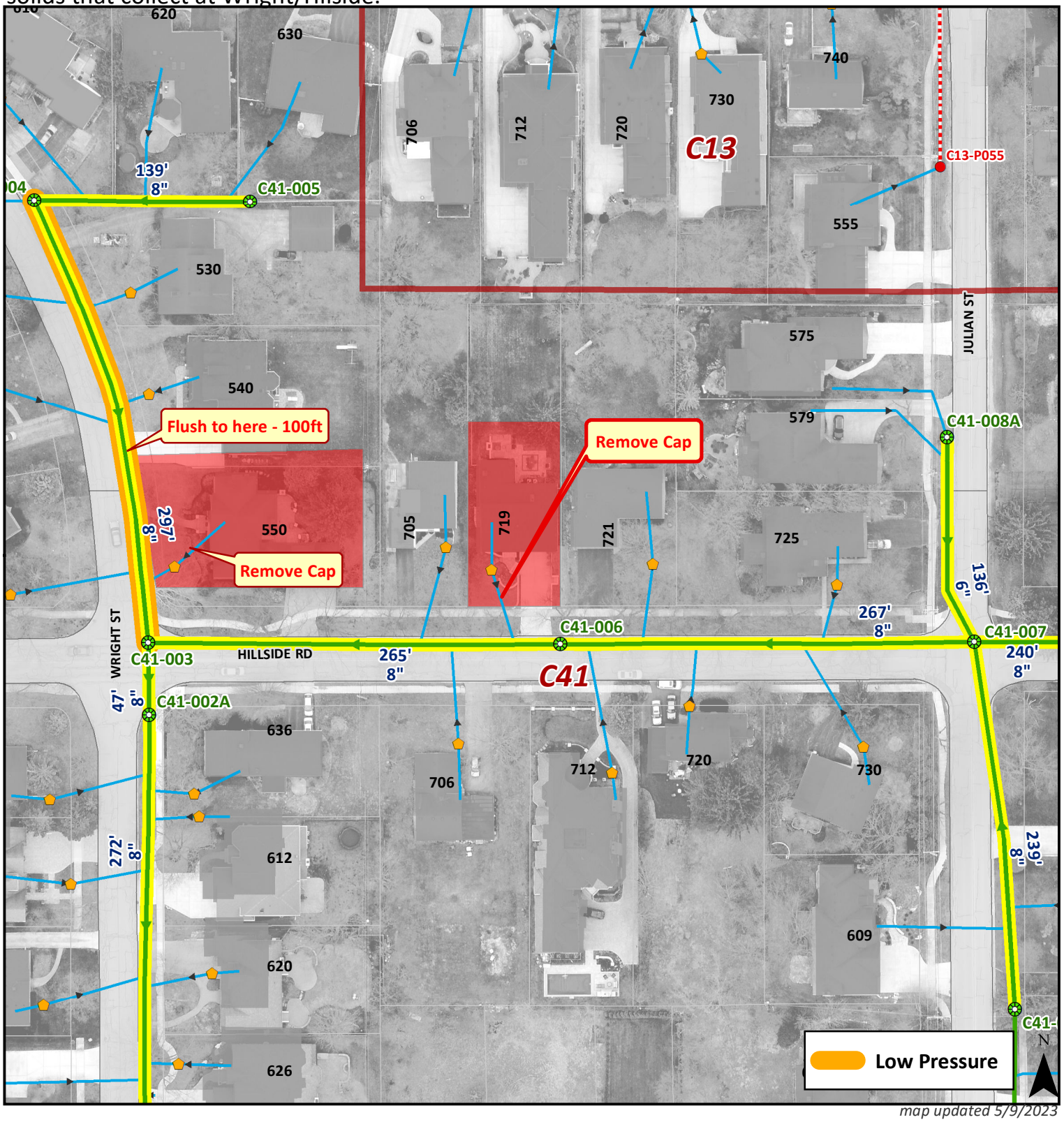
SANITARY FLUSHING PMS

PMS CHECK: FM-7 **Location: Hillside- Julian to Wright**

Sets: C41-007>C41-006>C41-003
C41-003 to 100ft north toward C41-004 **(Low Pressure)**

Description and Procedures

Set up at Hillside and Wright and flush 2 sets east to Hillside/Julian. **Flat line - Collects solids**
Remove cleanout cap at 550 S Wright St, then flush up 100ft toward MH C41-004 on Wright to clear solids that collect at Wright/Hilside.



map updated 5/9/2023

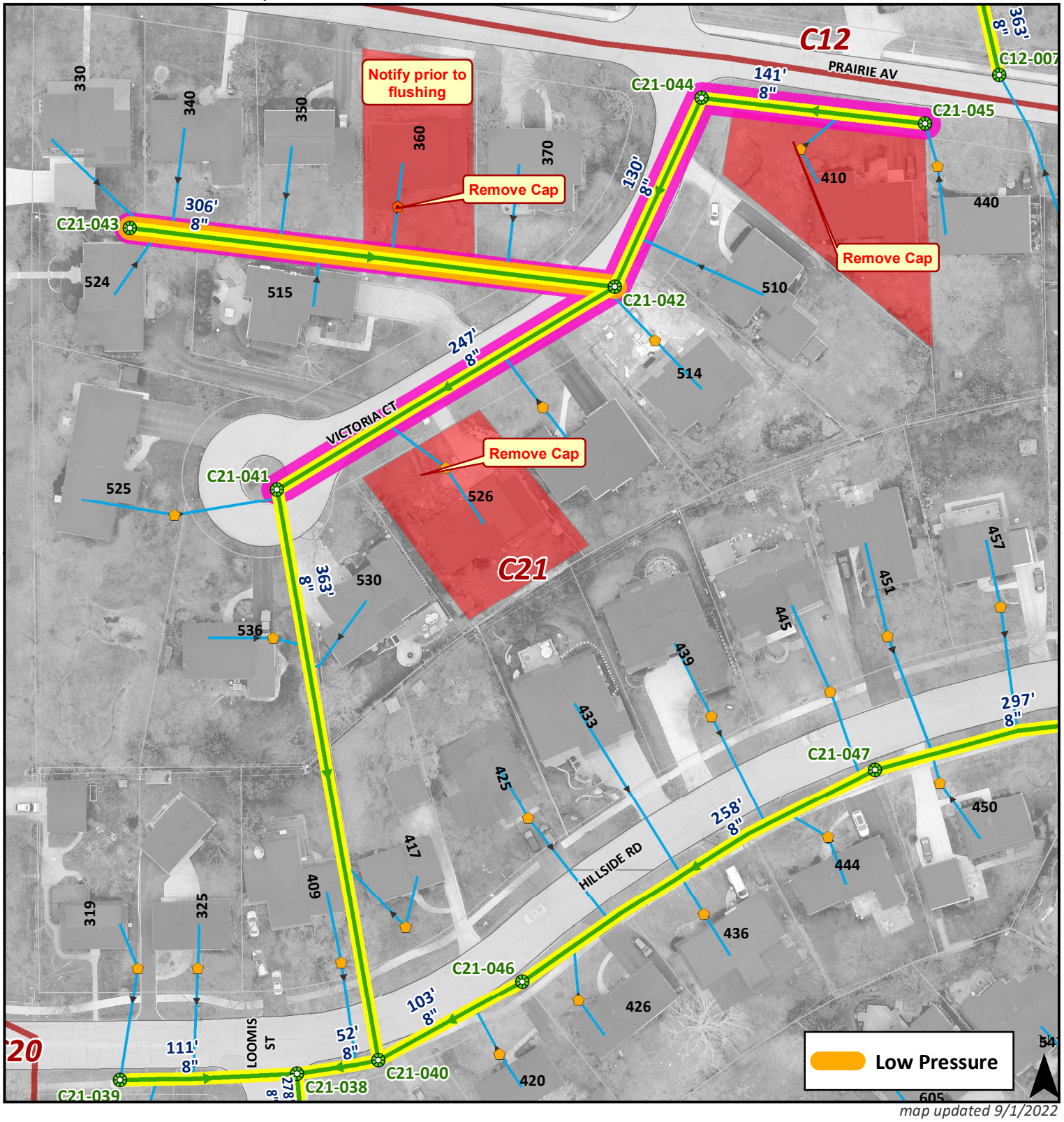
SANITARY FLUSHING PMS

PMS CHECK: FM-8 **Location: Victoria Court**

Sets: C21-045>C21-044 C21-044>C-21-042 C21-042>C21-041
C21-043>C21-042 **(Low Pressure)**

Description and Procedures

Flush Prairie Line (045-044) and behind homes (043-042) into Victoria Ct to MH 041 - If needed flush to Hillside. Notify resident at 360 Prairie
and remove cleanout caps at 360 Prairie, 410 Prairie, and 526 Victoria Ct



map updated 9/1/2022

SANITARY FLUSHING PMS

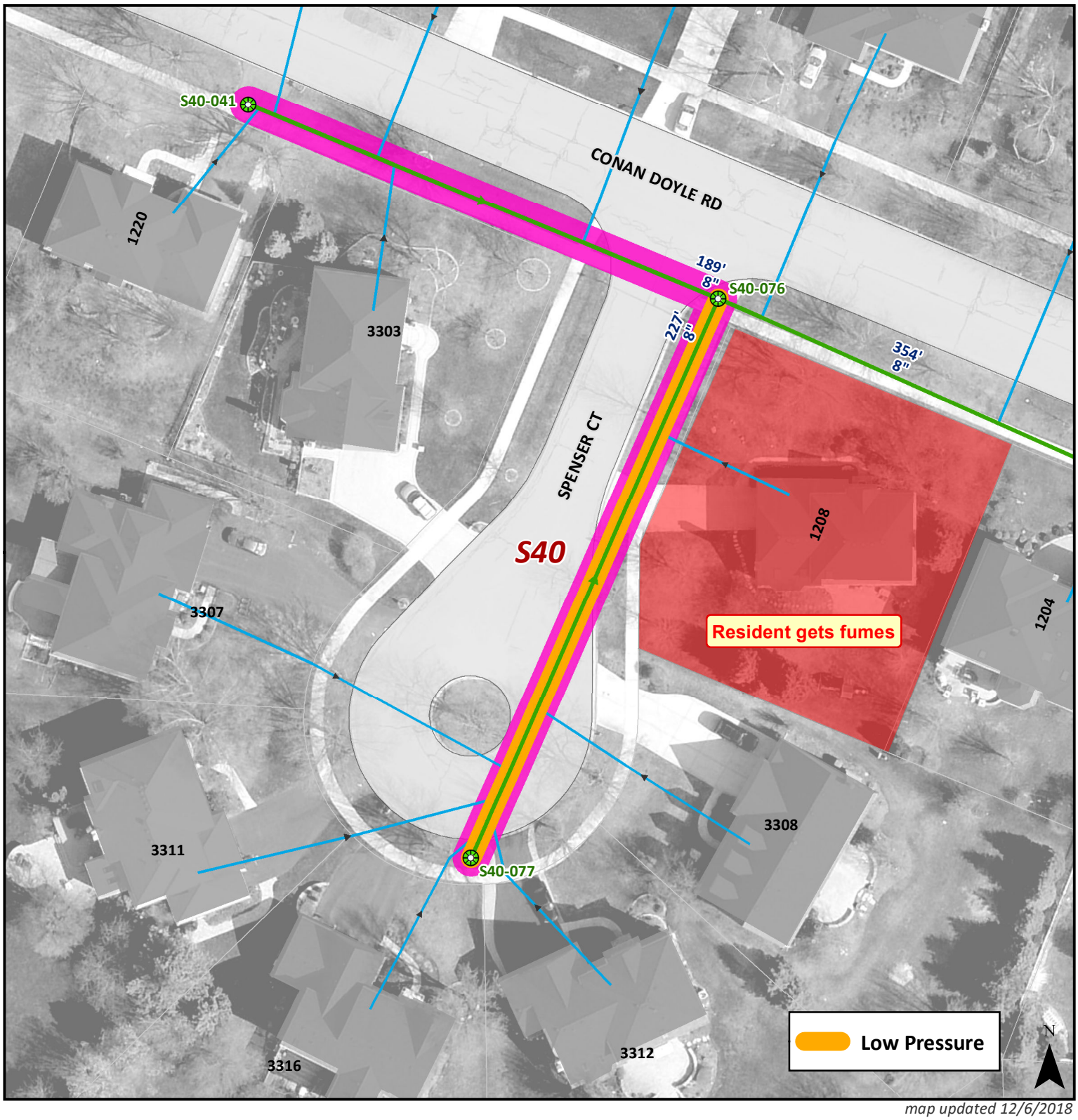
PMS CHECK: FM-9 **Location: Spenser Ct**

Sets: S40-041>S40-076 S40-077>S40-076 **(Low Pressure)**

Description and Procedures

FLUSH EVERY TWO WEEKS

Flush Spenser Ct line (077-076) **(Low Pressure)** Resident at 1208 Conan Doyle gets fumes



map updated 12/6/2018

SANITARY FLUSHING PMS

PMS CHECK: FM-10 **Location: Watercress Ct**

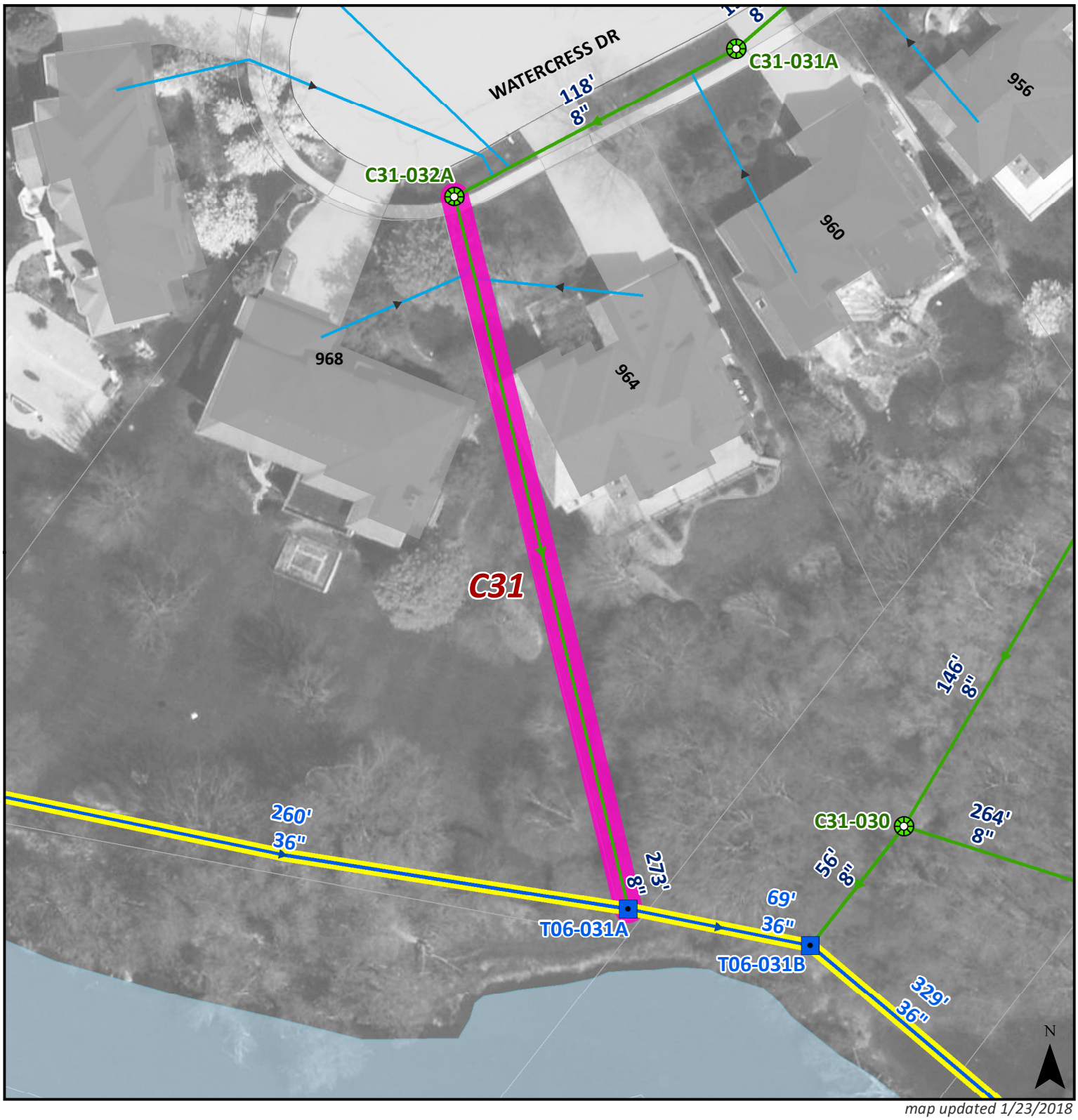
Sets: C31-032A to T06-031A

Description and Procedures

4 man pull hose to backyard and rootsaw entire line.

T06-031A is a Lifespan lid

DO NOT REVERSE FLUSH



map updated 1/23/2018

SANITARY FLUSHING PMS

PMS CHECK: FM-11 **Location: 2559 Bangert Ln**

Sets: S63-021>S23-022

Description and Procedures

Flush 1 set: 021 to 022



map updated 12/6/2018

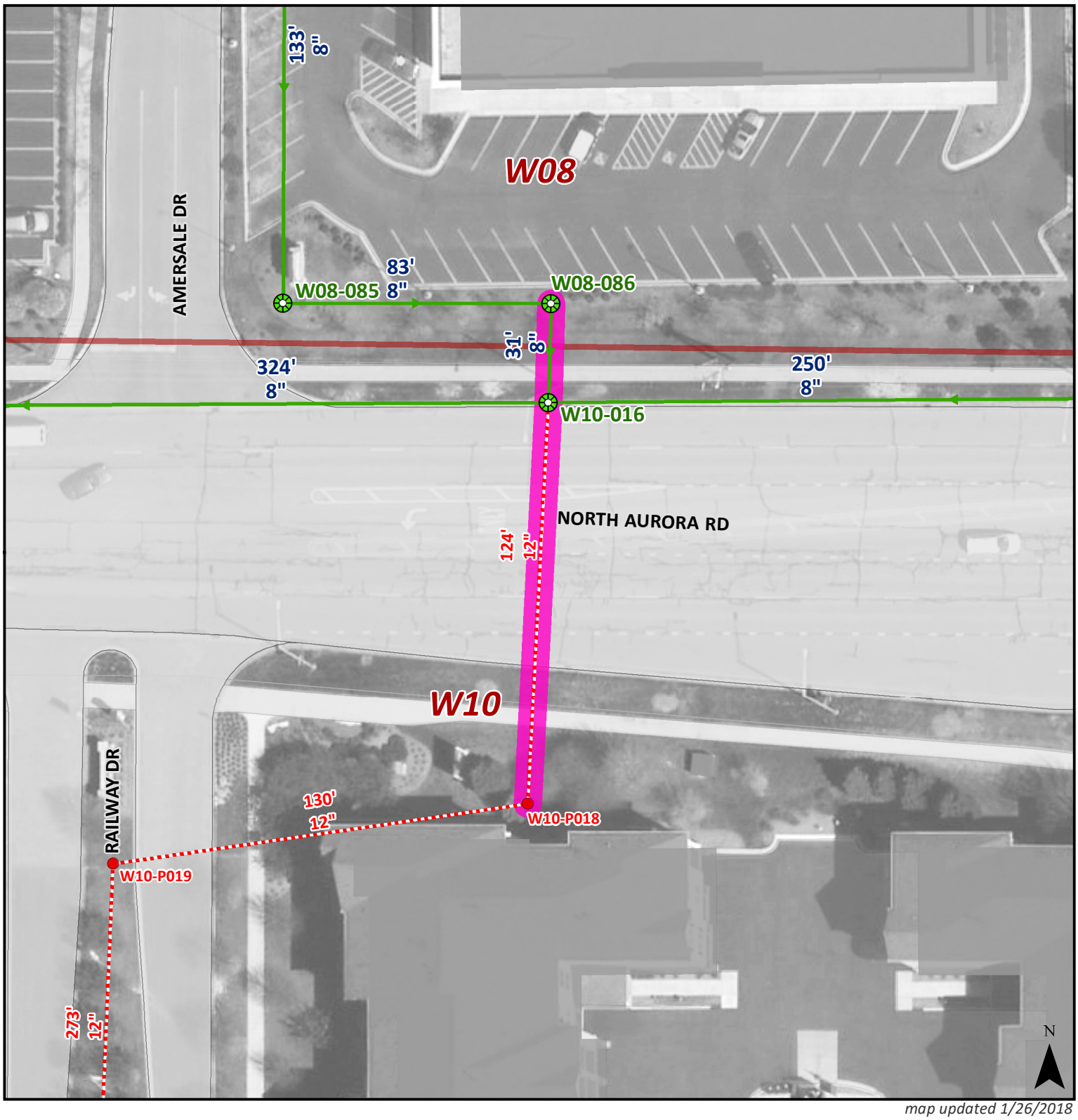
SANITARY FLUSHING PMS

PMS CHECK: FM-13 **Location: North Aurora and Route 59**

Sets: W08-086>W10-016 W10-016>W10-P018

Description and Procedures

Flush W10-P018 to W10-016 and W08-086 to W10-016



map updated 1/26/2018

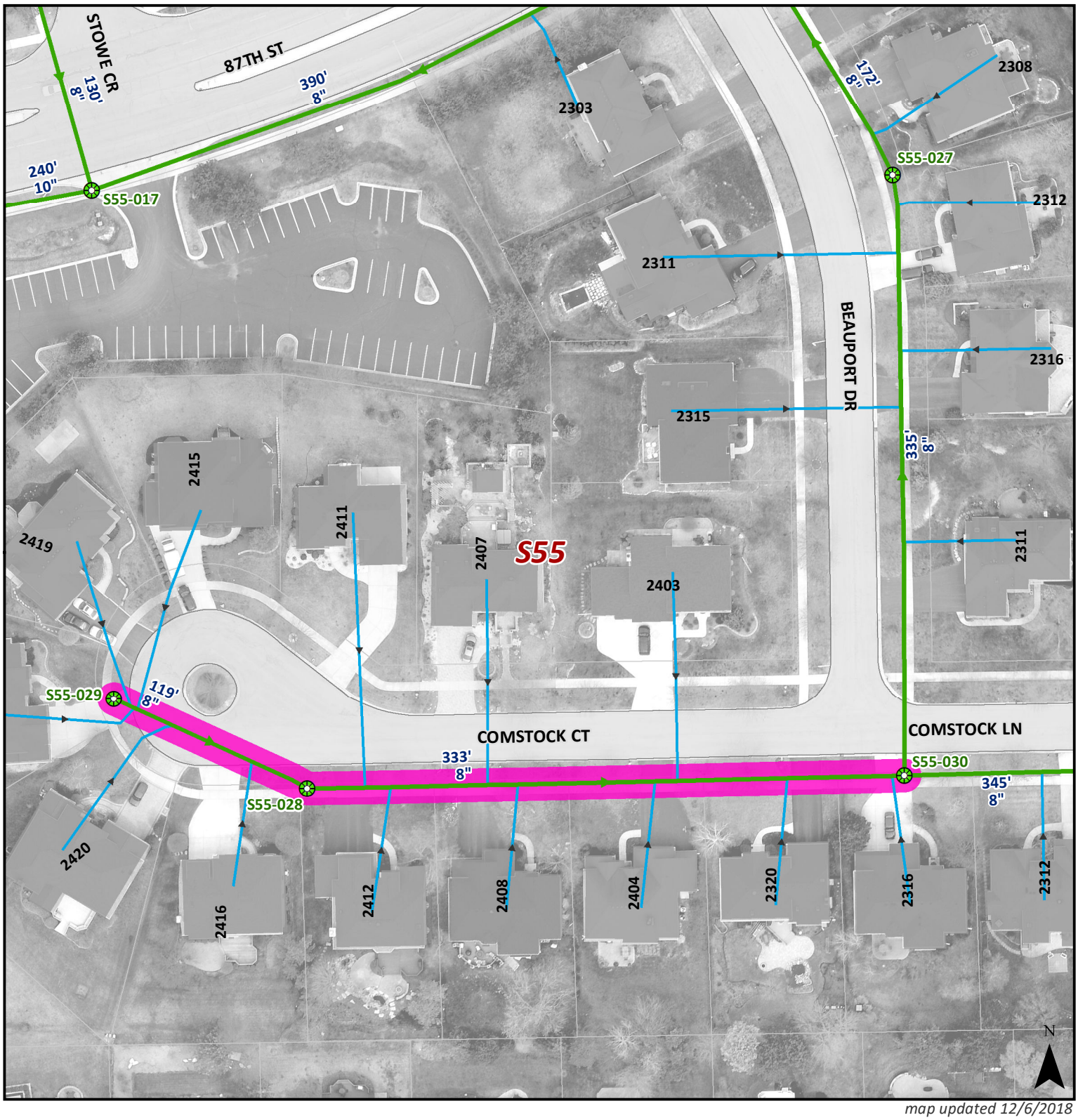
SANITARY FLUSHING PMS

PMS CHECK: FM-14 **Location: Comstock Ct and Beauport Rd**

Sets: S55-029>S55-028 S55-028>S55-030

Description and Procedures

Flush S55-029 to S55-028 and S55-028 to S55-030



map updated 12/6/2018

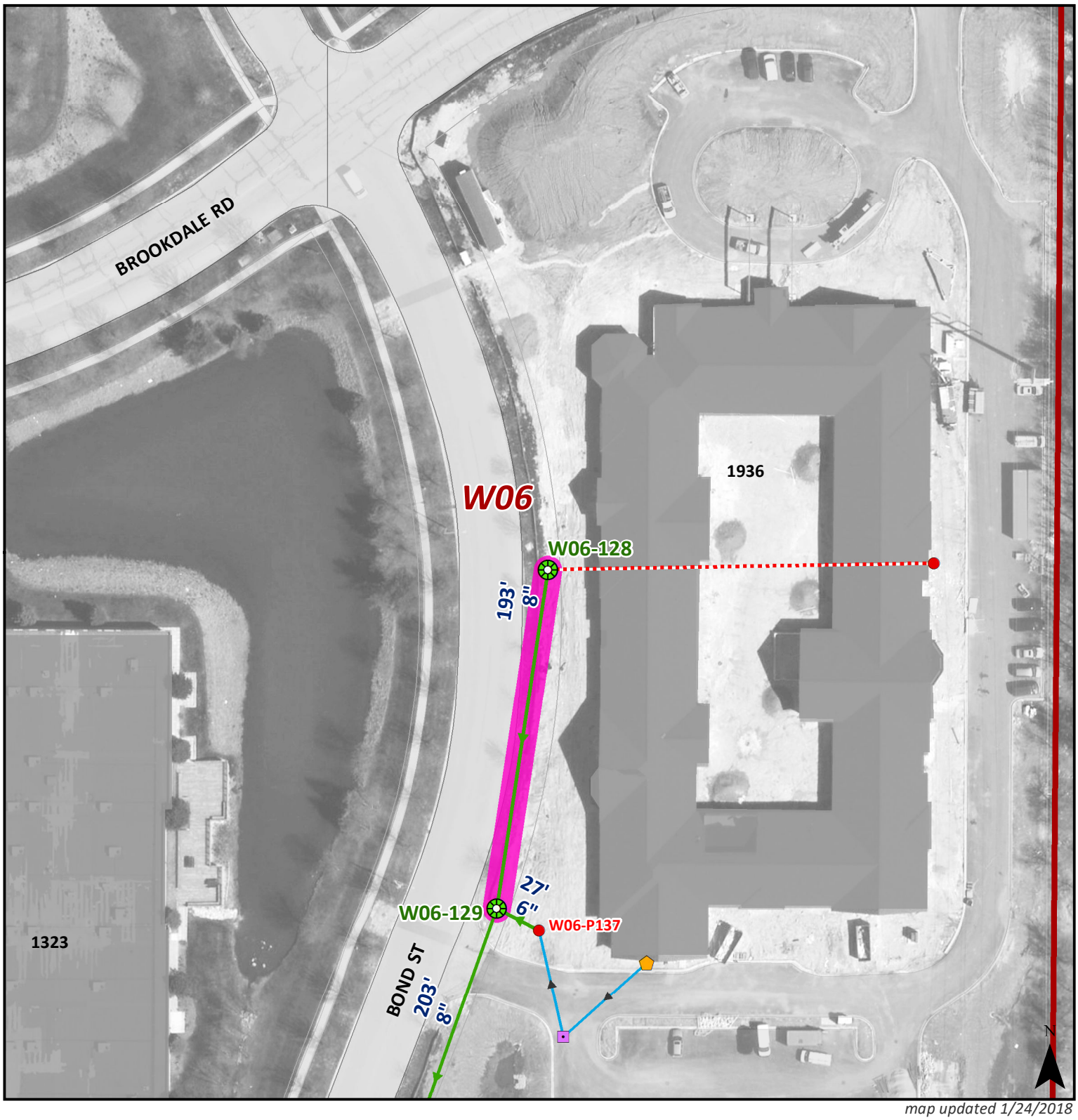
SANITARY FLUSHING PMS

PMS CHECK: FM-16

Location: 1936 Brookdale Rd
Silverado Senior Living

W06-128>W06-129

Description and Procedures
Flush set and vaccuum out at W06-129



map updated 1/24/2018

SANITARY FLUSHING PMS

PMS CHECK: FM-17 **Location: 1603 and 1611 77th St**

Set: S30-203>S30-202

Description and Procedures

1603 77th St has FLAT service - holds rags from cleanout to main

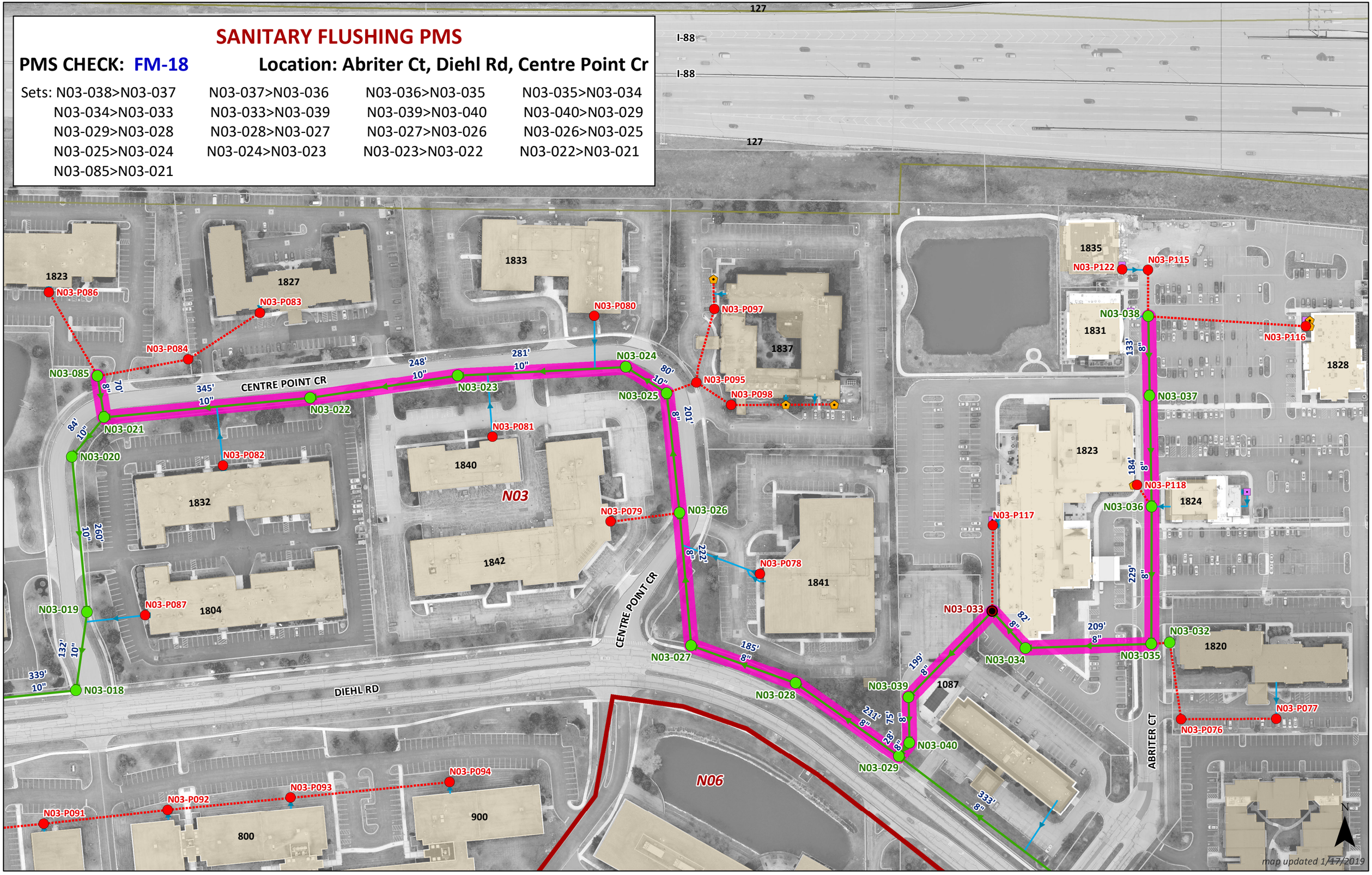


map updated 1/24/2018

SANITARY FLUSHING PMS

PMS CHECK: FM-18 **Location: Abriter Ct, Diehl Rd, Centre Point Cr**

Sets: N03-038>N03-037 N03-037>N03-036 N03-036>N03-035 N03-035>N03-034
N03-034>N03-033 N03-033>N03-039 N03-039>N03-040 N03-040>N03-029
N03-029>N03-028 N03-028>N03-027 N03-027>N03-026 N03-026>N03-025
N03-025>N03-024 N03-024>N03-023 N03-023>N03-022 N03-022>N03-021
N03-085>N03-021



SANITARY FLUSHING PMS

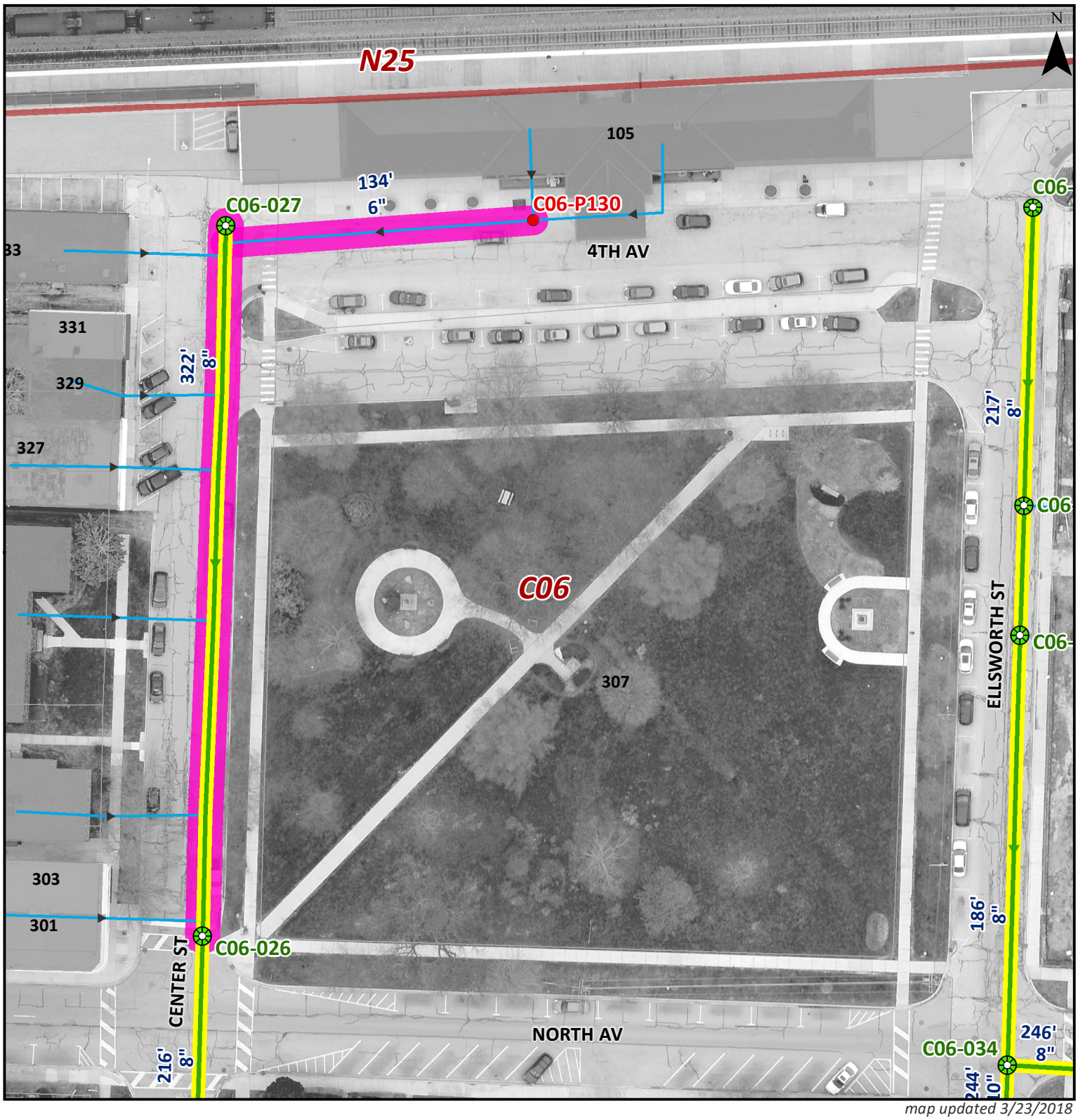
PMS CHECK: FM-19 **Location: 5th Av Station**

Sets: C06-P130 > Blind Service Connection
C06-027 > C06-026

Description and Procedures

Set up at C06-P130 and reverse flush to blind service connection

Set up at C06-026 and flush C06-027 > C06-026



map updated 3/23/2018

SANITARY FLUSHING PMS

PMS CHECK: FM-20 **Location: Burbon Ct/Elyse Ln**

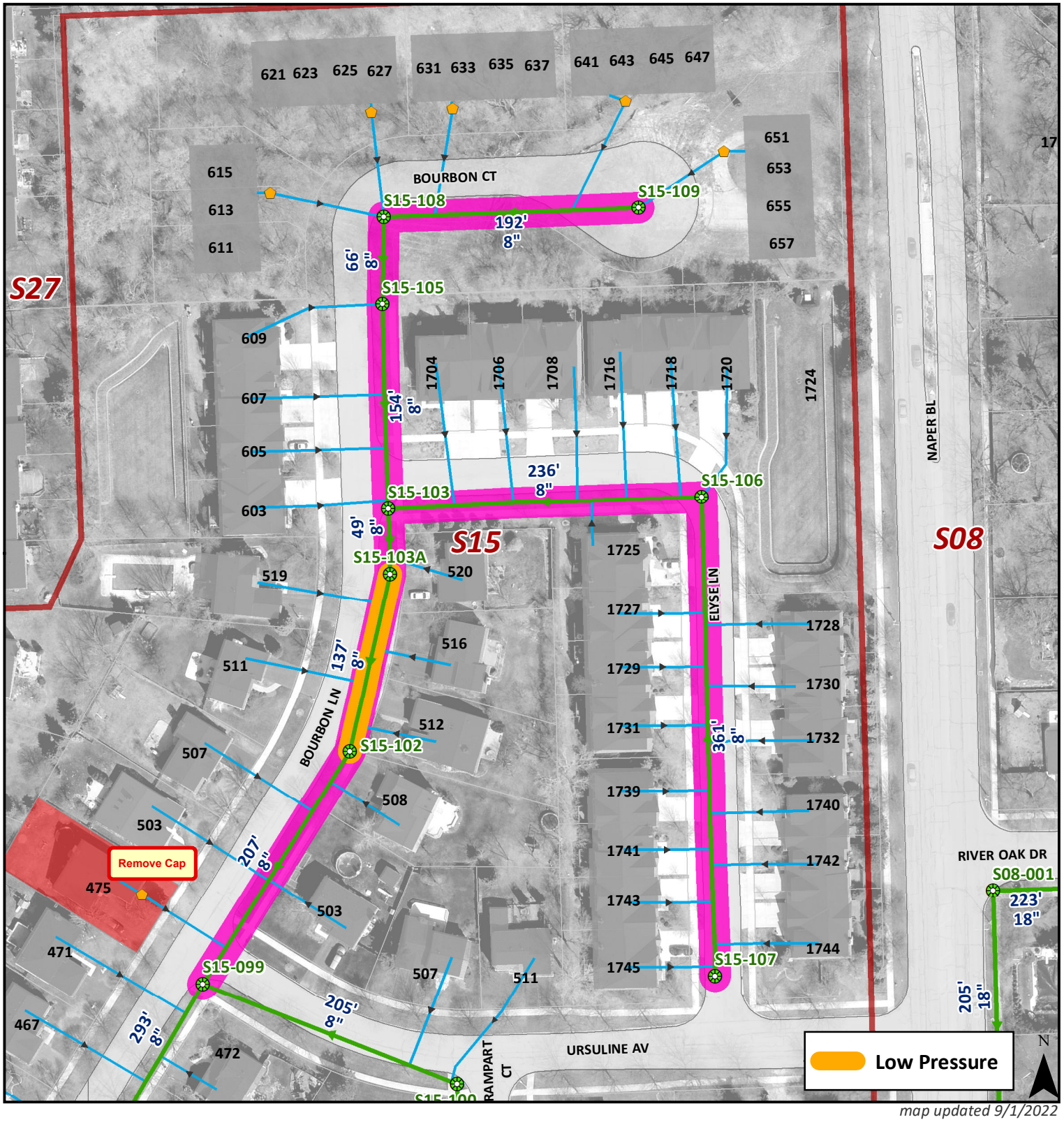
Sets: S15-106>103 S15-109>108 S15-108>105 S15-105>103
S15-103>103A S15-103A>102 S15-102>099 S15-107>106

Description and Procedures

Flush 8 sets - Lines are flat and Low Flow.

S15-103A>S15-102 **(Low Pressure)**

Remove cleanout cap at 475 Bourbon Ln, 1' from front window



map updated 9/1/2022

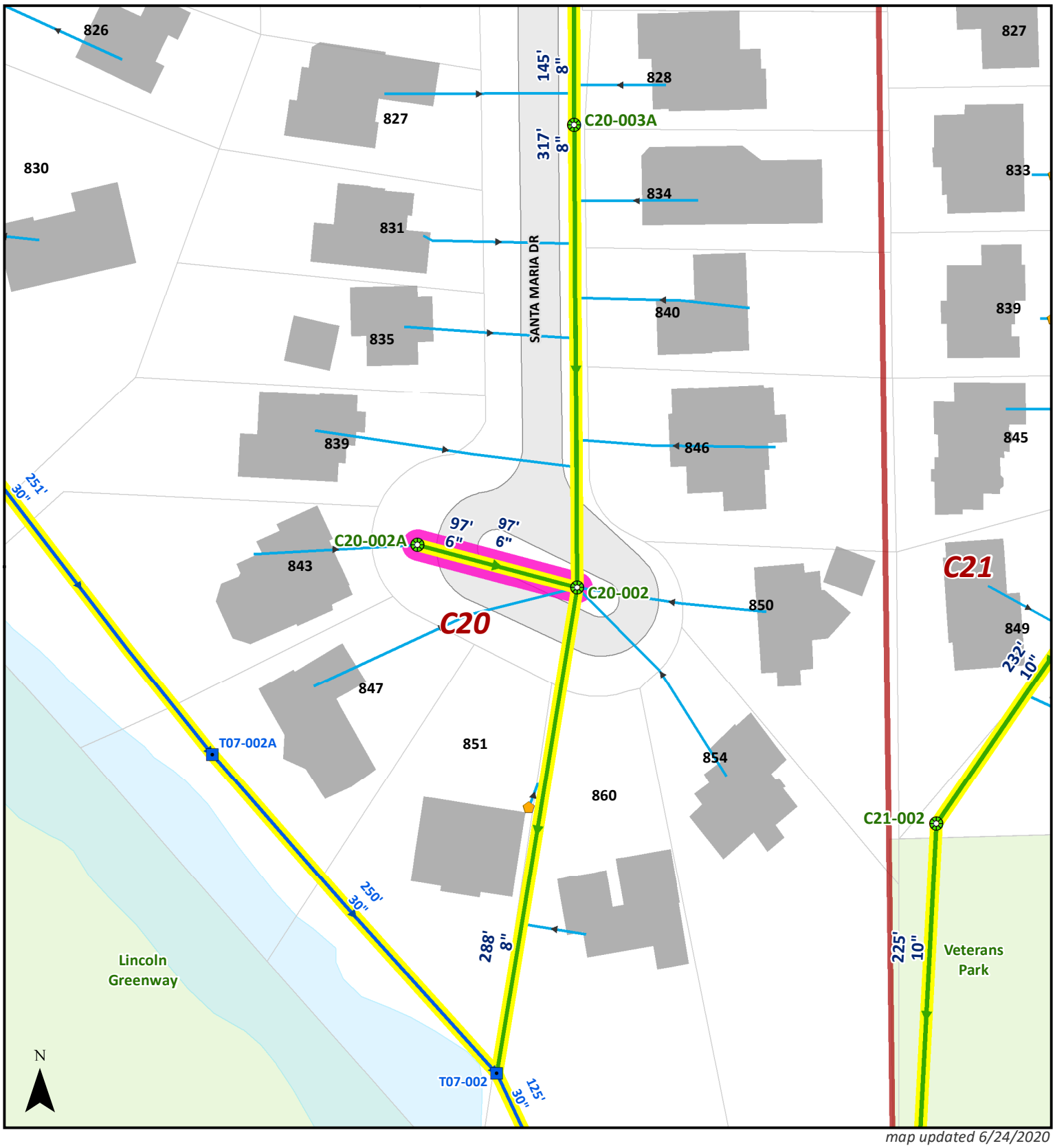
SANITARY FLUSHING PMS

PMS CHECK: FM-21 **Location: Santa Maria Ct**

Sets: C20-002A>C20-002

Description and Procedures

Flush 1 set



map updated 6/24/2020

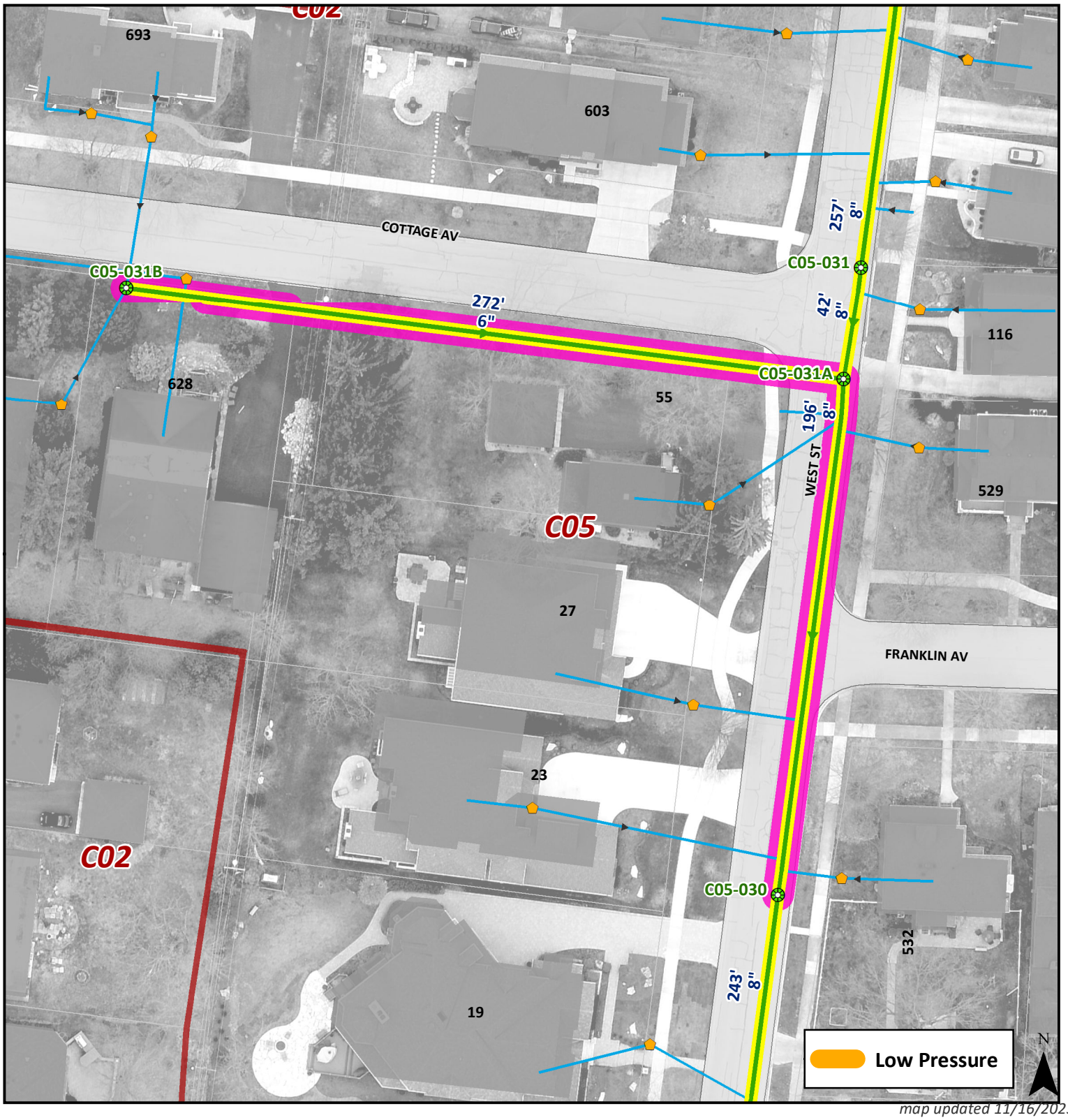
SANITARY FLUSHING PMS

PMS Check: FM-22 **Location: Cottage Av & West St**

Sets: C05-031B>C05-031A C05-031A>C05-030

Description and Procedures

Flush 031B>031A first. Then flush 031A>030



map updated 11/16/2023

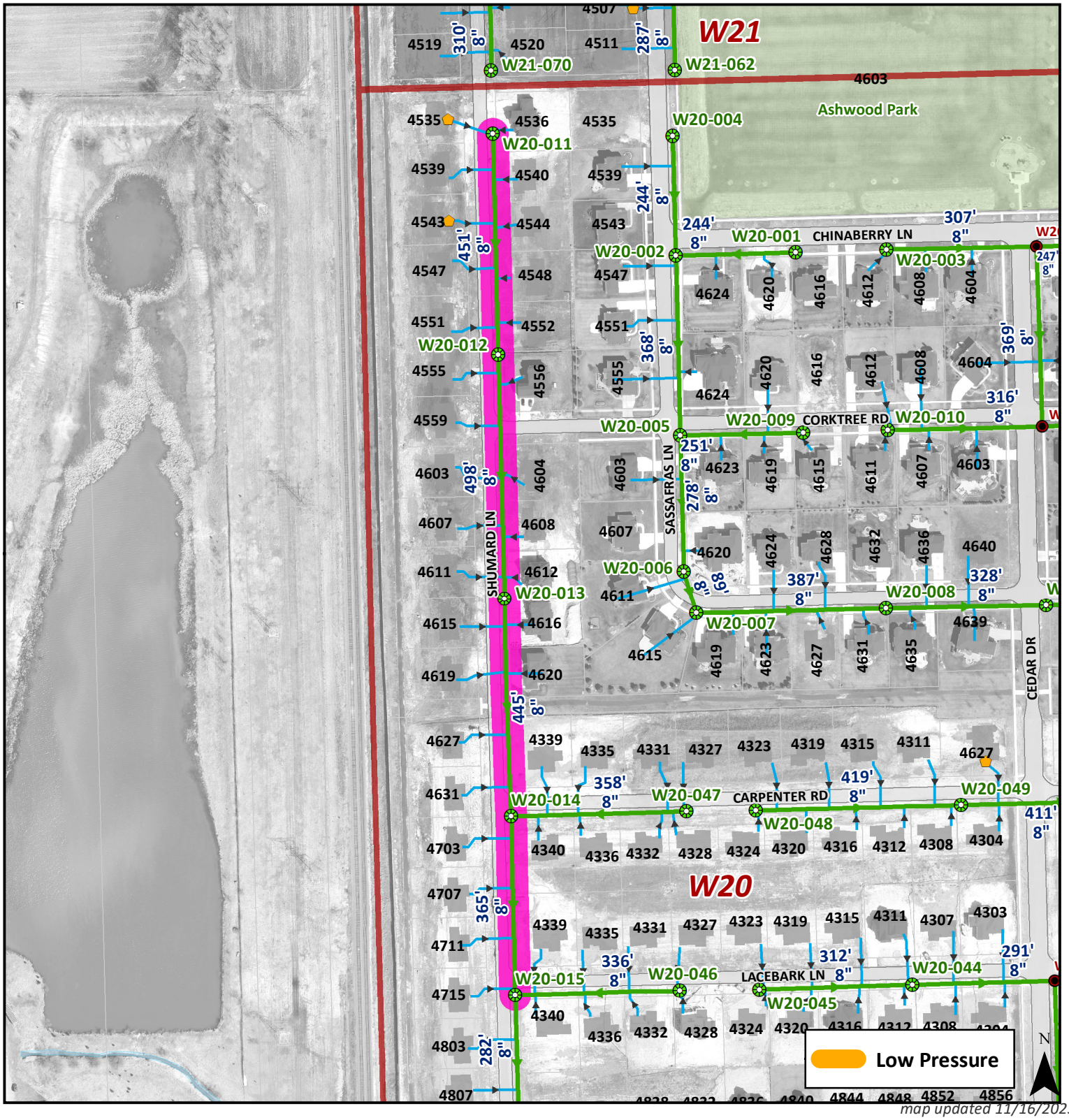
SANITARY FLUSHING PMS

PMS Check: FM-23 **Location: Shumard Ln**

Sets: W20-011>W20-012 W20-012>W20-013 W20-013>W20-014
W20-014>W20-015

Description and Procedures

Flush 011>012, 012>013, 013>014, then 014>015



map updated 11/16/2023

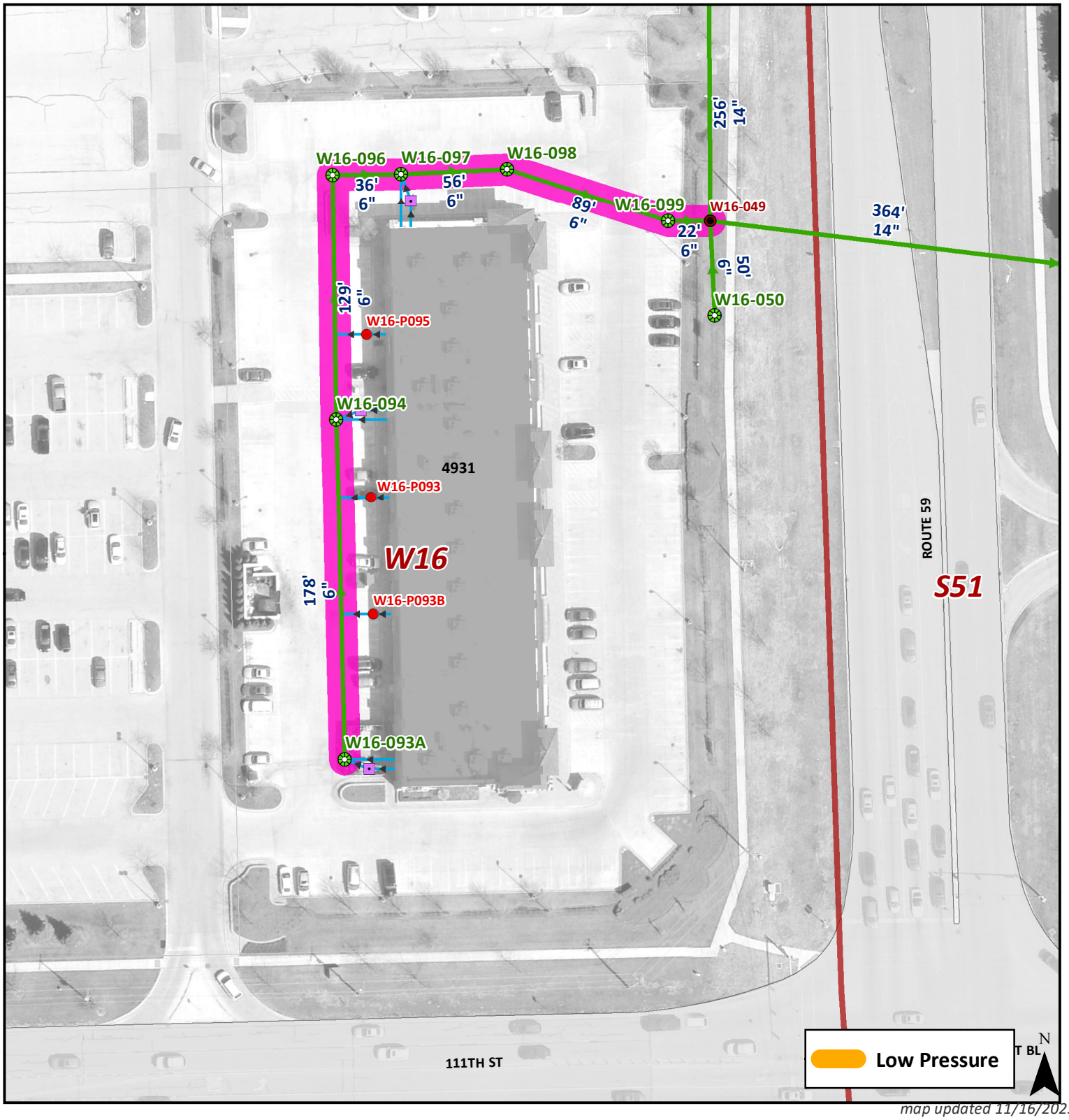
SANITARY FLUSHING PMS

PMS Check: FM-24 **Location: NW Corner of Route 59 & 111th St**

Sets: W16-093A>W16-094 W16-094>W16-096 W16-096>W16-097
W16-097>W16-098 W16-098>W16-099 W16-099>W16-049

Description and Procedures

Flush 093A>094, 094>096, 096>097, 097>098, 098>099, 099>049



map updated 11/16/2023

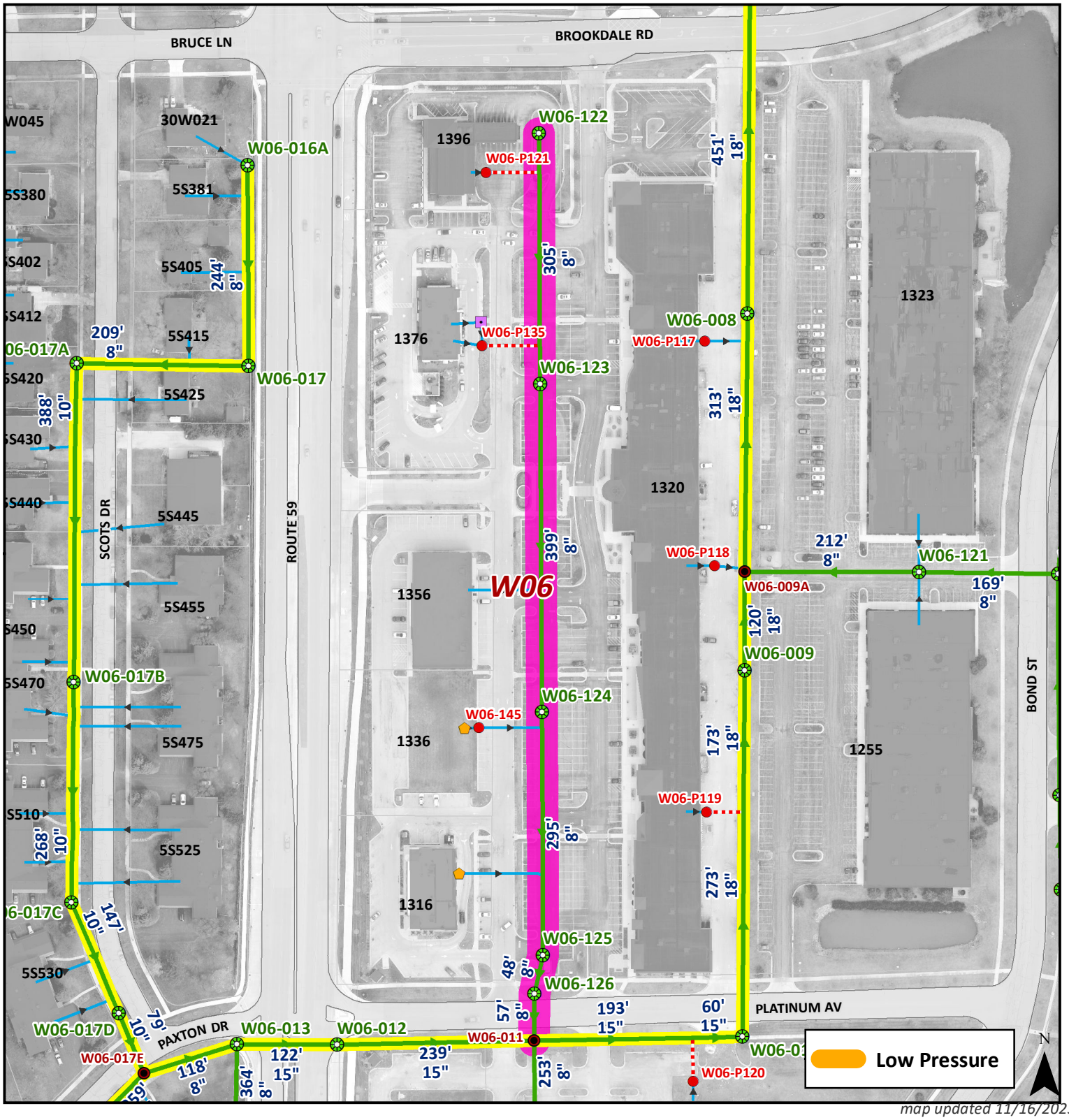
SANITARY FLUSHING PMS

PMS Check: FM-25 **Location: 1396 Rt 59 - McDonalds**

Sets: W06-122>W06-123 W06-123>W06-124 W06-124>W06-125
W06-125>W06-126 W06-126>W06-011

Description and Procedures

Flush 122>123, 123>124, 124>125, 125>126, 126>011



map updated 11/16/2023

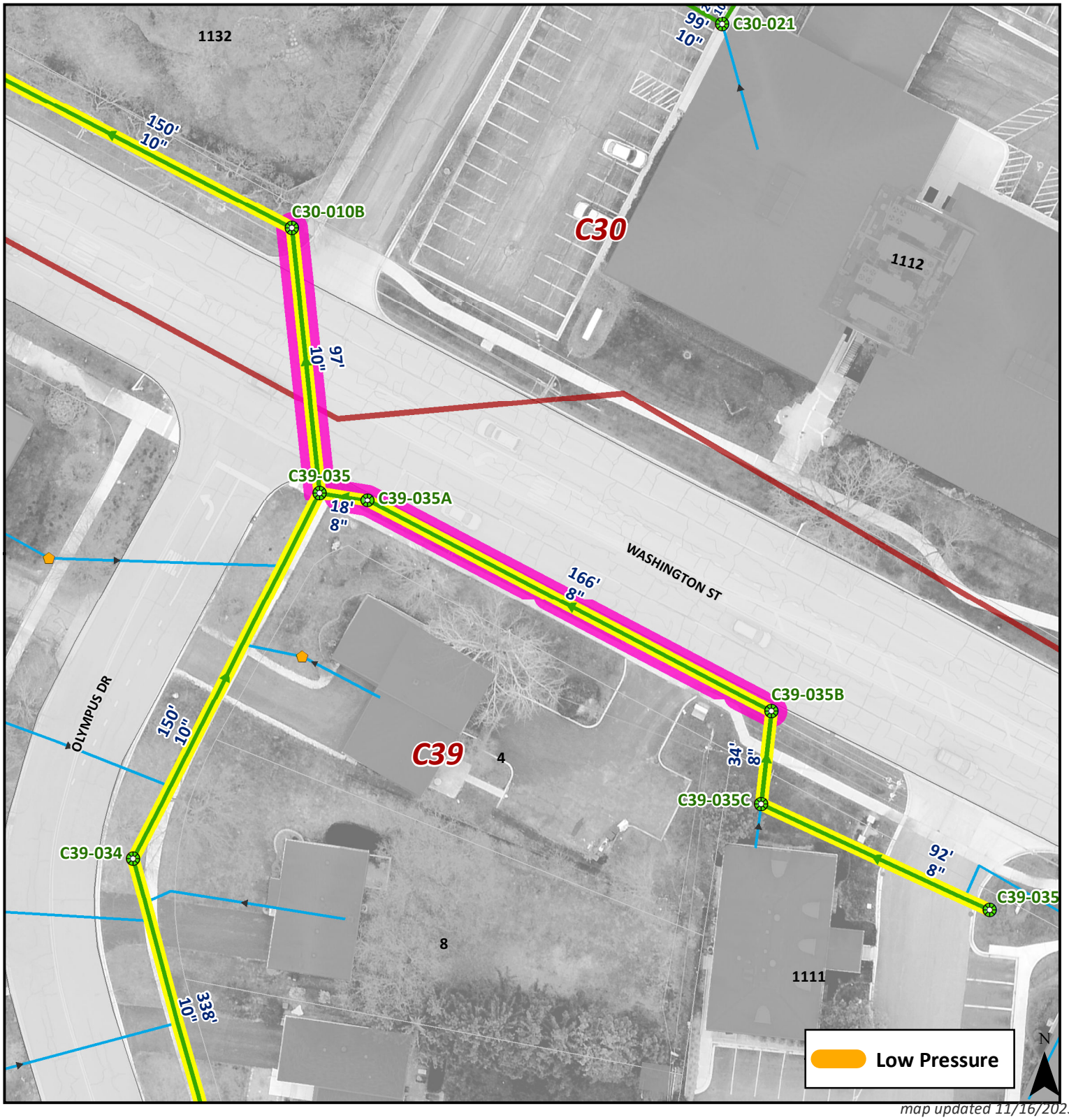
SANITARY FLUSHING PMS

PMS Check: FM-26 **Location: Washington St & Olympus Dr**

Sets: C39-035B>C39-035A C39-035A>C39-035 C39-035>C30-010B

Description and Procedures

Flush 035B>035A, 035A>035, C39-035>C30-010B



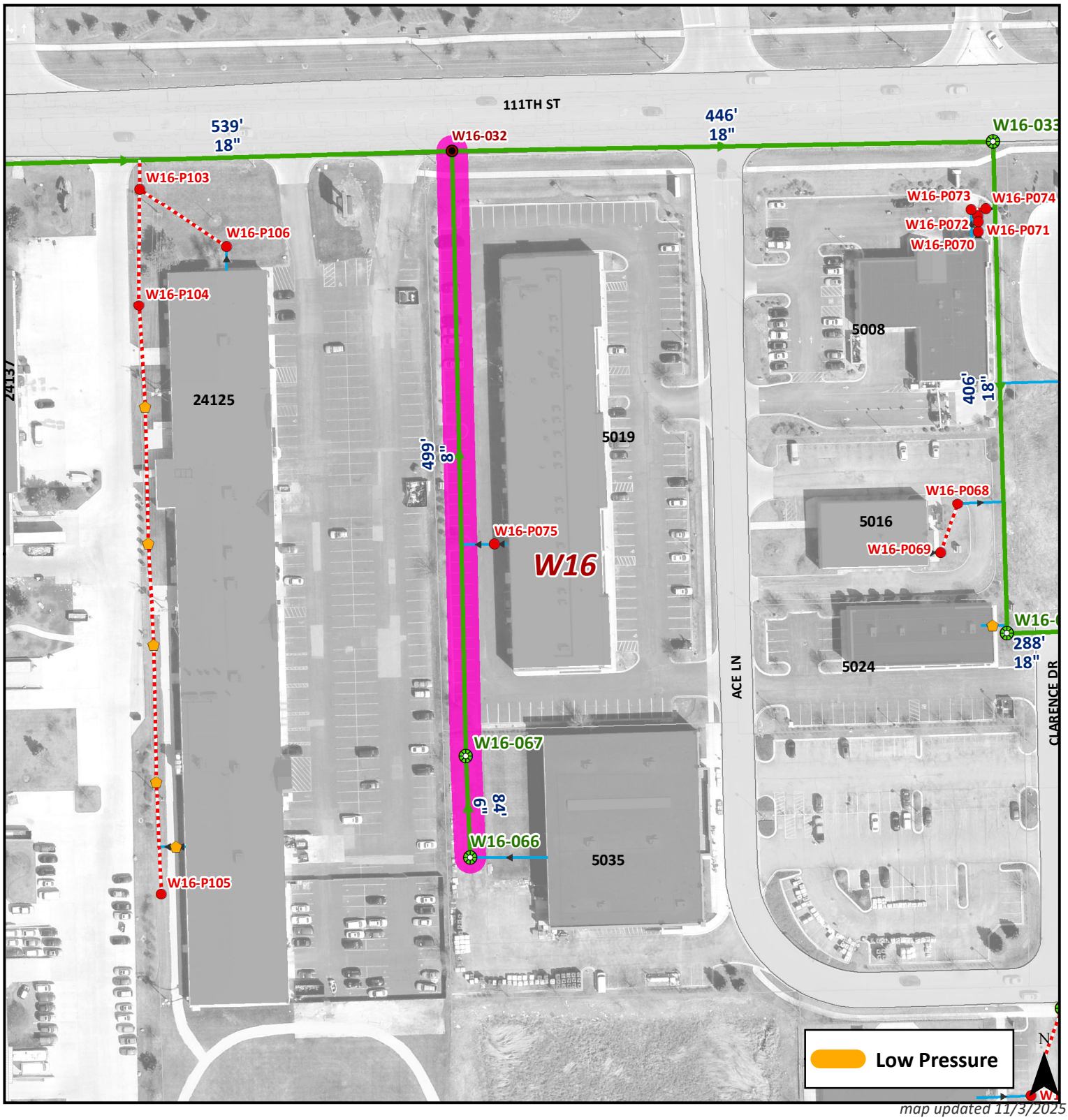
map updated 11/16/2023

SANITARY FLUSHING PMS

PMS CHECK: FM-27 **Location: Ace Hardware**

Sets: W16-066>W16-067
W16-067>W16-032

Description and Procedures
Grease



map updated 11/3/2025

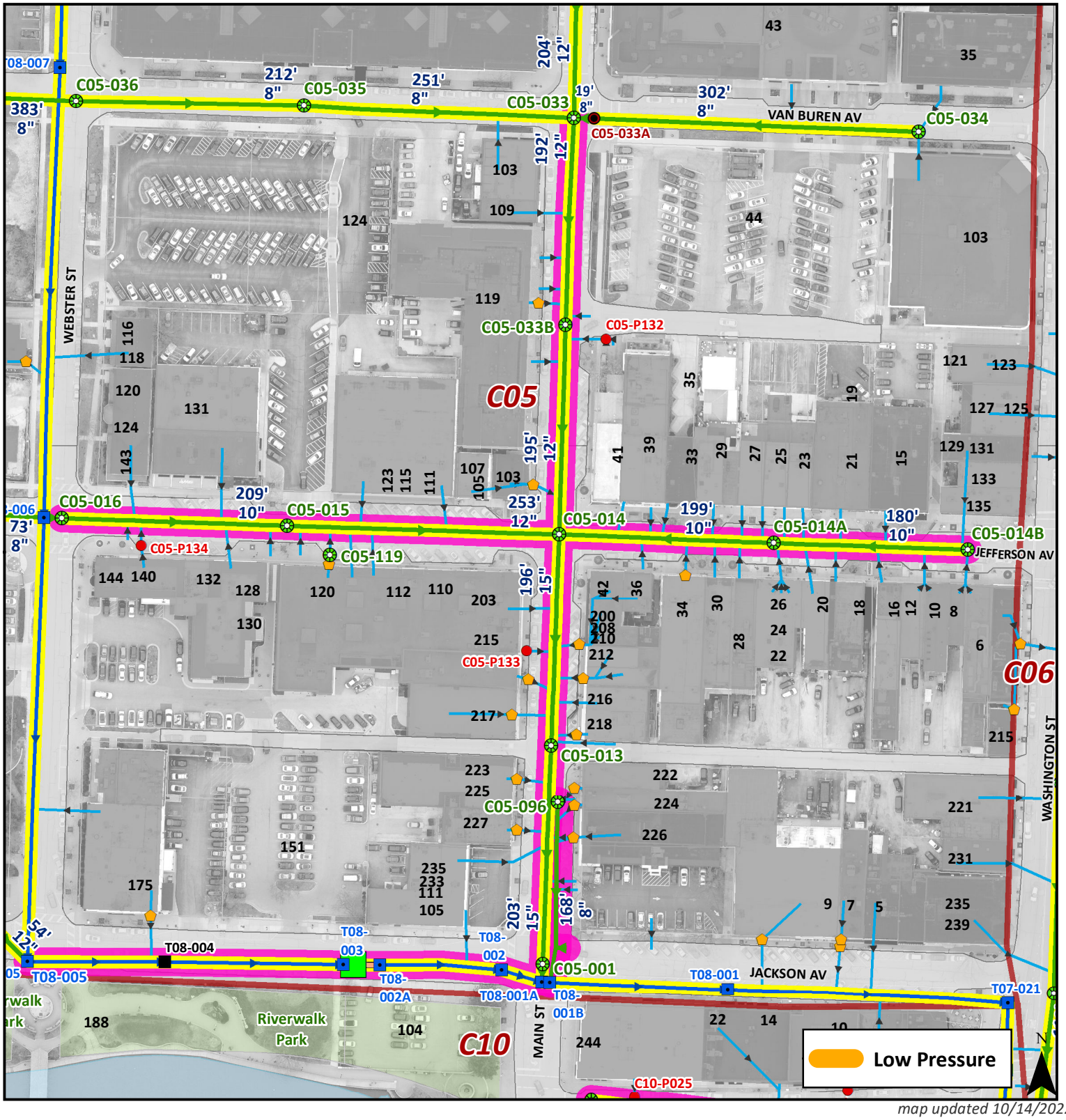
SANITARY FLUSHING PMS

PMS CHECK: FQ-1 **Location: Jefferson, Main, Jackson**

Sets: See Map Below

Description and Procedures

No longer need to flush line on Jackson in front of Pottery Barn



map updated 10/14/2022

SANITARY FLUSHING PMS

PMS CHECK: FQ-3 **Location: Hobson Mill Drive**

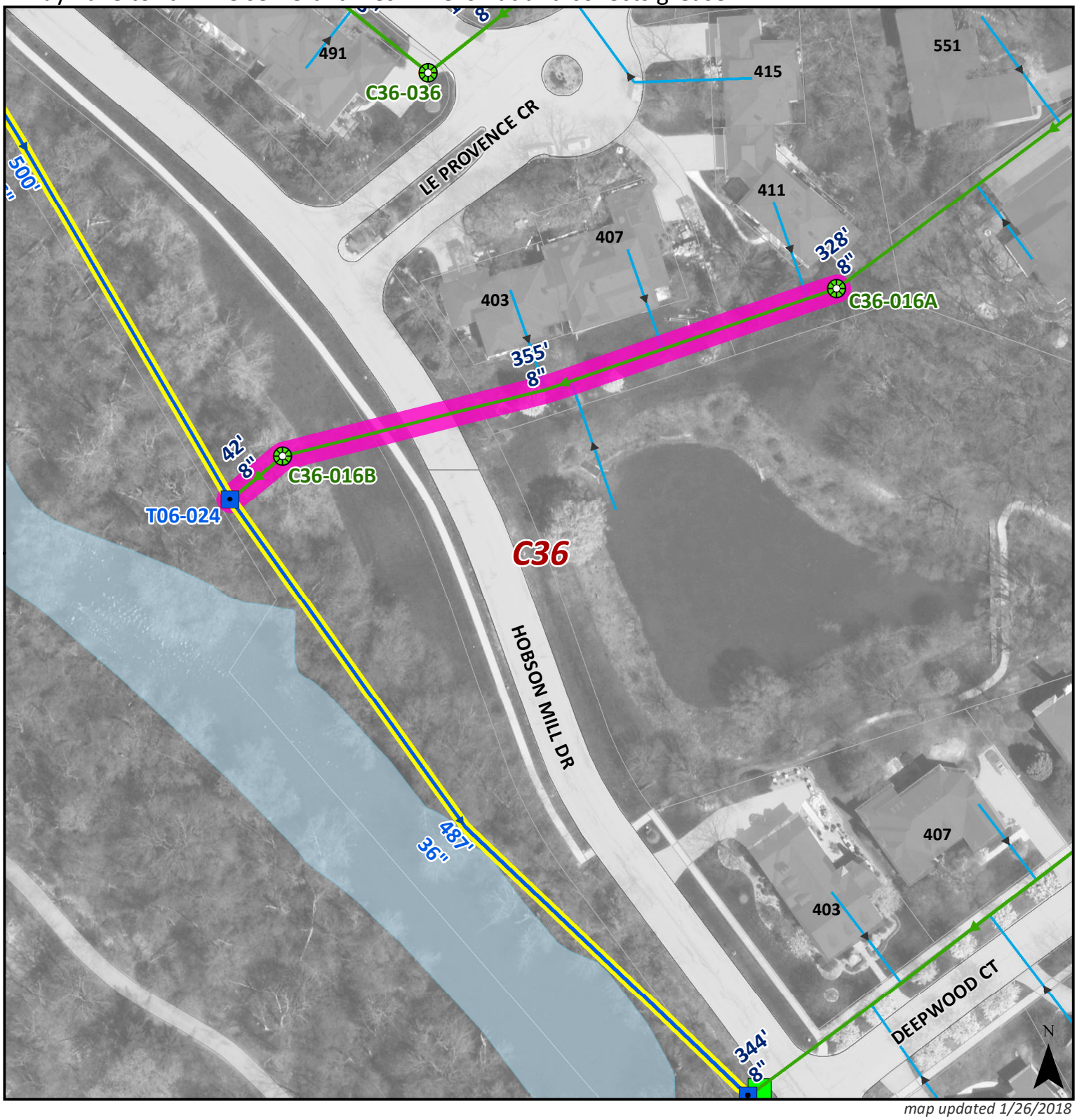
Sets: C36-016A>C36-016B C36-016B>T06-024

Description and Procedures

Flush 1 set from the interceptor to the 1st manhole east of the interceptor. Set up line and pull hose to T06-024 and flush past C36-016B east to C36-016A

Do this line when ground is solid

May have to run line serveral times - line is flat and collects grease



map updated 1/26/2018

SANITARY FLUSHING PMS

PMS CHECK: FQ-4 Location: Ogden Mall & Freedom Commons

Description and Procedures

Flush Highlighted Sets

Naper Blvd: Flush Main in May and November Only

Drop Pipe

Flush the mains on Naper Bl in May and November ONLY

Legend

PMS
- Quarterly 2

Manholes
- Collector
- Drop
- Interceptor
- Lined Thru
- Private

Gravity Main
- Collection
- Interceptor
- Private
- CIPP
- Service Lines
- Low Pressure

Other
- Sewer Basin
- Cleanout
- Grease Trap

Updated: 3/8/2023

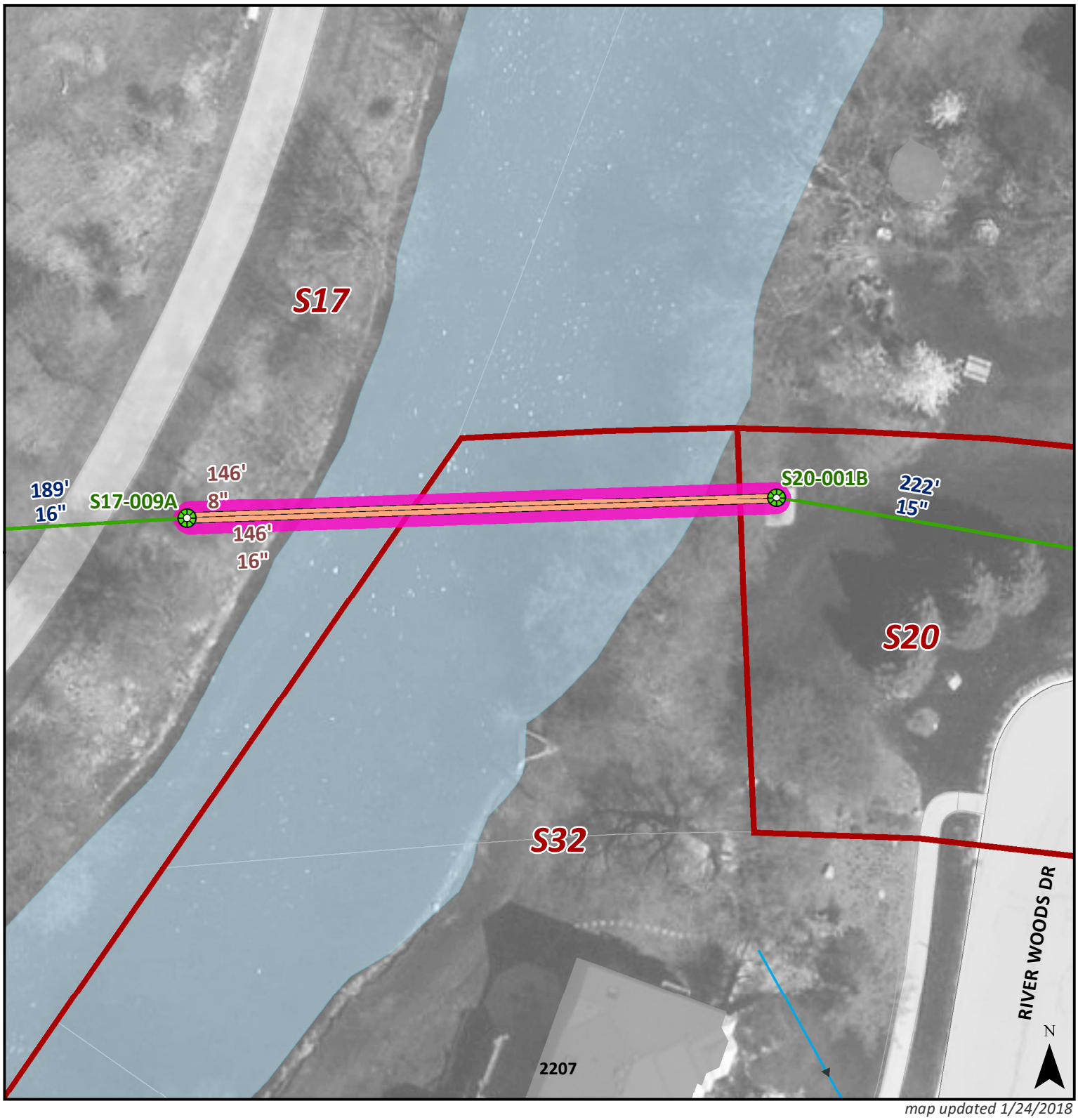
SANITARY FLUSHING PMS

PMS CHECK: FQ-5 **Location: 87th St Siphon**

Sets: S17-009A>S20-001B

Description and Procedures

Flush S20-001B to S17-009A - 2 barrels @ 145 ft each



map updated 1/24/2018

SANITARY FLUSHING PMS

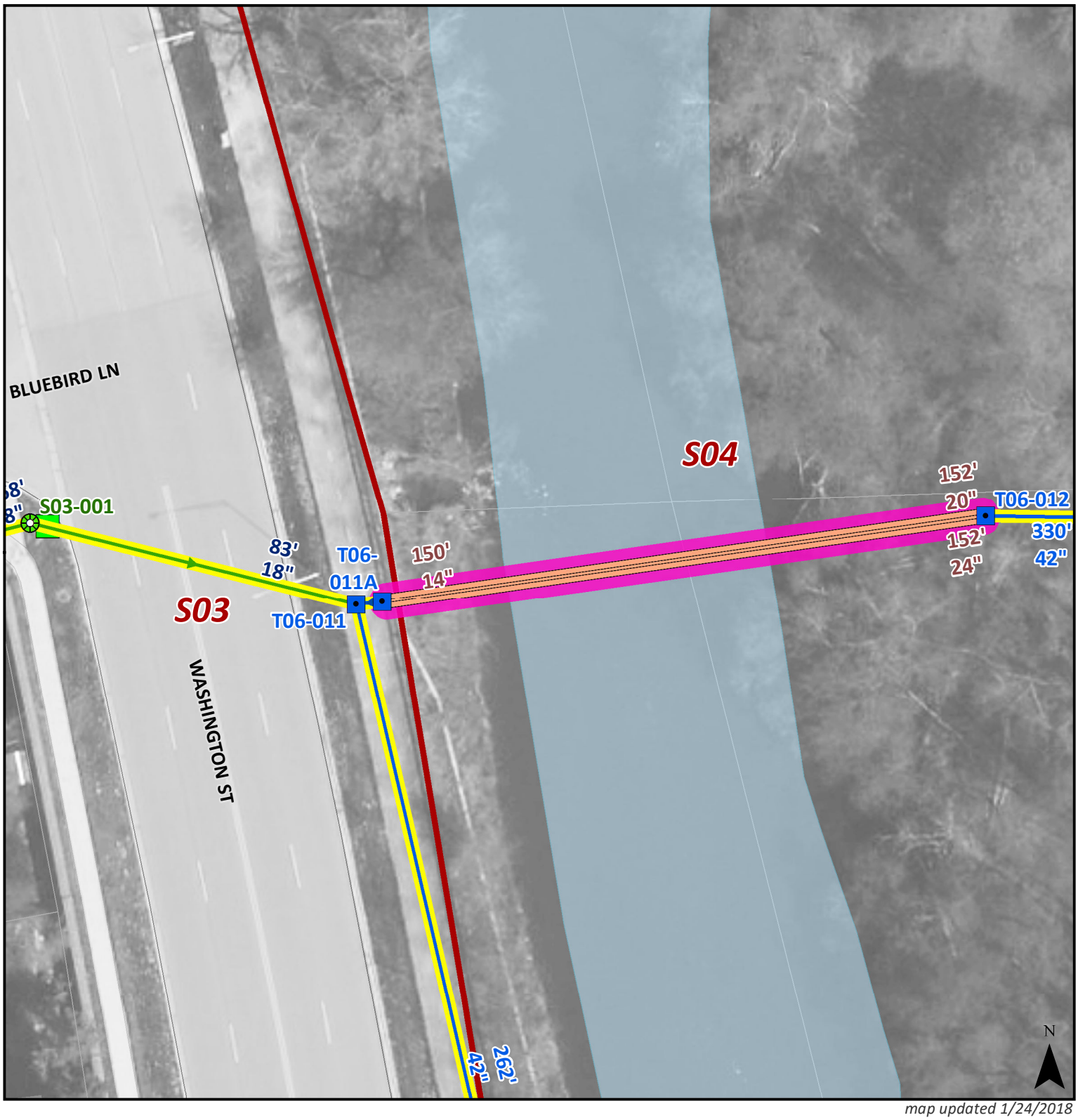
PMS CHECK: FQ-5 **Location: Bluebird Siphon**

Sets: T06-011>T06-011A T06-011A>T06-012

Description and Procedures

REMEMBER TO TAKE BIKE PATH SIGNAGE

Flush T06-12 to T06-011 - 3 barrels @ 156 ft each



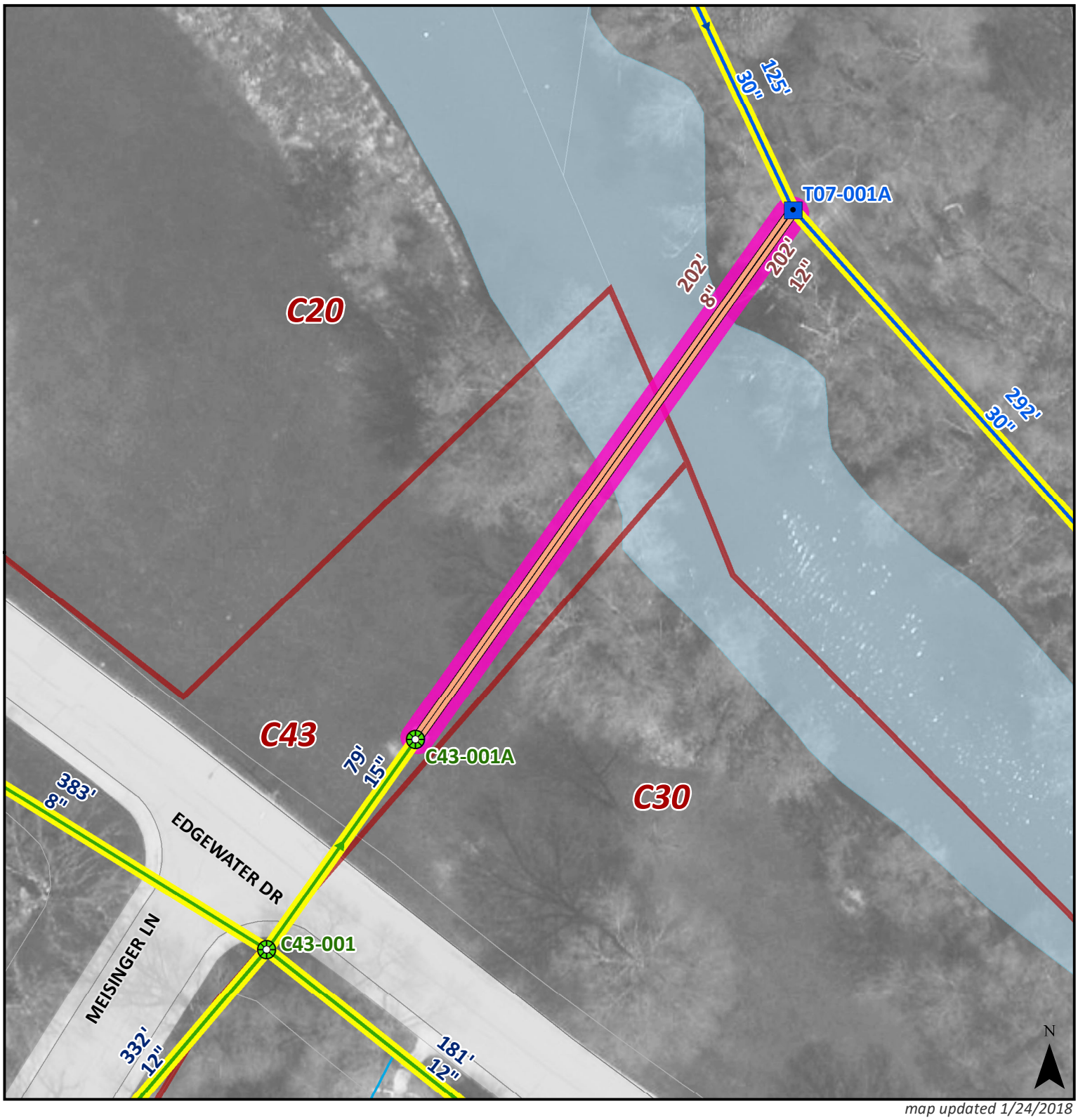
map updated 1/24/2018

SANITARY FLUSHING PMS

PMS CHECK: FQ-5 **Location: Edgewater Siphon**

Sets: C43-001A>T07-001A

Description and Procedures
2 barrels @ 205ft each
Flush effluent pipe to interceptor



map updated 1/24/2018

SANITARY FLUSHING PMS

PMS CHECK: FQ-5 **Location: Gartner Siphon**

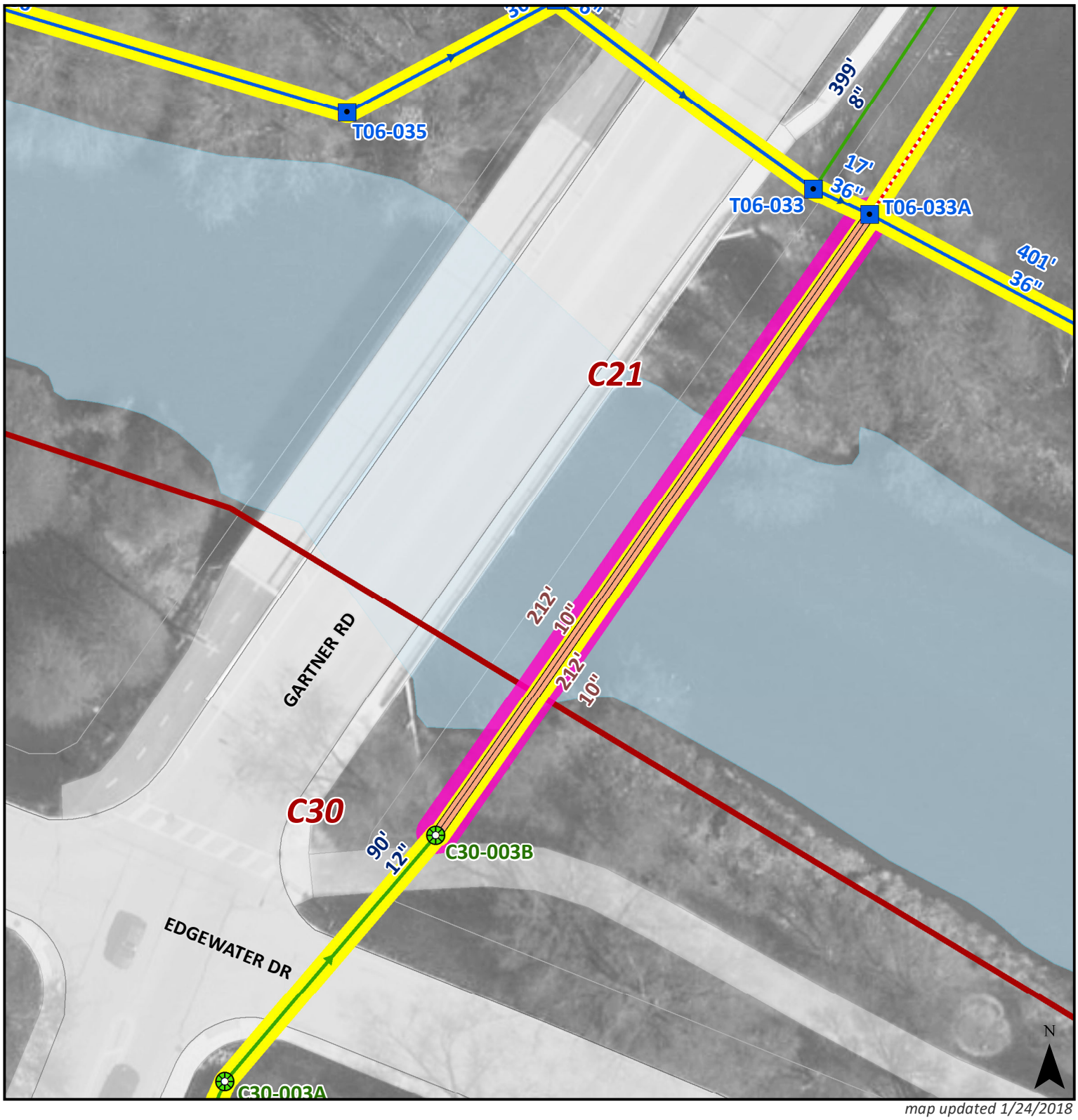
Sets: C30-003B>T06-033A

Description and Procedures

REMEMBER TO TAKE BIKE PATH SIGNAGE

2 Barrels (lined) @ 211ft each

Flush to Interceptor



map updated 1/24/2018

SANITARY FLUSHING PMS

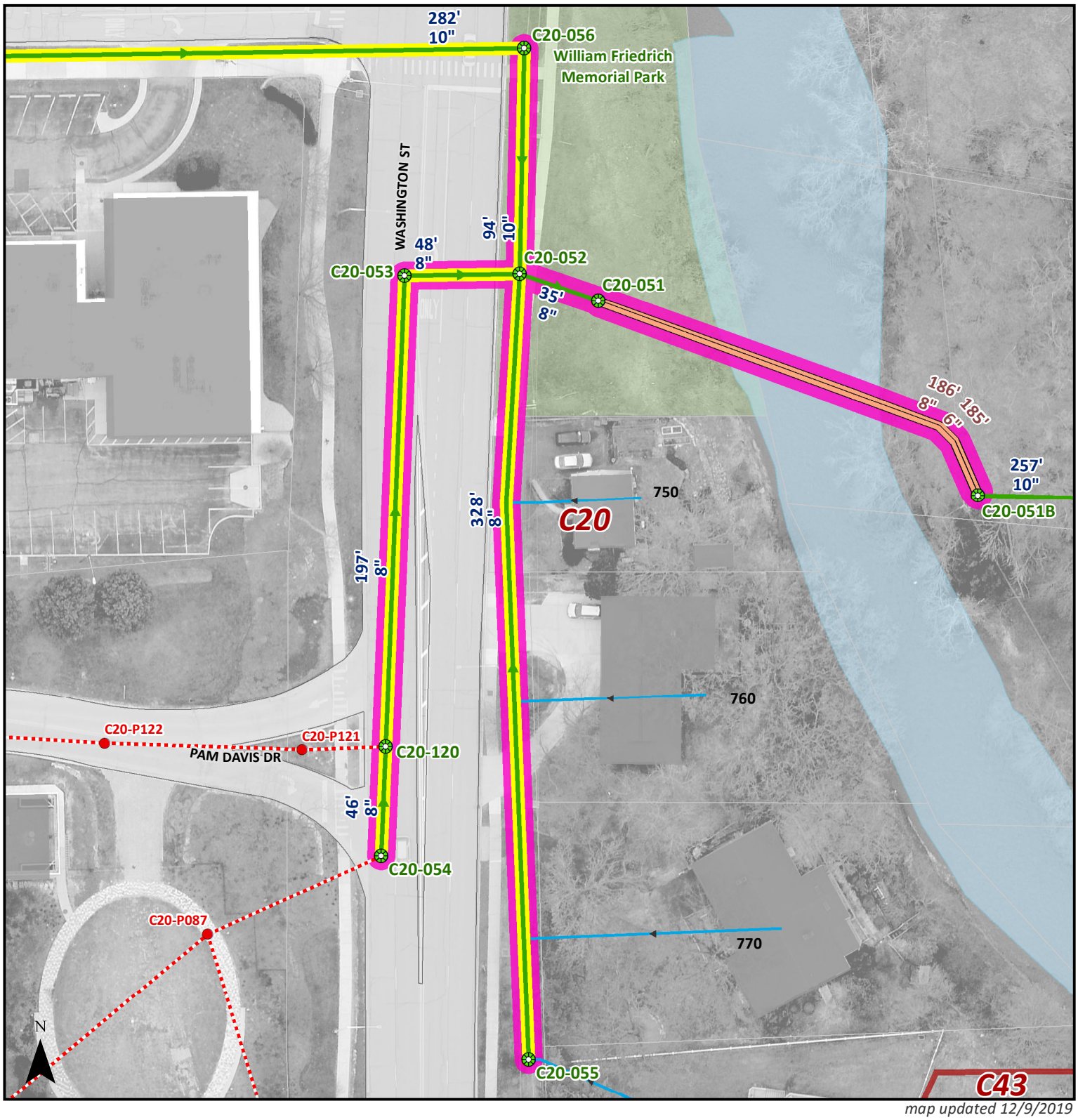
PMS CHECK: FQ-5 **Location: Hospital Siphon**

Sets: C20-054>C20-053 C20-053>C20-052 C20-56>C20-052 C20-055>C20-052
C20-052>C20-051 C20-051>C20-051B

Description and Procedures

Siphon - 2 barrels @ 178' each

Flush sets on both sides of Washington. Bucket/remove grit from C20-051B (MH on east side of river)



map updated 12/9/2019

SANITARY FLUSHING PMS

PMS CHECK: FQ-5 **Location: I-88 Tollway Siphon**

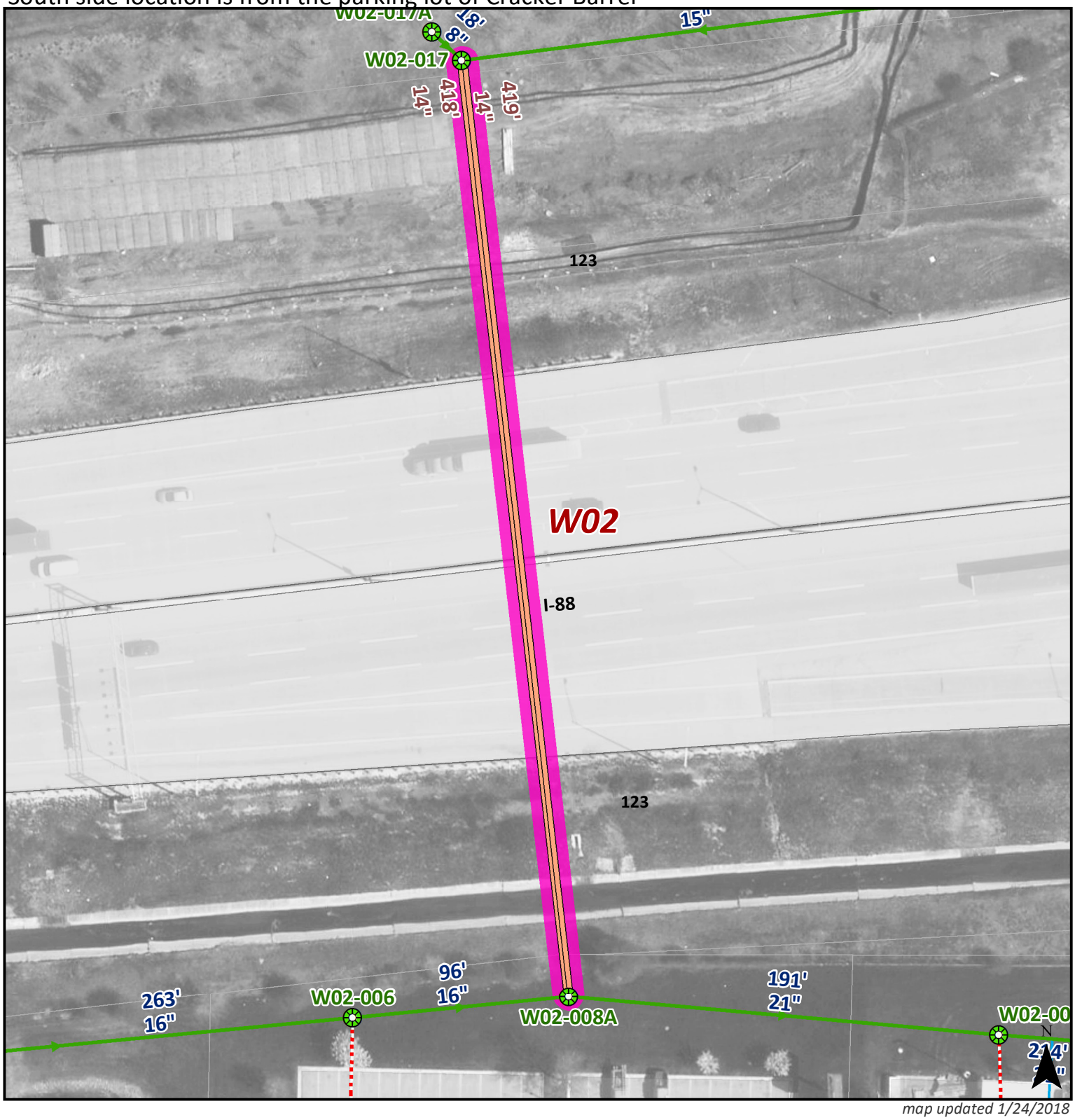
Sets: W02-017>W02-008A

Description and Procedures

2 Barrels

North side location is off the access road by Carmax

South side location is from the parking lot of Cracker Barrel



map updated 1/24/2018

SANITARY FLUSHING PMS

PMS CHECK: FQ-6 **Location: Springdale, Windemere, Gateshead**

Description and Procedures

March and September: Rootsaw S24-031 to S24-004, including Fireside Ct

June and December: Flush S24-031 to T01-013, including Fireside Ct **Heavy Grease**

****Only flush first 170-190 ft. of S24-029>S24-028****

Notify Residents 1 day prior to flushing:

2620 Springdale Ct (R. Garavalia) 630-778-8155 - open outside c.o prior to flushing

1259 Windemere (L. Gallagher) 630-428-7621- open outside c/o prior to flushing

1251 Windemere - open c/o cap prior to flushing and notify field supervisor

1304 Windemere - open c/o cap prior to flushing

1316 Fireside - open c/o cap prior to flushing

Notify Resident Open outside c/o cap

Open outside c/o cap

Only flush to 170-190 FT

Notify Resident Open outside c/o cap

Notify Resident Open outside c/o cap & Field Supervisor

DO NOT DO AS A DOUBLE SET

Low Pressure

N

map updated 10/18/2019

SANITARY FLUSHING PMS

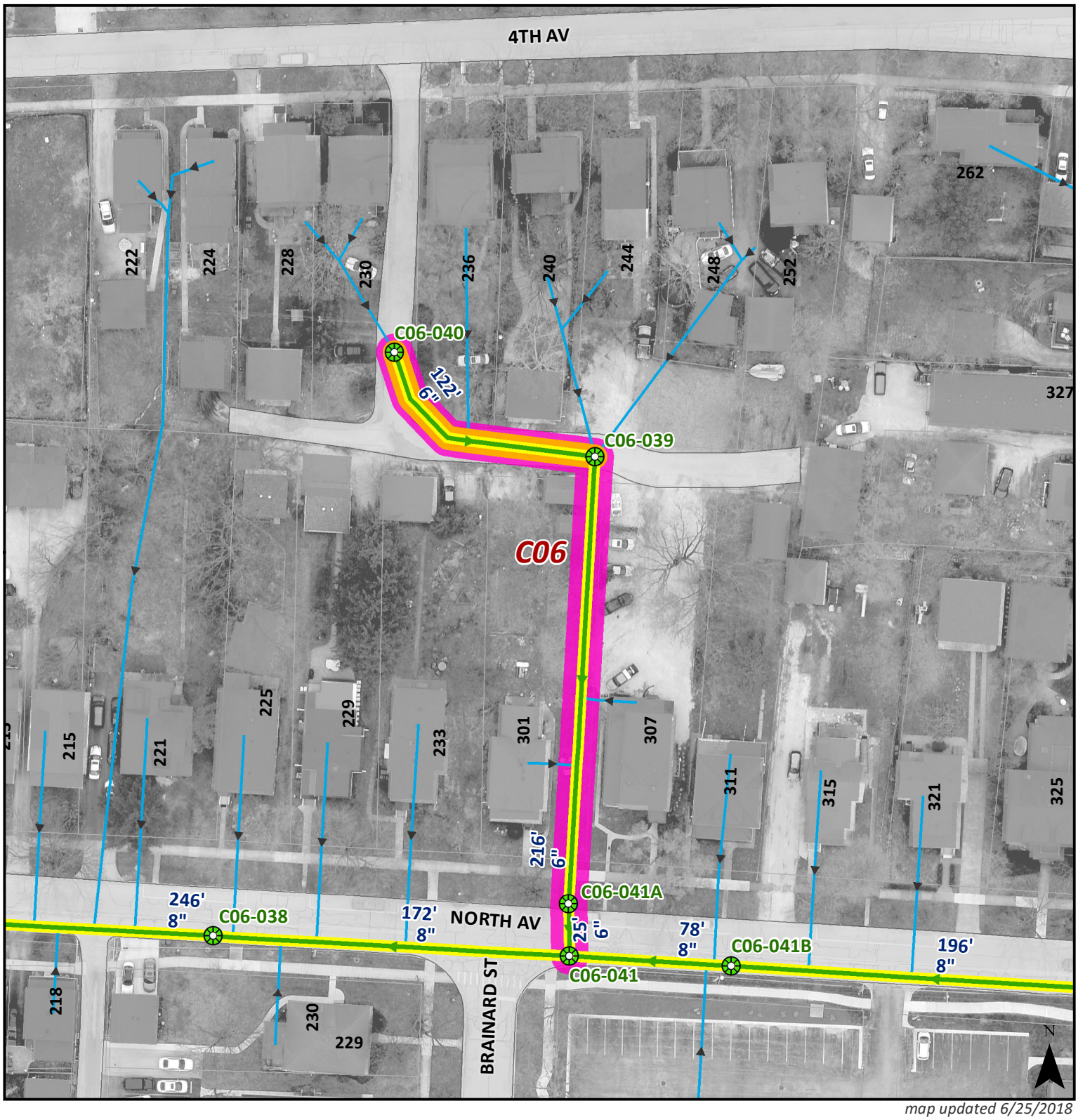
PMS CHECK: FQ-7 **Location: 4th Av Alley to North Av**

Sets: C06-040>C06-039 C06-039>C06-041A C6-041A>C06-041

Description and Procedures

C06-040>C06-039 **(Low Pressure)**

Use small nozzle wit no forward jet and no proofer



map updated 6/25/2018

SANITARY FLUSHING PMS

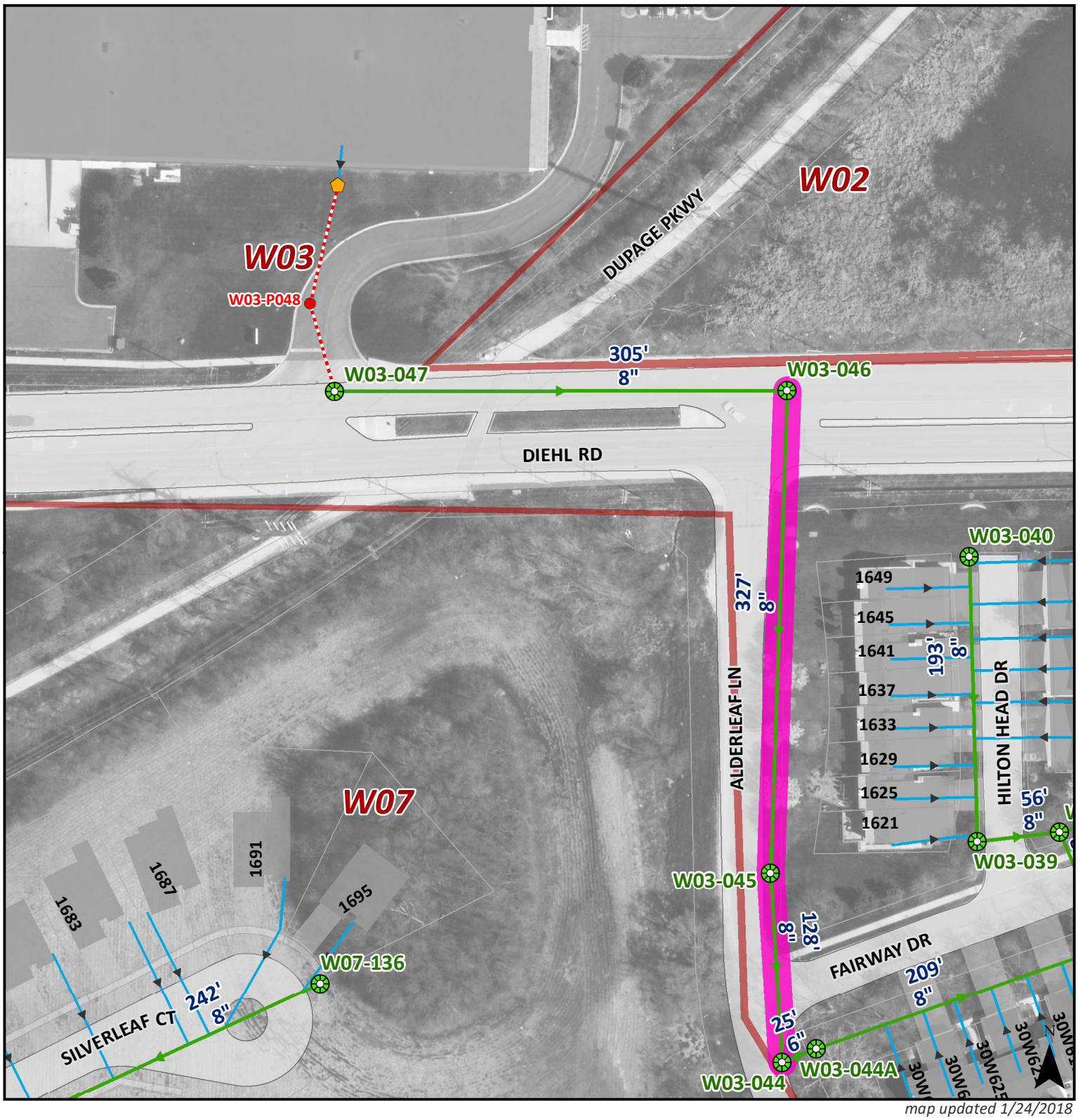
PMS CHECK: FQ-9

Location: Factory Card Outlet (Diehl/Fairway)

Sets: W03-046>W03-045 W03-045>W03-044

Description and Procedures

Flush 2 sets - line is flat



map updated 1/24/2018

SANITARY FLUSHING PMS

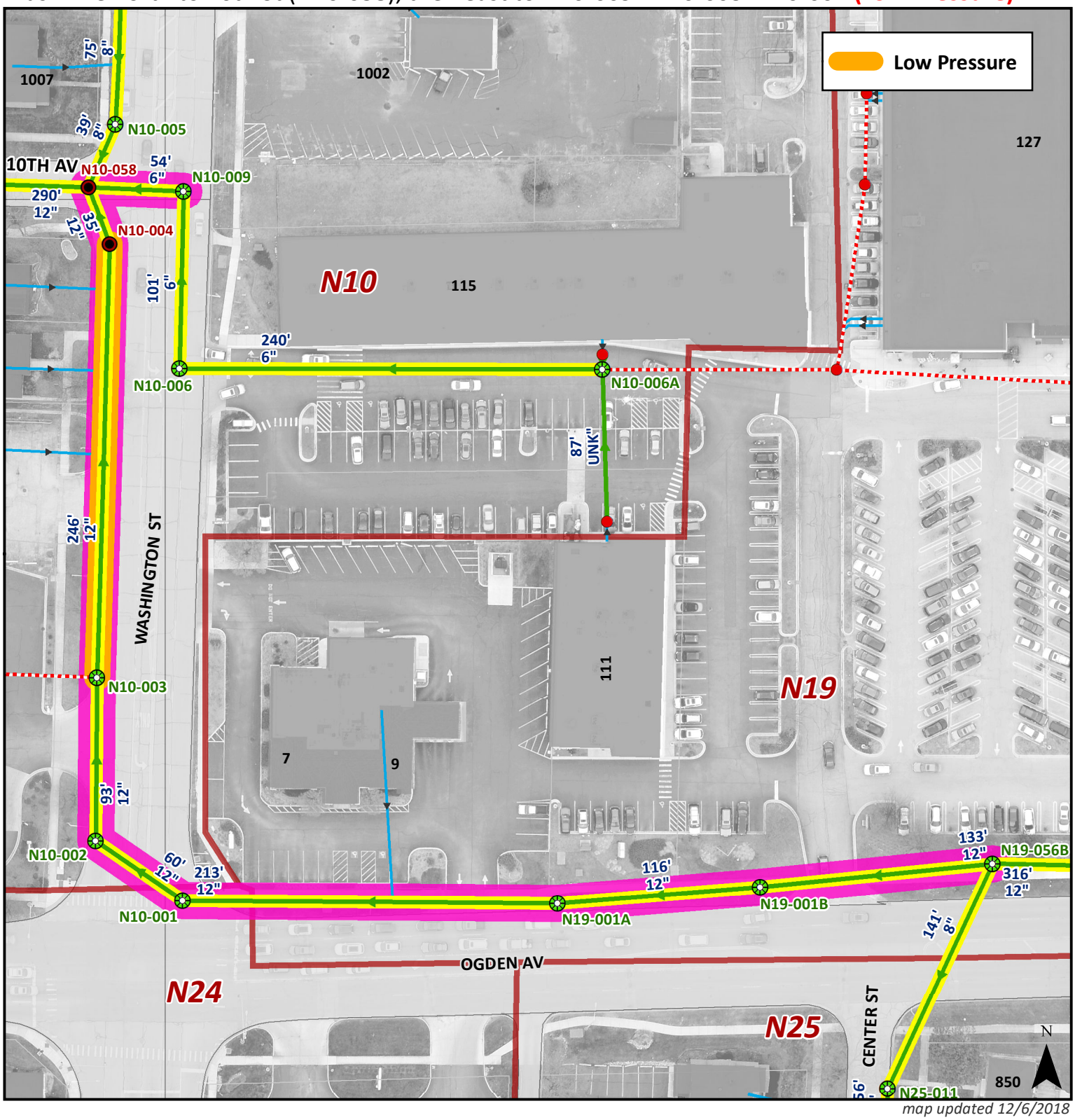
PMS CHECK: FQ-11 **Location: Ogden/Washington**

Sets: N19-056B>N19-001B N19-001B>N19-001A N19-001A>N10-001 N10-001>N10-002
N10-002>N10-003 N10-003>N10-004 N10-004>N10-058 N10-009>N10-058

Description and Procedures

****LOW TRAFFIC HOURS****

Set up in the southbound lan of Washington at the NW corner of Ogden/Washington - Use Cones
Flush east N19-056B. **Main bellies under storm on Washington**
Flush line north to 10th St (N10-058), then east to N10-009. N10-003>N10-004 **(Low Pressure)**



map updated 12/6/2018

SANITARY FLUSHING PMS

PMS CHECK: FQ-13 **Location: Allister**

Sets: W06-063A>W06-062

Description and Procedures

Grease Accumulation - Can reverse flush - no services attached

South sie of yard is 30W313 Allister



map updated 1/24/2018

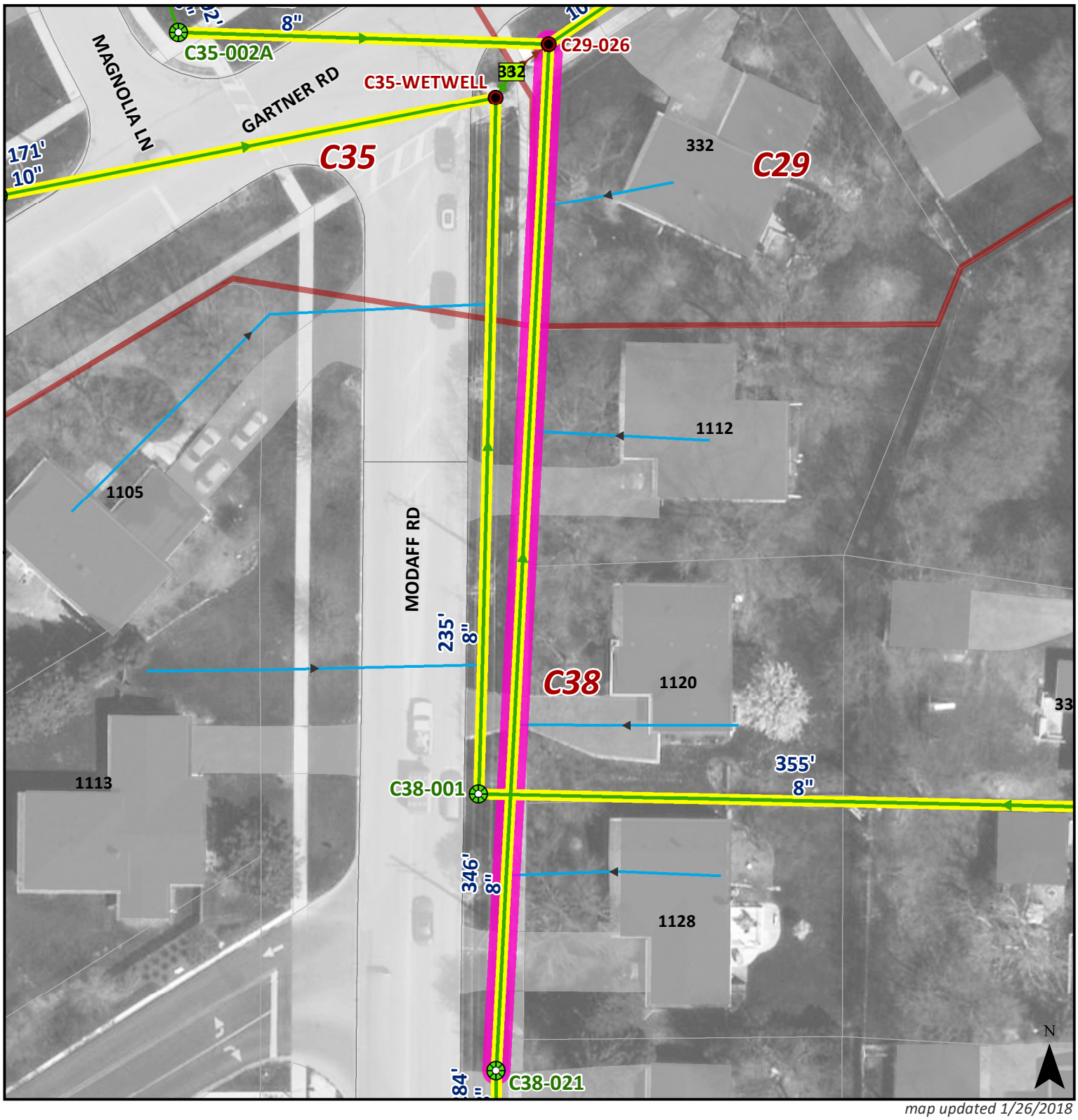
SANITARY FLUSHING PMS

PMS CHECK: FQ-14 **Location: Modaff & Gartner**

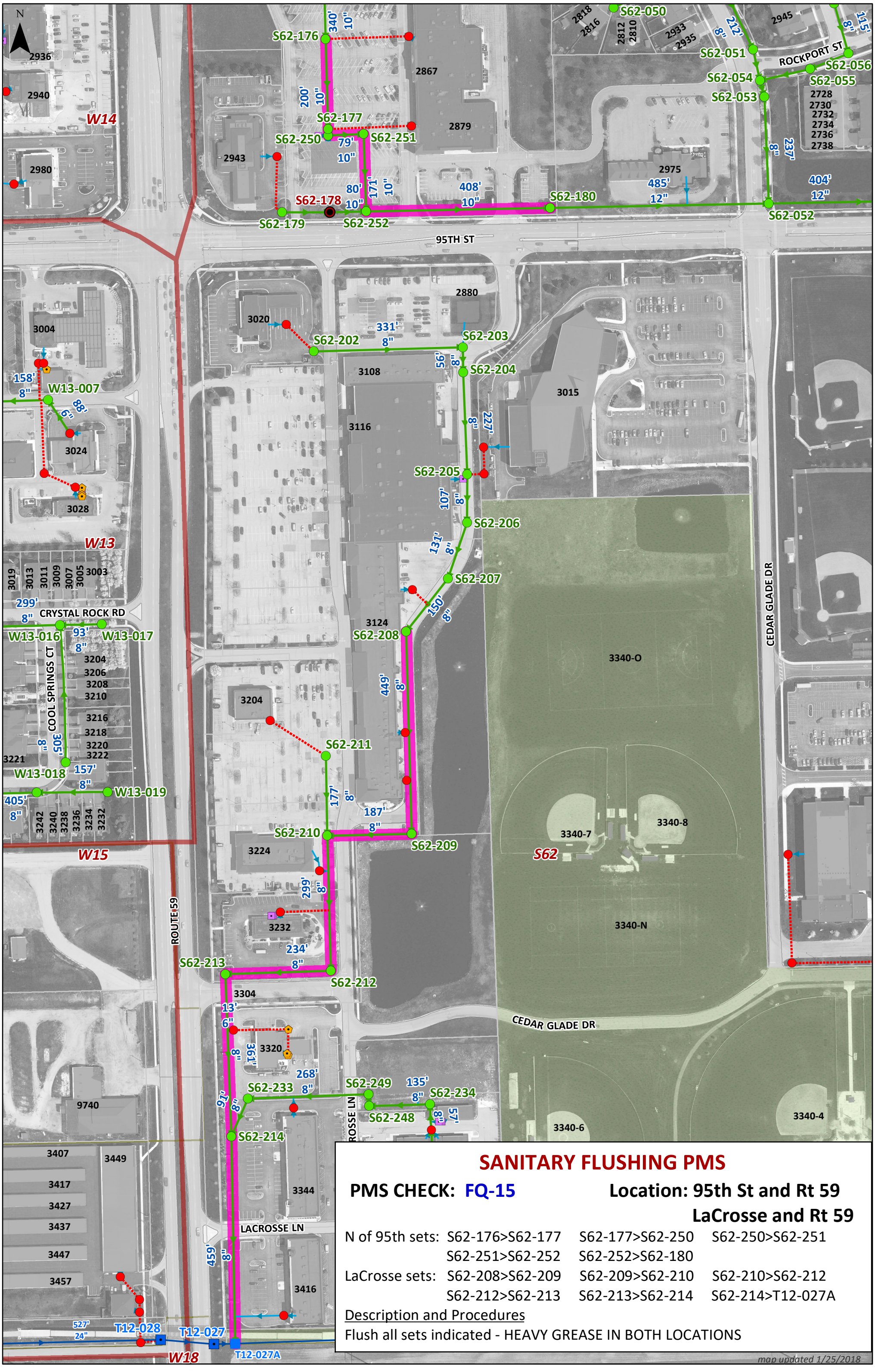
Sets: C38-021>C29-026

Description and Procedures

Grease accumulation - Flush using grease nozzle



map updated 1/26/2018



SANITARY FLUSHING PMS

PMS CHECK: FQ-15 **Location: 95th St and Rt 59**

LaCrosse and Rt 59

N of 95th sets: S62-176>S62-177 S62-177>S62-250 S62-250>S62-251
S62-251>S62-252 S62-252>S62-180

LaCrosse sets: S62-208>S62-209 S62-209>S62-210 S62-210>S62-212
S62-212>S62-213 S62-213>S62-214 S62-214>T12-027A

Description and Procedures

Flush all sets indicated - HEAVY GREASE IN BOTH LOCATIONS

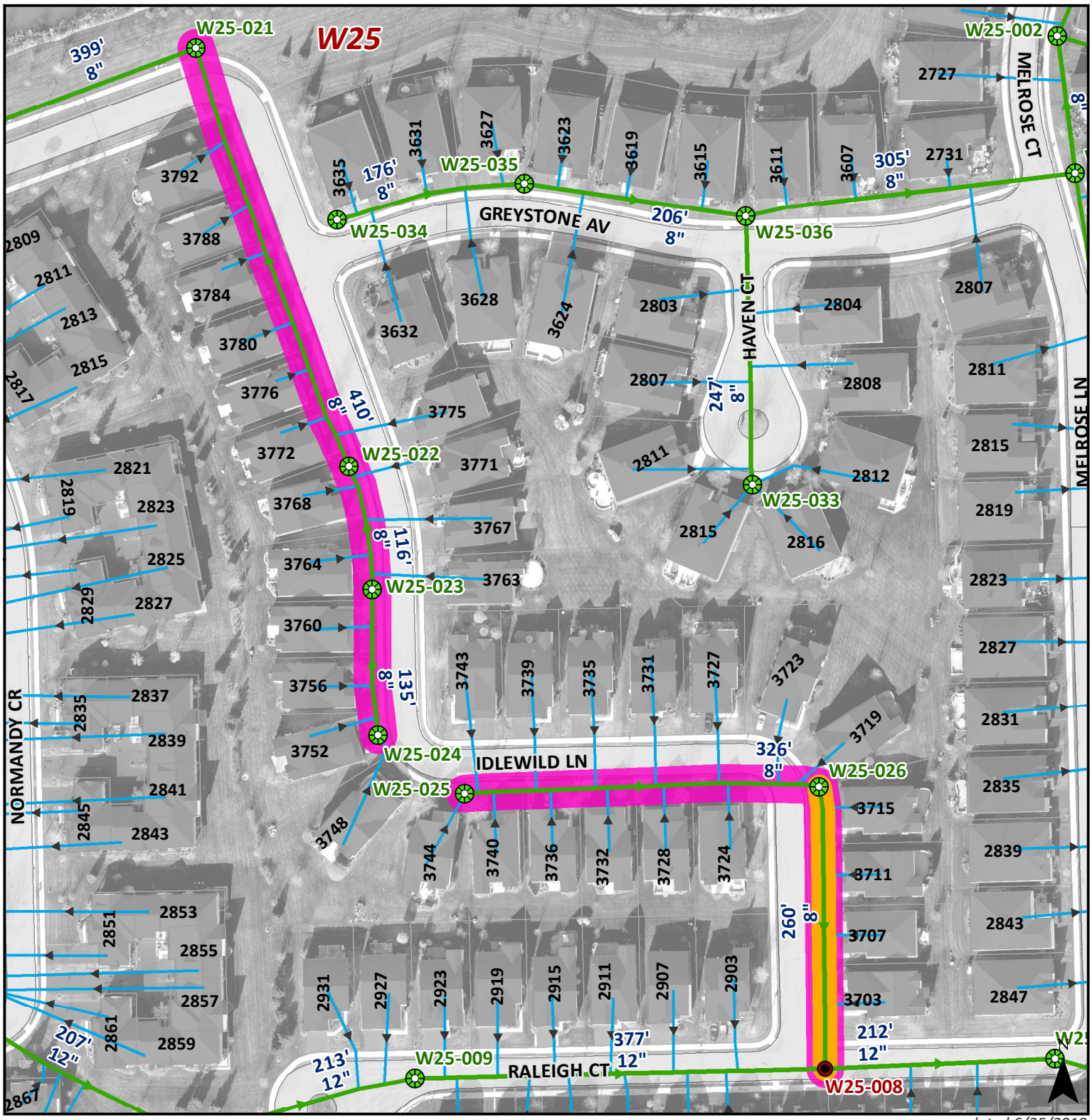
map updated 1/25/2018

SANITARY FLUSHING PMS

PMS CHECK: FQ-16 **Location: Idlewild (Carillon Club)**

Sets: W25-024>W25-023 W25-023>W25-022 W25-022>W25-021 W25-025>W25-026
W25-026>W25-008

Description and Procedures
Flush Sets
W25-026>W25-008 **(Low Pressure)**

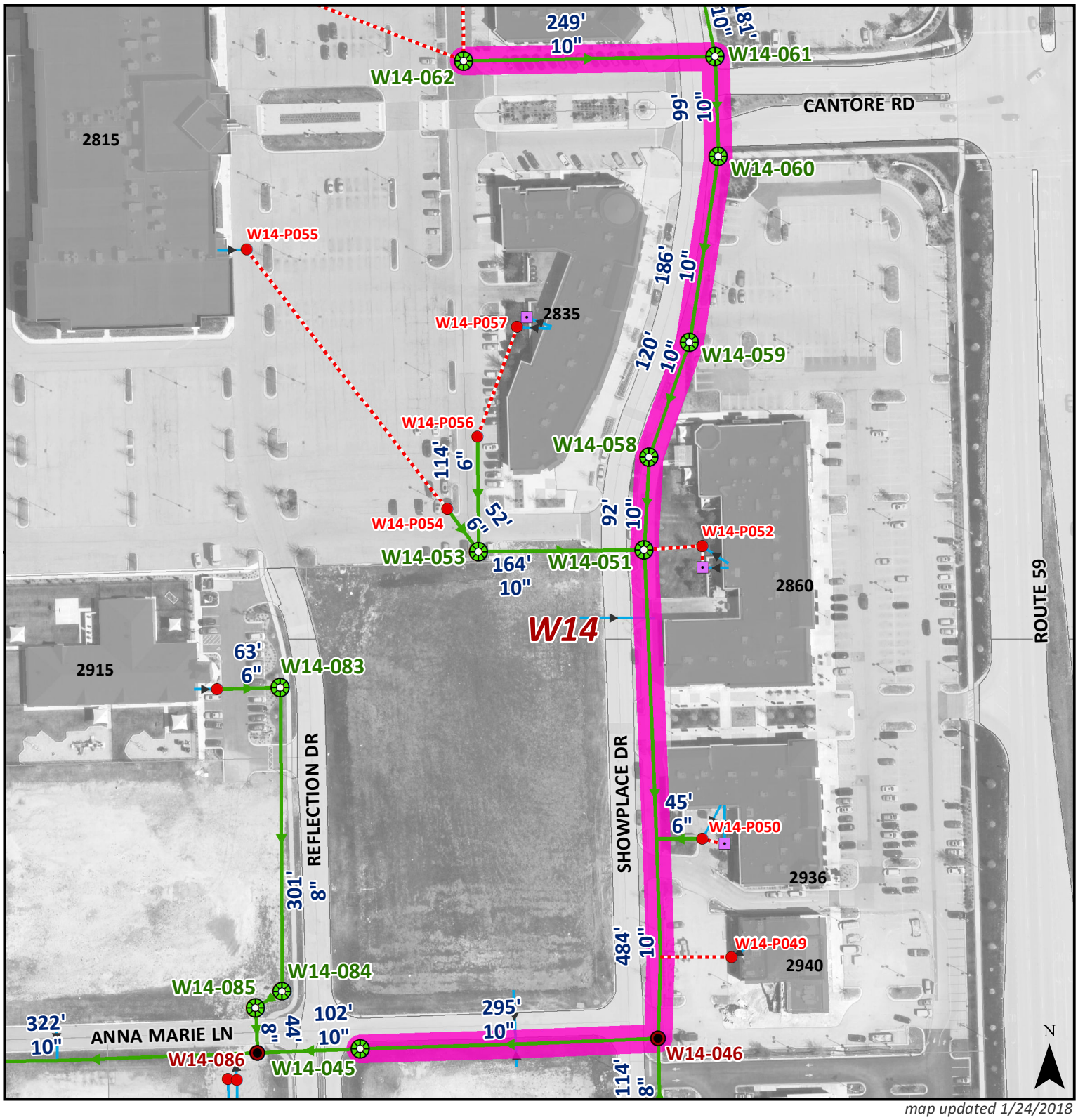


map updated 6/25/2018

SANITARY FLUSHING PMS

PMS CHECK: FQ-17 **Location: Showplace**

Sets: W14-062>W14-061 W14-061>W14-060 W14-060>W14-059 W14-059>W14-058
W14-058>W14-051 W14-051>W14-046 W14-046>W14-045



map updated 1/24/2018

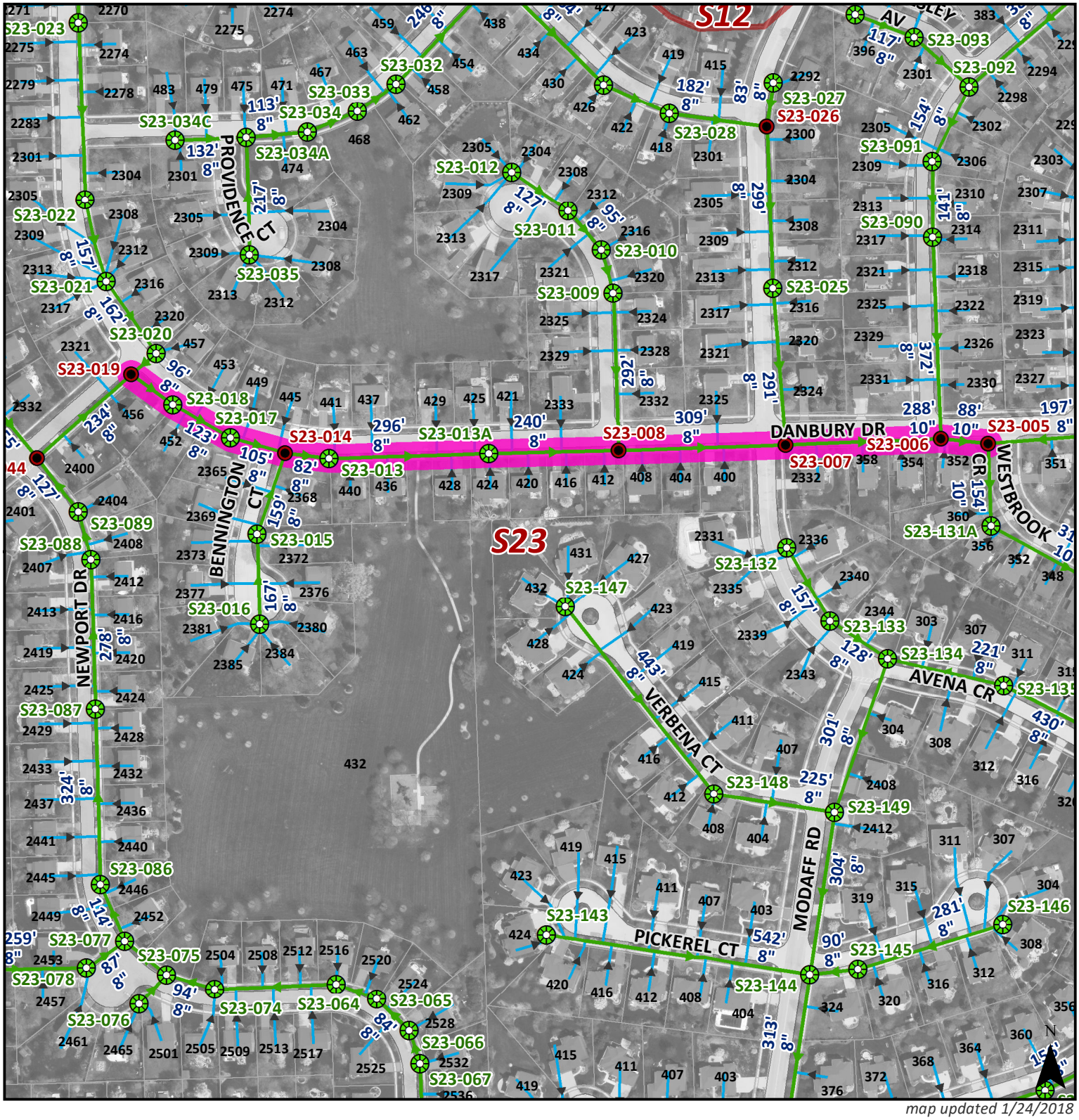
SANITARY FLUSHING PMS

PMS CHECK: FQ-18 **Location: Massachusets - Brock to Westbrook**

Sets: S23-019>S23-018 S23-018>S23-017 S23-017>S23-014 S23-014>S23-013
S23-013>S23-013A S23-013A>S23-008 S23-008-S23-007 S23-007>S23-006
S23-006>S23-005

Description and Procedures

Heavy Grease



map updated 1/24/2018

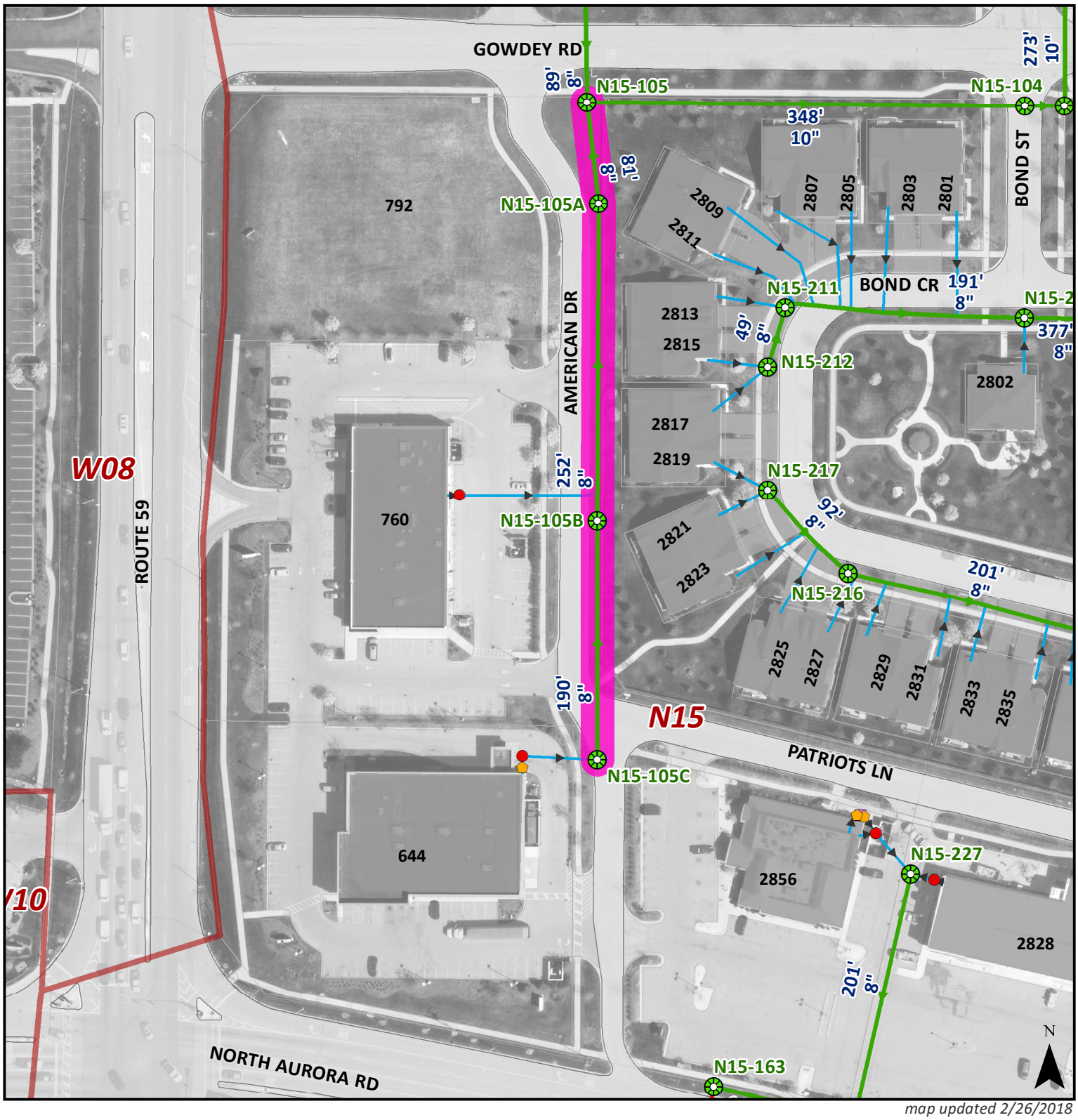
SANITARY FLUSHING PMS

PMS CHECK: FQ-19 **Location: American Drive**

Sets: N15-105C>N15-105B>N15-105A>N15-105

Description and Procedures

Flush 3 sets - Grease found, holding water

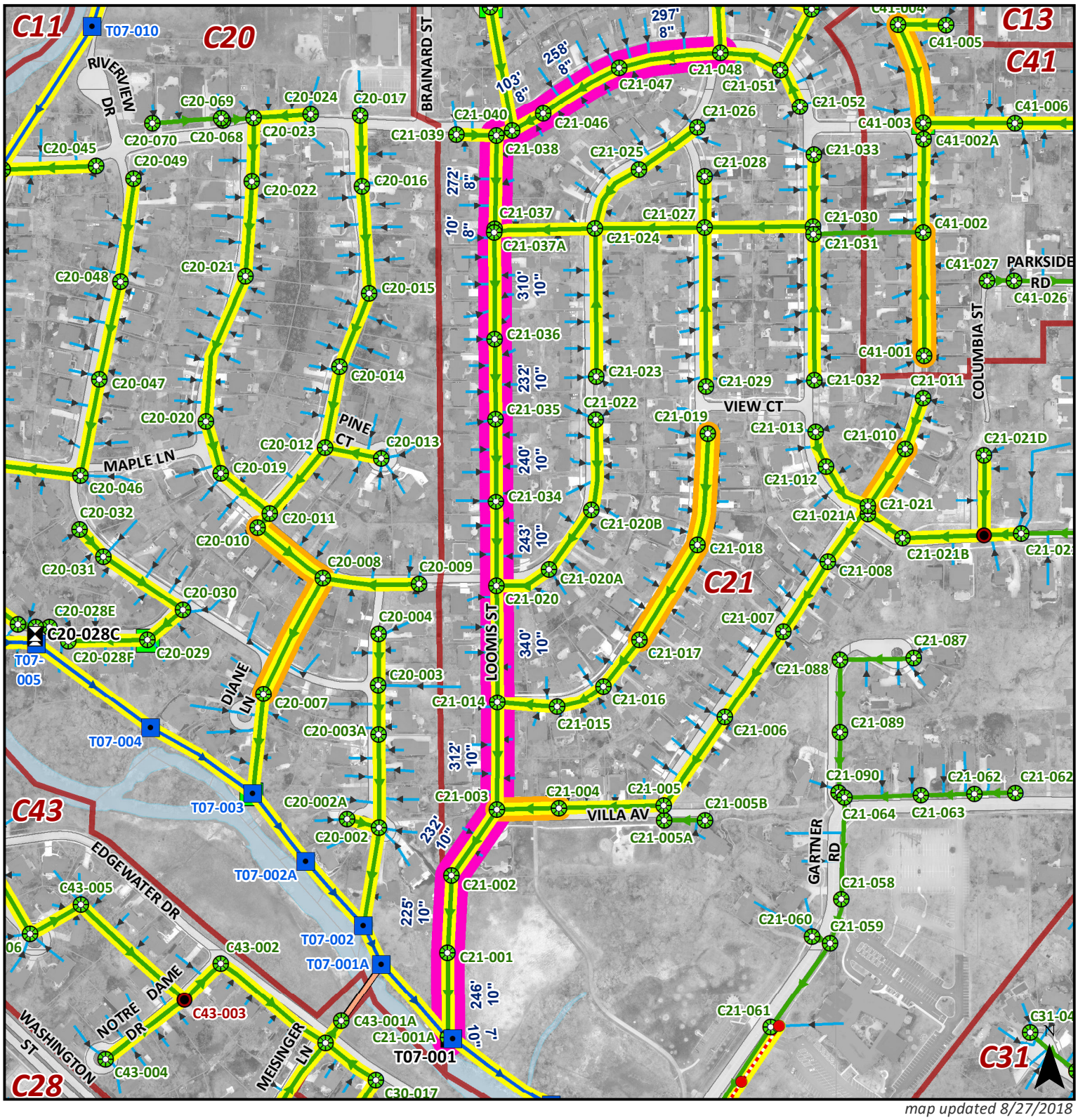


map updated 2/26/2018

SANITARY FLUSHING PMS

PMS CHECK: FQ-20 **Location: South Loomis**

Sets: C21-048>C21-047, C21-047>C21-046, C21-046>C21-040, C21-040>C21-038, C21-038>C21-037, C21-037>C21-037A, C21-037A>C21-036, C21-036>C21-035, C21-035>C21-034, C21-034>C21-020, C21-020>C21-014, C21-014>C21-003, C21-003>C21-002, C21-002>C21-001, C21-001>C21-001A, C21-001A>T07-001

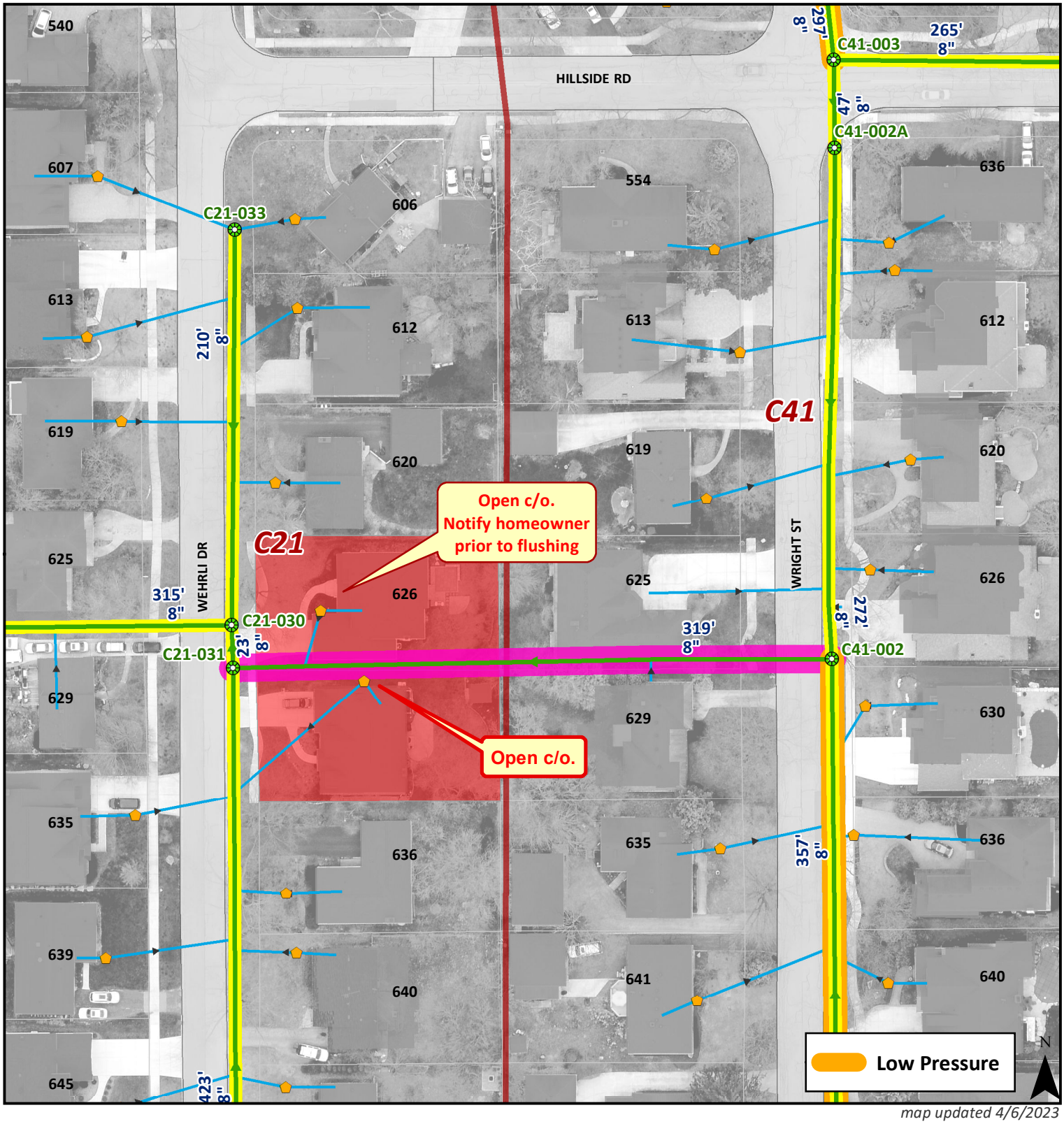


map updated 8/27/2018

SANITARY FLUSHING PMS

PMS CHECK: FQ-21 **Location: Wehrli/Wright**

Sets: C41-002>C21-031



map updated 4/6/2023

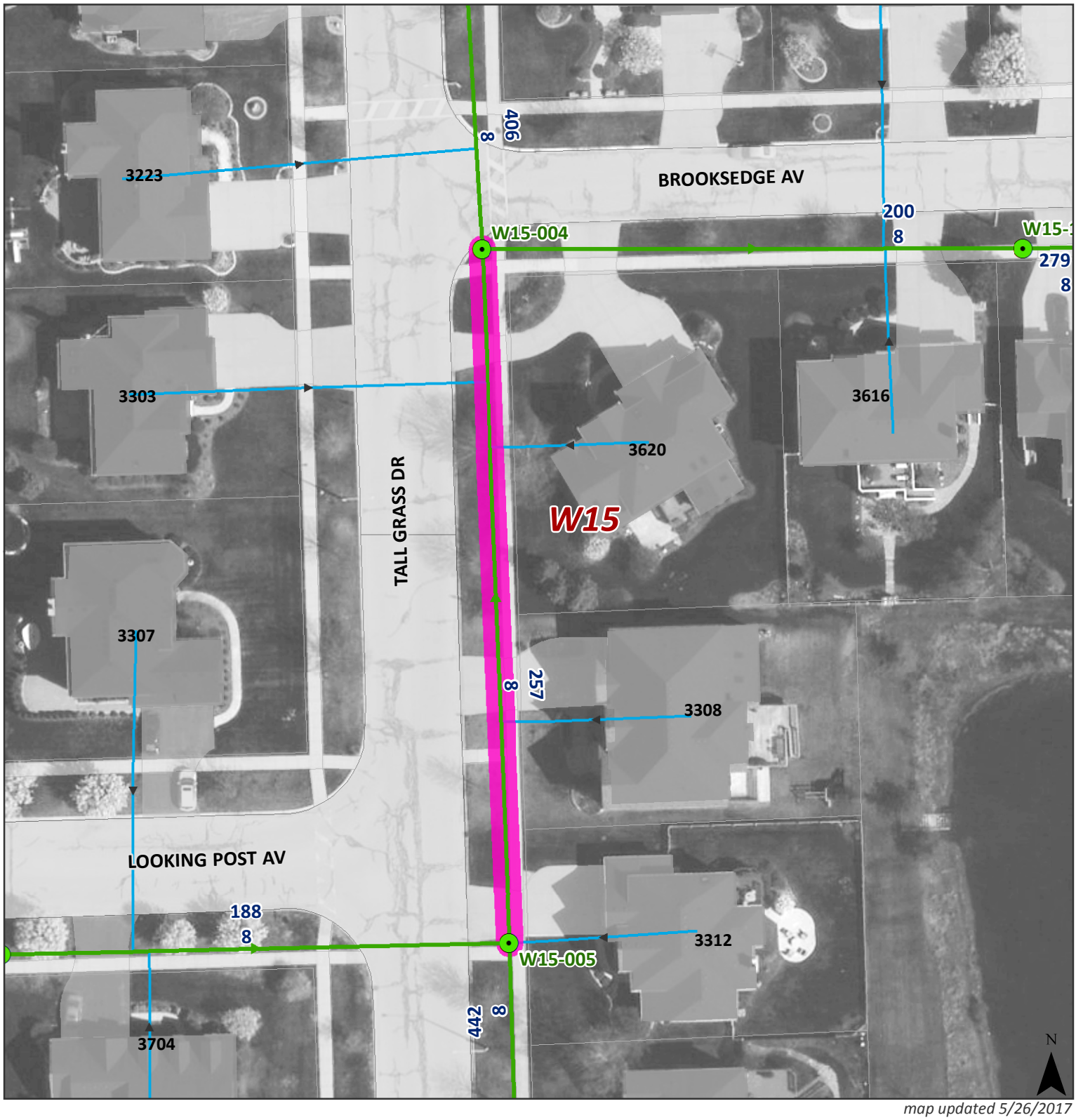
SANITARY FLUSHING PMS

PMS CHECK: FQ-22 **Location: Tall Grass Dr**

Set: W15-005>W15-004

Description and Procedures

Heavy Grease



map updated 5/26/2017

SANITARY FLUSHING PMS

PMS CHECK: FQ-23 **Location: 1907/1913 Coach Dr**

S15-039>039A>039B>041

Description and Procedures

Grease collecting in pipes

Open cleanouts at 1907 & 1913



map updated 2/28/2023

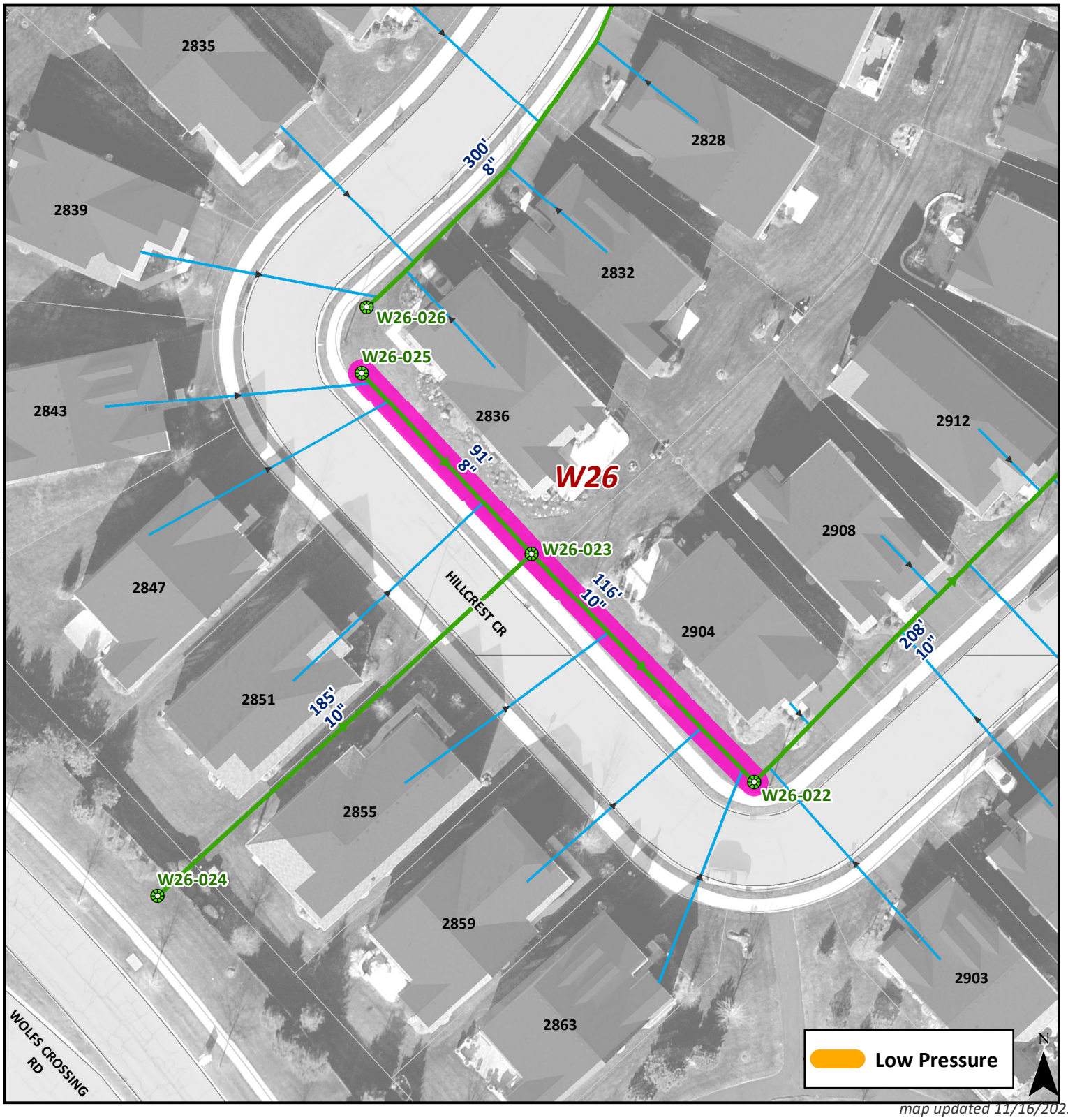
SANITARY FLUSHING PMS

PMS Check: FQ-24 **Location: Hillcrest - Carillon Club**

Sets: W26-025>W26-023 W26-023>W26-022

Description and Procedures

Flush 025>023, 023>022



map updated 11/16/2023

SANITARY FLUSHING PMS

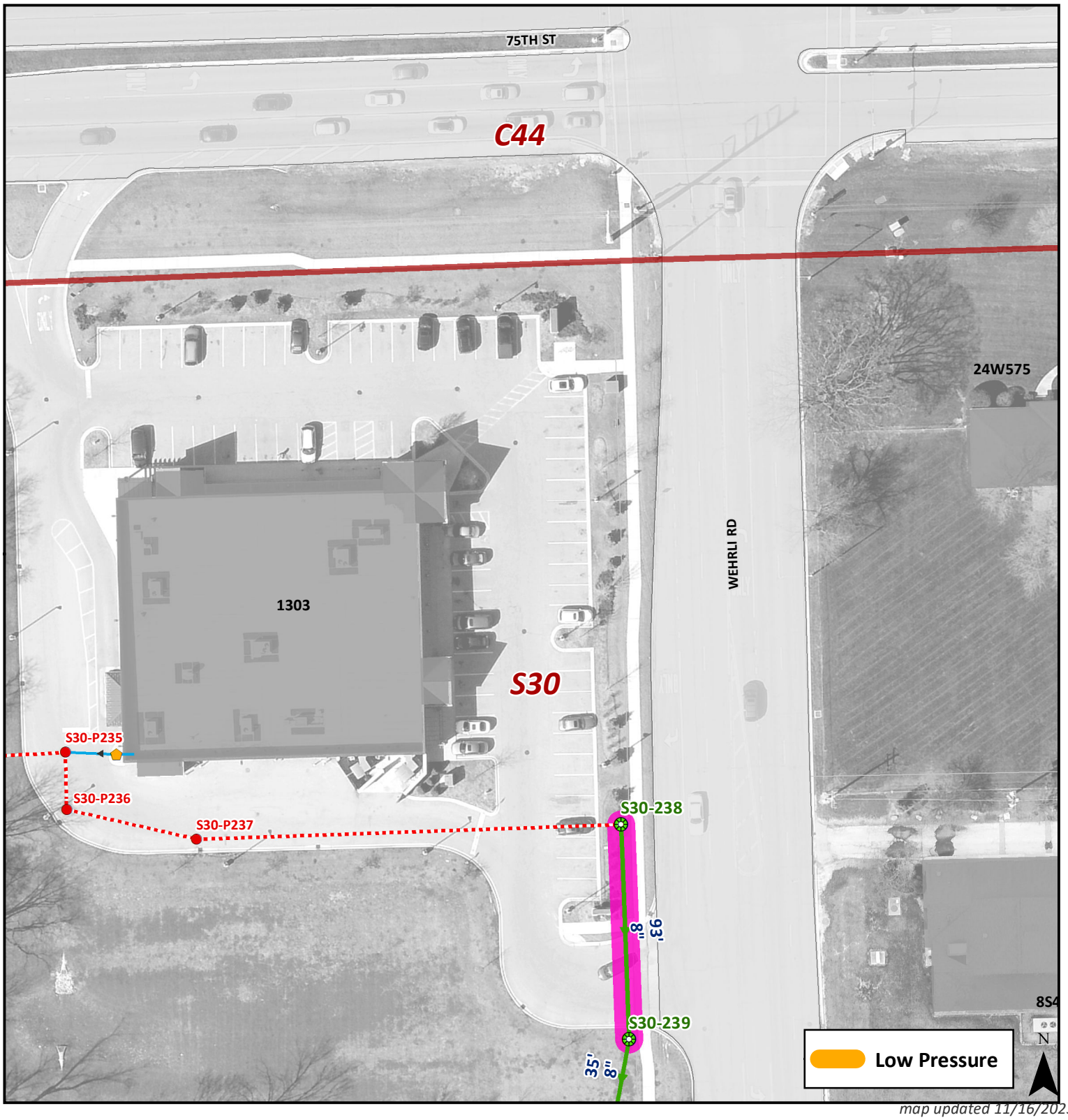
PMS Check: FQ-25

Location: Walgreens - Wehrli & 75th

Sets: S30-238>S30-239

Description and Procedures

Flush S30-238>S30-239



map updated 11/16/2023

SANITARY FLUSHING PMS

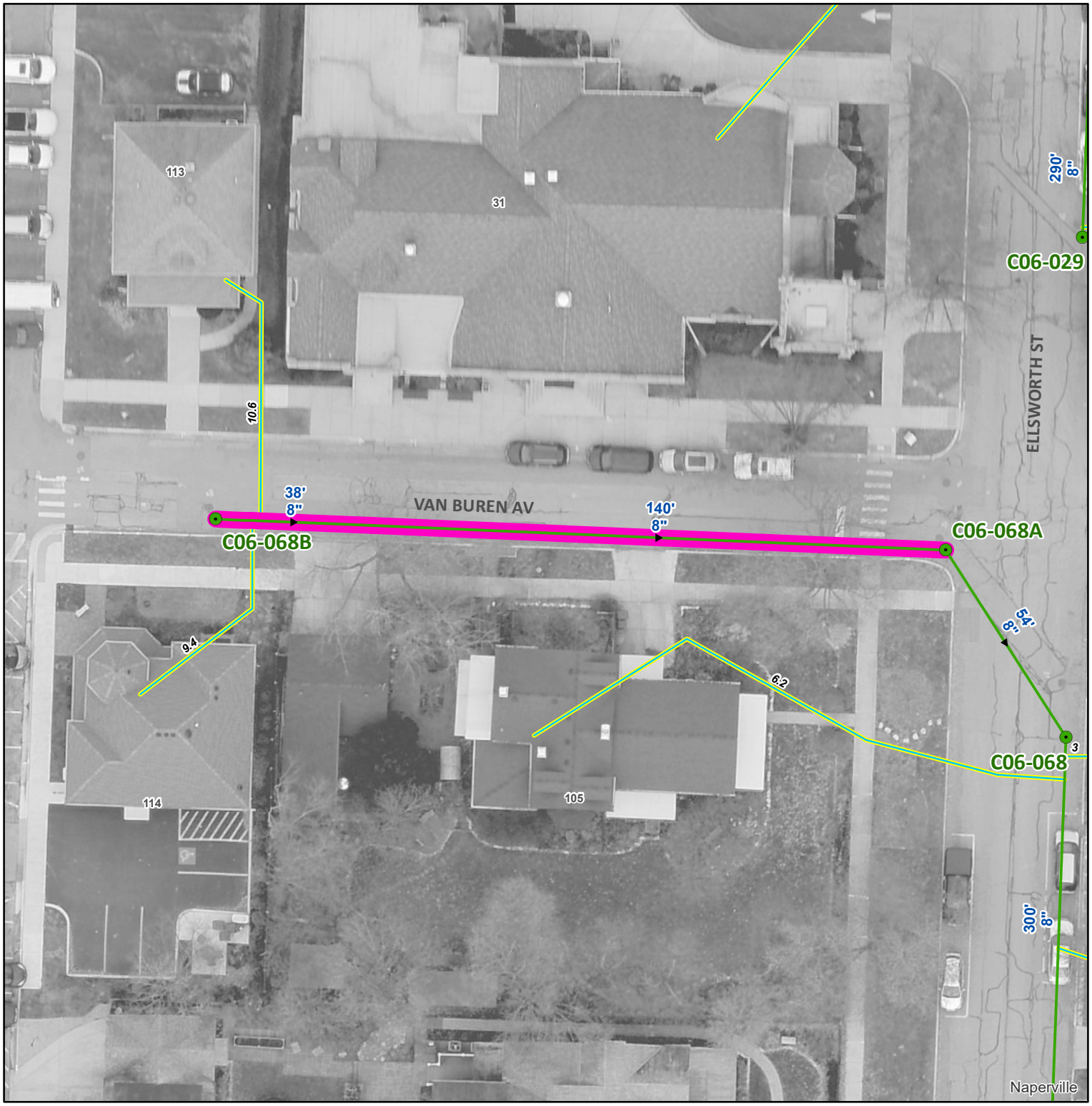
PMS Check:FQ-26

Set: C06-068B>C06-068A

Location: 114 E Van Buren Av

Description and Procedures

Flush C06-068B>C06-068A

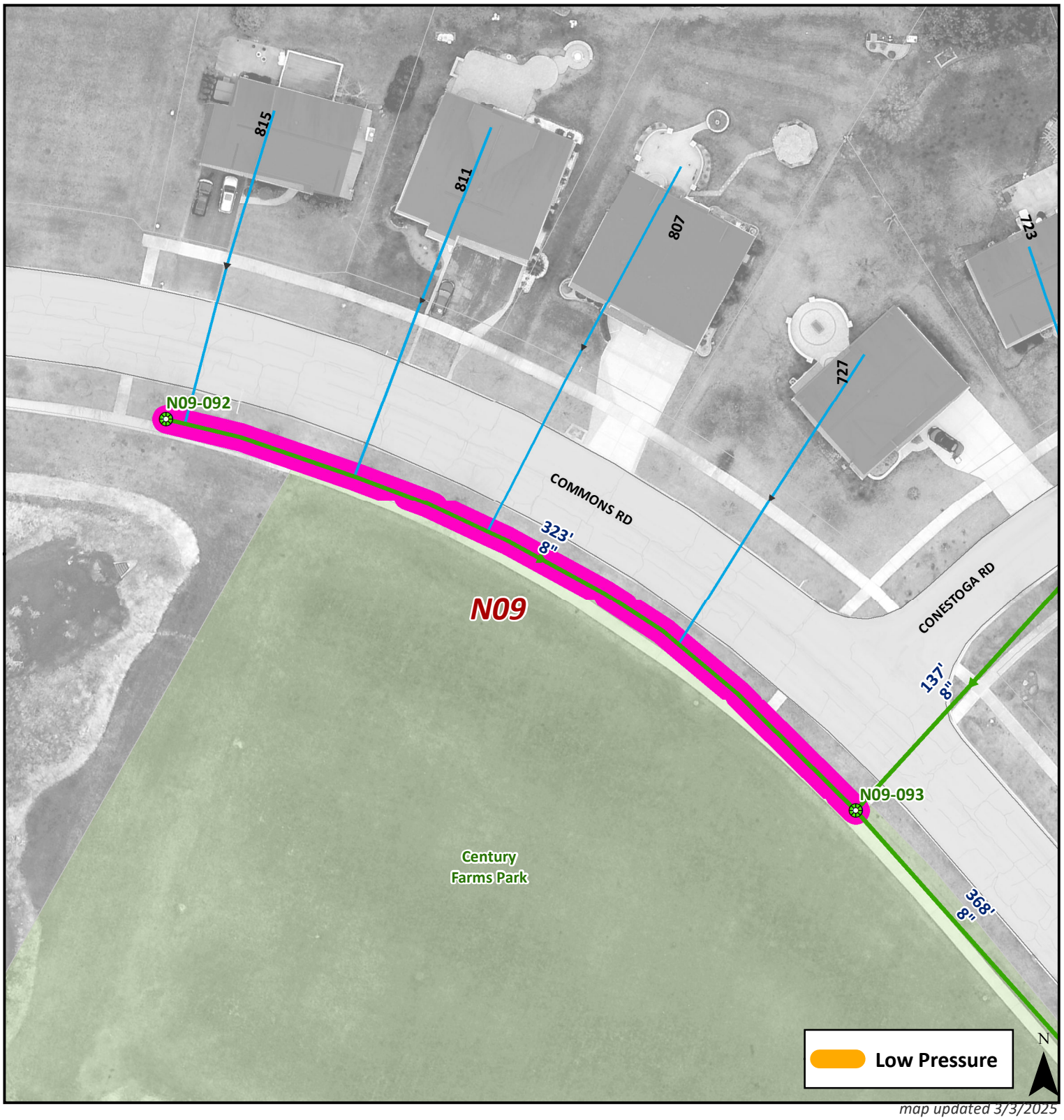


SANITARY FLUSHING PMS

PMS CHECK: FQ-27 **Location: Commons Rd**

Sets: N09-092>N09-093

Description and Procedures
Low FLow



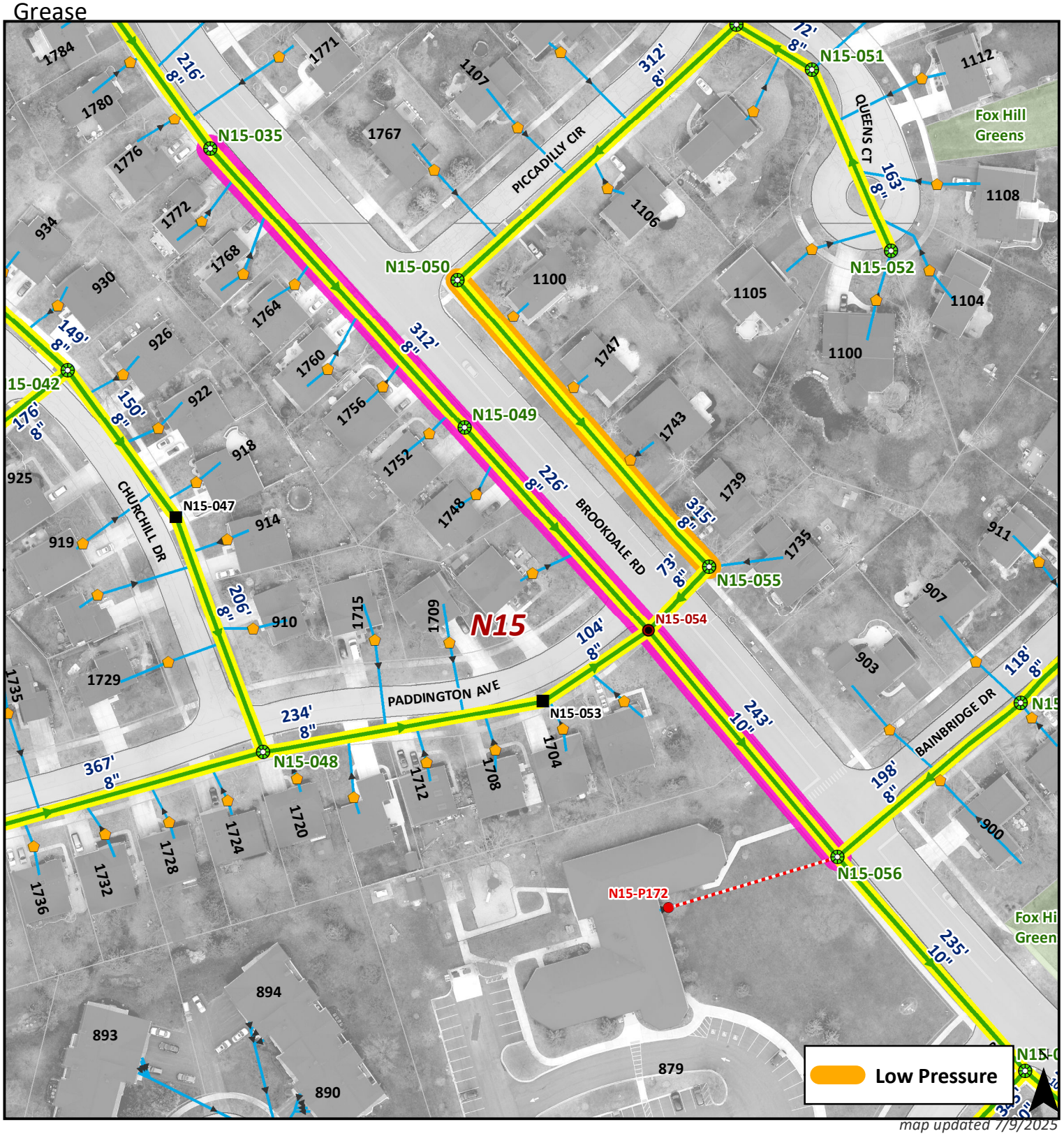
map updated 3/3/2025

SANITARY FLUSHING PMS

PMS CHECK: FQ-28 **Location: Brookdale Rd**

Sets: N15-035>N15-049
N15-049>N15-054
N15-054>N15-056

Description and Procedures
Grease



map updated 7/9/2025

SANITARY FLUSHING PMS

PMS CHECK: FS-1 **Location: Highland to Chicago**

C13-023A>C06-087>086>085>084>083>082>081>069

Description and Procedures

Set up on the 1st MH of Wright on Highland (C13-023A)

Flush Highland to Chicago Av



map updated 2/13/2018

SANITARY FLUSHING PMS

PMS CHECK: FS-2 Location: Ogden Grease Run

Description and Procedures

Flush ALL sidelines from Sleight to Brainard including Loomis

FLUSH ALL SIDE LINES FROM SLEIGHT TO BRAINARD, INCLUDING LOOMIS

Open c/o@ 1017 before flushing

Low Pressure Set

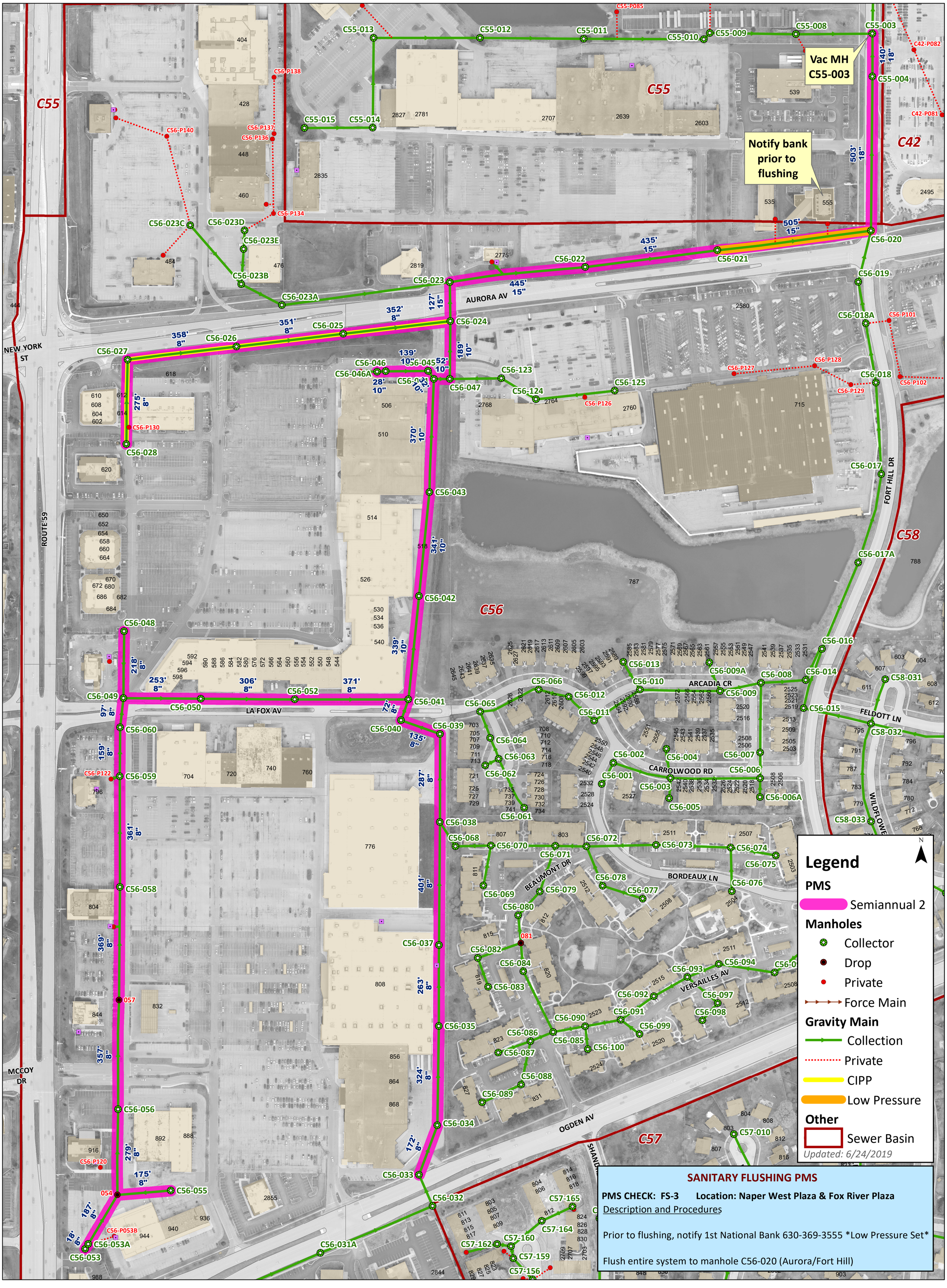
Legend

PMS
- Semiannual

Manholes
- Collector
- Drop
- Lined Thru
- Private

Gravity Main
- Collection
- Interceptor
- Private
- CIPP
- Low Pressure
- Flow Meter

Date Saved: 10/9/2023


C55
C56
C42
C58
C57
Vac MH
C55-003
Notify bank
prior to
flushing
AURORA AV
LA FOX AV
ARCADIA CR
CARROLWOOD RD
BEAUMONT DR
BORDEAUX LN
VERSAILLES AV
FELDOTT LN
FORT HILL DR
ROUTE 59
NEW YORK
ST
MCCOY
DR
OGDEN AV
WILDFLOWER
C55-P085
C55-013
C55-012
C55-011
C55-010
C55-009
C55-008
C55-003
C55-004
C42-P082
C42-P081
C56-P138
C56-P140
C56-P137
C56-P136
C56-P134
C55-015
C55-014
C56-023C
C56-023D
C56-023E
C56-023B
C56-023A
C56-024
C56-025
C56-026
C56-027
C56-028
C56-P130
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C56-046A
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C56-047
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C56-P053B
C56-P122
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435'
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445'
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159'
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361'
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279'
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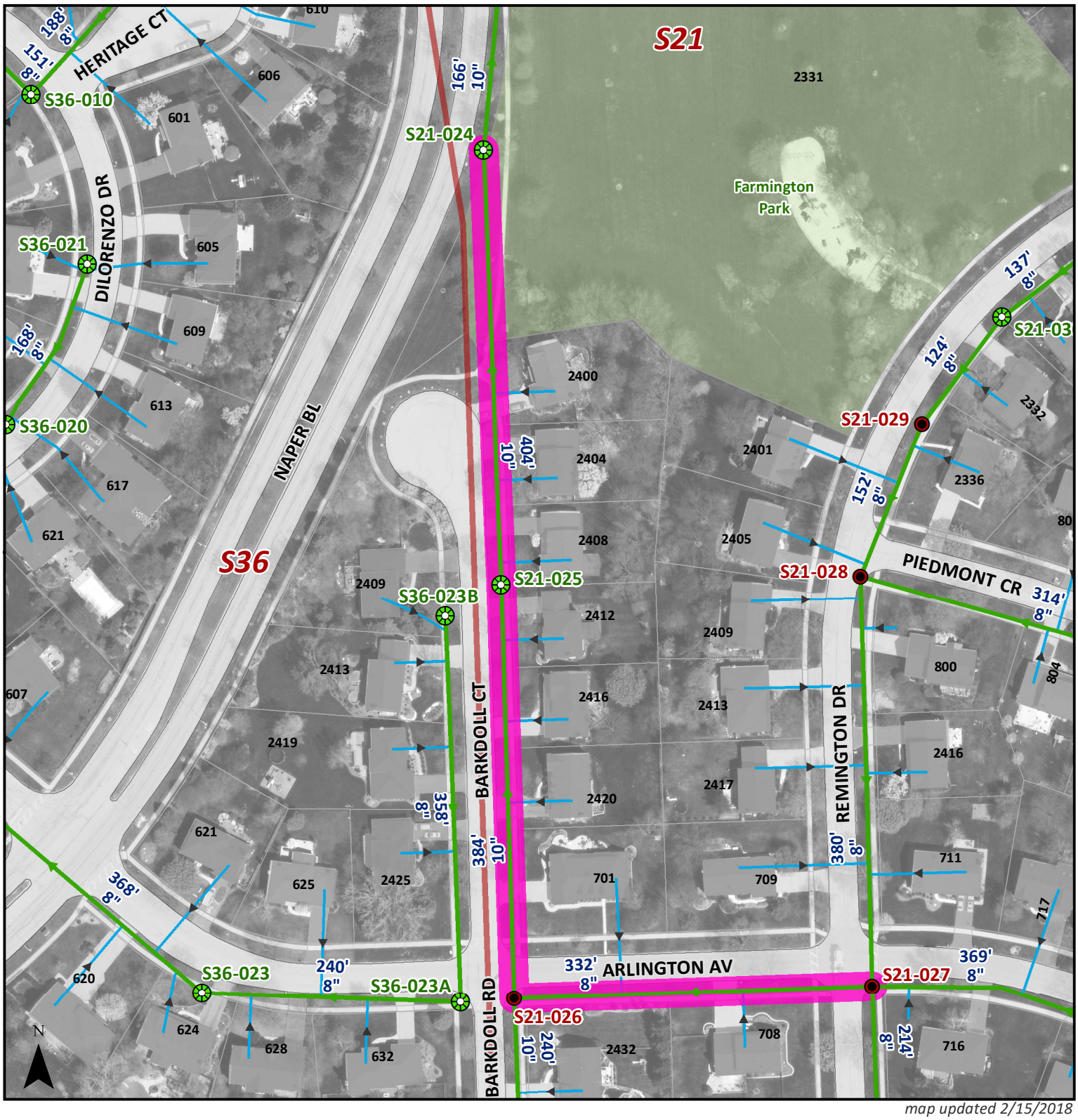
175'
8"
187'
8"
18'
8"
Legend
PMS
Semiannual 2
Manholes
Collector
Drop
Private
Force Main
Gravity Main
Collection
Private
CIPP
Low Pressure
Other
Sewer Basin
Updated: 6/24/2019
N
SANITARY FLUSHING PMS
PMS CHECK: FS-3 Location: Naper West Plaza & Fox River Plaza
Description and Procedures
Prior to flushing, notify 1st National Bank 630-369-3555 *Low Pressure Set*
Flush entire system to manhole C56-020 (Aurora/Fort Hill)

SANITARY FLUSHING PMS

PMS CHECK: FS-4 **Location: Barkdoll Ct, Arlington Av**

Arlington Av: S21-027>026
Barkdoll Ct: S21-026>025>024

<u>Description and Procedures</u>
Heavy Grease



map updated 2/15/2018

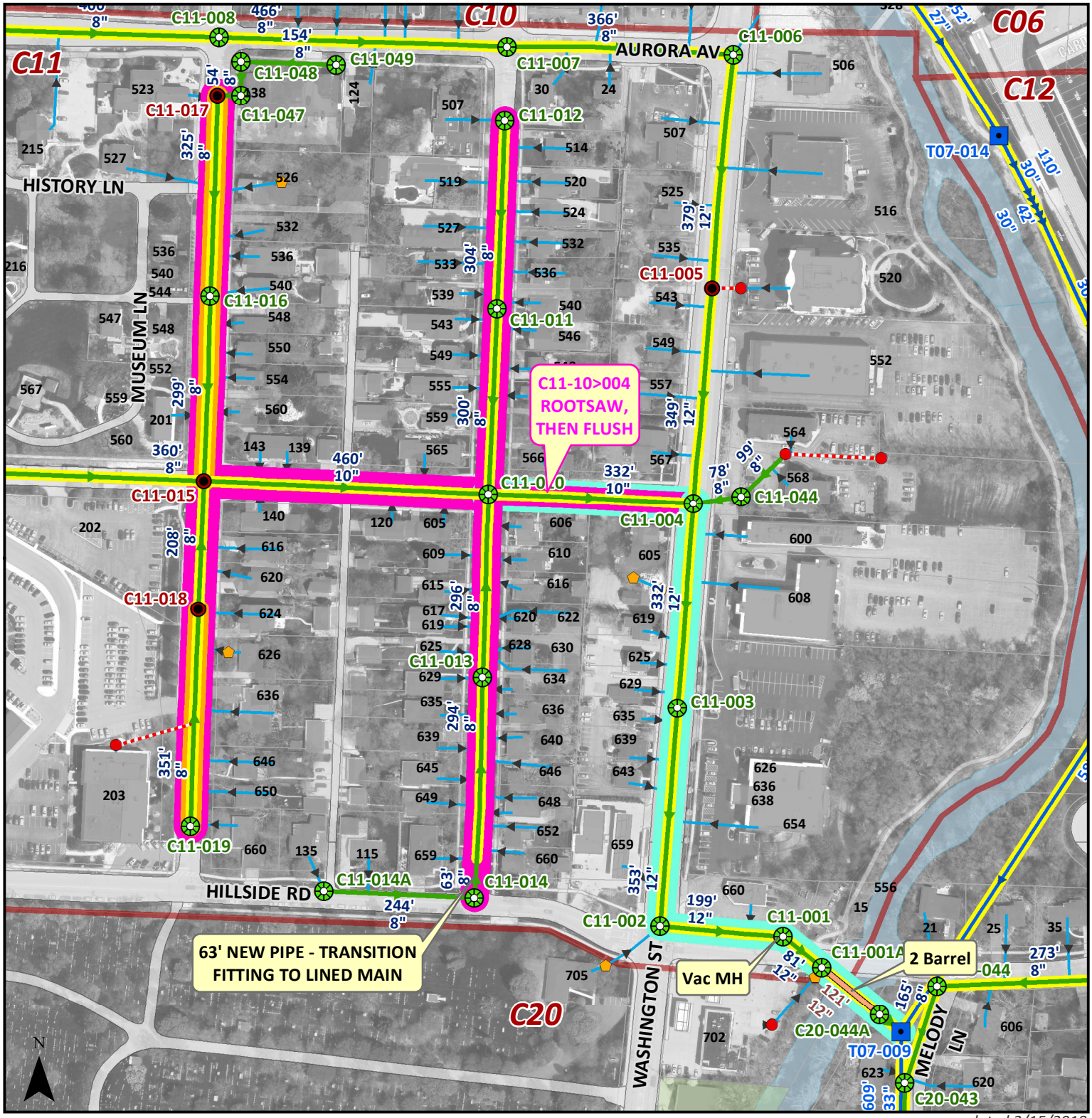
SANITARY FLUSHING PMS

PMS CHECK: FS-5 **Location: Webster, Main, Porter, Washington, Hillside**

Description and Procedures

ROOTSAW: Webster St: C11-017>016>015 AND C11-019>018>015
Main St: C11-012>011>010 AND C11-014>013>010
Porter Av: C11-015>010>004

FLUSH: Washington St: C11-004>003>002
Porter Av: C11-010>004
Hillside Av: C11-002>001>001A>C20-004A>T07-009



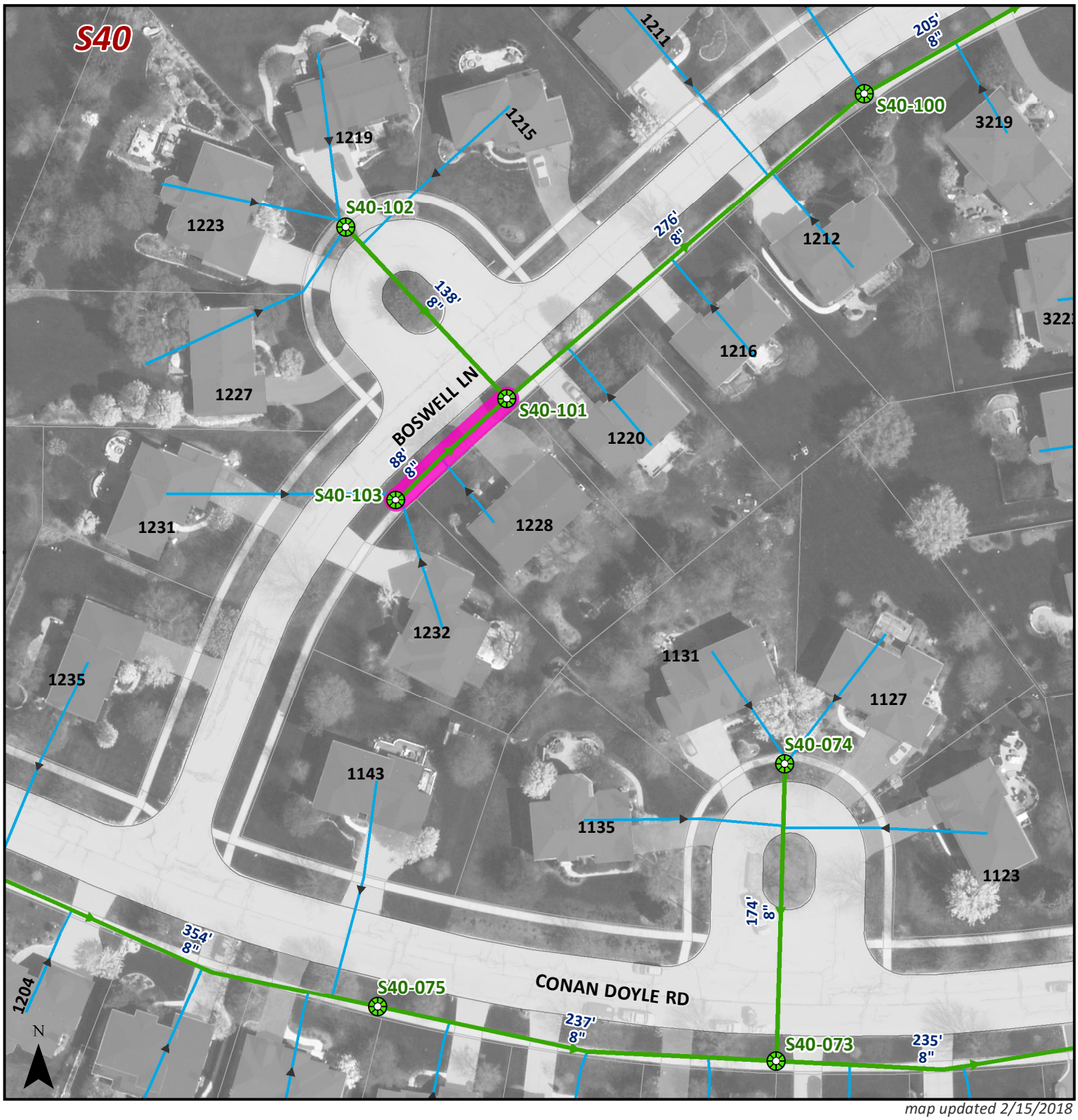
map updated 2/15/2018

SANITARY FLUSHING PMS

PMS CHECK: FS-7 **Location: Boswell Ln**

S40-103>S40-101

Description and Procedures
Flat – Heavy Rags, flush until clear



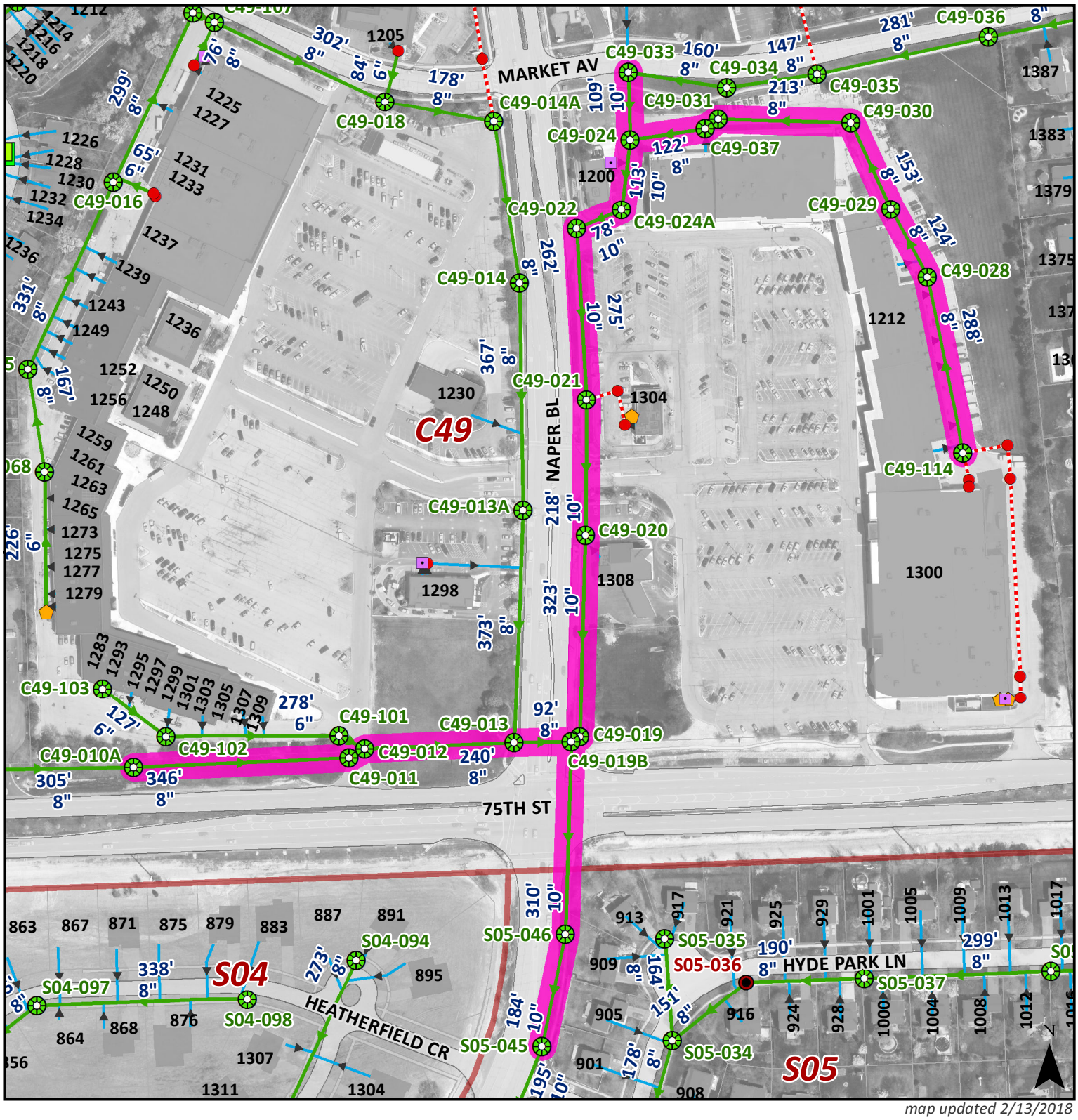
map updated 2/15/2018

SANITARY FLUSHING PMS

PMS CHECK: FS-8 **Location: Fox Run Square/Market Meadows**

Description and Procedures

Flush all highlighted sets to remove grease and grit

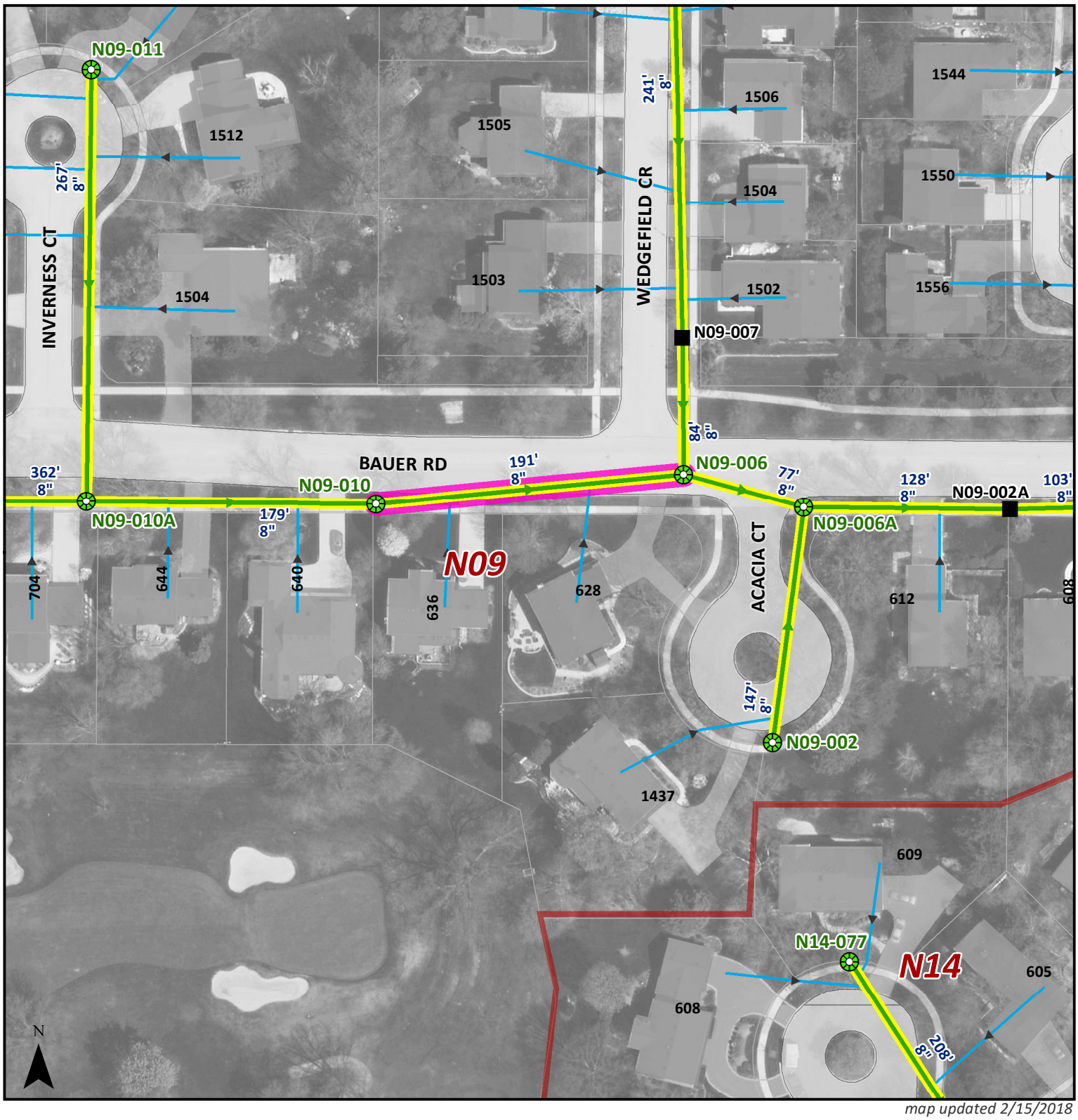


SANITARY FLUSHING PMS

PMS CHECK: FS-9 **Location: Bauer Rd @ Wedgefield (Cress Creek)**

N09-010>N09-006

Description and Procedures
Flush – Belly collects grease



map updated 2/15/2018

SANITARY FLUSHING PMS

PMS CHECK: FS-10 **Location: River Bend**

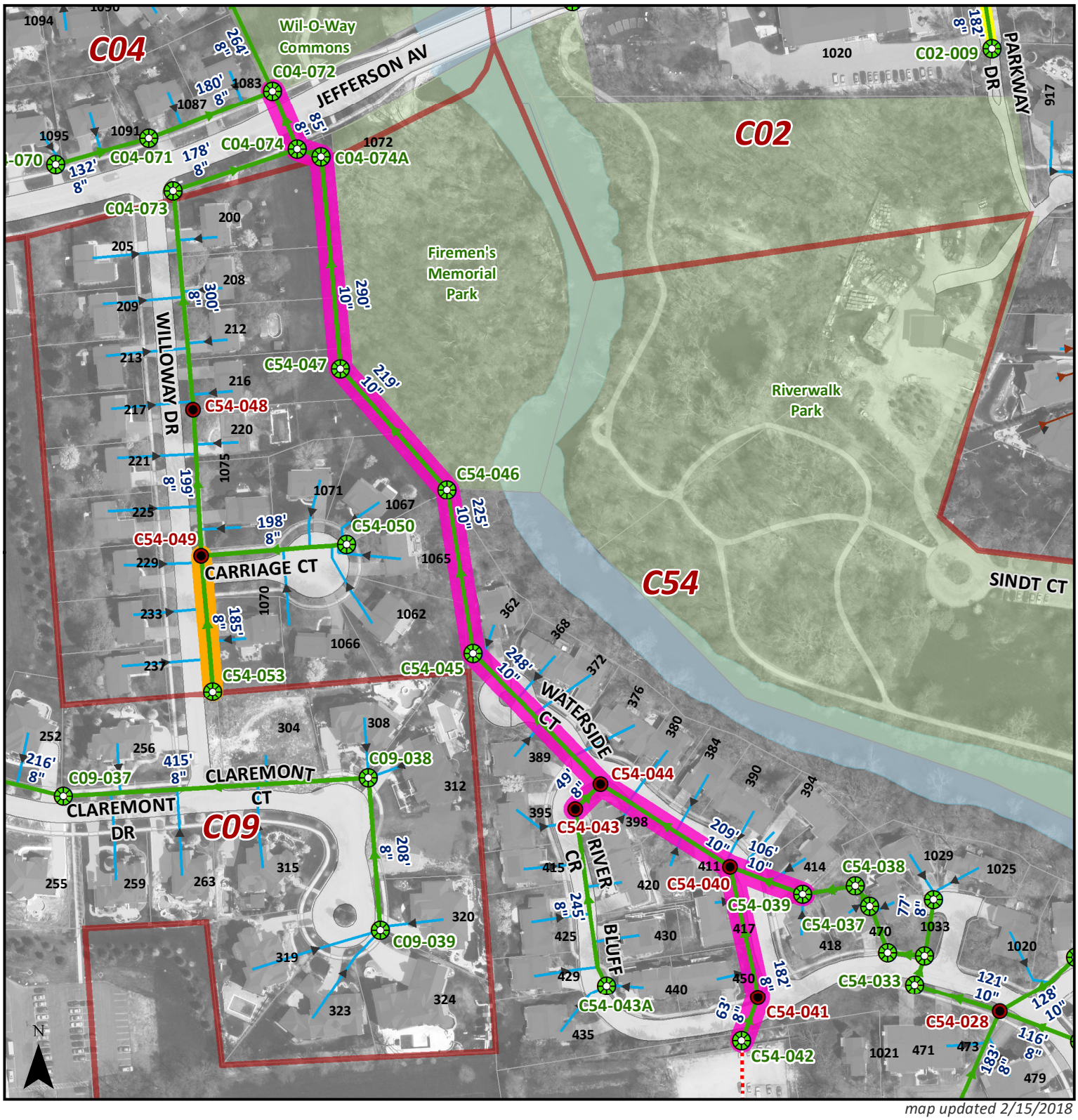
11 Sets

Description and Procedures

Heavy Grease from Meson Sabika

Several manholes have been landscaped over by residents

Flush across Jefferson to C04-072



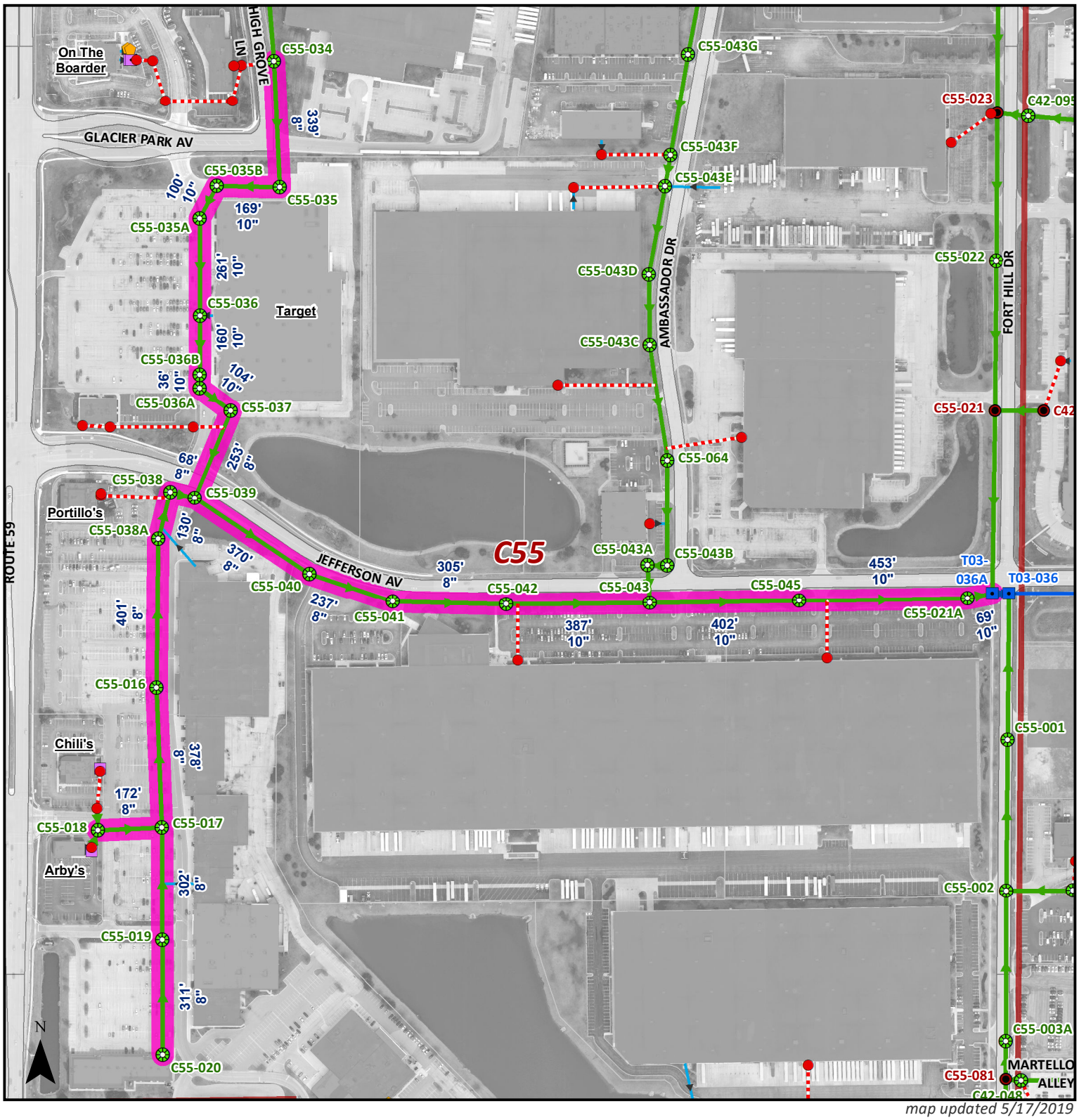
map updated 2/15/2018

SANITARY FLUSHING PMS

PMS CHECK: FS-11 **Location: Westridge Mall (C55)**

Description and Procedures

Heavy Grease from restaurants



map updated 5/17/2019

SANITARY FLUSHING PMS

PMS CHECK: FS-12 **Location: Commons Dr and William Penn Dr**

N09-085>N09-086

Description and Procedures

Flush using Grease Nozzle – belly collects grease



map updated 2/13/2018

SANITARY FLUSHING PMS

PMS CHECK: FS-13 **Location: Rose Ln @ Elmwood Dr**

C28-050>C28-049

Description and Procedures
Low Pressure



map updated 2/13/2018

SANITARY FLUSHING PMS

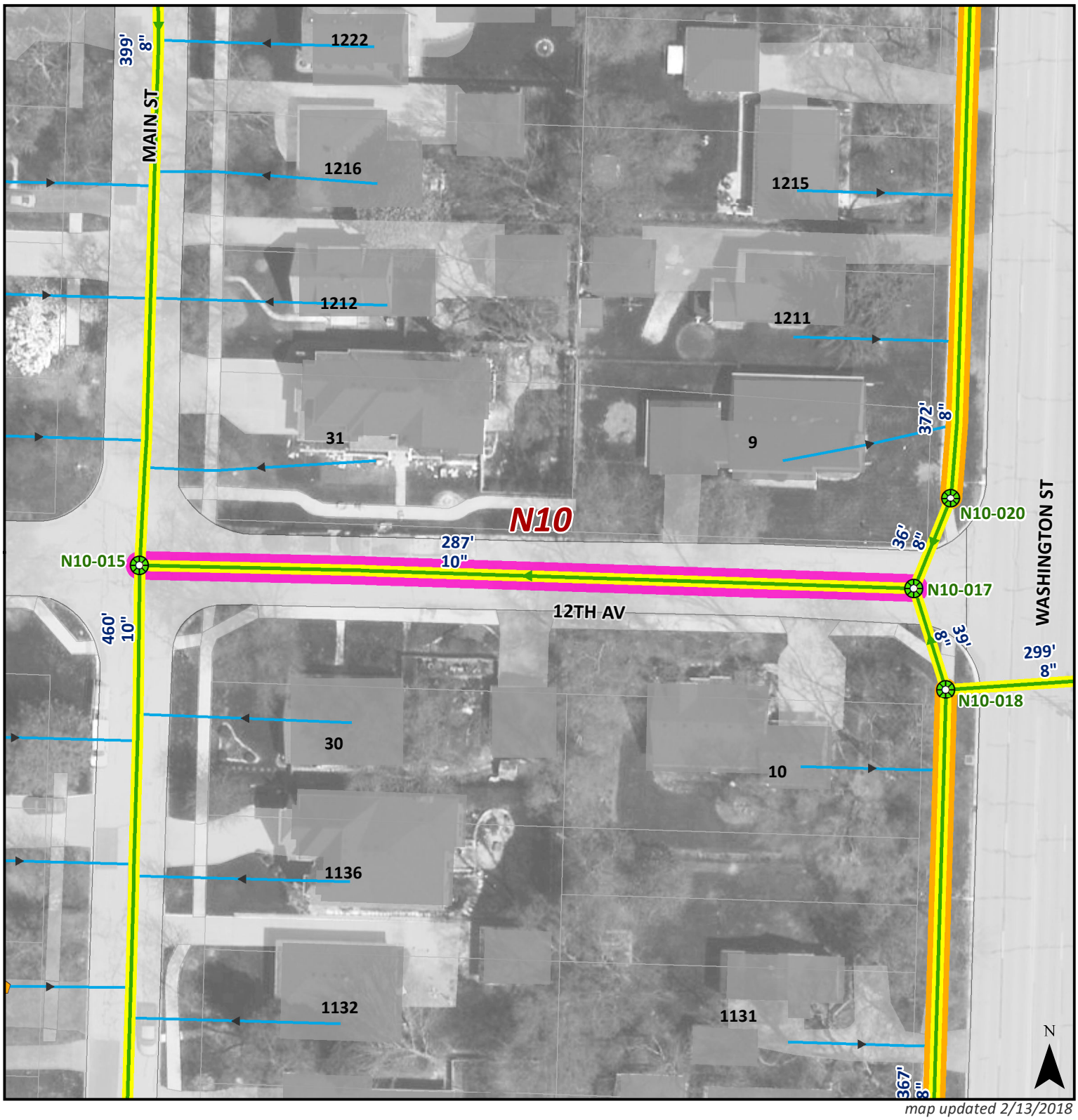
PMS CHECK: FS-14 **Location: 12th St and Washington St**

N10-017>N10-015

Description and Procedures

Belly collects Heavy Grease – Flush using spinner nozzle only – Flush at least 3x

Belly is approximately 140’ east of MH N10-015



map updated 2/13/2018

SANITARY FLUSHING PMS

PMS CHECK: FS-15 Location: Caputo's Grease Run

Description and Procedures
Use Spinner Nozzle
Clean from behind Caputo's to Route 59,
South along Route 59 Starting at W24-020,
Clean behind Strip mall with Melting Pot, Redhots, Burrito,
and east thru Harmony Grove (Fairhauser to Chokeberry to Clearwater)

W24 W16 S51 S50

HODDAM RD HODDAM CT FREELAND CR HAVILAND CT WAIT RD MATHER CT FAIRHAUSER RD FESSENEVA LN CLEARWATER LN CHOKEBERRY DR CANFIELD CT FOSTER CT NISWENDER CT FAIRHAUSER CT MATHER DR ROUTE 59 111TH ST ACE LN CLARENCE DR HIGH MEADOW RD HASSERT BL PRAIRIE SAGE LN SWITCH GRASS LN

Legend

PMS
- Semiannual

Manholes
- Collector
- Drop
- Private

Gravity Main
- Collection
- Private
- Service Lines

Other
- Sewer Basin
- Cleanout
- Grease Trap

Updated: 2/26/2018

SANITARY FLUSHING PMS

PMS CHECK: FS-17

Location: Ranchview Dr
Near Cinnamon Creek Lift Station

S30-103>S30-102>S30-101>WETWELL

Description and Procedures

REVERSE FLUSH INTO WETWELL. BE SUPER CAREFUL!!



map updated 2/26/2018

SANITARY FLUSHING PMS

PMS CHECK: FS-18 **Location: Charles - Between Elizabeth and Cheshire**

Description and Procedures

FLUSH C15-016>C15-014>C15-012

CAUTION: Offset joint lined over C15-014>C15-012

*Notify resident @ 1036 Elizabeth prior to flushing & Open Cleanout



map updated 2/12/2018

SANITARY FLUSHING PMS

PMS CHECK: RS-1 **Location: Douglas Av – west of Eagle St**

Description and Procedures
Rootsaw C05-091>C05-090

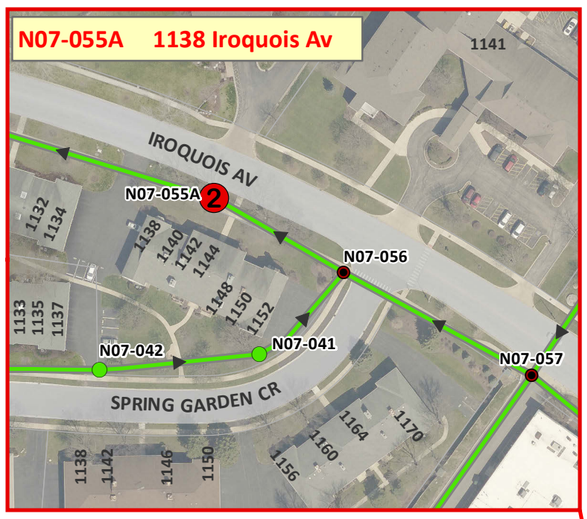


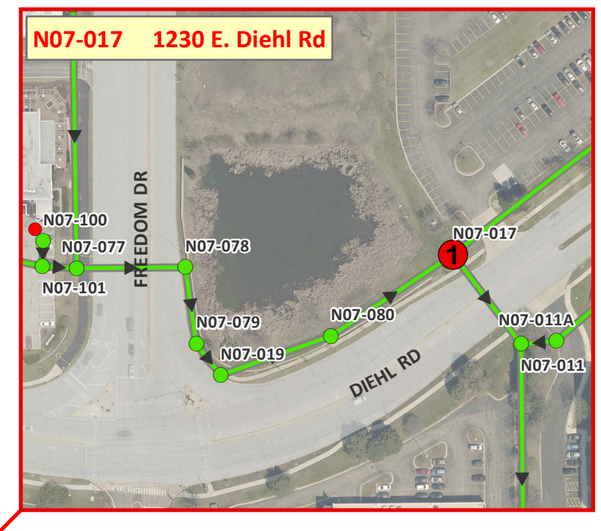
map updated 2/23/2018

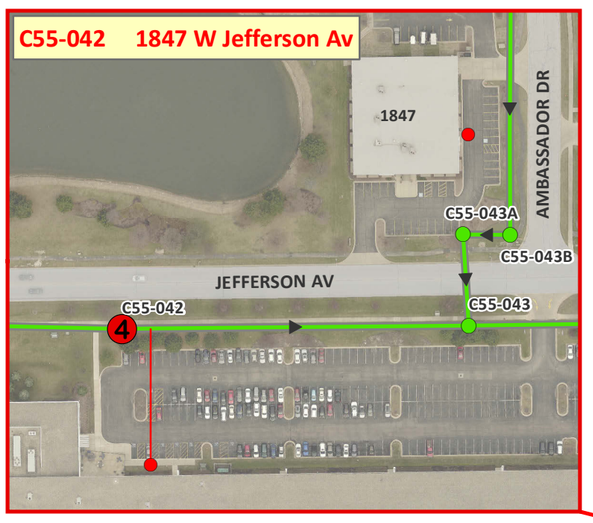
GREASE SAMPLE SITES

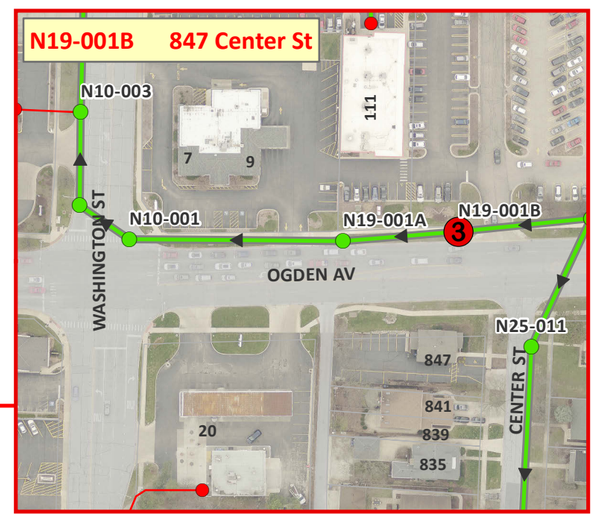
N
Not to Scale

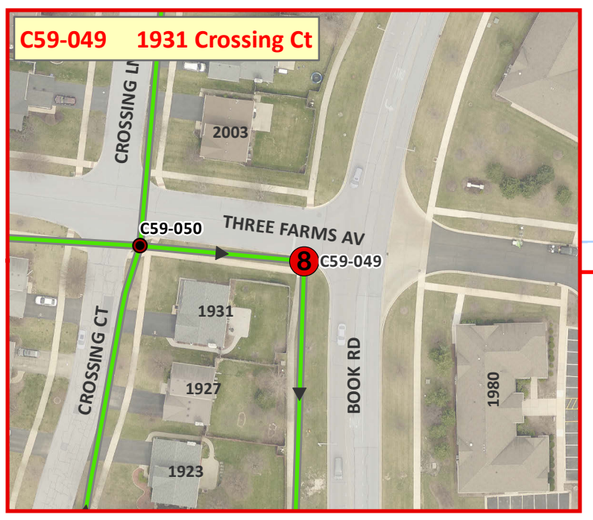


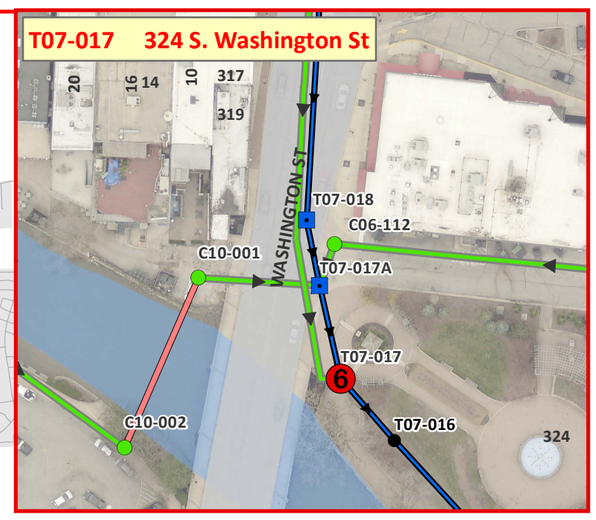


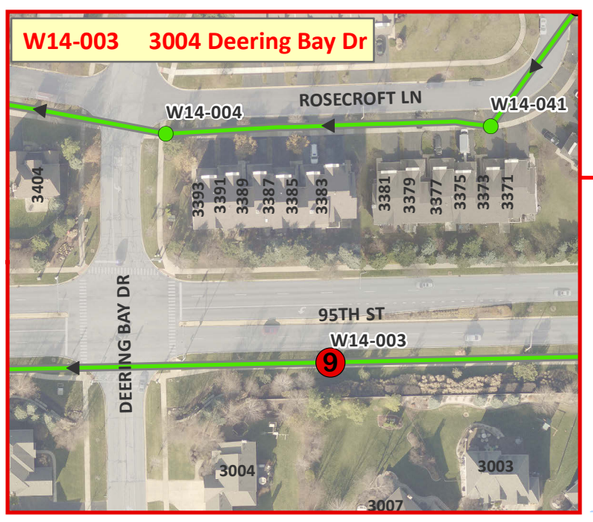


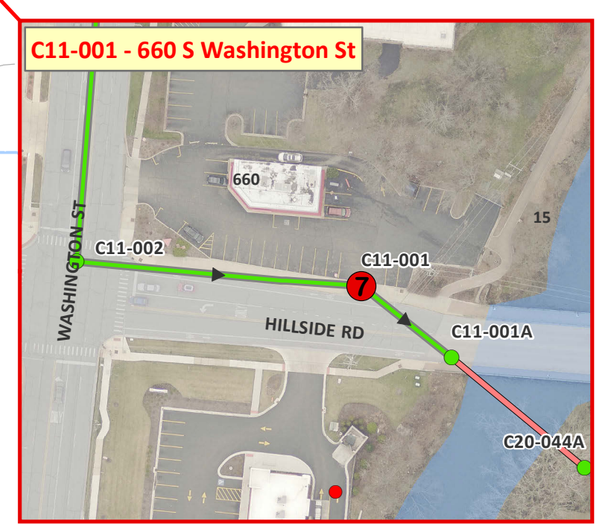


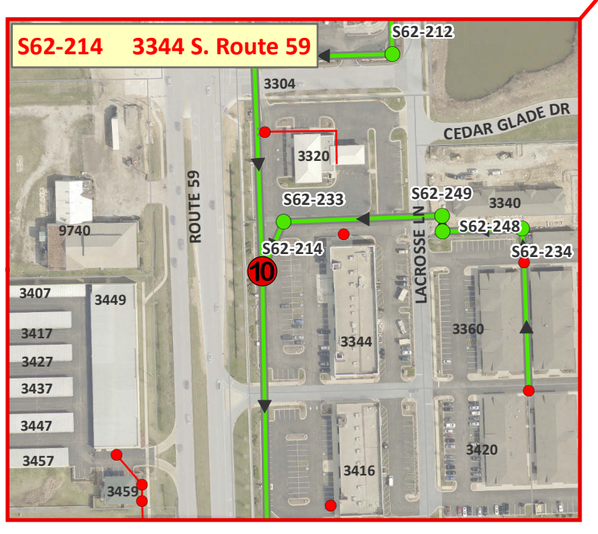


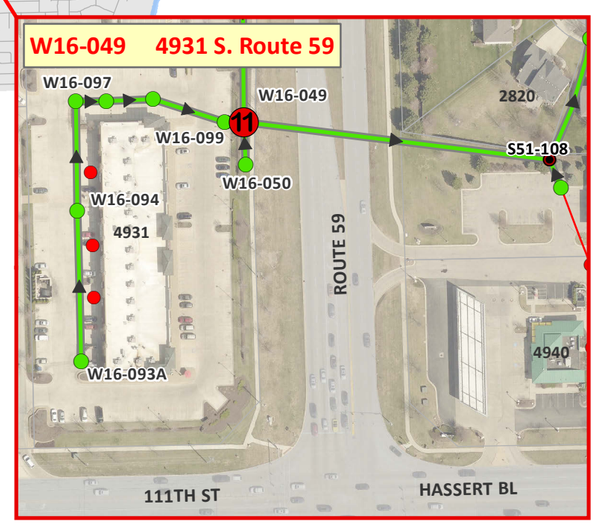


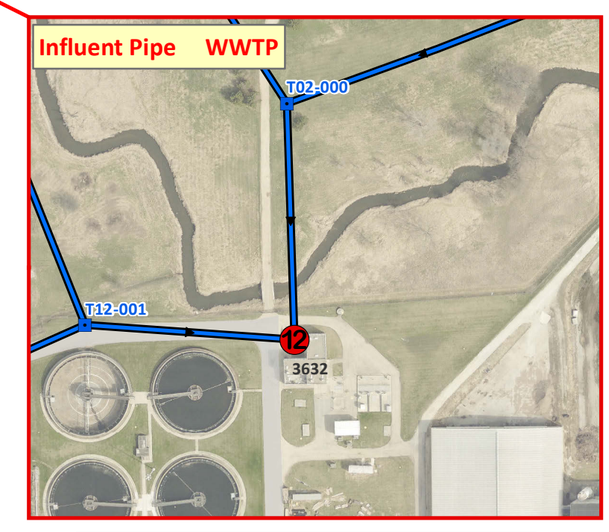












DEPARTMENT OF PUBLIC UTILITIES - WATER
Water Distribution & Collection
Created By: Kevin Steltzriede, Utility Specialist
10/14/2019

Naperville

PAYMENT AGREEMENT FOR STORM WATER DISCONNECTION FROM THE SANITARY SEWER.

The Department of Public Utilities-Water recognizes that certain areas of the city are more susceptible to reoccurring sanitary sewer backups due to heavy rainfall surcharges. We are committed to reducing the frequency and severity of these surcharges. We are offering you participation in our storm water disconnection program. This allows you to remove any storm water device such as sump pumps, gutters etc. that are improperly hooked to the sanitary sewer system. The City will reimburse you the homeowner 75% of the cost. We are doing this, although we have no direct responsibility to do so, to reduce the amount of wastewater backups caused by Inflow and Infiltration issue in the sanitary sewer system. This agreement only covers the cost to remove the storm water device and redirect the discharge outside the home.

The conditions for this transaction are as listed below:

A) Homeowner must obtain (3) written quotes and send copies of the quotes to the Collection & Pumping Supervisor for preauthorization prior to any work beginning. These quotes must include restoration. The City will make only one payment. Once the City has given you authorization you may schedule the work. The City will normally select the lowest quote but reserves the right to reject all quotes should they exceed usual and customary charges for this type of installation.

B) Upon completion of the installation, the Homeowner must submit proof of payment for the installation to the Collection & Pumping Supervisor. Payment will then be made by the City for 75% of the agreed on quotation. This will be paid to the customer. No payment will be made to the plumber. This transaction is between the DPU Wastewater Utility and the customer, not the plumber.

C) The City assumes no responsibility for the selection, installation, maintenance or operation of any device(s). Any future costs related to maintenance or repair of the device will be paid by the Homeowner.

D) If you perform the work yourself, and the cost of materials is less than $100, please send copies of your material receipts to the City for review. The city will review your receipts and process your reimbursement (for materials only).

E) A 12 month a re-inspection of the disconnection will be required.

CUSTOMER NAME _____

ADDRESS_____

PHONE _____
DESCRIPTION OF WORK_____

QUOTE #1 PRICE _____ PLUMBER_____

QUOTE #2 PRICE _____ PLUMBER_____

QUOTE #3 PRICE _____ PLUMBER

CITY'S 75% PAYMENT_____ _____

CONDITIONS/PAYMENT AGREED TO BY:

_____ _____
Customer Signature Date

_____ _____
Collection & Pumping, Supervisor Date

Date Installation Completed _____ Plumber_____

Return to: **Dept. of Public Utilities – Water, Attn: Collection & Pumping Supervisor;**
1200 W Ogden Ave, Naperville, IL 60563

DISCONNECTION OF STORM WATER
DISCHARGE TO THE SANITARY SEWER PROGRAM
HOLD HARMLESS AGREEMENT
(Required for program participation)

In consideration for reimbursement by the CITY of costs incurred under the terms of the storm water disconnection programs, I, the customer, agree to release, waive, discharge and hold harmless the CITY, it's officers, agents, servants, representatives and employees from any and all liability, claims, demands, actions and causes of action whatsoever arising out of or related to any loss, damage, or injury, including death, that may be sustained by me, or any of the property owned by me, as a result of my participation in the storm water disconnection program and the installation of any device. I further understand that my acceptance into the program by the CITY in no way implies liability by the CITY for any injury or property damage sustained by me as a result of any prior or future sanitary sewer backup.

The terms set forth herein shall be in full force and effect during my participation in the program and shall survive thereafter, and shall be binding upon my heirs, executors and representatives.

_____ _____

Customer Signature Date

North Operations Center (NOC) and South Operations Center (SOC)
Wet Weather Holding Lagoons Procedure

The holding lagoons at NOC & SOC are designed to offload sanitary flows during wet weather events to relieve potential surcharging in the collections system. When wet weather flows subside, the holding lagoons are drained back into the collection system.

NOC:

1. Close lagoon drainback valve (on north berm outside fence) as directed by supervisor or field supervisor. Valves may be closed prior to forecasted heavy rain events.

2. Once heavy rainfall starts, monitor wetwell levels at NOC and NW pump stations via SCADA. Monitor the weather and street and river flooding.

3. Make sure the holding lagoon drainback valve is closed.

4. The first high wetwell level for NWPS is 14.5 at which point the divertible opens. The divertible valve between NOC & NWPS is programmed to balance flows between these two stations. You can override the levels to operate the divertible valve with management approval.

5. When NOC wet well reaches 17' and NW wet well reaches 17' and levels continue to rise, pump to the NOC holding lagoon by operating the NOC actuator valve per programming. You can override set points to divert flow with management approval.

6. Monitor flows at May Watts Park via SCADA

7. Monitor the lagoon level, NOC and NW wet well levels and the weather. If Lagoon is reaching capacity notify a supervisory immediately. NOC wet well level – 22' backups in Cress Creek, NW wet well level – 22' backups Redfield Dr.

8. NOC lagoon levels need to be continuously monitored via visual inspection while actively pumping to the lagoon.

9. Stop pumping to the lagoon when NOC & NW wet well levels begin to drop and weather permits. Close the NOC actuator valve. Open force main drain valve from the lagoon to the NOC wet well. Monitor SCADA to ensure May Watts is not being overwhelmed by drainage entering system.

10. Goal is to drain the lagoon back into the sanitary system as soon as possible.

11. Once lagoon is drained, wash down and clean lagoon and treat the lagoon for odor control.

12. If the 10" Baker pump is required at any time during high flows, use bypass under front entrance or set up hose with road ramps. Notify Fire Station #9 if using road ramps.

SOC:

1. Monitor SCADA levels at SOC pump station. Monitor the weather and street flooding.
2. Make sure the holding lagoon drain back valve is closed.
3. Stage 10" Thompson pump and hoses near bypass manhole should it be needed.
4. When SOC wet well reaches 15' the Flygt pump will operate and pump to the lagoon.
5. When SOC Wet well reaches level of 17.5' (per program) the forcemain divertible valve to lagoon opens.
6. While pumping to lagoon, continuously monitor wetwell level, pump operations, Flygt pump, and divertible valve operations. If lagoon is nearing capacity, notify as supervisor immediately.
7. SOC wet well level – 22' backups Lemington and Chatham Ct.
8. Stop pumping to the lagoon when SOC wet well levels begin to drop and weather permits.
9. Drain the lagoon into the sanitary system. Monitor SCADA to while draining to ensure the system downstream is not overwhelmed by the drainage.
10. Treat the lagoon for odor control ASAP.
11. Make sure SOC 24" force main diversion valve is closed 100%.

Any lagoon overflows - Follow Overflow Response Plan

NOC Storage Lagoon



SOC Storage Lagoon



Memorandum of Understanding Between the City of Warrenville and the City of Naperville Regarding Interceptor Sanitary Sewer Capacity

(last updated by the City of Warrenville Public Works Department on 2/8/18)

This Memorandum of Understanding (MOU) has been prepared to memorialize recent discussions between the City of Warrenville and the City of Naperville regarding how Warrenville and Naperville can work together to monitor and address capacity constraints in Naperville's interceptor sanitary sewers along River Road, between approximately I-88 and Naperville's Northwest Pump Station at Ogden Avenue, especially as it relates to the anticipated full buildout conditions of Warrenville and that area of Naperville tributary to its Northwest Pump Station.

The City of Naperville has agreed to convey and treat up to 17,400 population equivalents (PE) from the City of Warrenville. The City of Warrenville is charged for conveyance and treatment on a monthly basis based on the Warrenville's percentage of flow of the total volume. The City of Naperville also has agreed to sell up to 10,000 PE of additional conveyance and treatment capacity for the Cantera Development for a total conveyance and treatment capacity (the City of Warrenville plus Cantera) not to exceed 27,400 PE. As of January 1, 2018, Warrenville has purchased 25,048 population equivalents (PE) of average daily flow of sanitary sewer transport and treatment capacity from Naperville, with the right to purchase an additional 2,352 PE, for a total of 27,400 PE. The following intergovernmental agreements (collectively the "IGA's") between the City of Warrenville and the City of Naperville document these rights:

1. Warrenville Agreement No. 49, and Naperville Resolution 82-4 later amended under Ordinance No. 84-200: Agreement for Wastewater Utility Service Between City of Warrenville and City of Naperville, dated April 5, 1982 – This agreement documents the original 17,400 PE of Naperville transport and treatment capacity allotted to Warrenville for all of its residential, commercial and industrial wastewater discharges.

2. Warrenville Ordinance No. 1345, and Naperville Ordinance No. 94-81: Second Amendment for Wastewater Utility Service Between the City of Warrenville and the City of Naperville, dated May 17, 1994 (the "Second Amendment") – This amendment documents that the City of Warrenville may purchase up to 10,000 PE of treatment capacity for the Cantera Development. As of January 1, 2018, Warrenville has purchased 7,648 PE of the maximum capacity of 10,000 PE, with the right to purchase an additional 2,352 PE.

Warrenville performed an analysis to calculate the anticipated full buildout residential population and total additional PE for the City (the "Buildout Analysis") (Exhibit 1). The Buildout Analysis projects the full buildout residential population of Warrenville will be 17,252 (this number excludes commercial and industrial uses and is not an accurate representation of the total connected load or flow). Exhibit 2 is a

summary of the total buildout sanitary sewer flow analysis and the actual existing sanitary sewer flows from Warrenville. Assuming the remaining sewer and treatment capacity is purchased within the Cantera development, at full buildout, Warrenville's projected average daily flow will not exceed the 27,400 PE of sanitary sewer transport and treatment capacity that Warrenville has purchased or has the right to purchase from Naperville, under the IGA's.

In section 2 of the "Second Amendment", Naperville has the right to direct Warrenville to design and construct a holding tank to reduce peak wastewater output from the Warrenville Development Property (aka Cantera). The holding tank will be sized in accordance with the criteria established in Exhibit 3, the Wastewater Study for Elmhurst-Chicago Stone Company Warrenville Quarry Development, prepared by SDI Consultants, Ltd., and dated October 12, 1990 (the "Wastewater Study").

WARRENVILLE COMMITMENTS

1. Develop and implement an Infiltration and Inflow (I/I) Reduction Program. Development of the program is underway, with Warrenville's sanitary sewer system divided into eleven (11) basins. Implementation of the first phase of the first basin is proposed in Warrenville's FY 2019 budget, and will be presented at the February 12, 2018, City Council Committee of the Whole meeting.

2. Work with Naperville to develop a scope of work for an engineering consultant, to be hired by Warrenville, to update the Wastewater Study to reflect current conditions and updated sanitary sewer flow projections associated with the anticipated full buildout conditions in Warrenville and that area of Naperville tributary to its Northwest Pump Station. This will be completed within three (3) months of the approval of this MOU.

3. Contract with a qualified engineering consultant (the "Consultant") and update the Wastewater Study to reflect current conditions and updated sanitary sewer flow projections associated with and the anticipated full buildout conditions in Warrenville and that area of Naperville tributary to its Northwest Pump Station. This will be completed within twelve (12) months of the approval of this MOU.

4. Consistent with section 2 of the Second Amendment, Warrenville will design and construct a holding tank to reduce peak wastewater output from Warrenville, in accordance with the criteria established in the updated wastewater study prepared by Warrenville.

   It is possible that the most appropriate location for this holding tank could be outside of the Cantera Development, and will require property acquisition. Warrenville will use its best efforts to complete necessary property acquisition for the holding tank within twelve months of the date it receives written notification, sent by certified mail to the City Administrator, from Naperville that this improvement is required.

Warrenville will use its best efforts to complete the design and construction of this facility within eighteen (18) months of acquiring the required property for this improvement, and Naperville notifying Warrenville in writing that this improvement is required.

NAPERVILLE COMMITMENTS

1. Approve all properly completed Illinois Environmental Protection Agency (IEPA) permit applications for public and private sanitary sewer extensions in Warrenville, provided (i) said permit applications are generally consistent with the projections contained in the Buildout Analysis and (ii) Warrenville is fulfilling its commitments outlined above.

2. Within two (2) weeks of a written request from Warrenville or its Consultant, meet with Warrenville and its consultant to develop the scope of work for the update of Exhibit 3. For this item, e-mail is an acceptable form of written request.

3. Within two (2) weeks of a written request from Warrenville or its Consultant, provide Naperville's flows, projected buildout, and other information required for Warrenville to fulfill its commitments, to Warrenville or its consultant. For this item, e-mail is an acceptable form of written request.

4. Within four (4) weeks of Warrenville submitting the initial draft of the update of Exhibit 3, Naperville will review the submittal and provide written comments and questions to Warrenville. For this item, e-mail is an acceptable form of written communication.

5. Within two (2) weeks of Warrenville submitting any subsequent version of the update of Exhibit 3, Naperville will review the submittal and provide written comments and questions to Warrenville. For this item, e-mail is an acceptable form of written communication.

CITY OF NAPERVILLE

Authorized Signature Douglas A. Krieger

Printed Name Douglas A. Krieger

Title City Manager Date 2/9/18

CITY OF WARRENVILLE

Authorized Signature John M Coakley

Printed Name John M. Coakley

Title City Administrator Date 2/8/2018

EXHIBIT 1

CITY OF WARRENVILLE
FULL BUILDOUT POPLUATION ANALYSIS

(Last updated by City of Warrenville Public Works 2/8/18)

Process for Estimating Full Buildout Population

Step One: Identify all properties in Warrenville's planning area that are either unincorporated, vacant, or not currently developed in a manner consistent with its Comp. Plan (see Appendix 1 Map). It is important to recognize that Warrenville's comprehensive plan is actually a combination of the following three components:

- The comprehensive land use plan Warrenville approved (Ordinance No. 714) in 1984 for the City's entire planning area. A copy of this plan is available at the following City website link: http://www.warrenville.il.us/DocumentCenter/View/1231. According to Table 2 in Chapter 2 of this plan (page 27), Warrenville's ultimate population was projected to be 21,750.
- The subarea land use plan Warrenville approved (Ordinance No. 2371) in 2007 for the 112 acre geographic area Warrenville refers to as the Old Town/Civic Center Area. A copy of this plan is available for review at the following City website link: http://www.warrenville.il.us/DocumentCenter/View/324
- The subarea land use plan Warrenville approved (Ordinance No. 3008) in 2016 for the 370 acre geographic area Warrenville refers to as the Southwest District. A copy of this plan is available for review at the following City Website link: http://www.warrenville.il.us/index.aspx?nid=611

Step Two: Create and use the Excel spreadsheet included in Appendix 2 to:

- Estimate the current population for each property identified on the Appendix 1 Map based on current use. The population generation table Warrenville and Naperville use to calculate school, park, and library land/cash contribution requirements for new residential development (Appendix 3) was used to make these estimates.
- Calculate the net increase in population that would result if each of these properties was developed with the land uses reflected in Warrenville's Comprehensive Plan and at densities that would be realistic from a market, regulatory, and political perspective.

Step Three: Calculate Warrenville's ultimate buildout population by adding the projected net population increase from cell M132 in the Appendix 2 Excel spreadsheet (3,879) to the 2015 American Communities Survey (Appendix 3) population estimate for Warrenville (13,373) for a total of 17,252.

Process for Estimating Sanitary Sewer Population Equivalent Projections for Full Buildout

Step One: Same as Step One in process used to estimate City of Warrenville ultimate/full buildout population.

Step Two: Create and use the Excel spreadsheet included in Appendix 5 to estimate the additional population associated with all improved residential properties located within Warrenville's existing corporate boundaries but not connected to the City's sanitary sewer system. 2015 American Communities Survey (ACS) five year estimates (Appendix 3) and current Warrenville sanitary sewer account data was used to estimate there are currently 471 detached, single-family, residential dwelling units in Warrenville that are NOT currently connected to the City's sanitary sewer system. 2015 ACS bedroom breakdown percentages and Appendices A and B of Part 370 Illinois Recommended Standards for Sewage Works in Title 35 of the State of Illinois Administrative Code were used estimate that 1,410 people live in these 471 dwelling units.

Step Three: Use the Excel spreadsheet included in Appendix 2 to:

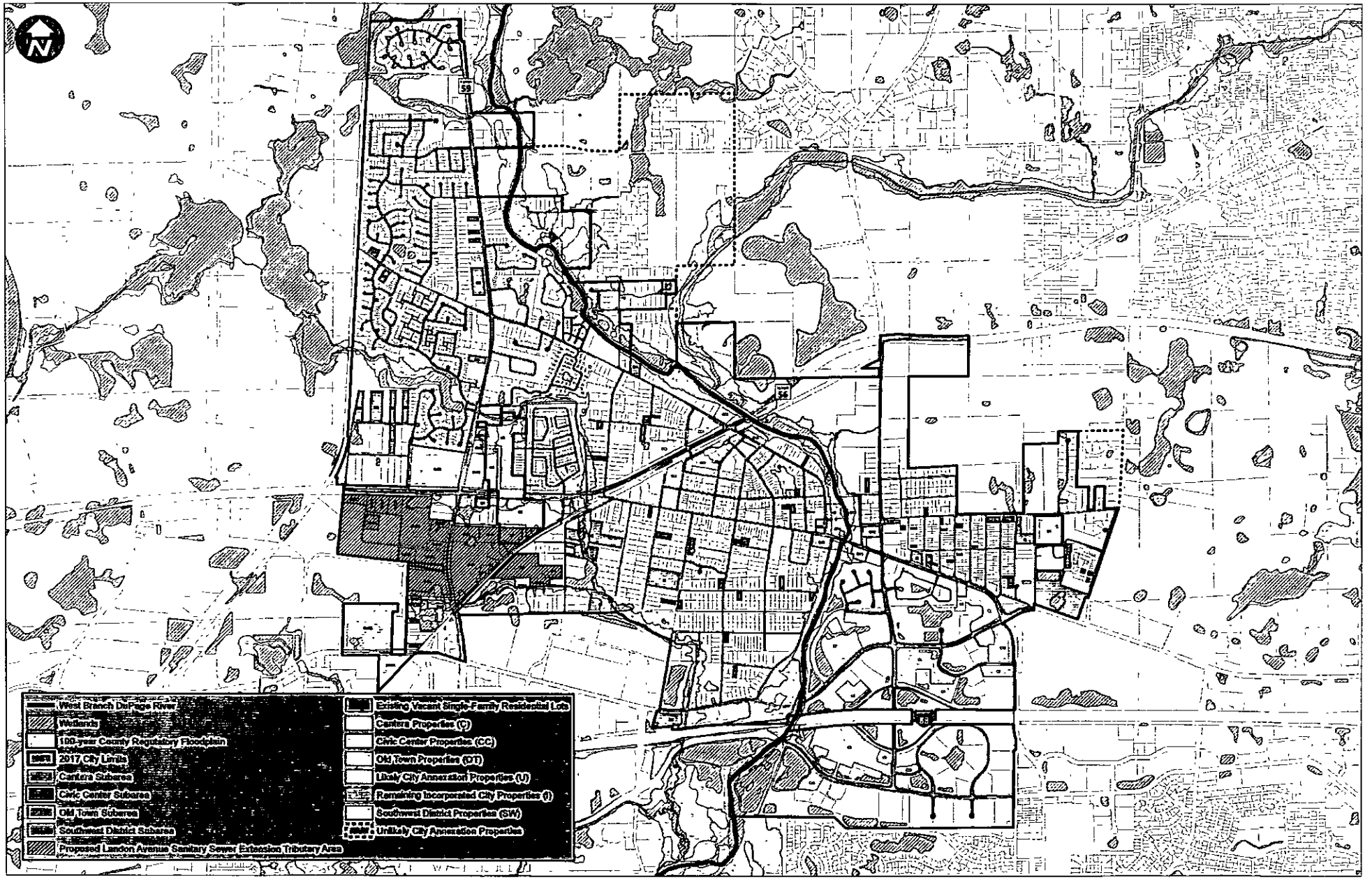
- Estimate the current population equivalent (PE) for each property identified on the Appendix 1 Map based on its current use and connection status to Warrenville's sanitary sewer system. This spreadsheet intentionally includes properties with existing non-residential buildings in Cantera that were vacant and not contributing to the existing average daily Cantera sanitary sewer flow.
- Calculate the net increase in PE that would result if each of these properties was (i) developed/fully occupied with the land uses reflected in Warrenville's Comp. Plan and at densities that would be realistic from a market, regulatory, and political perspective and (ii) connected to Warrenville's municipal sanitary sewer system. Appendices A and B of Part 370 Illinois Recommended Standards for Sewage Works in Title 35 of the State of Illinois Administrative Code was used to estimate the number of new residents/PE's that would be generated by the various types of future residential development anticipated in Warrenville. The PE data provided in Appendix 6 was used to estimate the additional sanitary sewer flow that would be produced by projected future senior housing and non-residential development.

Step Four: Calculate Warrenville's PE wastewater equivalent average daily flow at full buildout by adding the projected future PE increase reflected in cell L132 in the Appendix 2 Excel spreadsheet in millions of gallons per day (0.67 MGD) to the existing average daily wastewater flow data provided by Naperville, (1.78 MGD) for a total of 2.61 MGD.

Process for Estimating Sanitary Sewer Population Equivalent Projections for Landon Avenue Sanitary Sewer Extension Project

Step One: Identify all properties that would be tributary to the new sanitary sewer main that will be installed under this permit. These properties are identified in the hatched area on the map included in Appendix 1 as the "Proposed Landon Avenue Sanitary Sewer Extension Tributary Area" and in the last column of the Appendix 2 Excel spreadsheet.

Step Two: Use the Excel spreadsheet included in Appendix 2 to calculate the PE equivalent average daily wastewater flow that would result if each of the properties located within the proposed Landon Avenue Sanitary Sewer Extension tributary area was (i) developed with the land uses reflected in Warrenville's Comprehensive Plan and at densities that would be realistic from a market, regulatory, and political perspective and (ii) connected to Warrenville's municipal sanitary sewer system. The land use/PE data provided in Appendix 6 was used in these calculations. Where possible, Appendix 8 PE data mirrors Appendices A and B of Part 370 Illinois Recommended Standards for Sewage Works in Title 35 of the State of Illinois Administrative Code.


West Branch DuPage River
Wetlands
100-year County Regulatory Floodplain
2017 City Limits
Cantera Subarea
Civic Center Subarea
Old Town Subarea
Southwest District Subarea
Proposed Landon Avenue Sanitary Sewer Extension Tributary Area
Existing Vacant Single-Family Residential Lots
Cantera Properties (C)
Civic Center Properties (CC)
Old Town Properties (OT)
Likely City Annexation Properties (U)
Remaining Incorporated City Properties (I)
Southwest District Properties (SW)
Unlikely City Annexation Properties
59
56
APPENDIX 1

APPENDIX 2: Sanitary Sewer Population Equivalent Projections For Comprehensive Plan Buildout

Created by: R. Mentzer
Last Updated: 1/26/2018 KH

			EXISTING					FUTURE / PROJECTED								
Site #	Name	Net Site Area (3)	Zoning	Use	PE (1)	Notes	Comp Plan	Use	PE (1)	Notes (numbers are for Net Res Population Est)	Net PE Increase (1)(5)	Net Res Pop Inc. (1)(6)	IEPA Residental PE (2)	IEPA Non-Residential PE (2)	IEPA TOTAL PE (2)
CANTERA															
C1	MaeCliff Lots 3-7	406,415	SD	vacant site	0		office/com	125,345 sf office	125	per 10/14 revised PUD	125		0	125	125
C2	North end Lot D-2	38,000	SD	vacant site	0		office	7,500 sf office	8	staff est.	8		0	8	8
C3	Liberty Mutual Lot F2	194,900	SD	vacant site	0		office	44,500 sf office	45	per PUD Ord. # 2797	45		0	45	45
C4	Lot F1B	388,121	SD	vacant site/parking	0		office	150,000 sf office	150	per PUD Ord. # 1734	150		0	150	150
C5	Lot F1A - Navistar	656,529	SD	vacant 260K office building	0		office	260,000 sf office	260	per PUD Ord #1734	260		0	260	260
C6	Lot E1B	304,616	SD	vacant site/parking	0		office	158,000 sf office	158	sf limited by 2006 san sewer covenant restriction	158		0	158	158
C7	Lot C2	1,219,680	SD	vacant site/stormwater det	0		office	201 1 -bed apt, 153 2-bed apt, 10 3-bed apt, 20 2-bed TH, 40 3-bed TH, 38,000 sf strip commercial, 8,000 quick srv rest	904	20-2bed twnhm (33.9 persons) /40-3bed twnhm (95.0 persons) /201-1bed apt (355.4 persons) /153-2bed apt (307 1 persons)/10-3bed apt.(25 3 persons), strip commercial (36.5), QS rest (51)	904	817	1001	89	1090
C8	Lot 6 in Resub of Lot G1	1,173,000	SD	underutilized parkmg lot area	0		commercial	109 room limted service hotel, 6,000 sf quick serve rest, 156 1-bed apt, 80 2-bed apt, 22 3-bed apt	700	per most recent Casto Development/EPR Build-out plan. 156-1bed apt (275 persons) /80-2bed apt (160 persons)/22-3bed apt.(55 7 persons), QS rest (45), hotel (164)	700	444	527	209	736
C9	Chuy's Restaurant	84,000	SD	new 6,500 sf Chuys restaurant	0	6/17 occupancy	commercial	6,500 sf Chuys	49		49		0	49	49
C10	Cantera Commons Lot I2	160,301	SD	largely vacant strip commercial center	24		commercial	6,655 sf strip commercial (6 7), 6,655 sf QS rest (42 4)	49		25		0	25	25
C11	Lot 2 in Resub of Lot H11	80,150	SD	vacant 3,322 sf quick serve rest.	0	6/17 occupancy	commercial	3,322 sf Skippy's	21		21		0	21	21
C12	Lot F6 - Mill St Office Condos	397,703	SD	vacant pad site	0		office	69,230 sf office	69	Per approved final PUD Plan	69		0	69	69
Additional Cantera PE Subtotal at "Buildout"									2538		**2514**		**1528**	**1208**	**2736**
OLD TOWN SUBAREA															
OT1	Old Town Redv Site #1	112,032	O1	vacant site	0		commercial	24,000 sf strip commercial	23	Per subarea plan	23		0	23	23
OT2	SEX 2nd St /Jefferson St	86,714	R3	3-3bed & 1-4 bed det sf homes	12	3-3bed sf (8 9) 1-4bed sf (3 6)	townhomes	9-2bed and 9-3bed twnhm	37	1 697/15.3 persons in 2bed, 2 374/21 4 persons in 3bed	25	25	49	0	49
OT3	Second Street Residential	85,052	R4	2-1bed apt , 2-2bed apt , 6-2bed and 6-3bed det sf homes	42	2-1bed apt (3 6) 2-2bed apt (4.0) 6-2bed sf (16.5) 6-3bed sf (12 7)	townhomes	7-2bed and 7-3bed twnhm	28	1 697/11 9 persons in 2bed, 2 374/16 6 persons in 3bed	-14	-14	-2	0	-2
OT4	Citgo/Old Town Red. Site #2/Vogtles	44,602	B4	11,000 auto service building	11		rest /retail	4,000 sq ft. sit down rest, 4,000 strip com	34	rest (29 9), strip com (3 8)	23		0	23	23
OT5	NWX Batavia/Warrenville Rds	59,879	B4/R4	1,700 com, 1-1bed apt , 3-2bed and 1-3bed det sf	13	1-1bed apt (1.8) 3-2bed sf (5.9) 1-3bed sf (3 6) strip com(1 6)	retail/apts	24 -2bed apt and 9,000 sf strip com, 3,000 sf QS rest	76	2.007/48 persons in 2bed apt., rest (19 1), com (8 6)	63	37	56.5	26	83
OT6	Bollweg/Behr Properties	94,653	B4/R3	9,500 com, 2-1bed apt, 1-1bed det. sf	15	2-1bed apt (3 5) 1-2bed sf (2 7) strip com (9 1)	retail/office	8,000 sf strip com/8,000 office	16	strip com (7 8), office (8)	1	-6	-6.5	7	0
Old Town Subarea at "Buildout"											**121**		**97**	**79**	**176**
CIVIC CENTER SUBAREA															
CC1	CCRS #1	185,130	O1	vacant site	0	office/warehouse (501 office (1)	sf /twnhm	24 small lot sf./3 med. lot sf	66	2 374/55 8 persons in 24-3bed and 3.559/10.7 persons in 3-4 bed	66	66	94.5	0	95
CC2	Commercial @NWX Rockwell and Main	177,520	M1	15,000 office/30,000 warehouse	25	office (15), warehouse (10.2)	sr. housing/ twnhm	75 sr. housing units/7-2bed twnhm/7-3bed twnhm	122	1 697/11 9 persons in 2bed, 2.374/16.6 persons in 3bed, sr housing (93.8)	97	12	142 8	-25	118
CC3	Barnes Property	279,957	B4	10,000 office	10	office (10)	mixed use	5,000 sf strip commercial/45-1bed apt./45-2bed apt	175	1.768/79 6 pesons in 1bed apt, 2.007/90.3 persons in 2bed apt, strip com (4 9)	165	160	202.5	-5	197

APPENDIX 2

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
7			EXISTING					FUTURE / PROJECTED								
8	Site #	Name	Net Site Area (1)	Zoning	Use	PE (1)	Notes	Comp. Plan	Use	PE (1)	Notes (numbers are for Net Res Population Est)	Net PE Increase (1)(3)(4)	Net Res Pop Inc (1)(3)(4)	IEPA Residental PE (2)	IEPA Non-Residental PE (2)	IEPA TOTAL PE (2)
38	CC4	Walker Property	204,902	B4	vacant site	0		mixed use	29,000 sf strip com, 6,000 sf sit down rest /10-1bed apt /10-2bed apt	110	1 768/17 7 persons in 1bed apt, 2 007/20 1 persons in 2bed apt., com(27 8), rest(44 8)	110	38	45	73	118
39	CC5	NEX Batavia and Rt 56	109,480	B4/R2	1-3bed & 1-4bed det Sf	7		mixed-use	12-1bed apt./12-2bed apt./ 5,000sf sit down rest /5,000sf. strip com	88	1 768/21.2 persons in 1bed apt, 2 007/24 1 persons in 2bed apt ,rest(37 4), com(4 8)	81	38	47	42	89
40	CC6	SWX Batavia and Riverview Dr	68,054	B4/R4	10,000 office, 1-2bed and 2-3bed det Sf	19	1-2bed sf (2 7), 2 3bed sf (5 9), office (10)	retail/office	13,800 sf strip com, 3,000 QS rest	36	com (13.3), rest (22 4)	17	-19	-10 5	26.0	16
41																
42	Civic Center Subarea at "Buildout"											536		521	111	632
43																
44	SOUTHWEST DISTRICT SUBAREA															
45	SW1	NWX Rt. 56/Rt. 59	1,088,534	B2/B4/R2	no existing sewer connection	0		mixed use/ commercial	105 room hotel, 9,000 sf. SD rest., 6,000 sf. QS rest., 45,000 sf FS com , 20,000 office, 75,000 warehousing, 75,000 light mfg/assembly	394	hotel(157 5), SD rest. (67 2), QS rest. (38.2), FS com. (44.1), office (20), whs. (25.5), lgt. mfg. (41.3)	394		0	477	477
46	SW2	East side of Rt. 59 South of Ferry Creek	39,384	O1	three existing homes (9 residents) / no sewer connection	0		open space	3-det. sf. homes	9	1 2 bed (2 7 persons), 2-3bed (5 9 persons) sf Homes (3)	9	0	10 5	0	11
47	SW3	Intersection of Prairie/Rt. 59	67,822	O1	no existing sewer connection	0		commercial/o pen space	8,000 freestanding com., 4,000 QS rest.	33	FS com. (7.8), QS rest. (25 5)	33		0	33	33
48	SW4	NEX Rt 56/Rt. 59	309,312	O1	vacant site	0		commercial	5,000 sit down rest., 40,000 strip commercial	77	SD rest (37.4), strip com. (39.2)	77		0	77	77
49	SW5	South side of Ivan Albright	169,775	R2	three existing homes (8 residents)/no sewer connection	0		townhomes	14-2bed and 14-3bed twnhm	57	1 697/23.8 persons in 2bed, 2 374/33 2 persons in 3bed (3)	57	49	98	0	98
50	SW6	SEX Rt. 59/Ivan Albright	188,320	R2	two existing homes (5 residents) / no sewer connection	0		townhomes	15-2bed and 15-3bed twnhm	61	1 697/15.4 persons in 2bed, 2 374/35 6 persons in 3bed (3)	61	56	105	0	105
51	SW7	Klienman Property	908,614	B2	vacant site	0		commercial/ multi-fam	5,000 sf QS rest./10,000 sf. Strip com , 38-1bed twnhm/37-2bed twnhm/132-1bed apt/80-2bed apt/4-3bed apt	598	38-2bed twnhm (64.5 persons) /37 3bed twnhm (87.8 persons) /132-1bed apt (233.4 persons) /80-2bed apt (160.6 persons)/4-3bed apt (10 1 persons), QS restorm. (31 8), strip com (9.6)	598	556	713	41	754
52	SW8	Duke Property	392,769	R2	vacant site	0		mixed use/ commercial	20,000 strip com, 20,000 office, 5,000 QS rest/40,000 warehouse	79	Strip com. (19 2), office (20), QS rest. (25.8), warehouse (13 6)	79		0	105	105
53	SW9	City Owned Tortonello Property	45,312	R2	no existing sewer connection	0		open space/large lot sf	3-4bed det. sf	11	3.559/10.6 persons in 4 bed home	11	11	10 5	0	11
54	SW10	Misc Riggi Rd. sf lot	16,000	R2	vacant site	0		open space/large lot sf	1-3bed det sf	3	2.955/3 0 persons per 3 bed home	3	3	3.5	0	4
55	SW11	Burgess Enterprises Property	331,653	O1	vacant site	0		bus Park	20,000 office, 35,000 warehouse, 35,000 light mfg	33	Per City approved PUD plan for Highpoint Project. Office (20), whs(11 9), light mfg (19.3)	33		0	90	90
56	SW12	Gerhendstine Proprty	52,000	R2	vacant site	0		large lot sf	2-4bed det sf	7	3.559/7 1 persons in 4 bed home	7	7	7	0	7
57	SW13	Misc Barclay Av. sf lot	39,600	R2	vacant site	0		large lot sf	2-4bed det sf	7	3 559/7 1 persons in 4 bed home	7	7	7	0	7
58	SW14	Misc. Barclay Av sf lot	40,000	R2	vacant site	0		large lot sf	2-4bed det sf	7	3.559/7 1 persons in 4 bed home	7	7	7	0	7
59	SW15	Stahelin Properties	229,600	R2	vacant site			commercial	3,000 QS rest/7,000 freestanding com	26	QS rest (19.1), FS com (6 9)	26		0	26	26
60	SW16	Goff Property	124,558	R2	two existing homes (2 residents)/ no sewer connection	0		townhomes	10-2bed and 10-3bed twnhm	41	1 697/17.0 persons in 2bed, 2 374/23.7 persons in 3bed (3)	41	39	70	0	70
61	SW17	Moses Property	105,687	M1	existing home (2 residents)/ no sewer connection	0		twnhomes	9-2bed and 9-3bed twnhm	37	1.697/15.3 persons in 2bed, 2.374/21 4 persons in 3bed (3)	37	35	63	0	63

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
7			EXISTING					FUTURE / PROJECTED								
8	Site #	Name	Net Site Area (2)	Zoning	Use	PE (1)	Notes	Comp. Plan	Use	PE (1)	Notes (numbers are for Net Res Population Est)	Net PE Increase (1)(5)	Net Res. Pop Inc. (1)(6)	IEPA Residental PE (2)	IEPA Non-Residential PE (3)	IEPA TOTAL PE (2)
62	SW18	Blanchard Alliance Church vacant	73,468	B2	vacant site	0		twnhomes	7-2bed and 6-3bed twnhm	26	1.697/11.9 persons in 2bed, 2 374/14.2 persons in 3bed	26	26	45 5	0	46
63	SW19	Blanchard Alliance Church improved	144,134	B2	no existing sewer connection	0		church	150	8		8		0	8	8
64	SW20	Emmanual Baptist Church	117,560	R2	no existing sewer connection	0		church	186 current/450 future max seat church	23	based on max buildout	23		0	23	23
65	SW21	Wheeler Property	153,557	M1	no existing sewer connection	0		senior housing	80 bed sr. housing facility	100		100		0	100	100
66	SW22	Migs Corp Property	30,000	R2	vacant	0		townhomes	3-2bed and 3-3bed twnhm	12	1.697/5 1 persons in 2bed, 2 374/7 3 persons in 3bed	12	12	21	0	21
67	SW23	Anderson/Gentile/City Prop.	719,360	R2	vacant	0		townhomes	53-2bed and 53-3bed twnhm	216	Per 8/17 approved Prelim. PUD Plan for Lexington Trace. 1.697/90.0 persons in 2bed, 2 374/125.8 persons in 3bed	216	216	371	0	371
68	SW24	NWX Rt. 59/Estes	71,718	R2	existing home (2 residents) / no sewer connection	0		townhomes	7-2bed and 8-3bed twnhm	31	1 697/11.9 persons in 2bed, 2 374/19.0 persons in 3bed	31	29	52 5	0	53
69	SW25	Illinois Youth Home	1,185,501	R2	70 bed youth detention facility	155	Actual last 12 mo ave. water useage @15,487 gpd	business park	300,000 sf warehouse/50,000 office	152	whs (102), office (50)	-3		0	195	195
70		19 Existing Estes/Braggs det. sf to remain		R2	19 existing homes (56 residents)/ no sewer connections	0		large lot sf		56	8-2bed (2 746/22 0), 8-3bed (2.955/23.6), 3-4bed(3.559/10.7) (4) (5) (6)	56	0	66 5	0	67
71																
72	**Total Southwest District Subarea at "Buildout"**											**1949**		**1651**	**1175**	**2826**
73																
74	**REMAINING INCORPORATED CITY**															
75	I1	BP Prop. @NWX Herrick/Warrenville Rds	642,253	R1	vacant site	0		office	192,000 office	192		192		0	192	192
76	I2	Franke Prop. West St.	104,986	R1	existing home (4 residents)/no existing sewer connection	0		large lot sf	3-4 bed det sf	11	3.559/10 7 persons per 4bed det sf (4)	11	7	10 5	0	11
77	I3	SWX Galusha/West	40,700	R2	existing home (2 residents)/ no sewer connection	0		med lot sf	1-3bed /1-4bed det sf	7	2.955/3.0 persons per 3bed, 3.559/3 6 persons per 4bed (3)	7	5	7	0	7
78	I4	Herbo Property east	35,702	O1	vacant	0		office	10,000 sf sf	10		10		0	10	10
79	I5	Herbo Property west	74,302	O1	1-2bed det. Sf/1800 storage	5	1-2bed sf (2.7), storage (2.7)	office	20,000 office	20		15		-3.5	19	15
80	I6	Jaeger Property	23,338	B2	vacant site	0		sm Lot sf	1-3bed /2-4bed det. sf	10	1-3bed (2.955/3.0), 2-4bed(3.559/7 1)	10	10	10 5	0	11
81	I7	SEX Winfield/Galusha	39,669	R3	vacant site	0		med lot sf	1-3bed /2-4bed det sf	10	1-3bed (2.955/3.0), 2-4bed(3.559/7 1)	10	10	10 5	0	11
82	I8	Case Property	297,604	R2	no existing sewer connection	0		med lot sf	2-3bed/6-4bed det sf	27	2 3bed (2 955/5.9) 6-4bed (3.559/21.4)	27	27	28	0	28
83	I9	Wheeler/Townline Rd Prop	63,010	R2	vacant site	0		large lot sf	1-5bed det sf	4	1-5bed at 3 645	4	4	3 5	0	4
84	I10	Walker Property	170,750	R2	no existing sewer connection	0		med lot sf	1-3bed /5-4bed det sf	21	1-3bed (2 955/3 0), 5-4bed (3.559/17.8)	21	21	21	0	21
85	I11	Storro Property	345,136	R2	no existing sewer connection	0		med lot sf	3-3bed/7-4bed det sf	34	3-3bed (2 955/8.9), 7-4bed (3.559/24.9)	34	34	35	0	35
86	I12	Miller Prop./Point Oak Drive	61,709	R1A	vacant site	0		large lot sf	1-3bed /2-4bed det sf	10	1-3bed (2 955/3.0), 2-4bed (3.559/7 1)	10	10	11	0	11
87	I13	Sequestria Subdivision	529,967	R1A	vacant site	0		large lot sf	2-3bed/11-4bed det sf	45	2-3bed (2.955/5 9), 11-4bed (3.559/39.1)	45	45	45 5	0	46
88	I14	Aschauer Prop.	107,424	R1A	existing home (2 residents)/no sewer connection	0		large lot sf	1-3bed /2-4bed det sf	10	1 3bed (2 955/3.0), 2-4bed (3.559/7 1)(4)	10	8	10 5	0	11
89	I15	Burke Prop./Batavia Rd.	72,100	R2	existing home (2 residents) / no sewer connection (8)	0		med lot sf	1-3bed/2-4bed det sf	10	1-3bed (2.955/3.0), 2-4bed (3.559/7 1)	10	8	10.5	0	11
90	I16	Bozonelous Lot/Route 59	78,960	B2	vacant site	0		commercial	14,000 freestanding com	14	FS com (14)	14		0	14	14
91	I17	Vacant Lot/N side of Youghall Rd	95,630	M1	vacant site	0		Ind/wrhs	6,000 office/24,000 whse	14	office (6), whse (8.4)	14		0	30	30
92	I18	Four Winds School/N. side of Calumet Av	112,226	M1	vacant site	0		Ind/wrhs	7,000 office/28,000 whse	17	office (7), whse (9.8)	17		0	35	35
93	I19	Redev. site/N. side of Calumet Av	109,353	M1	no existing sewer connection	0		Ind/wrhs	7,000 office/28,000 whse	17	office (7), whse (9.8)	17		0	35	35
94	I20	Care of Trees/N. side of Calumet Av	218,444	M1	no existing sewer connection	0		Ind/wrhs	15,0000 office/60,000 whse	36	office (15), whse (21)	36		0	75	75
95	I21	NEX Talbot/Calumet Av	110,252	M1	vacant site	0		Ind/wrhs	7,000 office/28,000 whse	17	office (7), whse (9.8)	17		0	35	35
96	I22	Assemblage on W. side of Rt 59	192,725	R2	no existing sewer connection	0		office	40,000 office	40		40		0	40	40
97	I23	SW Batavia Rd. Redevelopment	43,636	R3	no existing sewer connection	0		med lot sf	1-3bed/3-4bed det sf	14	1-3bed (2 955/3.0), 3-4bed (3.559/10.7)	14	14	14	0	14
98	I24	NW Batavia Rd Redevelopment	46,388	R4	no existing sewer connection	0		sm lot sf	2-3bed/ 2-4bed det sf	13	2-3bed (2 955/5 9), 2-4bed (3 559/7 1)	13	13	14	0	14

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
7			EXISTING					FUTURE / PROJECTED								
8	Site #	Name	Net Site Area (3)	Zoning	Use	PE (1)	Notes	Comp Plan	Use	PE (1)	Notes (numbers are for Net Res Population Est)	Net PE Increase (1)(5)	Net Res. Pop Inc (3)(6)	IEPA Residental PE (2)	IEPA Non-Residental PE (2)	IEPA TOTAL PE (2)
99	J25	Schille Property/Ferry Road	256,803	M1	1-4bed det. Sf home, 12,000 storage	22	1-bed sf (3 6), storage (18 2)	office	75,000 sf office	75		53		-3.5	57	53
100	Hrrk. Wds.	10-2 Bed Duplex Units		R1A		0		office	duplex	17	10-2bed (1 697/17.0)	17	17	35	0	35
101	Hrrk Wds	10-3 Bed Duplex Units		R1A		0		office	duplex	24	10-3bed (2 374/23 7)	24	24	35	0	35
102	Misc vac. Lots	20-3 Bed Detached SF Homes		Misc		0		med lot sf	mis det. sf	59	20-3bed (2 955/59 1)	59	59	70	0	70
103	Misc vac. Lots	40-3 Bed Detached SF Homes		Misc		0		med. lot sf	mis det sf	142	40-4bed (3 559/142 4)	142	142	140	0	140
104	Misc. vac Lots	15-5 Bed Detached SF Homes		Misc		0		med. lot sf	mis det sf	55	15-5bed (3.645/54 7)	55	55	52.5	0	53
105																
106	**Total Remaining Incorporated City at "Buildout"**											**948**		**557**	**541**	**1098**
107																
108	LIKELY CITY ANNEXATIONS															
109	U1	15 existing Albright/Patterman det SF	n/a	DuPage		0		med lot sf		41	6-2bed (2 746/16 5), 6-3bed (2,955/17.7), 2-4bed(3,559/7 1)	41	41	49	0	49
110	U2	Albright Townhome Redev	211,261	DuPage		0		townhome	16-2bed and 16-3bed twnhm	65	1 697/27 2 persons in 2bed, 2.374/38.0 persons in 3bed	65	65	112	0	112
111	U3	3 existing S. Side Rt 56 det SF	62,376	DuPage		0		med lot sf		65	8-2bed (2 746/22.0), 6-3bed (2,955/23.6), 3-4bed(3,559/10.7)	65	65	66 5	0	67
112	U4	W. Side of Home Av. Townhome Redev	205,782	DuPage		0		townhome	16-2bed and 16-3bed twnhm	65	1.697/27.2 persons in 2bed, 2.374/38.0 persons in 3bed	65	65	112	0	112
113	U5	6 existing Home/Prairie det SF	n/a	DuPage		0		sm lot sf		24	3-2bed (2 746/8 2), 3-3bed (2 955/8.8), 2-4bed(3,559/7.1)	24	24	28	0	28
114	U6	Galusha Farm	430,390	DuPage		0		large lot sf	10-4bed det sf	36	10-4bed (3.599/36.0)	36	36	35	0	35
115																
116	**Total Likely City Annexations at "buildout"**											**296**		**403**	**0**	**403**
117																
118	UNLIKELY CITY ANNEXATIONS															
119		N side of Galusha, w. side of Herrick, Cove Lane	n/a	DuPage				large lot sf	28 - 4 bed det sf	100	28-4bed (3.599/100)	100	100	98	0	98
120		W. side of Williams, S side of Forestview Dr N	n/a	DuPage				large lot sf	12 - 4bed det. sf	43	12-4bed (3.599/43)	43	43	42	0	42
121		Old Farm Lane	n/a	DuPage				large lot sf	10 - 4bed det. sf	36	10-4bed (3.599/36)	36	36	35	0	35
122		Lost Meadows Lane	n/a	DuPage				large lot sf	16 - 4bed det. sf	58	16-4bed (3 599/58)	58	58	56	0	56
123		Morris Ct /Forest Lane	n/a	DuPage				large lot sf	19 - 4bed det. sf	68	19-4bed (3.599/68)	68	68	66.5	0	67
124		Oak Lane	n/a	DuPage				large lot sf	17 - 4bed det. sf	61	17-4bed (3.599/61)	61	61	59.5	0	60
125		Renouf Drive	n/a	DuPage				large lot sf	8 - 4bed det. sf	29	8-4bed (3.599/29)	29	29	28	0	28
126																
127	**Total Unlikely City Annexations at "buildout"**											**395**		**385**	**0**	**385**
128																
129																
130	**Landon Avenue Sanitary Sewer Permit Tributary Area**											1519		1801	303	2104
131																
132	**Southwest District**											**2245**		**2053**	**1175**	**3228**
133	**Cantera**											**2514**		**1528**	**1208**	**2736**
134	**Warrenville (w/o SW District or Cantera)**											**2000**		**1560**	**730**	**2290**
135																
136	**TOTAL CITY "BUILDOUT"**											**6759**	**3855**	**5140**	**3114**	**8254**
137											check	6759				
138		Footnotes and Assumptions														
139		(1) Residential population generation estimates based on Warrenville/Naperville School,Park, and Library Contributions Population Generation Table (Appendix 5)														
140		(2) PE estimate based on Table No 1 -Residential Occupancy Criteria from Title 35, Subtitle C, Chapter II, Part 370, Section 370 Appendix A of the Illinos Administrative Code														
141		(3) Net development site is total site area minus all 100 yr. floodplain/wetland areas														
142		(4) Bedroom breakdown % per 2015 American Communities Survey data (Appendix 4)														
143		(5) PE for existing homes in SW District (row 70) is accounted for in the TAB 3 Estimated Additional PE From Existing Incorporated Residential Served by Private Septic spreadsheet														
144		(6) Population increase adjusted to account for existing residents on site (Appendix 7)														
145		Assumed townhouse net development site density in Old Town/Civic Center Subarea = 9 d.u./ac which is higher than any other townhouse project developed in the City in the past 25 years														
146		Assumed townhouse net development site density for sites in Southwest District without specific pending development proposal = 7 d.u./ac.														

TABLE OF ESTIMATED ULTIMATE POPULATION PER DWELLING UNIT

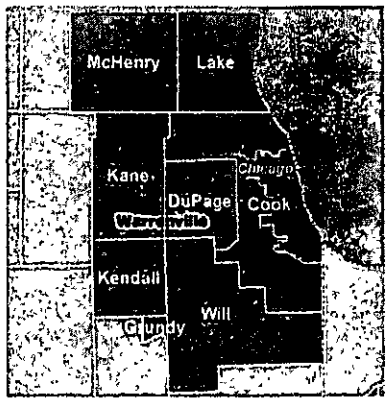
Type Of Unit	Preschool 0 - 4 Yrs.	Elementary Grades K - 5 5 - 10 Yrs.	Middle Grades 6 - 8 11 - 13 Yrs.	Total Grades K - 8 5 - 13 Yrs.	High School Grades 9 - 12 14 - 17 Yrs.	Adult 18 Yrs. +	Total Per Dwelling Unit
Detached single-family:							
2 bedroom	0.120	0.411	0.138	0.549	0.222	1.856	2.746
3 bedroom	0.268	0.486	0.153	0.639	0.135	1.913	2.955
4 bedroom	0.371	0.702	0.259	0.961	0 242	1.985	3.559
5 bedroom	0.386	0.590	0.236	0 826	0.242	2.191	3.645
Attached single-family:							
2 bedroom	0.206	0.084	0.057	0.141	0.030	1.318	1.697
3 bedroom	0.214	0.104	0.039	0.143	0.050	1.966	2 374
4 bedroom	0.183	0.271	0.106	0.377	0.105	2.102	2.767
5 bedroom[1]	--	--	--	--	--	--	--
Apartments:							
Efficiency[1]	--	--	--	--	--	1.400	1.400
1 bedroom	0.058	0.032	0.012	0.044	0.013	1.653	1.768
2 bedroom	0.129	0.064	0.031	0.095	0.038	1.744	2.007
3 bedroom	0 199	0.115	0.073	0.188	0.083	2.055	2.525

Note:
1. No yield data were generated due to lack of population or no (or very few) residential

APPENDIX 3

APPENDIX 4

MetroPulse
Community Data Snapshot | Warrenville



GENERAL POPULATION CHARACTERISTICS, 2015

	Community	DuPage County**	CMAP Region
Total Population	13,373	930,412	8,505,977
Total Households	4,904	338,083	3,067,594
Average Household Size	2.7	2.7	2.7
Population Change, 2000-10	-1.7%	1.4%	3.5%
Median Age*	38.0	38.8	36.5

Source: 2000 and 2010 Census, 2015 American Community Survey five-year estimates

*Note that all Regional Medians were calculated based on Grouped Frequency Distributions.
**For municipalities located in more than one county, data provided is for the county containing the largest portion of the municipality

RACE AND ETHNICITY, 2015

	Community		DuPage County		CMAP Region	
	Count	Percent	Count	Percent	Count	Percent
White	9,124	68.2	638,010	68.6	4,437,089	52.2
Hispanic or Latino*	2,653	19.8	129,549	13.9	1,902,685	22.4
Black	529	4.0	42,526	4.6	1,443,074	17.0
Asian	491	3.7	100,181	10.8	564,622	6.6
Other	576	4.3	20,146	2.2	158,507	1.9

Source: 2015 American Community Survey, five-year estimates. Universe Total population. *Includes Hispanic or Latino residents of any race

AGE COHORTS, 2015

	Community		DuPage County		CMAP Region	
	Count	Percent	Count	Percent	Count	Percent
19 and under	3,544	26.5	245,897	26.4	2,271,714	26.7
20 to 34	2,597	19.4	175,819	18.9	1,810,122	21.3
35 to 49	3,124	23.4	190,925	20.5	1,757,378	20.7
50 to 64	2,887	21.6	197,408	21.2	1,623,940	19.1
65 to 79	969	7.2	88,262	9.5	763,055	9.0
80 and Older	252	1.9	32,101	3.5	279,768	3.3

Source 2015 American Community Survey five-year estimates Universe Total population

HOUSEHOLD INCOME, 2015

	Community		DuPage County		CMAP Region	
	Count	Percent	Count	Percent	Count	Percent
Less than $25,000	520	10.6	42,209	12.5	611,519	19.9
$25,000 to $49,999	860	17.5	61,051	18.1	628,579	20.5
$50,000 to $74,999	1,060	21.6	56,810	16.8	525,203	17.1
$75,000 to $99,999	798	16.3	47,261	14.0	390,982	12.7
$100,000 to $149,999	1,045	21.3	62,654	18.5	469,634	15.3
$150,000 and Over	621	12.7	68,098	20.1	441,677	14.4
Median Income	$75,517		$79,658		$63,441	

Source 2015 American Community Survey five-year estimates Universe. Total households.

EDUCATIONAL ATTAINMENT, 2015

	Community		DuPage County		CMAP Region	
	Count	Percent	Count	Percent	Count	Percent
High School Diploma or Higher	8,120	91.5	579,645	92.4	4,930,208	87.0
Bachelor's Degree or Higher	3,793	42.8	293,166	46.7	2,095,647	37.0

Source: 2015 American Community Survey five-year estimates Universe Population 25 and older.

Community Data Snapshot: Warrenville - Page Two

HOUSING AND TENURE, 2015

	Community		DuPage County		CMAP Region	
	Count	Percent	Count	Percent	Count	Percent
Occupied Housing Units	4,904	**93.4**	338,083	**94.7**	3,067,594	**90.9**
Owner-Occupied	3,973	81.0	248,508	73.5	1,964,992	64.1
Renter-Occupied	931	19.0	89,575	26.5	1,102,602	35.9
Vacant Housing Units	349	**6.6**	18,933	**5.3**	307,518	**9.1**

Source. 2015 American Community Survey five-year estimates Universe Total housing units

HOUSING TYPE, 2015

	Community		DuPage County		CMAP Region	
	Count	Percent	Count	Percent	Count	Percent
Single Family, Detached	2,753	52.5	213,557	60.0	1,687,381	50.4
Single Family, Attached	1,468	28.0	43,691	12.3	255,569	7.6
2 Units	37	0.7	2,441	0.7	237,396	7.1
3 or 4 Units	351	6.7	11,585	3.3	281,795	8.4
5 or more Units	637	12.1	84,942	23.8	886,515	26.5

Source· 2015 American Community Survey five-year estimates Universe Total housing units excluding mobile, boat, RV, van, etc.

HOUSING SIZE, 2015

	Community		DuPage County		CMAP Region	
	Count	Percent	Count	Percent	Count	Percent
0 to 1 Bedrooms	171	3.3	42,816	12.0	546,567	16.2
2 Bedrooms	1,993	37.9	88,113	24.7	968,317	28.7
3 Bedrooms	2,080	39.6	119,867	33.6	1,132,344	33.5
4 Bedrooms	845	16.1	86,014	24.1	573,487	17.0
5+ Bedrooms	164	3.1	20,206	5.7	154,397	4.6
Median Number of Rooms*		**5.9**		**6.2**		**6.0**

Source 2015 American Community Survey five-year estimates. Universe: Total housing units *Includes all rooms

HOUSING AGE, 2015

	Community		DuPage County		CMAP Region	
	Count	Percent	Count	Percent	Count	Percent
Built 2000 or Later	262	5.0	33,997	9.5	415,030	12.3
Built 1970 to 1999	3,896	74.2	205,817	57.6	1,134,825	33.6
Built 1940 to 1969	778	14.8	96,630	27.1	1,049,851	31.1
Built Before 1940	317	6.0	20,572	5.8	775,406	23.0
Median Year Built		1978		1977		1967

Source 2015 American Community Survey five-year estimates Universe· Total housing units

HOUSING & TRANSPORTATION (H+T)* COSTS, PERCENT OF INCOME PER HOUSEHOLD

	Median-Income Family	Low-Income Single-Parent Family	Moderate-Income Retired Couple	Moderate-Income Family
Housing Costs	30.4	49.8	38.8	36.9
Transportation Costs	21 1	29.7	11.9	20.1
H + T Costs	51.5	79.4	50.7	57.0

Source. Location Affordability Index, U S. Dept. of Transportation and U.S. Dept of Housing and Urban Development

*The purpose of the H+T Index is to isolate the effect of location on housing and transportation costs, grouped by common demographic characteristics that form four distinct household types The values above represent the percent of household income that an average household within each of these types in the region would spend on housing and transportation if they lived in this county. The standard threshold of affordability is equal to 30 percent for housing costs and 45 percent for housing and transportation costs combined For more information, visit www locationaffordability.info/About_Data aspx.

Community Data Snapshot: Warrenville - Page Three

EMPLOYMENT STATUS, 2015

	Community		DuPage County		CMAP Region	
	Count	Percent	Count	Percent	Count	Percent
In Labor Force	8,247	**77.4**	516,237	**70.1**	4,530,902	**67.6**
Employed*	7,554	91.6	479,592	92.9	4,089,665	90.3
Unemployed	693	8.4	36,311	7.0	428,995	9.5
Not In Labor Force	2,408	**22.6**	220,567	**29.9**	2,168,191	**32.4**

Source: 2015 American Community Survey five-year estimates Universe: Population aged 16 and over.

*Does not include employed population in the Armed Forces

PRIVATE SECTOR EMPLOYMENT, 2015*

	Community		DuPage County		Six-County Region**	
	Count	Percent	Count	Percent	Count	Percent
Private Employment	N/A	N/A	544,363	N/A	3,433,003	N/A
Job Change (2005-15)	N/A	N/A	24,522	4.7	99,623	3.0
Private Sector Jobs per HH	N/A		1.61		1.13	

Source: Illinois Department of Employment Security (IDES)

*Figures exclude employees not covered by unemployment insurance

**Kendall County is not included in IDES data

EMPLOYMENT OF COMMUNITY RESIDENTS, 2014

By Industry Sector	Count	Percent
Health Care	747	12.1
Professional	652	10.6
Manufacturing	578	9.4
Retail Trade	541	8.8
Education	538	8.7

EMPLOYMENT IN THE COMMUNITY, 2014

By Industry Sector	Count	Percent
Professional	1,580	19.4
Wholesale Trade	1,225	15.1
Management	849	10.4
Accommodation and Food	699	8.6
Health Care	646	7.9

By Employment Location			*By Residence Location*		
Naperville	572	9.3	**Chicago**	714	8.8
Wheaton	485	7.9	**Naperville**	713	8.8
Chicago	470	7.6	**Aurora**	681	8.4
Aurora	296	4.8	**Warrenville**	293	3.6
Warrenville	293	4.8	**Wheaton**	199	2.4

Source: U.S Census Bureau, Longitudinal-Employer Household Dynamics Program.

MODE OF TRAVEL TO WORK, 2015

	Community		DuPage County		CMAP Region	
	Count	Percent	Count	Percent	Count	Percent
*Work at Home**	360	N/A	24,244	N/A	183,368	N/A
Drive Alone	5,833	82.1	367,120	82.3	2,783,650	72.6
Carpool	808	11.4	35,595	8.0	333,064	8.7
Transit	214	3.0	30,269	6.8	515,377	13.4
Walk or Bike	179	2.5	9,518	2.1	160,132	4.2
Other	70	1.0	3,802	0.9	43,951	1.1
TOTAL COMMUTERS	7,104	**100.0**	446,304	**100.0**	3,836,174	**100.0**

Source: 2015 American Community Survey five-year estimates

*Not included in "total commuters "

ANNUAL VEHICLE MILES TRAVELED (VMT) PER HOUSEHOLD, 2015*

	Community	DuPage County	CMAP Region
Average Vehicle Miles Traveled	22,092	21,800	16,723

Source. CMAP analysis of US Census Bureau, HERE, Illinois Environmental Protection Agency and Illinois Secretary of State data.

*Estimates are made from input data from 2013-2016

Community Data Snapshot: Warrenville - Page Four

GENERAL MERCHANDISE RETAIL SALES, 2016

	Community	DuPage County	CMAP Region
Total Retail Sales*	$220,695,320	$20,274,952,381	$125,192,928,993
Total Sales per Capita**	$16,503	$21,791	$14,718

Source: Illinois Department of Revenue

*Does not include qualifying food, drugs, and medical appliances.
**Per capita calculations based on population from 2015 ACS 5-year estimates

EQUALIZED ASSESSED VALUE, 2015

Residential	**$247,203,723**
Commercial	**$145,236,122**
Industrial	**$12,828,513**
Railroad	**$0**
Farm	**$21,639**
Mineral	**$0**
TOTAL	**$405,289,997**

Source: Illinois Department of Revenue

OPEN SPACE AND WALK SCORE

	Open Space Acreage per 1,000 Residents
Community	**33.1**
DuPage County	**45.0**
Region	**39.8**
Walk Score*	**N/A**

Source: CMAP calculations of 2013 Land Use Inventory, walkscore.com.
*Walk Score is a number between 0 and 100 that measures the average walkability of a municipality

GENERAL LAND USE, 2013

	Acres	Percent
Single-Family Residential	1,431.0	40.1
Multi-Family Residential	69.0	1.9
Commercial	460.4	12.9
Industrial	45.8	1.3
Institutional	157.5	4.4
Mixed Use	N/A	N/A
Transportation and Other	681.2	19.1
Agricultural	87.2	2.4
Open Space	442.9	12.4
Vacant	194.9	5.5
TOTAL	**3,569.8**	**100.0**

Source: Chicago Metropolitan Agency for Planning Parcel-Based Land Use Inventory.

For More Information

Please direct inquiries to Jon Hallas, 312-386-8764 or JHallas@cmap.illinois.gov. To access other Community Data Snapshots for municipalities and counties in the Chicago Metropolitan Agency for Planning's seven-county northeastern Illinois region, visit www.cmap.illinois.gov/data/metropulse/.

Chicago Metropolitan Agency for Planning

THE CHICAGO COMMUNITY TRUST AND AFFILIATES

Last updated June 2017

Appendix 5

Estimated Additional PE From Existing Incorporated Residential Served by Private Septic

Created by: R: Mentzer

Last Updated: 2/8/18

A. Estimated Total Number of Existing Housing Units in City of Warrenville NOT Served with City Sanitary Sewers

	5,253	Total housing units in City of Warrenville (1)
-	637	Total multi-family/apartment housing units in City of Warrenville (1)
	4,616	Total non multi-family/apartment housing units in City of Warrenville
-	4,145	Total non-mulit family/apartment residential City sanitary sewer accounts (2)
	471	**Total # of existing housing units in City of Warrenville without City sanitary sewer service (3)**

B. Estimated Population Equivalent Associated with Existing Housing Units (HU) Not Served with City Sanitary Sewers

Unit Type	Bedroom Breakdown % (4)	Total HU on Septic	Estimated Bedroom Breakdown	Population Estimate Per Unit (5)	Population Estimate by Unit Type
1-bed	0.033		16	2.746	42.7
2-bed	0.379		179	2.746	490.2
3-bed	0.396	471	187	2.955	551.2
4-bed	0.161		76	3.599	272.9
5-bed	0.031		15	3.645	53.2
TOTAL EST. EXISTING CITY OF WARRENVILLE POPULATION NOT CONNECTED TO CITY SANITARY SEWER SERVICE					**1410**

BASED ON TITLE 35: 471 x 3.5 = **1648.5 PE**

Assumptions and data sources:

(1) Per 2015 American Communities Survey (ACS) data

(2) Per City of Warrenville Utility Billing 8/17

(3) There are no attached single family homes or apartments located within the City of Warrenville that are serviced by a private septic system. Therefore, all housing units within the City of Warrenville that are not connected to the City's Sanitary Sewer System are assumed to be detached single family homes.

(4) Percentage breakdown of different housing size/bedroom as reflected in 2015 ACS data for City of Warrenville

(5) Population generation estimates for different size homes as provided in Naperville and Warrenville land/cash dontion ordinance

APPENDIX 5

APPENDIX 6: Land Use to Population Equivalents

prepared by Sr. Civil Engineer Kristine Hocking, last updated 1/30/18 100

USAGE	UNIT	AWWA Category	AWWW GPD	ILLINOIS TITLE 35 (GPD per UNIT)	PE/UNIT (Using 1 PE = 100 GPD)
Multi-Tenant Commercial Strip	LEASABLE SQUARE FOOT	NA	NA	0.100	**0.00100**
Free-standing Retailer	LEASABLE SQUARE FOOT	NA	NA	0.100	**0.00100**
Sit down/dine-in restaurant with bar	LEASABLE SQUARE FOOT	Restaurants	0.7470	NA	**0.00747**
Quick serve restaurant	LEASABLE SQUARE FOOT	Fast food restaurant	0.6369	NA	**0.00637**
Business Park Mixed Use	LEASABLE SQUARE FOOT	NA	NA	0.100	**0.00100**
Business Park Mixed Use	LEASABLE SQUARE FOOT	NA	NA	0.100	**0.00100**
Senior Housing	PER BED	NA	NA	125	**1.25000**
Hotel/Motel	PER ROOM	NA	NA	150	**1.50000**
State of Illinois Youth Detention	PER BED	NA	NA	200	**2.00000**
Church	PER SEAT	NA	NA	5	**0.05000**
Light Manufacturing	LEASABLE SQUARE FOOT	NA	NA	0.100	**0.00100**
Warehouse, Distribution	LEASABLE SQUARE FOOT	NA	NA	0.100	**0.00100**
Other Industrial	LEASABLE SQUARE FOOT	NA	NA	0.100	**0.00100**
Efficiency or Studio Apartment	PER UNIT	NA	NA	1	**1.00000**
1 Bedroom Apartment	PER UNIT	NA	NA	1.5	**1.50000**
2 Bedroom Apartment	PER UNIT	NA	NA	3	**3.00000**
3 Bedroom Apartment	PER UNIT	NA	NA	3	**3.00000**
Single Family Dwelling	PER UNIT	NA	NA	3.5	**3.50000**

Total Buildout Flow Analysis Table using IEPA Values in Appendix 2

1. Condition	2. Existing Conditions City of Warrenville*	3 Existing Conditions Cantera**	4. Total Existing Flow	5. Buildout Conditions Landon Avenue Permit Only***	6. Buildout Conditions Southwest District***	7. Buildout Conditions Cantera***	8. Buildout Conditions Rest of City (w/o SW District or Cantera)***	9. Total Existing Flow plus Landon Avenue Permit Buildout***	10. Total Ultimate Buildout***	11. City of Warrenville Maximum Allowable Flows under Agreement and Ammendments at Current Capacity (from Naperville June 23,2017 Letter Table 1)	12.City of Warrenville Maximum Allowable Flows under Agreement and Ammendments at Ultimate Capacity (from Naperville June 23,2017 Letter Table 1)
								Col 4 + Col 5	Col 4 + Col 6 + Col 7+ Col 8		
Average Daily Flow (MGD)	1.55	0.23	1.78	0.21	0.32	0.27	0.23	**1.99**	**2.61**	2.50	2.74
Average Day Flow of the 3-Low Flow Months of the Previous 12 Months	1 20	0.21	1.41	0.16	0.25	0.21	0.18	**1.99**	**2.02**	1.94	2.12
Peak Day Flow limited to less than 250% of Average Day Flow of the 3-Low Flow Months of the Previous 12 Months	3.00	0.53	3.53	0.41	0.62	0.53	0.44	**4.98**	**5.04**	4.84	5.30
Peak Hour Flow limited to less than 400% of Average Day Flow of the 3-Low Flow Months of the Previous 12 Months	4.80	0.84	5.64	0.65	1.00	0.85	0.71	**7.96**	**8.07**	7.74	8.49

*Actual Flows from the Ferry Road Metering Site (2016-2017) (Provided by City of Naperville)

**Uses Actual 2015 Data Cantera Metering Site (Provided by City of Naperville)

***Using ratio between 3-Low Flow Month Average Day Flow to Average Day Flow for previous 12 months. This will fluctuate. Uses Appendix 4 PE Value 0.774

Last Updated 2/8/2018

EXHIBIT 2

EXHIBIT 3

S|D|I
CONSULTANTS LTD.

WASTEWATER STUDY

FOR

ELMHURST-CHICAGO STONE COMPANY

WARRENVILLE QUARRY DEVELOPMENT

Warrenville, Illinois

WASTEWATER STUDY

for

ELMHURST-CHICAGO STONE COMPANY

WARRENVILLE QUARRY DEVELOPMENT

Warrenville, Illinois

An Analysis of the
Wastewater Conveyance
and Treatment System
Serving the
City of Warrenville

Prepared By:
SDI CONSULTANTS, LTD.
1520 Kensington Road, Suite 110
Oak Brook, Illinois 60521
708-571-0353

October 12, 1990

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EXECUTIVE SUMMARY

This study provides an analysis of the impact of development of the Elmhurst-Chicago Stone Quarry (ECSQ) site in Warrenville on the wastewater conveyance and treatment system of the City of Naperville. The City of Naperville conveys and treats wastewater from the City of Warrenville under an existing intergovernmental agreement between the municipalities. Warrenville's wastewater is transported to the Springbrook Regional Water Reclamation Center by an interceptor sewer system owned and operated by Naperville. This interceptor sewer system, comprised of 27", 36" and 42" diameter trunk sewers and two pumping stations, has a finite flow capacity which, if significantly exceeded, could result in sewer backups in Naperville.

Accordingly, this study was undertaken to gather data on existing wastewater flows and to project future flows from the Elmhurst-Chicago Stone Quarry development as well as the total service area tributary to the interceptor sewer system. Future flows were computed by two different methods. First, "anticipated-actual" flows, which include daily dry weather, daily wet weather and peak hourly flows, were projected based upon past historical peaking factors and full development of the service area. Second, "theoretical-maximum" flows were developed based upon the wet weather peaking factors permitted under the intergovernmental agreement and application of these factors to wastewater flows generated by a fully developed service area.

The results of the study indicate that if future wastewater flows do not exceed the "anticipated-actual" wastewater flows, the interceptor system will have sufficient capacity to accommodate full development of the remaining unbuilt areas in Naperville, Warrenville, and the ECSQ site without adding capacity to the interceptor system. If future wastewater flows exceed those flows

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which can reasonably be anticipated and approach the theoretical maximum rates permitted under the intergovernmental agreement, then the capacity of the existing interceptor sewer system may be exceeded and peak flows may have to be attenuated to avoid potentially unacceptable surcharges in the system.

Peak flows can be attenuated through the construction of a holding basin on the ECSQ site. This holding basin would detain wastewater flow from the quarry development for the period of time during which peak flows exceed the capacity of the interceptor sewer system. The detained flows would then be released during non-peak wastewater flow periods.

Since the capacity of the interceptor system may not be exceeded, a holding basin should not be constructed at the onset of quarry development; however, an area for a holding basin should be reserved in the land plan for the quarry development. The design and construction of this basin should be deferred until such time as the flow rates in the interceptor sewer system exceed the capacity of the system.

With respect to the ECSQ site, the current development uses and densities generate an estimated daily dry weather wastewater flow of 1,000,000 gallons. This flow rate may increase or decrease slightly depending on the actual development constructed on the quarry site but for purposes of amending the intergovernmental agreement this flow rate represents a reasonable estimation of wastewater flow.

I. INTRODUCTION

This study has been undertaken to analyze the impact of development of the Elmhurst-Chicago Stone Company's Warrenville Quarry on the surrounding municipal wastewater conveyance and treatment systems. The Elmhurst-Chicago Stone Quarry (ECSQ) is a 650 acre tract of land bounded by Mill Street on the east, Diehl Road Commons on the south, the West Branch of the DuPage River on the west, and Warrenville Road on the north. It is bisected by the East-West Tollway (I-88) and is wholly contained within the corporate limits of the City of Warrenville.

Multi-use development is planned for the property including residential, office, business park (office/warehouse), retail and hotel uses. Three new county roadways will be extended through the property: 1) Diehl Road (east-west) from River Road to Mill Street; 2) Ferry Road (east-west) from River Road to Mill Street; and 3) Winfield Road (north-south) from Warrenville Road to Diehl Road. A diamond interchange is planned at the Winfield Road/East-West Tollway Intersection. Public utilities, including water distribution, sanitary sewer and stormwater collection, natural gas, electric and telephone systems, will be installed as part of the overall site infrastructure improvements to prepare the property for development.

This study specifically analyzes the impact of wastewater flow from the developed ECSQ property on the surrounding wastewater collection and treatment facilities.

II. REPORT OBJECTIVES

The ECSQ property, along with the remainder of the City of Warrenville, is located within the Facilities Planning Area (FPA) of the Springbrook Regional Water Reclamation Center which is owned and operated by the City of Naperville. The City of Warrenville does not own a municipal wastewater treatment facility. The absence of a municipal treatment plant in Warrenville results from the fact that until the early 1970's Warrenville's sewage had been collected and treated by a private utility company, the Westview Utility Company. In the early 1970's, Warrenville bought, and then sold, this system to Naperville. Naperville abandoned the treatment plant serving Warrenville and constructed an interceptor sewer system and the Springbrook regional treatment plant to accommodate wastewater flows originating within the Springbrook FPA.

An intergovernmental agreement was established between the City of Naperville and the City of Warrenville on August 5, 1982 and amended on December 18, 1984. The basic agreement provided for the conveyance and treatment of Warrenville's wastewater by the City of Naperville. It guaranteed to Warrenville an interceptor sewer capacity of 17,400 P.E. (1.74 MGD) daily dry weather flow. The 1984 amendment modified and updated the method for computing treatment and conveyance costs but left all other elements of the 1982 agreement intact. The agreement permitted daily wet weather flows up to 250 percent of the average daily dry weather flow, the latter to be calculated as the average of the lowest three flow months of the previous twelve months. Peak hourly wet weather flow rates were limited to 400 percent of the average daily dry weather flow rate, the latter to be calculated as the

average of the lowest three flow months of the previous twelve months.

At the direction of the Northeastern Illinois Planning Commission (NIPC), that portion of Naperville's interceptor sewer system serving Warrenville was designed and constructed with the ECSQ site specifically excluded from the computation of the design capacity of Naperville's interceptor sewers. NIPC took this position when the interceptor sewers were being planned in 1972 in response to their expectation that the ECSQ property would not be developed for at least 50 years. As development in northeastern Illinois accelerated over the past twenty years, this position has proven to be inappropriate.

The ECSQ property is located in one of the fastest growing corridors in DuPage County. In recent years, the City of Warrenville and the Elmhurst-Chicago Stone Company have been seriously analyzing a number of development programs for the site with densities ranging from approximately nine (9) to fourteen (14) million square feet. Inasmuch as wastewater flows generated by development of the ECSQ site were not included in the original intergovernmental agreement between Naperville and Warrenville, it is necessary to again amend the intergovernmental agreement to make provisions for the additional wastewater flow from the City of Warrenville to include the ECSQ property.

To facilitate the amendment process, Naperville has requested a thorough technical analysis identifying the impact to their interceptor sewer system from the development of the ECSQ site. This analysis must include projected ECSQ flows as well as current and future flows from the remaining portion of the FPA within Naperville to determine if Naperville's interceptor sewer system has sufficient capacity for the added flows.

The objectives of this report are: 1) to determine current and future flows generated by the tributary areas of the interceptor sewer system within the City of Warrenville, the City of Naperville and the ECSQ site; 2) to evaluate the available capacity in that portion of Naperville's interceptor sewer system serving the City of Warrenville; 3) to compare the available capacity of the interceptor system and the Springbrook Treatment plant with projected average daily dry weather, daily wet weather and peak hourly wet weather flow rates; 4) to identify potential areas of capacity limitations and set forth solutions whereby those flows which exceed the interceptor system capacity can be attenuated.

III. BACKGROUND

In 1989, as part of an analysis to determine the development potential of the ECSQ property, SDI Consultants evaluated three options available for treatment of wastewater originating from the ECSQ property. These options included the utilization of a land treatment system, a packaged treatment plant and connection to the Naperville wastewater system. From this analysis it was concluded that connection to Naperville's system was the preferred option given the existing intergovernmental agreement between the municipalities and Naperville's advanced wastewater treatment facilities.

To obtain information on Naperville's interceptor sewer system and treatment plant, Mr. Allan Poole, Director of the Water and Wastewater Utility Department of the City of Naperville was contacted. Mr. Poole provided physical information on existing interceptor sewers, treatment plant capacity, historical flow data for that portion of Naperville's interceptor sewer system serving Warrenville and future additional flows resulting from development within Naperville.

To obtain information on Warrenville's local sewer system, Mr. Dennis Posluszny, Director of Public Works for Warrenville and Mr. Kenneth Carmignani of James J. Benes & Associates, Warrenville's engineering consultant were contacted. Messrs. Posluszny and Carmignani provided SDI with data on Warrenville's local sewer system and flow data for the past twelve months as measured at the Warrenville Flow Measurement Station.

Finally, with respect to development of the ECSQ site, dry weather and peak flows were projected based upon a range of

probable development plans for the property. The results of this investigation and the projection of flow data are presented in the following sections of this report.

IV. WARRENVILLE SYSTEM DATA

A. Existing Sewer System

The City of Warrenville owns and maintains its own sanitary sewage collection system. This system is relatively new inasmuchas the oldest portions of the system were installed in the mid-1960's. Since 1973, the system has been expanded to provide sewer service to approximately 3500 customers within the service area of the City of Warrenville. Approximately two-thirds of the customers are served by local sewers which are less than 6 years old.

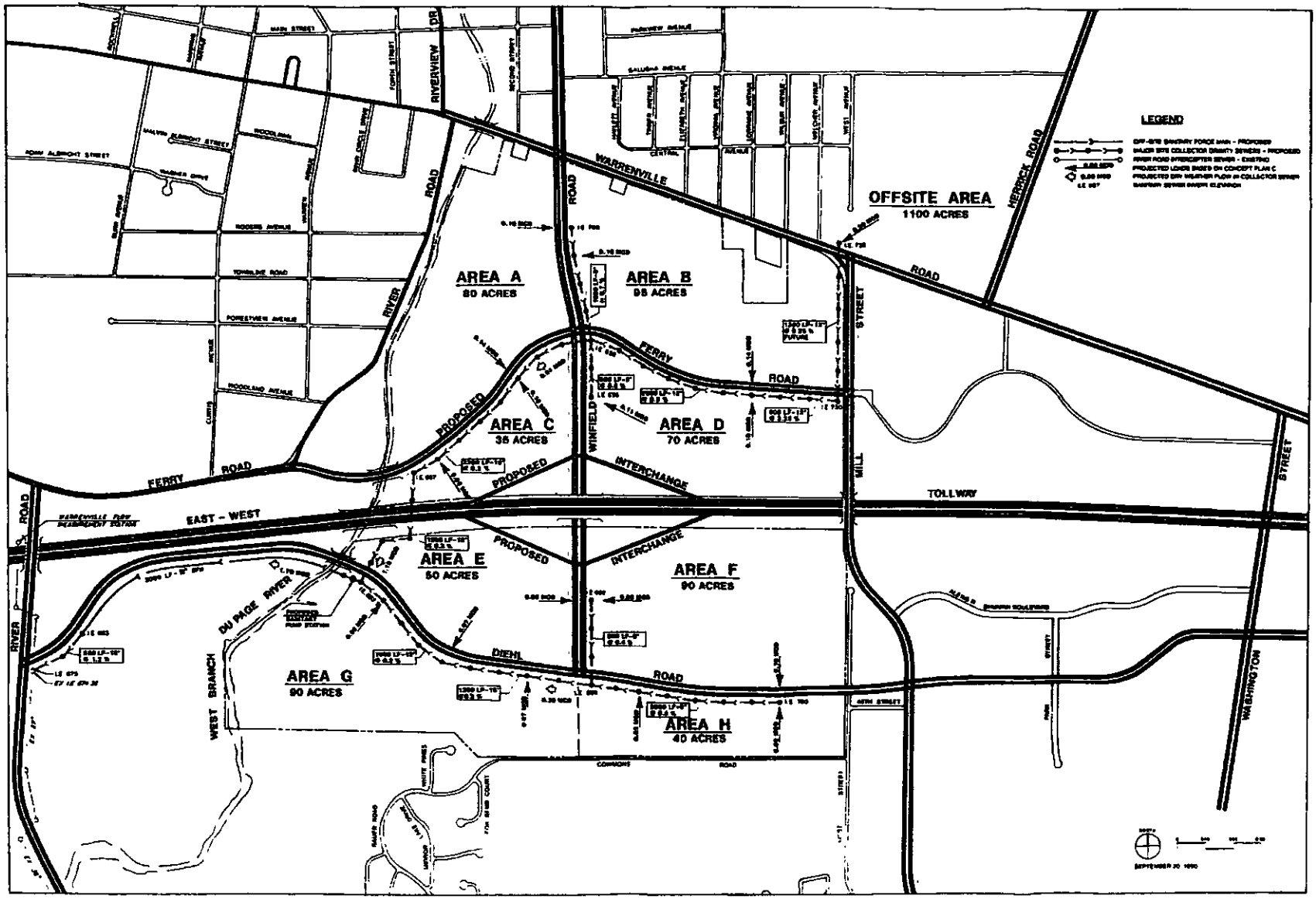
The Warrenville local and collector sewer system conveys sanitary sewage to a flow measurement station located immediately north of I-88, west of River Road and south of Ferry Road. At this point, wastewater is discharged into Naperville's 27" diameter interceptor sewer known as the River Road Interceptor Sewer. The flow measurement station at the discharge point from Warrenville's sewer collection system to Naperville's interceptor sewer system is known as the Warrenville Flow Measurement Station (WMS). This station, owned by Naperville, is a permanent and automated flow measurement device and is manufactured, monitored and maintained by ADS Service, Inc. This state-of-the-art station records both depth and velocity of flow at regular time intervals throughout the day. The data is continuously stored and then retrieved and plotted on a graph of flow rate versus time of day. This data permits the computation not only of total flow but also of peak flow rates throughout the day, week, month or year. (See Appendix A)

The intergovernmental agreement between Naperville and Warrenville referenced hereinbefore provides for the measurement of wastewater flow by Naperville at this station. Monthly billings are prepared based upon the documentation of flow obtained from the Warrenville Measurement Station. The City of Warrenville periodically and independently checks the results of wastewater flow billed by Naperville to Warrenville by means of a McBierney Flow-Tote measuring device. Warrenville's periodic confirmation efforts have generally found daily flows to be within 4% and monthly flows within 2% of the amount billed by Naperville.

B. Proposed ECSQ Sewer System

Development of the ECSQ site will include construction of a sanitary sewer collector system. The major components of this system will be constructed parallel to the public roadways referenced in the introduction to this report. A preliminary layout for the ECSQ sanitary sewer system is based upon anticipated land uses and total wastewater flow and is shown on Exhibit 1. The proposed grading for the site will permit construction of a sewer system which will serve all areas of the ECSQ site by gravity. This gravity system will collect and convey wastewater to a new pump station located adjacent to the Diehl Road crossing of the West Branch of the DuPage River. This pump station will discharge wastewater through a 12" force main which extends west along Diehl Road to the 27" diameter River Road Interceptor Sewer.

The ECSQ collection system, when constructed in accordance with IEPA and City of Warrenville standards, should experience wet weather flows with peaking factors significantly below the peak flow factors currently



ELMHURST CHICAGO STONE PROPERTY

WARRENVILLE QUARRY SITE

PRELIMINARY WASTEWATER COLLECTION SYSTEM

EXHIBIT 1

associated with Warrenville's existing system. This reduction in peak factors is due to the fact that introduction of stormwater into a sanitary sewer system serving new developments can more readily be prevented whereas sanitary sewer systems serving existing (older) residential areas are more susceptible to wet weather inflow from roof drains, yard drains, sump pumps, infiltration, etc.

At the present time, detailed data is not available for wet weather flows from sanitary sewer systems which primarily serve office, business park and multi-family developments similar to the type of development uses contemplated for the ECSQ site. If such data were available, it is likely that actual peak factors would be lower than those permitted in the intergovernmental agreement for daily wet weather and peak hourly wet weather flows. Since detail data is not available to document reduced wet weather peaking factors, the actual peaking factors determined for wastewater flow from Warrenville over the past 12 months will be used to project peak flows from the ECSQ site.

C. Existing Warrenville Wastewater Flow

1) Average Daily Dry Weather Flow

Table 1 has been prepared to summarize wastewater flow data furnished by Warrenville. This data sets forth the average daily dry weather flow as defined in the intergovernmental agreement between Warrenville and Naperville. The 13 month time period contained in Table 1 begins with July 1, 1989 and ends on July 31, 1990. A 13 month time frame was used due to the unavailability of flow

data for October 1989. Based upon the data shown in Table 1 the average daily dry weather flow for the lowest three flow months is calculated to be 0.927 MGD. The intergovernmental agreement between Warrenville and Naperville limits the daily wet weather flow to 250 percent of the average daily dry weather flow. Based upon an average daily dry weather flow of 0.927 MGD, the current maximum allowable daily wet weather flow is 2.50 x 0.927 MGD or approximately 2.32 MGD.

TABLE 1

WARRENVILLE WASTEWATER DATA
AVERAGE DAILY DRY WEATHER FLOW

Month/Year	Total Flow (MG)		Days	Avg Daily Flow (MG)
7-89	31.723		31	1.023
8-89	30.410		31	0.981*
9-89	30.099		30	1.003
10-89	NO	DATA	AVAILABLE	
11-89	27.016		30	0.901*
12-89	27.889		31	0.900*
1-90	36.412		31	1.175
2-90	34.897		28	1.246
3-90	46.139		31	1.488
4-90	34.536		29**	1.191
5-90	51.866		31	1.673
6-90	37.623		30	1.254
7-90	34.533		31	1.114

*Lowest 3 months in 12 month period
**4-1-90 data missing

Flow data taken at Warrenville Measurement Station

Computation of Average Daily Dry Weather Flow
per Wastewater Utility Service Agreement

Mon/Yr	Flow	Days
8-89	30.410	31
11-89	27.016	30
12-89	27.889	31
	85.315 /	92 = 0.927 MG

Average Daily Dry Weather
Flow (Qadf) = 0.927 MG

2) Daily Wet Weather Flow

Table 2 sets forth the highest wet weather flow day for each month and the peaking ratio for the wet weather flow day to the average daily dry weather flow. During the aforementioned 12 month time period there were 6 days when wet weather flow exceeded 2.32 MGD, the calculated allowable maximum daily wet weather flow.

On two occasions, unusually high and prolonged wet weather flow occurred. First, during a three day period in March, 1990 (March 9, 10, 11) City of Warrenville Public Works personnel stated that high levels of stormwater flow in streams adjacent to sanitary sewers may have inundated sanitary manholes which did not have watertight lids. Second, on May 9 and May 10, unusually high wet weather flows were experienced due to unauthorized discharge of stormwater into Warrenville's sanitary sewer system from the Maple Hill development. These two occasions created an aberration in the data which can be discarded in the determination of average peaking factors relating wet weather to dry weather flows.

In general, peaking factors for the existing flows shown on Table 2 are less than the 250 percent peak factor set forth in the intergovernmental agreement. The average of these peak factors, exclusive of the March and May, 1990 peaks, can serve as a representative wet weather peak flow factor for projecting future peak day flows from Warrenville.

TABLE 2

WARRENVILLE WASTEWATER DATA
DAILY WET WEATHER FLOW

Average Daily Flow (Qadf) = 0.927 MG
Maximum Allowable Wet Weather Daily Flow = 2.318 MG
(0.927 MG x 250 percent)

		Daily Wet Weather Flow	
Date	Day	Highest Day (MG)	Peak Factor*
7-30	Sun	1.811	1.95
8-05	Sat	1.333	1.44
9-01	Fri	1.813	1.96
11-15	Wed	1.015	1.09
12-22	Fri	0.983	1.06
1-25	Thu	1.851	2.00
2-22	Thu	1.907	2.06
3-10	Sat	2.834	3.07**
3-08	Thu	2.300	2.48
4-14	Sat	1.538	1.66
5-10	Thu	5.871	6.40**
5-11	Fri	2.328	2.51
6-14	Thu	2.305	2.49
7-20	Fri	1.671	1.80
			22.50

Average Daily Wet Weather Peak Factor = 22.5/12 x 100 = 188 percent

*Peak Factor = Highest Day Flow/Qadf
**Not used in the computation of the average daily wet weather peak factor. Rather, the second highest day was selected for the month.

Average Daily Wet Weather Peak Factor = 188 percent

3) Peak Hourly Wet Weather Flow

Table 3 presents peak hourly wet weather flow rates from July 1989 to July 1990. Based upon the 0.927 MGD average daily dry weather flow the calculated maximum allowable peak hourly flow rate is 4.00 x 0.927 MGD or 3.71 MGD. During the aforementioned 12 month time period there were five occasions when the peak hourly flow rate exceeded the 3.71 MGD limit. To determine a representative, historical

peak hourly factor which was not overly sensitive to extreme events nor overly "dampened" by non-rainfall peak flows, an engineering judgement was made to select the three highest peak hour flow conditions experienced each month. These three peak flows from each month would be averaged over a twelve month interval to compute an "average" peak hourly factor.

Typical ratios for peak hourly wet weather flows to average daily dry weather flow ranged from 1.52 to 4.89. For the three highest peak hour flow conditions experienced each month the average peak hour ratio for a 12 month period is 265 percent which is significantly less than the 400 percent factor set forth in the intergovernmental agreement. This average peak hour factor is appropriate for projecting future peak hour flows from additional developments in Warrenville and the ECSQ site.

TABLE 3

WARRENVILLE WASTEWATER DATA
PEAK HOURLY WET WEATHER FLOW

Average Daily Flow (Qadf) = 0.927 MG
Maximum Allowable Peak Hourly Wet Weather Flow Rate = 3.71 MGD
(0.927 MGD x 400 percent)

Month/Year	Day/Date	Hour	Peak Hourly Flow Rate (MGD)	Peak Factor (Peak/Qadf)
7-89	Su, 30th	1	3.206	3.46
	Th, 20th	1	2.079	2.24
	Tu, 18th	18	2.073	2.24
8-89	Sa, 12th	17	2.244	2.42
	Fr, 11th	15	1.921	2.07
	Sa, 5th	10	1.849	1.99
9-89	Fr, 1st	3	4.529	4.89
	Sa, 9th	9	2.046	2.21
	We, 13th	7	1.882	2.03
11-89	Su, 26th	11	1.410	1.52
	Th, 23rd	12	1.486	1.60
	Tu, 7th	8	1.436	1.55
12-89	Sa, 9th	10	1.420	1.53
	Sa, 23rd	11	1.427	1.54
	Su, 3rd	11	1.410	1.52
1-90	Th, 25th	8	2.907	3.14
	We, 17th	8	2.425	2.62
	Fr, 26th	19	2.303	2.48
2-90	Th, 22nd	16	3.053	3.29
	Fr, 23rd	8	2.244	2.42
	Sa, 3rd	11	2.179	2.35
3-90	Sa, 10th	14	4.128	4.45
	Th, 8th	16	4.098	4.42
	Su, 11th	10	3.421	3.69
4-90	Sa, 14th	11	1.942	2.09
	Fr, 20th	21	1.807	1.95
	Sa, 21st	11	1.750	1.89
5-90	Fr, 4th	8	4.443	4.79
	Fr, 11th	8	3.165	3.41
	Sa, 12th	10	2.841	3.06
6-90	Th, 14th	8	3.631	3.91
	We, 13th	23	3.017	3.25
	Fr, 29th	8	2.690	2.90
7-90	Fr, 20th	8	2.050	2.21
	Th, 19th	19	1.932	2.08
	We, 11th	8	1.847	1.99
				95.22

Average Peak Hourly Wet Weather Factor = Sum of the highest 3 Peak Factors for each month/36 x 100 = 95.22/36 x 100 = 265 percent

Average Peak Hour Factor = 265 percent

D. Projected ECSQ Wastewater Flow

1) Average Daily Dry Weather Flow

As stated before, the ECSQ site is being planned as a multi-use, multi-year development. Table 4 sets

forth the anticipated land uses, acreages and daily dry weather flows resulting from a development with potential net acreages ranging from 500 to 525 acres; the balance of the property will be utilized for infrastructure and open space. Given this development range, the projected daily dry weather flow rate from the ECSQ site when fully developed is between 900,000 to 1,400,000 gallons. For purposes of wastewater flow assumption relative to Springbrook Treatment Plan capacity requirements, this report is based upon a required treatment plant capacity of 1,000,000 gallons per day dry weather flow.

TABLE 4

ECSQ DRY WEATHER
WASTEWATER FLOW PROJECTION

CONCEPT A

LAND USE	SIZE	WATER USAGE RATE	TOTAL DAILY WATER USE (MG)
1. Corporate User	1,160,000 SF	0.15 GPD/SF	0.174
2. Office	4,340,000 SF	0.10 GPD/SF	0.434
3. Business Park	2,825,000 SF	0.04 GPD/SF	0.113
4. Retail	250,000 SF	0.10 GPD/SF	0.025
5. Hotel	500 Rooms	250 GPD/Room	0.125
6. Residential	425 Units	250 GPD/Unit	0.106
			TOTAL USE = 0.977 MG

Total Daily Wastewater Flow* = 0.90 x 0.977 MG = 0.879 MG* Say 900,000 gallons

CONCEPT B

1. Corporate User	2,110,000 SF	0.15 GPD/SF	0.317
2. Office	4,175,000 SF	0.10 GPD/SF	0.418
3. Business Park	1,860,000 SF	0.04 GPD/SF	0.074
4. Retail	250,000 SF	0.10 GPD/SF	0.025
5. Hotel	500 Rooms	250 GPD/Room	0.125
6. Residential	550 Units	250 GPD/Unit	0.137
			TOTAL USE = 1.096 MG

Total Daily Wastewater Flow = 0.90 x 1.096 MG = 0.986 MG* Say, 1,000,000 gallons

CONCEPT C

1. Corporate User	3,133,333 SF	0.15 GPD/SF	0.470
2. Office	6,190,000 SF	0.10 GPD/SF	0.619
3. Business Park	2,750,000 SF	0.04 GPD/SF	0.110
4. Retail	370,000 SF	0.10 GPD/SF	0.037
5. Hotel	468 Rooms	250 GPD/Room	0.117
6. Residential	812 Units	250 GPD/Unit	0.203
			TOTAL USE = 1.556 MG

Total Daily Wastewater Flow* = 0.90 x 1.556 MG = 1.400 MG* Say 1,400,000 gallons

*For planning purposes, wastewater flow (sanitary sewage) is assumed to be 90% of water consumption.

2) Daily & Peak Hourly Wet Weather Flows

Daily and Peak Hourly Wet Weather Flows can be computed on the basis of the projected average daily dry weather flow for the alternative development concepts and peaking factors currently experienced in Warrenville. These flow rates would represent the anticipated actual flow from the ECSQ site given a range of development densities. In addition, the worst-case flows to the Naperville Interceptor System can be determined by computing the projected wastewater flow from the ECSQ site on the basis of the peaking factors permitted in the intergovernmental agreement between Warrenville and Naperville.

Table 5 sets forth the projected flow rates from the ECSQ site for Development Concepts A, B & C under dry weather and wet weather conditions.

TABLE 5

ECSQ WET WEATHER WASTEWATER FLOW PROJECTION

ECSQ Development Concept	Average Daily Dry Weather Flow Rate	Daily Wet Weather Flow Rate 1.88 Peak Factor	Daily Wet Weather Flow Rate 2.50 Peak Factor	Peak Hourly Wet Weather Flow Rate 2.65 Peak Factor	Peak Hourly Wet Weather Flow Rate 4.00 Peak Factor
A	0.90 MG	1.69 MG	2.25 MG	2.38 MGD	3.60 MGD
B	1.00 MG	1.88 MG	2.50 MG	2.65 MGD	4.00 MGD
C	1.40 MG	2.63 MG	3.50 MG	3.71 MGD	5.60 MGD

Based upon current development planning, Concept B is the most likely development scenario and will be used in the projection of anticipated actual flows to the interceptor sewers. Concept C will be used in the projection of theoretical maximum flows to analyze the worse-case impact to Naperville's interceptor system.

V. NAPERVILLE SYSTEM DATA

There are four components within Naperville's overall wastewater collection and treatment system which are affected by wastewater flow from the ECSQ property. These components are: the Springbrook Regional Water Reclamation Center, the Springbrook Interceptor Sewer, the Northwest Pump Station and the River Road Interceptor Sewer. (See Exhibit 2)

A. Springbrook Regional Water Reclamation Center

The City of Naperville owns and operates a wastewater treatment plant known as the Springbrook Regional Water Reclamation Center. This plant was originally constructed between 1973 and 1975. It was completed and put in service in 1976. It has since been expanded two times with completion of the most recent expansion planned in 1991. Current capacity is 15 MGD design average flow (DAF) and 35 MGD design maximum flow (DMF). Capacity after the 1990-91 expansion will be the 18.75 MGD design average flow (DAF) and 40.30 MGD design maximum flow (DMF).

The Springbrook treatment plant can be readily expanded due to the availability of adequate land area at the plant site and previous planning which was undertaken in anticipation of future plant expansions. Mr. Poole has stated that adequate capacity can be made available to accommodate wastewater flow from the ECSQ site. This capacity increase would be addressed as part of an amended intergovernmental agreement between Warrenville and Naperville.

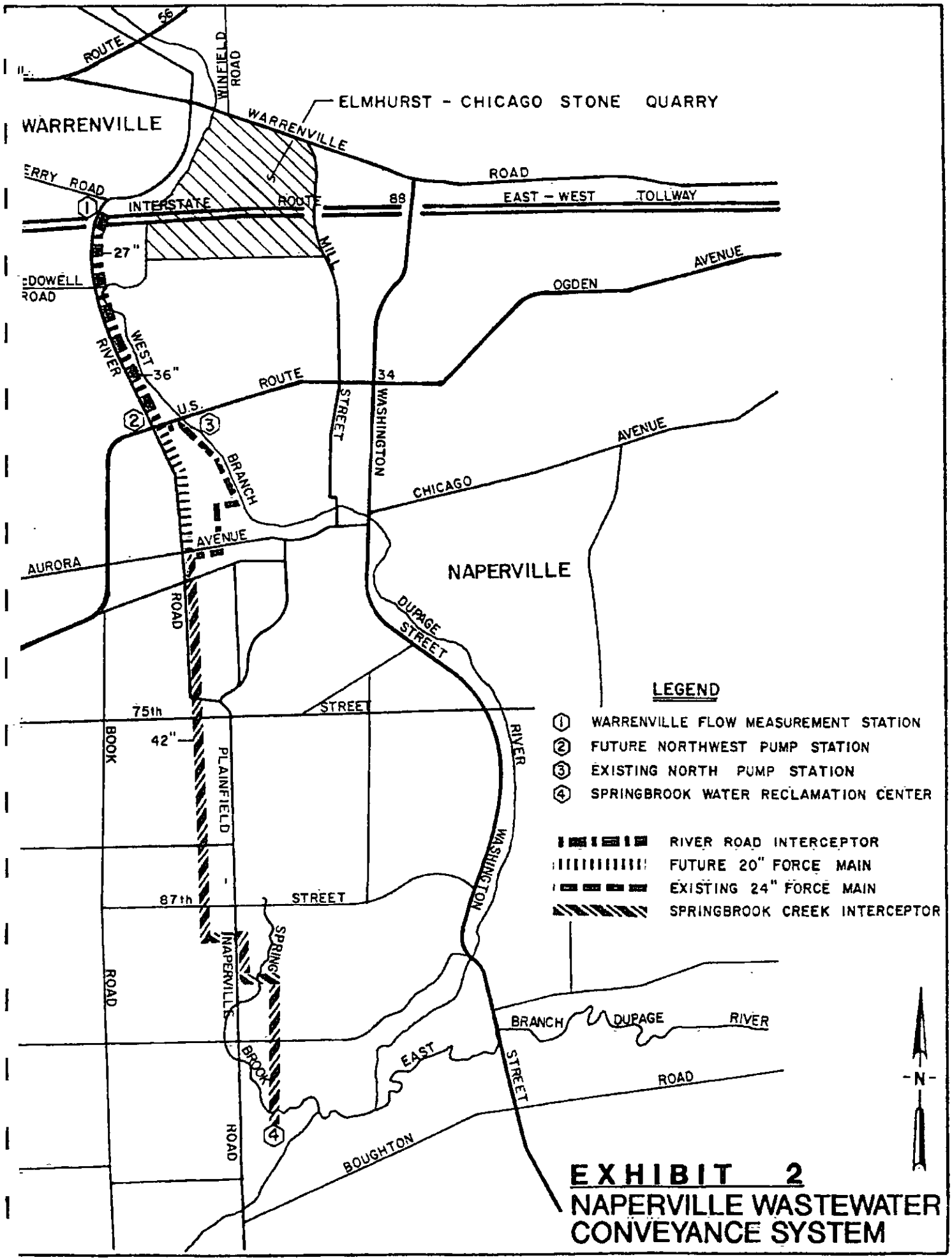


EXHIBIT 2
NAPERVILLE WASTEWATER CONVEYANCE SYSTEM

B. Naperville Interceptor Sewer System

Naperville's Water and Wastewater Utility Department operates a number of major interceptor sewers which convey wastewater flow to the Springbrook Regional Water Reclamation Center. Two of these interceptors are utilized in the conveyance of wastewater from Warrenville to the treatment plant. These same interceptors would also be used to convey wastewater from the ECSQ site to the plant. The portions of the Naperville interceptor sewer system affected by flow from the City of Warrenville and the ECSQ site are: 1) the 42" diameter Springbrook Creek Interceptor; 2) the Northwest Wastewater Pump Station and 20" diameter Force Main; and 3) the 27" and 36" diameter River Road Interceptor.

1) 42" Springbrook Interceptor Sewer

This interceptor sewer is the major conveyance sewer for all wastewater originating from Warrenville and the northwesternmost portions of the City of Naperville. It ranges in depth from 8.6 feet to 34.75 feet with an average depth between 18 to 23 feet. Table 6 presents the physical data pertaining to the Springbrook Interceptor Sewer. Manhole No. 1 is located at the discharge end of the sewer adjacent to the Springbrook Treatment Plant. Manhole No. 60 is located at the receiving end of the system approximately 4.9 miles north of the treatment plant and 2.5 miles south of the ECSQ site.

The information contained within Table 6 which is of particular significance in this study is the flowing full capacity of the interceptor. Over 77 percent of the length of this sewer has a flowing full (Manning's) capacity of 20 MGD. At 12 sewer

TABLE 6

SPRINGBROOK INTERCEPTOR SEWER

AURORA AVENUE TO SPRINGBROOK WATER RECLAMATION CENTER

MANHOLE	GROUND ELEV USGS	INVERT ELEV USGS	DEPTH FEET	DISTANCE FEET	SLOPE %	SIZE DIA	CAPACITY RUN/FULL MGD	FLOW VELOCITY FPS	COMMENTS
60	693.68	682.51	11.17						NE corner Aurora&River(54" casir
59A	694.49	682.19	12.30	90	0.36	36"	25.84	5.66	Aurora Avenue crossing
59	690.42	678.87	11.55	330	1.00	36"	43.07	9.44	River Road
58	691.78	677.48	14.30	431	0.60	36"	27.24	5.97	River Road
57	696.00	675.56	20.44	402	0.40	36"	27.24	5.97	River Road
56	701.04	674.97	26.07	337	0.17	42"	26.79	4.31	Oswego Road crossing
55	700.05	674.95	25.10	385	0.10	42"	20.55	3.31	
54	685.74	674.04	11.70	385	0.23	42"	31.16	5.02	
53	684.24	673.74	10.50	407	0.07	42"	17.19	2.77	
52	682.46	673.06	9.40	385	0.17	42"	26.79	4.31	
51	681.08	672.48	8.60	520	0.10	42"	20.55	3.31	
50	681.94	672.04	9.90	498	0.10	42"	20.55	3.31	
49	681.57	671.51	10.06	505	0.10	42"	20.55	3.31	
48	680.12	670.90	9.22	513	0.10	42"	20.55	3.31	
47	679.87	670.37	9.50	506	0.10	42"	20.55	3.31	
46	679.74	669.84	9.90	507	0.10	42"	20.55	3.31	
45	689.47	669.27	20.20	506	0.11	42"	21.55	3.47	
44	685.21	668.81	16.40	551	0.08	42"	18.38	2.96	75th Street crossing
43	680.44	668.54	11.90	498	0.05	42"	14.53	2.34	
42	678.47	667.97	10.50	504	0.11	42"	21.55	3.47	
41	689.05	667.35	21.70	496	0.12	42"	22.51	3.62	
40	701.00	667.10	33.90	497	0.05	42"	14.53	2.34	
39	690.13	666.83	23.30	505	0.05	42"	14.53	2.34	
38	684.63	666.03	18.60	550	0.14	42"	24.31	3.91	
37	693.94	665.64	28.30	549	0.07	42"	17.19	2.77	
31	677.62	665.26	12.36	409	0.00	42"	18.38	2.96	Drop Manhole-upper
31	677.62	655.82	21.80						Drop Manhole-lower
30	678.43	655.03	23.40	503	0.15	42"	25.16	4.05	32-33-34-35-36 not used
29	682.70	654.70	28.00	401	0.08	42"	18.38	2.96	
28	675.50	654.53	20.97	300	0.10	42"	20.55	3.31	
27	682.08	653.78	28.30	504	0.10	42"	20.55	3.31	
26	688.36	653.61	34.75	492	0.10	42"	20.55	3.31	
25	682.00	653.06	28.94	505	0.10	42"	20.55	3.31	
24	684.50	652.45	32.05	497	0.12	42"	22.51	3.62	
23	681.75	651.55	30.20	506	0.10	42"	20.55	3.31	
22	678.87	651.37	27.50	499	0.04	42"	12.99	2.09	Contract E
21	681.42	650.72	30.70	498	0.13	42"	23.43	3.77	Contract D-87th Street crossing
20	675.46	650.16	25.30	499	0.11	42"	21.55	3.47	
19	669.88	649.58	20.30	506	0.11	42"	21.55	3.47	
18	669.00	649.40	19.60	445	0.04	42"	12.99	2.09	
17	668.57	648.77	19.80	506	0.12	42"	22.51	3.62	
16	666.90	648.23	18.70	499	0.09	42"	19.49	3.14	
15	663.57	647.87	15.70	529	0.08	42"	18.38	2.96	
14	666.45	645.00	21.45	531	0.54	42"	47.75	7.68	
13	663.83	642.48	21.35	514	0.49	42"	45.48	7.32	
12	652.09	640.09	12.00	531	0.45	42"	43.59	7.01	
11	646.77	636.97	9.80	425	0.73	42"	55.51	8.93	
10	650.03	635.43	14.60	430	0.36	42"	38.98	6.27	
9	665.02	632.72	32.30	561	0.48	42"	45.01	7.24	
8	661.67	629.47	32.20	550	0.58	42"	49.48	7.96	
7	652.95	628.35	24.60	543	0.20	42"	29.06	4.68	
6	651.00	627.50	23.50	461	0.18	42"	27.57	4.44	95th Street crossing
5	647.03	626.63	20.40	500	0.17	42"	26.79	4.31	
4	640.71	625.41	15.30	499	0.22	42"	30.48	4.90	
3	637.31	624.21	13.10	505	0.23	42"	31.16	5.02	
2	637.07	623.15	13.92	485	0.22	42"	30.48	4.90	
1	637.83	622.23	15.60	407	0.22	42"	30.48	4.90	
JUNCTION MH	637.70	621.40	16.30	396	0.22	42"	30.48	4.90	
WET WELL	638.00	618.02	19.98	347	0.13	48"	33.66	4.15	
TOTAL				25985					4.92 Miles

segments (length of sewer pipe between 2 adjoining manholes) the flowing full capacity of the 42" diameter interceptor is less than 20 MGD. At two of these twelve segments the capacity is less than 13 MGD. The segments having a capacity of less than 20 MGD comprise 23 percent of the total system and the segments having a capacity less than 13 MGD comprise 4 percent of the total length of the interceptor. These segments are noteworthy because peak (wet weather) flows may cause some surcharging in these segments.

Section VI of this report develops the projected peak flows when the areas tributary to the north end of the Springbrook Interceptor Sewer are fully developed. The adequacy of the Springbrook Interceptor Sewer's conveyance capacity is also analyzed in Section VI based upon the projected peak flows from the interceptor's service area.

2) Northwest Wastewater Pump Station & 20" Force Main

The Northwest Wastewater (NW) Pump Station is a new, and as yet unconstructed, pump station which will be located at the corner of River Road and Ogden Avenue approximately 6.0 miles north of the treatment plant and 1.3 miles south of the ECSQ site. It was originally planned to be constructed in 1990 but has since been deferred to 1991 and may possibly be deferred beyond 1991 depending upon available funding. A new 20" force main extends from the pump station south along River Road and discharges into Manhole No. 60 of the 42" Springbrook Interceptor Sewer. This force main is currently under construction and will be completed in 1990.

The NW pump station and force main were designed to intercept wastewater which currently flows through the River Road Interceptor Sewer to the existing North Pump Station located at the West Branch of the DuPage River and Ogden Avenue. It will alleviate the capacity limitations of the North Pump Station and corresponding 24" force main. Unlike the Springbrook and River Road Interceptor Sewers, the NW Pump Station and 20" Force Main were planned to provide capacity for ECSQ wastewater flow if, and when, the property was developed.

If development of the ECSQ site is to occur in the next few years, the City of Naperville will probably construct the aforementioned pump station at its ultimate capacity. If the ECSQ development is not imminent, the pump station would initially be constructed with a lower capacity. The design capacities of the Northwest and North Pump Stations as planned by Naperville with and without the ECSQ site are shown in Table 7.

TABLE 7

NORTH & NORTHWEST WASTEWATER PUMP STATIONS
DESIGN CAPACITY

	Peak Pumping Capacity	
	w/0 ECSQ Site	w/ECSQ Site
North Pump Station	10.94 MGD	10.94 MGD
Northwest Pump Station	4.37 MGD	8.57 MGD
Total =	15.31 MGD	19.51 MGD*

*Total delivery capacity to the northernmost portion of the Springbrook Interceptor Sewer.

It should also be noted that diversion capabilities have been designed into the NW Pump Station. If inflow to the station exceeds pumping capacity, or if failure of one or more pumps is experienced, wastewater flowing into this pump station can be diverted through the existing 36" sewer flowing east along Ogden Avenue to the North Pump Station. From this station, wastewater can be pumped to the 42" Springbrook Interceptor in the same manner it currently flows to the interceptor.

3) River Road Interceptor Sewer

The River Road Interceptor Sewer contains two segments of gravity sewers with different diameters.(See Exhibit 3) The 36" diameter portion of the interceptor begins at the proposed NW Pump Station (existing Manhole No. 7) and extends northerly along River Road to Manhole No. 19. Manhole No. 19 serves as a junction structure for a 24" trunk sewer extending west along McDowell Road and the 27" diameter portion of the River Road Interceptor Sewer which extends northerly along River Road. The 27" diameter interceptor sewer terminates in Manhole No. 29 which is also the location of the Warrenville Flow Measurement Station.

The River Road Interceptor Sewer provides conveyance for all wastewater flows originating from the City of Warrenville and those portions of the City of Naperville located north of the Burlington Northern Railroad and west of River Road. This interceptor sewer ranges in depth from 17.6 to 41.5 feet with an average depth between 26 and 30 feet. Table 8 presents the physical data pertaining to the River Road Interceptor Sewer. Due

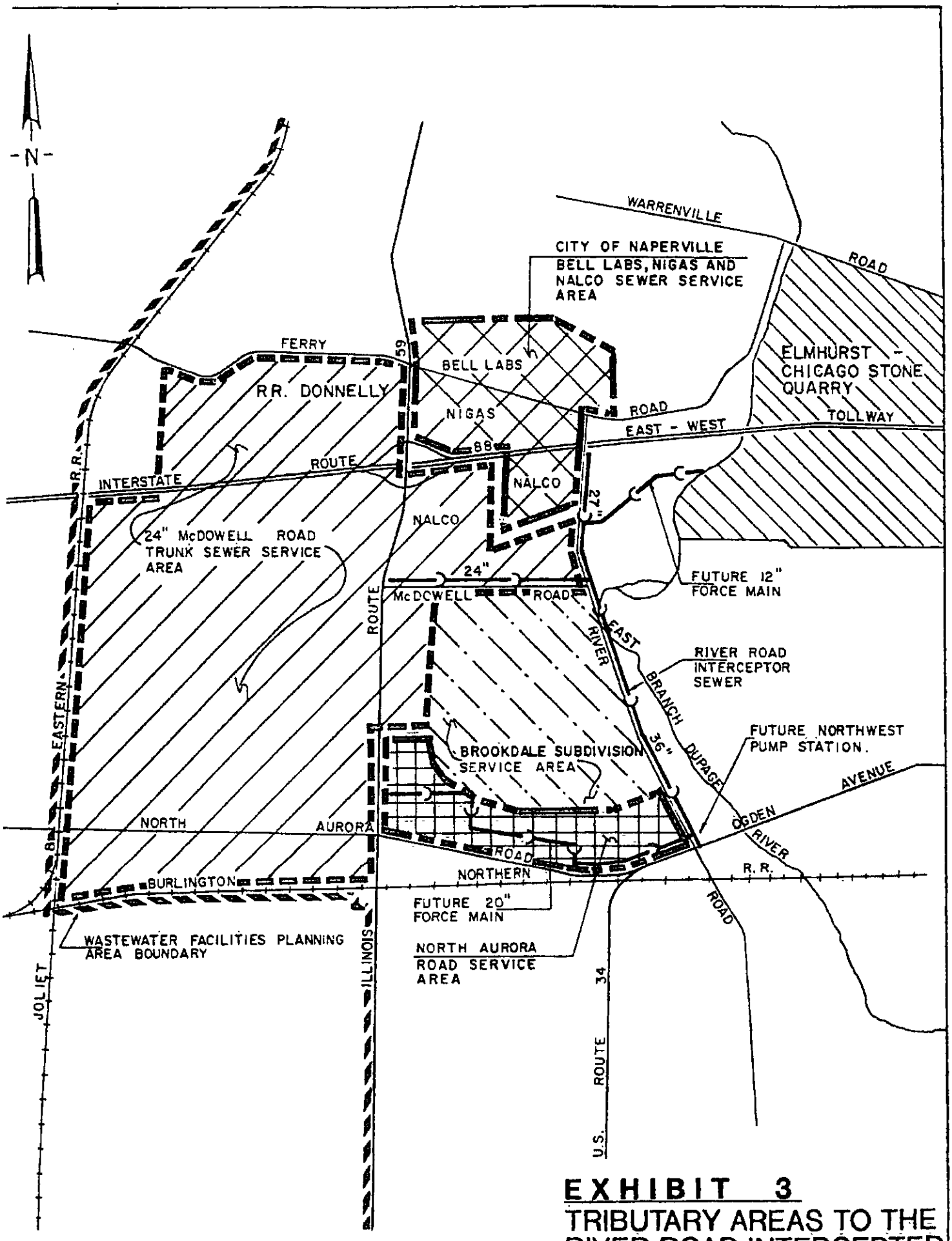


EXHIBIT 3

TRIBUTARY AREAS TO THE RIVER ROAD INTERCEPTER

TABLE 8

RIVER ROAD INTERCEPTOR SEWER
FROM NORTHSIDE AT INTERSTATE 88 (E-W TOLLWAY TO NORTH WASTEWATER PUMP STATION)
AT 1200 OGDEN AVENUE

MANHOLE	GROUND ELEV USGS	INVERT ELEV USGS	DEPTH FEET	DISTANCE FEET	SLOPE %	SIZE DIA	CAPACITY RUN/FULL MGD	FLOW VELOCITY FPS	COMMENTS
29	701.95	676.38	25.57						Flow Measure Sta (Parshall Flume)
28	696.67	675.69	20.98	345	0.07	27"	5.30	2.06	I-88 Crossing (225'-48"steel case)
27	703.97	674.78	29.19	440	0.07	27"	5.30	2.06	
26	702.73	674.65	29.32	142	0.07	27"	5.30	2.06	River Rd Crossing
25	697.04	674.36	28.37	516	0.06	27"	4.90	1.91	
24	695.32	673.90	23.14	615	0.07	27"	5.30	2.06	
23	714.56	673.44	21.88	583	0.08	27"	5.66	2.20	
22	706.38	673.03	41.53	282	0.14	27"	7.49	2.92	
21	704.89	672.74	33.64	292	0.10	27"	6.33	2.46	
20	699.55	672.82	32.07	232	-0.03	27"			Reverse Slope-River Rd Crossing
19	693.44	672.20	27.35	440	0.14	36"	16.11	3.53	
18	694.28	671.84	21.60	526	0.07	36"	11.39	2.50	
17A	701.25	671.81	22.47	98	0.03	36"	7.46	1.63	
17	698.04	671.48	26.56	341	0.09	36"	12.92	2.83	Inc 127'Jacking Pipe (30-35'depth)
16	688.45	671.01	27.03	605	0.08	36"	12.18	2.67	
15A	690.54	670.89	17.56	306	0.04	36"	8.61	1.89	
15	692.08	670.54	20.00	285	0.12	36"	14.92	3.27	
14	693.68	669.90	22.18	598	0.11	36"	14.28	3.13	
13	701.12	669.90	23.78	460	0.00	36"			
12	700.07	669.92	31.20	243	-0.01	36"			Reverse Slope
11A	696.20	669.70	30.37	327	0.07	36"	11.39	2.50	
11	696.00	669.32	26.88	103	0.37	36"	26.20	5.74	Brookdale Blvd Crossing
10	697.50	669.03	28.47	455	0.06	36"	10.55	2.31	
9	692.92	668.82	28.68	452	0.05	36"	9.63	2.11	
8	698.42	668.32	24.60	456	0.11	36"	14.28	3.13	
7	703.02	667.32	31.10	453	0.22	36"	20.20	4.43	
6	703.00	667.26	35.76	190	0.03	36"	7.46	1.63	River Rd Crossing (84'Jacking Pipe)
5	701.92	667.12	35.88	249	0.06	36"	10.55	2.31	Ogden Crossing (160'-54"steel case)
4	699.12	666.82	35.10	409	0.07	36"	11.39	2.50	
3	682.54	661.30	37.82	392	1.41	36"	51.14	11.20	
2	682.28	660.48	22.06	186	0.44	36"	28.57	6.26	DuPage River Crossing
1	679.53	660.33	21.95	57	0.26	36"	21.96	4.81	
JUNCTION MAN HOLE	680.50	658.02	22.48	538	0.43	36"			Existing 30" S.S. at 0.25% slope to Wet Well

Above information from "As-Built" plans by Clark, Dietz & Associates-Engineers, Inc. entitled "Drawings for Warrenville Interceptor Sewer-Phase I Contract F" dated Feb. 1975, and "Drawings for River Road Interceptor Sewer-Phase II Contract G" dated Feb. 1976

to the construction of the NW Pump Station, only that portion of the River Road Interceptor Sewer located between Manhole Nos. 7 and 29 enters into the capacity considerations of this study.

With respect to the capacity of the 36" diameter portion of the interceptor, over 75 percent of the total length of the 36" sewer has a flowing full capacity of 10 MGD or greater. Five segments, or 25 percent of the total length of the 36" diameter sewer, have a capacity less than 10 MGD.

With respect to the capacity of the 27" diameter portion of the interceptor, over 78 percent of the total length of the 27" sewer has a flowing full capacity of 5 MGD or greater. Two segments, or 22 percent of the total length of the 27" diameter sewer have a capacity less than 5 MGD.

Section VI develops the projected peak flows to the north end of the 27" diameter portion of the River Road Interceptor and to the north end of the 36" diameter portion of the interceptor when the tributary areas to each part of the River Road interceptor sewer are fully developed. These flows are used to evaluate the adequacy of the River Road Interceptor Sewer.

C. River Road Interceptor Projected Future Flows

Mr. Poole also indicated that additional flows resulting from future development within Naperville must be included in the projection of total flows to be conveyed by the River Road Interceptor Sewer. It is Naperville's intention to reserve and protect a sufficient portion of the remaining capacity of this sewer to ensure that future development in this part of Naperville may occur

without limitation due to lack of interceptor sewer capacity. In order to properly evaluate the capacity available for wastewater flow from the ECSQ site, an estimate of flow resulting from future Naperville developments tributary to the River Road Interceptor Sewer has been computed based upon development information provided by Mr. Poole. This information is set forth in Table 9.

TABLE 9

FUTURE NAPERVILLE WASTEWATER FLOW
TO
RIVER ROAD INTERCEPTOR SEWER

Wastewater Flow Tributary to
27" Diameter River Road Sewer
(See Exhibit 3)

Origin	Type of Development	Square Footage	Average Daily Flow: Projected Flow/Unit	Average Daily Flow: Dry Weather Flow(MG)
1. NI Gas Co. Headquarters	Office	2,000,000	0.10 gpd/s.f.	0.20
2. Bell Labs Property	Office/Research	2,000,000	0.15 gpd/s.f.	0.30
3. Nalco Corp.	Office/Research	600,000	0.15 gpd/s.f.	0.09
			Total =	0.59

Wastewater Flow Tributary to
36" Diameter River Road Sewer
(See Exhibit 3)

Origin	Type of Development	No. of Acres or Dwelling Units	Average Daily Flow: Projected Flow/Unit	Average Daily Flow: Dry Weather Flow(MG)
4. 24" McDowell Rd Trunk Sewer Service Area	Mixed Use	2100 Acres	----	2.00*
5. Brookdale Subdivision	Residential	780 D.U.	3.5 P.E./D.U.	0.27
			Total =	2.27

*For computation of this flow see Appendix B

VI. EVALUATION OF NAPERVILLE SYSTEM CAPACITY

A. Evaluation Assumptions

A comparison of future wastewater flow to the capacity of the individual components of Naperville's wastewater conveyance system is necessary to determine the adequacy of Naperville's system. The effect of average daily dry weather, daily wet weather and peak hourly wet weather flows must be analyzed and compared to interceptor sewer and pump station capacity. If surcharges result they must be reviewed to determine if wastewater rises to unacceptable elevations at any location along the length of the sewer.

Three assumptions have been made to facilitate the evaluation of existing interceptor sewer capacity. First, with respect to the computation of peak flow rates, it is recognized that calculating the maximum peak hourly wet weather flow rate by simply adding the peak hour flows from large, independent service areas produces flow rates which are higher than those actually experienced. This bias to higher theoretical flows occurs because the addition of peak wastewater flows without regard to time assumes that peak hour flow rates from independent service areas occur simultaneously. This assumption is technically incorrect and produces an overly-conservative (higher than actual) estimate of peak flows.

The projection of accurate peak hourly flow rates in interceptor sewers is a complex procedure which is dependent upon many variables within the service area. This level of accuracy is not warranted for this study given the variables contained in the projected future flow rates and, if such a detailed study were undertaken, would only serve to reduce the peak flows set forth in this report. Accordingly, the projected flows analyzed

herein are clearly the "worst-case" flows. If these theoretical flows can be conveyed by the present Naperville system without unacceptable surcharges, then the actual anticipated flows and resulting surcharge depths should also be acceptable.

Second, the data presented in this report allows for a reasonable approximation of the total future flow to the River Road Interceptor Sewer and Northwest Pump Station. The Springbrook Interceptor Sewer, however, will receive some additional flow beyond that received from the River Road Interceptor. No attempt has been made to determine the amount of additional flow to the Springbrook Interceptor inasmuch as some level of reserve capacity appears to be available in the interceptor. Also, Mr. Poole has stated he does not anticipate the addition of substantial additional flows to the Springbrook Interceptor Sewer from the areas in Naperville south of Aurora Avenue.

Third, in comparing the actual peak factors for current wastewater flow from Warrenville to the peak factors contained in the intergovernmental agreement (188 percent calculated to 250 percent regulated for daily wet weather flow and 265 percent calculated to 400 percent regulated for peak hourly flow), it is apparent that application of the intergovernmental agreement peaking factors will produce unrealistically high wet weather flows based upon historical flow data. It would appear that a more realistic assessment of the impact of peak flows on Naperville's interceptor system must take into account the actual historical peak flow factors when determining future wet weather flows.

An analysis of the impact of the theoretical flows based upon peak factors permitted by the intergovernmental agreement is beneficial only as a means of determining

the theoretical maximum flows and the corresponding maximum anticipated surcharges which could occur in Naperville's interceptor sewer system.

For purposes of evaluating Naperville's interceptor sewer capacity, daily wet weather and peak hour wet weather flow rates have been analyzed by using both the average historical peaking factors and the theoretical (intergovernmental agreement) maximum peaking factors. This methodology should provide a reliable estimation of the anticipated actual and theoretical maximum surcharges which would occur in Naperville's interceptor sewer system.

B. River Road Interceptor Sewer - 27" Diameter

1) Projected Design Flows

Flow to the 27" diameter portion of the River Road Interceptor Sewer includes wastewater from the City of Warrenville, the ECSQ site, and the Northern Illinois Gas, Bell Lab and Nalco Corporation sites in Naperville. Table 10 presents design flows to this portion of the River Road Interceptor after full development of the above-referenced properties. Wastewater from the City of Warrenville (exclusive of the ECSQ site) is presented in Table 10 at the maximum daily dry weather flow rate of 1.74 MGD permitted under the intergovernmental agreement between Warrenville and Naperville. Although it is unlikely, in our opinion, that the City of Warrenville (exclusive of the ECSQ site) will ever experience daily dry weather flows of 1.74 MGD due to the limited amount of area remaining to be developed in Warrenville, it is

TABLE 10

RIVER ROAD INTERCEPTOR SEWER
27" DIAMETER
DESIGN FLOWS

ANTICIPATED ACTUAL FLOWS:

CONTRIBUTING AREA	AVERAGE DAILY DRY WEATHER FLOW (MGD)	DAILY WET WEATHER FLOW PEAKING FACTOR	DAILY WET WEATHER FLOW DAILY FLOW (MG)	PEAK HOURLY WET WEATHER FLOW PEAKING FACTOR	PEAK HOURLY WET WEATHER FLOW PEAK HOUR FLOW (MGD)
ECSQ Site	1.00	1.88	1.88	2.65	2.65
City of Warrenville	1.74	1.88	3.27	2.65	4.61
City of Naperville	0.59	1.88	1.11	2.65	1.56
-N.I. Gas					
-Bell Lab					
-Nalco Corp.					
Total	3.33		6.26		8.82

THEORETICAL MAXIMUM FLOWS:

CONTRIBUTING AREA	AVERAGE DAILY DRY WEATHER FLOW (MGD)	DAILY WET WEATHER FLOW PEAKING FACTOR	DAILY WET WEATHER FLOW DAILY FLOW (MG)	PEAK HOURLY WET WEATHER FLOW PEAKING FACTOR	PEAK HOURLY WET WEATHER FLOW PEAK HOUR FLOW (MGD)
ECSQ Site	1.40	2.50	3.50	4.00	5.60
City of Warrenville	1.74	2.50	4.35	4.00	6.96
City of Naperville	0.59	2.50	1.48	4.00	2.36
-N.I. Gas					
-Bell Lab					
-Nalco Corp.					
Total	3.73		9.33		14.92

necessary to maintain the permitted flow rate set forth in the intergovernmental agreement for Warrenville so that future development in Warrenville is not limited by the ECSQ development. Therefore, for purposes of capacity analysis, a daily dry weather flow of 3.33 MGD, as shown in Table 10, is the projected anticipated actual daily dry weather flow to the 27" diameter portion of the River Road Interceptor Sewer.

Table 10 also projects future daily wet weather flows of 6.26 MGD. This flow is based upon a peaking factor of 1.88 for wastewater flow from the existing City of Warrenville, the ECSQ site and the Northern Illinois Gas, Bell Lab and Nalco Corp. sites in Naperville.

Finally, Table 10 also shows a future peak hourly wet weather flow rate of 8.82 MGD. This flow is based upon a peaking factor of 2.65 for wastewater flow from the existing City of Warrenville, the ECSQ site and the Northern Illinois Gas, Bell Lab and Nalco Corp. sites in Naperville.

Theoretical maximum flows reflecting the "worst-case" condition of maximum flow from the ECSQ site and the City of Warrenville and peak factors in accordance with the maximum allowable limits set forth in the intergovernmental agreement are calculated to be 3.73, 9.33 and 14.92 MGD for average daily dry weather, daily wet weather and peak hourly flow rates, respectively.

2) Capacity Analysis

a. Anticipated Actual Flows

The projected flow conditions described in the previous section can be compared to the flowing full capacity of the 27" diameter portion of the River Road Interceptor Sewer. Table 11 has been prepared to show surcharge depths in the 27" diameter interceptor sewer when this sewer is subjected to flow rates of 6, 9 and 15 MGD. These flow rates were selected for backwater analysis because they approximate the anticipated actual daily wet weather, peak hourly wet weather and the theoretical maximum peak hourly wet weather wastewater flow conditions. A simplifying, and conservative, assumption in all capacity calculations was made by assuming that the flow rate conveyed through the entire length of the sewer is the sum of all flows tributary to the sewer regardless of the point of inflow into the sewer.

The total average daily dry weather flow in the 27" diameter sewer is 3.33 MG which is less than the pipe's flowing full capacity.

The daily wet weather flow rate of 6.26 MGD exceeds the flowing full capacity of the 27" diameter River Road Interceptor between Manhole Nos. 20-21 and 25-26. A maximum surcharge of 0.47 feet occurs at Manhole Nos. 26 and 27 and can be considered insignificant in its impact to operation of the system.

TABLE 11

RIVER ROAD INTERCEPTOR SEWER
27" DIAMETER
SURCHARGE DATA

UPSTREAM MANHOLE	GROUND ELEVATION	MANHOLE INVERT ELEVATION	WASTEWATER SURCHARGE ELEVATION @ 6 MGD	@ 9 MGD	@ 15 MGD
29	701.95	676.38	678.63	682.38(3.75)	694.62(15.99)
28	696.67	675.69	677.94	681.65(3.71)	692.66(14.72)
27	703.97	674.78	677.50(0.47)	680.72(3.69)	690.17(13.14)
26	702.73	674.65	677.37(0.47)	680.41(3.51)	689.35(12.45)
25	697.04	674.36	676.90(0.29)	679.32(2.71)	686.43(9.82)
24	695.32	673.90	676.34(0.19)	678.02(1.87)	682.96(6.81)
23	714.56	673.44	675.81(0.12)	676.79(1.10)	679.67(3.98)
22	706.38	673.03	675.55(0.27)	676.19(0.91)	678.06(2.78)
21	704.89	672.74	675.28(0.29)	675.57(0.58)	676.40(1.41)
20	699.55	672.82	675.07	675.07	675.07

*Parentheses indicate depth of surcharge above the crown of the sewer. See Appendix C for calculation of surcharge depth.

The peak hour wet weather flow rate of 8.82 MGD results in a maximum surcharge of 3.75 feet over the crown of the pipe at Manhole No. 29. Based upon a review of the rim and invert elevations of the 27" diameter River Road Interceptor Sewer shown in Table 8, a surcharge of 3.75 feet should not create sewer backup problems for adjoining local sewers. This conclusion should, however, be confirmed by a review of the as-built data for connecting sewers available from Naperville and Warrenville.

b. Theoretical Maximum Flows

The theoretical maximum flow rates computed in Table 10 can also be compared to the flow capacity of the 27" diameter interceptor. Under these theoretical conditions, the total average daily dry weather flow is 3.73 MG which is less than the flowing full capacity of the 27" diameter sewer.

The daily wet weather flow rate of 9.33 MG exceeds the flowing full capacity of the 27" diameter sewer and results in a maximum surcharge of 3.75 feet above the crown of the pipe at Manhole No. 29. As stated above, this surcharge should not present sewer backup conditions in adjoining local sewers.

The peak hourly wet weather flow rate of 14.92 MGD significantly exceeds the flowing full capacity of the 27" diameter sewer. Under these flow conditions a maximum surcharge of

15.99 feet is experienced at Manhole No. 29. It is quite possible that a review of the as-built drawings will indicate that a surcharge of 15.99 feet would cause unacceptable sewage backups in either the Warrenville or Naperville systems.

From the data presented above, it is apparent that for five of the six flow conditions, the 27" diameter interceptor sewer has sufficient capacity and no increase in the capacity of the system is required. It is only under the theoretical maximum peak hourly condition that surcharges may create unacceptable sewer backups in adjoining local sewers. If this condition did occur, some type of system capacity enhancement, such as a holding basin, may be required.

C. River Road Interceptor Sewer - 36" Diameter

1) Projected Design Flows

Flow to the 36" diameter portion of the River Road Interceptor Sewer includes wastewater from the 27" diameter portion of the River Road Interceptor, the 24" diameter Naperville trunk sewer along McDowell Road and the Brookdale Subdivision. Table 12 presents the design flows to this portion of the River Road Interceptor Sewer after full development of the areas served by the tributary sewers.

As with the 27" diameter portion of the interceptor, wastewater flow rates are projected as actual anticipated and theoretical maximum flow

rates. Table 12 sets forth average daily dry weather flows of 5.60 MG. It also projects future daily wet weather flows of 10.53 MGD. This flow is based upon a peaking factor of 1.88 for wastewater flow from Warrenville, the ECSQ site, the Northern Illinois Gas, Bell Lab and Nalco Corp. sites in Naperville and the service areas in Naperville tributary to the 24" diameter McDowell Road trunk sewer and the Brookdale Subdivision sewers.

Finally, Table 12 presents a future peak hourly wet weather flow rate of 14.84 MGD. This flow is based upon a peak factor of 2.65 for all tributary wastewater flows.

Theoretical maximum flows reflecting the "worst-case" condition of maximum flow from the ECSQ site and the City of Warrenville and peak factors in accordance with the maximum allowable percentages shown in the intergovernmental agreement are calculated to be 6.00, 15.01 and 24.00 MGD for average daily dry weather, daily wet weather and peak hourly flow rates, respectively.

TABLE 12

RIVER ROAD INTERCEPTOR SEWER
36" DIAMETER
DESIGN FLOWS

ANTICIPATED ACTUAL FLOWS:

CONTRIBUTING AREA	AVERAGE DAILY DRY WEATHER FLOW (MG)	DAILY WET WEATHER FLOW PEAKING FACTOR	DAILY WET WEATHER FLOW DAILY FLOW (MG)	PEAK HOURLY WET WEATHER FLOW PEAKING FACTOR	PEAK HOURLY WET WEATHER FLOW PEAK HOUR FLOW (MGD)
ECSO Site	1.00	1.88	1.88	2.65	2.65
City of Warrenville	1.74	1.88	3.27	2.65	4.61
City of Naperville					
-N.I. Gas, Bell Lab & Nalco Corp.	0.59	1.88	1.11	2.65	1.56
-24" McDowell Road Trunk Sewer Service Area	2.00	1.88	3.76	2.65	5.30
-Brookdale Subdivision	0.27	1.88	0.51	2.65	0.72
Total	5.60		10.53		14.84

THEORETICAL MAXIMUM FLOWS:

CONTRIBUTING AREA	AVERAGE DAILY DRY WEATHER FLOW (MGD)	DAILY WET WEATHER FLOW PEAKING FACTOR	DAILY WET WEATHER FLOW DAILY FLOW (MG)	PEAK HOURLY WET WEATHER FLOW PEAKING FACTOR	PEAK HOURLY WET WEATHER FLOW PEAK HOUR FLOW (MGD)
ECSO Site	1.40	2.50	3.50	4.00	5.60
City of Warrenville	1.74	2.50	4.35	4.00	6.96
City of Naperville					
-N.I. Gas, Bell Lab & Nalco Corp.	0.59	2.50	1.48	4.00	2.36
-24" McDowell Road Trunk Sewer Service Area	2.00	2.50	5.00	4.00	8.00
-Brookdale Subdivision	0.27	2.50	0.68	4.00	1.08
Total	6.00		15.01		24.00

2) Capacity Analysis

a. Anticipated Actual Flows

The projected flow conditions described in the previous section can be compared to the flowing full capacity of the 36" diameter portion of the River Road Interceptor Sewer. Table 13 has been prepared to show surcharge depths in the 36" interceptor sewer when this sewer is subjected to flow rates of 11, 15 and 24 MGD. Once again, these flow rates were selected for backwater analysis because they approximate the anticipated actual daily wet weather and peak hourly wet weather and the theoretical maximum peak hourly wet weather flow conditions.

The total average daily dry weather flow through the 36" diameter sewer is 5.60 MGD which does not exceed the pipe capacity.

The daily wet weather flow rate is 10.53 MGD and slightly exceeds the flowing full capacity of the 36" diameter interceptor sewer. A maximum surcharge of 0.53 feet over the crown of the pipe occurs at Manhole No. 14 which will not present operational problems.

The peak hour weather flow rate is 14.84 MGD which results in a maximum surcharge of 2.55 feet over the crown of the pipe at Manhole No. 19.

TABLE 13

RIVER ROAD INTERCEPTOR SEWER
36" DIAMETER
SURCHARGE DATA

UPSTREAM MANHOLE	GROUND ELEVATION	MANHOLE INVERT ELEVATION	WASTEWATER SURCHARGE ELEVATION @ 11 MGD	@ 15 MGD	@ 24 MGD
20	699.55	672.82	675.43	678.28(2.46)	689.70(13.88)
19	693.44	672.20	675.12	677.75(2.55)	688.31(13.11)
18	694.28	671.84	674.75	677.11(2.27)	686.66(11.82)
17A	701.25	671.81	674.68	676.98(2.17)	686.34(11.53)
17	698.04	671.48	674.44	676.56(2.08)	685.26(10.78)
16	688.45	671.01	674.01	675.83(1.82)	683.36(9.35)
15A	690.54	670.89	673.63	675.45(1.56)	682.39(8.50)
15	692.08	670.54	673.85(0.31)	675.10(1.56)	681.49(7.95)
14	693.68	669.90	673.43(0.53)	674.37(1.47)	679.62(6.72)
13	701.12	669.90	673.10(0.20)	673.81(0.91)	678.17(5.27)
12	700.07	669.92	672.92	673.51(0.59)	677.40(4.48)
11A	696.20	669.70	672.54	673.11(0.41)	676.37(3.67)
11	696.00	669.32	672.46(0.14)	672.98(0.66)	676.03(3.71)
10	697.50	669.03	672.14(0.11)	672.43(0.40)	674.60(2.57)
9	692.92	668.82	671.82	671.88(0.06)	673.18(1.36)
8	698.42	668.32	670.27	671.32	671.75(0.43)
7	703.02	667.32	668.88	669.39	670.32

*Parentheses indicate depth of surcharge above crown of sewer. See Appendix C for calculation of surcharge depth.

Once again, a review of the rim and invert elevations of the 36" diameter River Road Interceptor Sewer indicates that this surcharge should not create local sewer backup problems for adjoining local sewers. This conclusion should also be confirmed by a review of the as-built sewer data for connecting sewers available from the City of Naperville.

b. Theoretical Maximum Flows

The theoretical maximum flow rates computed in Table 12 can also be compared to the flow capacity of the 36" diameter interceptor. Under these theoretical conditions, the total average daily dry weather flow is 6.00 MG which does not exceed the flowing full capacity of the 36" diameter sewer.

The daily wet weather flow rate is 15.01 MG which exceeds the flowing full capacity of the 36" diameter sewer. A maximum surcharge of 2.55 feet above the crown of the pipe occurs at Manhole No. 19 which will not present operational problems.

The peak hourly wet weather flow rate is 24.00 MGD and significantly exceeds the flowing full capacity of the 36" diameter sewer. Under these flow conditions a maximum surcharge of 13.88 feet is experienced at Manhole No. 20. Again, it is possible that a review of the as-built drawings will indicate that a surcharge

of 13.88 feet would cause unacceptable sewage backups.

As in the case of the 27" diameter interceptor, in five of the six flow conditions, the 36" diameter sewer has adequate capacity and would not require capacity enhancement.

D. NW Pump Station

1) Projected Design Flows

Total flow to the NW Pump Station is comprised of flows from the 36" diameter River Road Interceptor Sewer and flows received from the service area west of River Road and north of North Aurora Road in Naperville. Table 14 sets forth the projected flows at the NW Pump Station based upon the same peaking factors used for the analysis of the 36" diameter River Road Interceptor Sewer.

2) Capacity Analysis

a. Anticipated Actual Flows

If the projected flow conditions shown in Table 14 are compared to the design capacity of the NW Pump Station shown in Table 7 (8.57 MGD), it is apparent that this pump station can accommodate all dry weather flow (5.69 MGD) to the station without diversion. For daily and peak hourly wet weather flows of 10.70 MGD and 15.08 MGD, 2.13 MGD and 6.51 MGD, respectively, would be diverted to the

North Pump Station. The combined capacity of the Northwest and North Pump Stations is 19.51 MGD. Therefore, depending on the flow to the North Pump Station from other tributary areas within Naperville, the capacity of both pump stations may be temporarily exceeded under certain peak hourly flow conditions and some reserve capacity would have to be provided in the system.

b. Theoretical Maximum Flows

The theoretical maximum flow rates computed in Table 14 can also be compared to the flow capacity of the NW Pump Station. Under these theoretical conditions, the total average daily dry weather flow is 6.09 MG which does not exceed the design capacity of the NW Pump Station.

The daily wet weather flow rate of 15.24 MG does exceed the design capacity of the NW Pump Station. Under this flow condition, 6.67 MG would be diverted to the North Pump Station.

The peak hourly wet weather flow rate of 24.36 MGD exceeds the combined design capacity of the Northwest and North Pump Station. Under these flow conditions it would be necessary to use the storage lagoons at the North Pump Station to reduce the peak hourly flows to levels capable of being accommodated by the two pump stations.

TABLE 14

NORTHWEST PUMP STATION
DESIGN FLOWS

ANTICIPATED ACTUAL FLOWS:

CONTRIBUTING AREA	AVERAGE DAILY DRY WEATHER FLOW (MG)	DAILY WET WEATHER FLOW PEAKING FACTOR	DAILY WET WEATHER FLOW DAILY FLOW (MG)	PEAK HOURLY WET WEATHER FLOW PEAKING FACTOR	PEAK HOURLY WET WEATHER FLOW PEAK HOUR FLOW (MGD)
ECSQ Site	1.00	1.88	1.88	2.65	2.65
City of Warrenville	1.74	1.88	3.27	2.65	4.61
City of Naperville					
-N.I. Gas, Bell Lab & Nalco Corp.	0.59	1.88	1.11	2.65	1.56
-24" McDowell Road Trunk Sewer Service Area	2.00	1.88	3.76	2.65	5.30
-Brookdale Subdivision	0.27	1.88	0.51	2.65	0.72
-N. Aurora Road Service Area	0.09	1.88	0.17	2.65	0.24
Total	5.69		10.70		15.08

THEORETICAL MAXIMUM FLOWS:

CONTRIBUTING AREA	AVERAGE DAILY DRY WEATHER FLOW (MG)	DAILY WET WEATHER FLOW PEAKING** FACTOR	DAILY WET WEATHER FLOW DAILY FLOW (MG)	PEAK HOURLY WET WEATHER FLOW PEAKING** FACTOR	PEAK HOURLY WET WEATHER FLOW PEAK HOUR FLOW (MGD)
ECSQ Site	1.40	2.50	3.50	4.00	5.60
City of Warrenville	1.74	2.50	4.35	4.00	6.96
City of Naperville					
-N.I. Gas, Bell Lab & Nalco Corp.	0.59	2.50	1.48	4.00	2.36
-24" McDowell Road Trunk Sewer Service Area	2.00	2.50	5.00	4.00	8.00
-Brookdale Subdivision	0.27	2.50	0.68	4.00	1.08
-N. Aurora Road Service Area	0.09	2.50	0.23	4.00	0.36
Total	6.09		15.24		24.36

E. Springbrook Interceptor Sewer

1) Projected Design Flows

Flow to the Springbrook Interceptor Sewer includes wastewater received from the Northwest and North Pump Stations and wastewater flows from existing developments south of Aurora Avenue and west of Naperville-Plainfield Road. The projected flow into the 42" diameter interceptor sewer from the service area north of Oswego Road is equal to the combined pumping capacity of the Northwest and North Pump Stations. At the north end of the Springbrook Interceptor Sewer the combined pumping rate of the two stations is 19.51 MGD.

2) Capacity Analysis

The projected maximum flow rate presented above can be compared to the flowing full capacity of the Springbrook Interceptor Sewer. Table 15 shows that the 42" diameter interceptor sewer can accommodate a flow rate of 20 MGD with a maximum surcharge of 0.28 feet at Manhole No. 41. Any additional flows entering the 42" interceptor south of Manhole No. 60 appear to be quite limited and well within the reserve capacity available in the 42" Springbrook Interceptor Sewer. Confirmation of this assumption should be obtained from Mr. Poole of the City of Naperville's Water and Wastewater Utility Department.

To determine the magnitude of surcharge resulting from a 25 MGD flow rate which would account for

additional inflow to the interceptor at selected points south of Manhole No. 60, the portion of the 42" interceptor sewer between Manhole Nos. 31 and 60 was analyzed under a 25 MGD flow rate. Table 15 shows a maximum surcharge depth of 5.12 feet which occurs at Manhole No. 56.

As a "worst-case" scenario and in the event that a major new wastewater inflow source were to occur south of 75th Street, the portion of the 42" diameter interceptor sewer between Manhole Nos. 1 and 31 was analyzed under a 30 MGD flow rate. This flow rate produced a maximum surcharge of 7.80 feet above the crown of the pipe at Manhole No. 31.

TABLE 15

SPRINGBROOK INTERCEPTOR SEWER
42" DIAMETER
SURCHARGE DATA

UPSTREAM MANHOLE*	GROUND ELEVATION	MANHOLE INVERT ELEVATION	WASTEWATER SURCHARGE ELEVATION @ 20 MGD	@ 25 MGD	@ 30 MGD
56	701.04	674.97	-----	683.59(5.12)	-----
54	685.74	674.04	-----	682.42(4.88)	-----
41	689.05	667.35	671.13(0.28)	-----	
31	677.62	655.82	-----	-----	667.12(7.80)
19	669.88	649.58	639.19(0.11)	-----	-----

*Manholes shown in Table 15 relate to the critical sewer segments referred to in Section V-B-1. See Appendix C for calculation of surcharge depth.

F. Springbrook Regional Water Reclamation Center

The impact of increased wastewater flows to the Springbrook treatment plant is not as significant as the impact to interceptor sewers inasmuchas the treatment plant, unlike interceptor sewers, can be expanded. As stated before, the addition of average daily dry weather flows ranging from 0.900 MG to 1.40 MG and daily wet

weather flows between 2.25 MG and 3.50 MG from the ECSQ site can be readily accommodated within the expansion potential of the Springbrook Regional Water Reclamation Center.

VII. CONCLUSION

This study was undertaken to evaluate the impact of wastewater flow originating from Elmhurst-Chicago Stone Company's Warrenville Quarry site on that portion of the interceptor sewer system of Naperville which provides service to Warrenville. Flows from the ECSQ site and other tributary areas in Warrenville and Naperville have been projected based upon existing flow data and future development plans for affected areas in the above-noted municipalities.

A. Findings

In determining the potential impact of future wastewater flows on the existing system, it was necessary to evaluate both the "anticipated-actual" and the "theoretical-maximum" (worst-case) flow conditions. Table 16 has been prepared to summarize key findings of the data and analysis presented in Section VI.

An examination of this table indicates that under "anticipated-actual" flow conditions the resulting interceptor sewer surcharges and Northwest Pump Station by-pass rates should create little, if any, operational difficulties, even during peak hourly wet weather flow conditions. If the flows actually experienced in the future reflect the anticipated flows, there would be, in our opinion, no basis for undertaking any special construction measures to attenuate peak flows.

Table 16 also summarizes the impact to the interceptor system when "theoretical-maximum" flows are imposed upon the system. Under these flow conditions, it is apparent that significant surcharges would occur during peak hourly wet weather flow conditions which could result in

TABLE 16

COMPARISON OF CRITICAL FLOW RATES AND SURCHARGE/BY-PASS*

INTERCEPTOR SYSTEM COMPONENT	DAILY DRY WEATHER FLOW	DAILY DRY WEATHER MAXIMUM SURCHARGE (FT) BY-PASS (MG)	AVERAGE DAILY WET WEATHER FLOW	AVERAGE DAILY WET WEATHER MAXIMUM SURCHARGE (FT) BY-PASS (MG)	PEAK HOURLY WET WEATHER FLOW	PEAK HOURLY WET WEATHER MAXIMUM SURCHARGE (FT) BY-PASS (MGD)	PEAK HOURLY WET WEATHER ECSO FLOW (MGD)	PEAK HOURLY WET WEATHER % OF PEAK HOURLY TOTAL
Anticipated Actual Design Flows								
River Road Interceptor								
-27" Diameter	3.33 MG	-0-	6.26 MG	0.47 ft	8.82 MGD	3.75 ft	2.52	28.6
-36" Diameter	5.60 MG	-0-	10.53 MG	0.53 ft	14.84 MGD	2.55 ft	2.52	17.0
Northwest Pump Station	5.69 MG	-0-	10.70 MG	2.13 MG	15.08 MGD	6.51 MGD	2.52	16.7
Springbrook Interceptor	19.51 MG	-0-	19.51 MG	0.53 ft	19.51 MGD	0.53 ft	2.52	12.9
Theoretical Maximum Design Flows								
River Road Sewer								
-27" Diameter	3.73 MG	-0-	9.33 MG	3.75 ft	14.92 MGD	15.99 ft	5.60	37.5
-36" Diameter	6.00 MG	-0-	15.01 MG	2.55 ft	24.00 MGD	13.88 ft	5.60	23.3
Northwest Pump Station	6.09 MG	-0-	15.24 MG	6.67 MG	24.36 MGD	15.79 MGD	5.60	23.0
Springbrook Sewers	19.51 MG	-0-	25.00 MG	5.12 ft	25.00 MGD	5.12 ft	5.60	22.4

*Surcharge/By-pass refers to depth of surcharge in interceptor sewers or the rate of flow by-passing the NW Pump Station.

sewage backups in the connecting sewers. Accordingly, the "theoretical-maximum" peak hour, wet weather flow condition, if realized, would require additional flow capacity to the system or implementation of a method to reduce peak flows.

Adding capacity to the system by constructing new sewers can be costly and disruptive to surrounding infrastructure. In a situation where the interceptor sewer capacity is essentially fixed unless new piping is installed, it is more preferable to employ a method whereby peak flows can be attenuated.

B. Flow Attenuation

If the theoretical, wet weather peak hour flow condition was realized, an appropriate method for reducing peak flows in this particular situation would be to provide wastewater storage facilities which temporarily detain the wastewater until peak flow rates subside. The detained wastewater is then released into the interceptor sewers during non-peak periods. The flow data provided by Warrenville and Naperville demonstrate that daily peak flow periods generally occur between 7:30 a.m. and 9:30 a.m. and 7:00 p.m. and 9:00 p.m. With respect to rainfall-influenced peak rates it is obvious that peak flow due to rainfall can occur at any point in the day. If wastewater flows were to be temporarily detained in a holding basin and discharged during the low-flow or non-rainfall influenced periods of the day, the effective capacity of the system would be increased. (Currently, this temporary detainage of excessive peak flows takes place at the North Pump Station through the use of the storage lagoons along the river.)

If ECSQ's peak hourly flows are compared to total flow in the interceptor system, it is apparent that, during "theoretical-maximum" peak hourly flow periods, the temporary interruption of flow from the ECSQ site would reduce, but not totally eliminate, interceptor system surcharges and pump station by-passes (See Table 16). Total elimination of surcharges during "theoretical-maximum" flow conditions would require the construction of a holding basin diverting flow from Naperville and Warrenville tributary areas to the River Road interceptor, not just the ECSQ site. Given the small probability that the theoretical flows projected herein will ever occur, it should not be necessary to construct a holding basin until such time as flow rates in the interceptor sewer system exceed the capacity of the system.

Total ultimate flow from the ECSQ site and the remainder of future development areas in Naperville will not occur for a number of years. The opportunity for Naperville to carefully monitor flow at critical points throughout the interceptor system by means of the ADS flow measurement stations will permit an on-going and accurate evaluation of wastewater flow in the system. The ability to monitor daily dry, daily wet and peak hourly wet weather conditions will allow Naperville to develop correlation factors between area-wide development and actual wastewater flow. This information will permit accurate forecasting of long-term interceptor sewer capacity demands.

C. Recommendations

Based on the findings of this study we do not recommend construction of a wastewater holding basin on the ECSQ

site at the on-set of development for the following reasons:

First, the actual flow in the system after total development of the service areas will probably not reach a flow rate which exceeds the functional capacity of the interceptor system.

Second, flow measurement will permit on-going monitoring and comparison of wastewater flow rates and system capacity. This monitoring activity will serve as an early warning system which will provide adequate advance notice to increase system capacity.

Third, it is highly unlikely that the "theoretical-maximum" flows projected herein will become actual flow rates experienced by the system. If a specific segment of the Naperville system experiences capacity problems, then it may be more desirable and cost effective to increase the capacity of this specific segment rather than constructing a holding basin. If it proves to be unfeasible to increase the capacity of a part of the interceptor system, a holding basin can always be utilized as a means of increasing system capacity assuming that some land area has been set aside for this use.

We recommend that the following conditions be made part of an amended intergovernmental agreement between Warrenville and Naperville to allow for the inclusion of Elmhurst-Chicago Stone Quarry wastewater flows into Naperville's interceptor sewer and treatment system.

First, construction of a new pump station and force main discharging from the ECSQ site to the 27" diameter River Road Interceptor Sewer should include an ADS flow measurement station not only for Naperville's billing purposes but also for the monitoring of peaking factors associated with wastewater flow discharged from the ECSQ property.

Second, a permanent flow measurement station should be installed at the proposed Northwest Pump Station to accurately determine wastewater flows and peaking factors associated with the River Road Interceptor Sewer tributary areas in Naperville west of River Road. This flow could be determined by subtracting flow measurements at the Warrenville Measuring Station and ECSQ Measuring Station from a measuring station located at the Northwest Pumping Station. The purpose for this level of flow monitorization is to accurately determine the peaking factors associated with each of the three major tributary areas to the NW Pump Station (Warrenville, ECSQ and Northwest Naperville).

Third, if at any point, during or after full development of the areas tributary to Naperville's interceptor sewer system, wastewater flows exceed functional pipe capacities, a holding basin could be installed on the ECSQ site. Based upon our understanding of allowable surcharge depths we believe this holding basin would have to be installed when the peak hourly wet weather flows in the 27" diameter interceptor sewer consistently reach or exceed flows in the range of 11 to 13 MGD.

Fourth, the size of the holding basin should be determined when more detailed flow monitoring data is available. The size of the basin will be influenced by the percentage of the service area which has been fully developed and by the length of time peak flows exceed the interceptor sewer and pumping station capacity. Based upon the flow data received from Naperville and Warrenville it appears that the average duration that wet weather peak flows would exceed the capacity of the interceptor system is approximately three to four hours. If ECSQ flow was totally withheld during this period of time and then released after the flow rate in the 27" diameter sewer declined to less than 9 MGD, the required holding basin volume would range between 150,000 gallons and 240,000 gallons depending on the size of the ECSQ development. Given the unpredictable nature of wet weather conditions it would be good engineering practice, in our opinion, to design the holding basin with some factor of safety for size to account for variations in the rate and amount of flow which may occur at any point during the day. This factor can be more knowledgeably selected after a longer period has elapsed for data collection and analysis.

Fifth, an area on the ECSQ site adjacent to the proposed pumping station should be reserved on the ECSQ land plan. This area would be available for construction of a wastewater holding basin if it is required in the future. Since the holding basin would most likely consist of a buried tank(s) in the vicinity of the pump station, the area reserved

for the basin could also serve as part of open space or walkway areas planned for the development.

Sixth, for purposes of projecting capacity demands at the Springbrook Regional Water Reclamation Center, a daily dry weather flow from the ECSQ site at full development should be assumed to be 1,000,000 gallons.

D. Summary

In conclusion, it is our opinion that the Naperville Interceptor Sewer system has adequate capacity to accept flows from the ECSQ site as well as all other service areas currently tributary to the River Road Interceptor Sewer for the foreseeable future. In the event that future flows begin to approach or exceed interceptor sewer capacity, the system capacity can be increased by construction of a wastewater holding facility to temporarily detain flow originating from the ECSQ site. The facility should not, in our opinion, be designed or constructed until the magnitude of excess wastewater flow, if any, can be more accurately projected.

The Springbrook Treatment Plant can be expanded as part of an on-going capacity increase process to accept the wastewater flow generated by development of the Elmhurst-Chicago Stone Quarry.

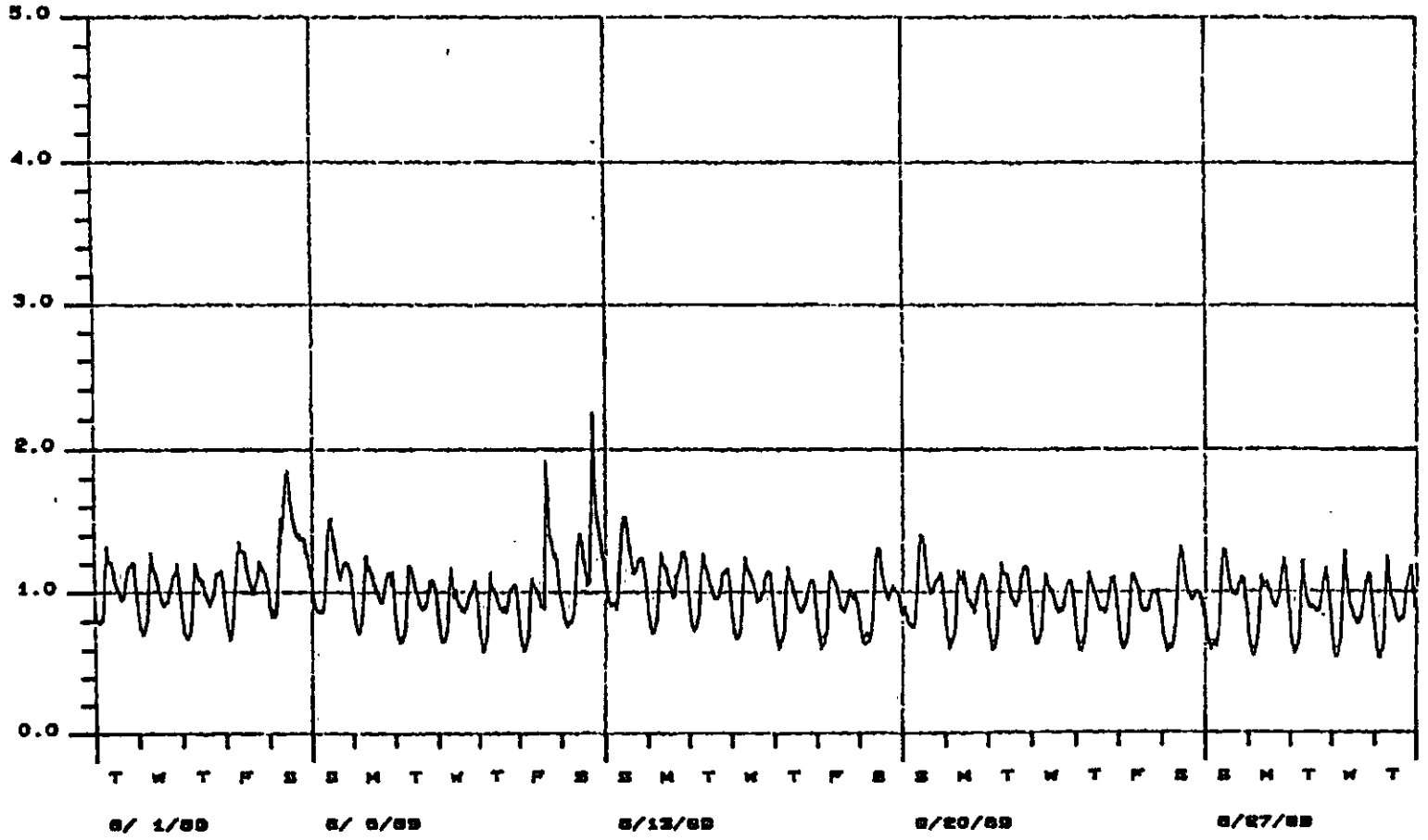
APPENDIX A

SAMPLE WMS FLOW MEASUREMENT DATA

CITY OF NAPERVILLE

WMS

AUGUST, 1990 DATA



1.041 +
0.985 +
0.974 +
1.067 +
1.335 +
1.126 +
1.002 +
0.933 +
0.906 +
0.885 +
1.037 +
1.195 +
1.159 +
1.045 +
1.008 +
0.978 +
0.910 +
0.894 +
0.937 +
1.020 +
0.934 +
0.958 +
0.900 +
0.895 +
0.888 +
0.904 +
0.926 +
0.925 +
0.891 +
0.863 +
0.880 +
30.410 *

09-25-89 15:42:41 Sensor: MAN VM

8-59

SITEID : NMS
ID 1 : DIAMETER = 27.00 INCHES
ID 2 : CITY OF WARRENVILLE NW FLOW

PIPE DIAMETER : 27.000
PIPE SHAPE : CIRCULAR
ENERGY GRADIENT : 3.157 SERTIS/M

BASIN : 0201 RIVER RD.
RAIN GAUGE:
MUD: 0.0

	TUESDAY AUG 1,1989		WEDNESDAY AUG 2,1989		THURSDAY AUG 3,1989		FRIDAY AUG 4,1989		SATURDAY AUG 5,1989		SUNDAY AUG 6,1989		MONDAY AUG 7,1989	
	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD
0:00:00	6.9		6.7		6.7		6.5		6.9		7.2		6.8	
:15:00	6.8		6.6		6.5		6.5		6.7		7.2		6.6	
:30:00	6.7		6.3		6.3		6.3		6.6		7.1		6.5	
:45:00	6.6	0.919	6.3	0.849	6.2	0.837	6.1	0.819	6.6	0.936	7.0	1.030	6.4	0.877
1:00:00	6.4		6.1		6.1		6.1		6.5		6.9		6.3	
:15:00	6.4		6.1		6.0		5.9		6.5		6.9		6.3	
:30:00	6.3		6.0		5.9		5.8		6.5		6.8		6.2	
:45:00	6.3	0.816	6.0	0.748	5.8	0.719	5.8	0.712	6.5	0.859	6.7	0.948	6.1	0.782
2:00:00	6.2		5.9		5.8		5.8		6.5		6.7		6.0	
:15:00	6.2		5.9		5.8		5.8		6.6		6.6		6.0	
:30:00	6.2		5.9		5.8		5.7		6.6		6.5		6.0	
:45:00	6.1	0.782	5.8	0.705	5.7	0.680	5.7	0.671	6.6	0.874	6.5	0.877	5.9	0.726
3:00:00	6.1		5.9		5.7		5.7		6.6		6.5		5.9	
:15:00	6.2		5.9		5.7		5.8		6.5		6.5		5.9	
:30:00	6.3		6.0		5.7		5.9		6.5		6.5		5.9	
:45:00	6.3	0.784	6.0	0.715	5.8	0.677	5.9	0.691	6.6	0.869	6.6	0.867	6.0	0.717
4:00:00	6.2		6.0		5.9		6.2		6.6		6.5		6.1	
:15:00	6.3		6.2		5.9		6.4		6.5		6.6		6.2	
:30:00	6.3		6.1		5.9		6.5		6.7		6.5		6.2	
:45:00	6.3	0.826	6.2	0.765	5.9	0.712	6.7	0.847	7.0	0.909	6.5	0.867	6.2	0.775
5:00:00	6.4		6.2		6.0		7.1		7.2		6.5		6.4	
:15:00	6.5		6.3		6.1		7.4		7.6		6.5		6.5	
:30:00	6.7		6.5		6.3		7.4		8.0		6.5		6.6	
:45:00	6.8	0.685	6.7	0.632	6.5	0.707	7.5	1.095	8.0	1.288	6.5	0.861	6.7	0.662
6:00:00	7.1		7.0		6.8		7.6		8.9		6.5		7.0	
:15:00	7.4		7.2		7.0		7.8		8.9		6.5		7.1	
:30:00	7.8		7.4		7.2		7.9		8.5		6.5		7.4	
:45:00	8.0	1.154	7.7	1.092	7.4	1.017	8.1	1.242	8.5	1.519	6.6	0.867	7.6	1.054
7:00:00	8.0		7.9		7.6		8.1		8.4		6.6		7.8	
:15:00	8.3		8.0		7.8		8.2		8.5		6.7		8.0	
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:45:00	8.2	1.315	8.0	1.204	7.7	1.220	8.2	1.353	8.7	1.449	7.0	0.948	7.8	1.245
8:00:00	7.9		7.9		7.6		8.1		8.7		7.2		7.8	
:15:00	7.7		7.6		7.6		8.0		9.0		7.4		7.6	
:30:00	7.7		7.5		7.5		8.0		9.3		7.6		7.6	
:45:00	7.8	1.212	7.5	1.176	7.4	1.150	7.9	1.287	9.4	1.648	7.9	1.145	7.6	1.182
9:00:00	7.8		7.5		7.3		7.9		9.4		8.1		7.6	
:15:00	7.9		7.6		7.4		8.0		9.7		8.4		7.6	
:30:00	7.8		7.5		7.3		8.1		9.6		8.4		7.6	
:45:00	7.6	1.212	7.4	1.135	7.2	1.084	8.0	1.293	9.6	1.822	8.6	1.408	7.6	1.170
10:00:00	7.6		7.4		7.3		7.9		9.6		8.7		7.5	
:15:00	7.6		7.4		7.4		8.1		9.8		8.6		7.5	
:30:00	7.6		7.4		7.4		7.9		9.6		8.7		7.5	
:45:00	7.5	1.162	7.3	1.092	7.4	1.095	7.9	1.269	9.5	1.649	8.7	1.389	7.4	1.129
11:00:00	7.4		7.2		7.4		7.8		9.4		8.8		7.4	
:15:00	7.3		7.1		7.3		7.7		9.4		8.8		7.4	
:30:00	7.4		7.0		7.3		7.5		9.4		8.7		7.4	
:45:00	7.2	1.069	7.0	1.016	7.2	1.072	7.6	1.173	9.2	1.741	8.5	1.519	7.3	1.092

	TUESDAY AUG 1,1989		WEDNESDAY AUG 2,1989		THURSDAY AUG 3,1989		FRIDAY AUG 4,1989		SATURDAY AUG 5,1989		SUNDAY AUG 6,1989		MONDAY AUG 7,1989	
	AV DEPTH	MGD	AV DEPTH	MGD	AV DEPTH	MGD	AV DEPTH	MGD	AV DEPTH	MGD	AV DEPTH	MGD	AV DEPTH	MGD
12:28:88	7.2		7.8		7.1		7.5		9.1		8.4		7.2	
:15:88	7.1		6.9		7.8		7.5		9.8		8.3		7.2	
:38:88	7.2		6.9		7.3		7.3		8.8		8.3		7.3	
:45:28	7.2	1.844	7.8	8.982	7.2	1.882	7.3	1.189	8.8	1.589	8.2	1.388	7.2	1.852
13:88:88	7.2		6.9		7.2		7.3		8.7		8.1		7.1	
:15:88	7.8		6.5		7.8		7.3		8.6		8.1		7.8	
:38:88	7.1		6.3		7.8		7.3		8.7		8.8		7.8	
:45:28	7.8	1.819	6.7	8.932	6.9	8.986	7.2	1.872	8.6	1.582	8.8	1.293	7.8	1.888
14:88:88	7.8		6.8		6.9		7.3		8.5		7.9		7.1	
:15:82	7.8		6.7		6.8		7.2		8.6		7.8		7.8	
:38:82	7.8		6.7		6.8		7.8		8.4		7.8		7.8	
:45:82	7.8	8.985	6.8	8.913	6.8	8.948	7.1	1.833	8.3	1.479	7.7	1.224	6.9	8.969
15:82:82	6.9		6.7		6.7		7.1		8.3		7.6		6.8	
:15:88	6.9		6.7		6.8		7.1		8.4		7.6		6.7	
:38:83	6.9		6.8		6.7		7.1		8.3		7.6		6.8	
:45:88	6.9	8.956	6.9	8.929	6.9	8.926	7.8	1.813	8.3	1.488	7.5	1.153	6.8	8.932
16:28:88	6.9		6.7		6.9		7.2		8.4		7.4		6.8	
:15:82	6.9		6.7		7.8		7.2		8.5		7.4		6.7	
:32:83	7.8		6.9		6.9		7.4		8.4		7.3		6.9	
:45:88	7.2	8.972	6.9	8.934	6.9	8.961	7.3	1.864	8.3	1.413	7.4	1.898	6.9	8.942
17:88:88	7.8		6.9		6.9		7.2		8.3		7.4		6.9	
:15:83	7.2		7.8		6.9		7.4		8.2		7.4		7.8	
:38:88	7.3		7.1		7.2		7.4		8.1		7.5		7.8	
:45:88	7.3	1.858	7.2	1.885	7.1	8.988	7.6	1.169	8.3	1.362	7.6	1.135	7.8	8.991
18:88:88	7.3		7.2		7.3		7.8		8.2		7.6		7.1	
:15:82	7.5		7.2		7.4		7.8		8.3		7.7		7.2	
:38:88	7.6		7.2		7.5		7.8		8.3		7.7		7.4	
:45:82	7.6	1.133	7.2	1.858	7.4	1.181	7.7	1.212	8.3	1.375	7.7	1.191	7.5	1.875
19:88:38	7.7		7.4		7.4		7.8		8.4		7.8		7.5	
:15:88	7.6		7.4		7.4		7.7		8.4		7.6		7.4	
:38:88	7.6		7.4		7.5		7.6		8.2		7.8		7.4	
:45:82	7.6	1.176	7.4	1.189	7.4	1.121	7.5	1.193	8.1	1.378	7.7	1.283	7.5	1.118
28:88:88	7.6		7.4		7.5		7.5		8.1		7.6		7.6	
:15:88	7.7		7.4		7.4		7.6		8.8		7.7		7.4	
:38:88	7.6		7.5		7.5		7.5		8.8		7.7		7.5	
:45:82	7.7	1.179	7.4	1.121	7.5	1.129	7.6	1.147	8.8	1.281	7.7	1.188	7.4	1.127
21:88:88	7.8		7.6		7.4		7.6		7.9		7.5		7.4	
:15:88	7.7		7.8		7.6		7.5		7.9		7.6		7.3	
:38:88	7.8		7.7		7.6		7.5		7.9		7.6		7.3	
:45:88	7.6	1.285	7.6	1.179	7.6	1.158	7.4	1.132	7.9	1.242	7.6	1.156	7.3	1.894
22:88:38	7.5		7.6		7.5		7.4		7.8		7.6		7.4	
:15:88	7.6		7.4		7.4		7.4		7.6		7.5		7.7	
:38:88	7.4		7.4		7.2		7.2		7.6		7.4		7.6	
:45:88	7.3	1.133	7.2	1.184	7.1	1.875	7.2	1.884	7.5	1.176	7.4	1.129	7.3	1.136
23:88:88	7.2		7.1		7.1		7.2		7.5		7.3		7.2	
:15:83	7.2		7.8		7.8		7.2		7.5		7.1		7.8	
:38:82	7.8		6.8		6.9		7.8		7.4		7.8		6.9	
:45:88	6.8	1.888	6.7	8.967	6.7	8.978	6.9	1.819	7.4	1.115	6.9	1.822	6.8	8.956
TOTAL FLOW		1.841		8.985		8.974		1.867		1.333		1.126		1.832
MINIMUMS	2:45:88	8.767	2:45:88	8.691	2:45:88	8.673	2:45:88	8.655	1:88:88	8.846	3:38:88	8.856	2:45:88	8.718
AM'NIMS	2:45:88	8.767	2:45:88	8.691	2:45:88	8.673	2:45:88	8.655	1:88:88	8.546	3:38:88	8.856	2:45:88	8.718
MAXIMUMS	7:15:82	1.372	7:38:28	1.388	7:15:88	1.236	7:32:88	1.384	18:15:88	1.893	11:88:88	1.555	7:15:88	1.272

Sensor : MAN Time of Report : 89-26-89 13:31:28 Flow Average for week : 1.875 Total Flow for week: 7.528

CITY OF NAPERVILLE QUADRASCAN NO: 2

SITEID : WNS PIPE DIAMETER : 27.000 BASIN : 2001 RIVER RD.
ID 1 : DIAMETER = 27.00 INCHES PIPE SHAPE : CIRCULAR RAIN GAUGE:
ID 2 : CITY OF WARRENVILLE NW FLOW ENERGY GRADIENT : 3.157 SQRT(S)/N MOD: 0.0

	TUESDAY AUG 8,1989		WEDNESDAY AUG 9,1989		THURSDAY AUG 10,1989		FRIDAY AUG 11,1989		SATURDAY AUG 12,1989		SUNDAY AUG 13,1989		MONDAY AUG 14,1989	
	RN DEPTH	MOD	RN DEPTH	MOD	RN DEPTH	MOD	RN DEPTH	MOD	RN DEPTH	MOD	RN DEPTH	MOD	RN DEPTH	MOD
0:00:00	6.5		6.5		6.3		6.2		6.7		7.5		6.6	
:15:00	6.3		6.3		6.2		6.1		6.7		7.4		6.5	
:30:00	6.2		6.1		6.0		6.0		6.7		7.2		6.4	
:45:00	6.3	0.794	6.1	0.792	5.9	0.751	5.8	0.743	6.6	0.985	7.2	1.081	6.3	0.842
1:00:00	5.9		5.9		5.7		5.8		6.5		7.1		6.1	
:15:00	5.8		5.8		5.7		5.7		6.4		7.0		6.1	
:30:00	5.7		5.8		5.6		5.6		6.4		7.0		6.1	
:45:00	5.7	0.687	5.7	0.687	5.6	0.653	5.5	0.648	6.3	0.821	6.9	0.954	6.1	0.768
2:00:00	5.7		5.7		5.4		5.5		6.3		6.9		6.0	
:15:00	5.7		5.6		5.4		5.4		6.2		6.9		5.9	
:30:00	5.6		5.7		5.4		5.4		6.2		6.7		5.9	
:45:00	5.5	0.646	5.7	0.655	5.4	0.599	5.3	0.593	6.1	0.779	6.8	0.937	5.9	0.712
3:00:00	5.6		5.7		5.4		5.3		6.1		6.7		5.9	
:15:00	5.7		5.7		5.3		5.4		6.1		6.7		5.9	
:30:00	5.7		5.7		5.4		5.4		6.1		6.7		5.9	
:45:00	5.7	0.655	5.7	0.662	5.5	0.589	5.4	0.591	6.1	0.760	6.7	0.916	6.1	0.727
4:00:00	5.8		5.7		5.6		5.4		6.2		6.8		6.1	
:15:00	5.9		5.9		5.6		5.7		6.2		6.7		6.2	
:30:00	5.8		5.9		5.6		5.7		6.2		6.6		6.2	
:45:00	5.9	0.696	5.9	0.696	5.6	0.646	5.6	0.639	6.2	0.784	6.7	0.913	6.2	0.779
5:00:00	5.9		5.9		5.7		5.7		6.2		6.7		6.3	
:15:00	6.1		6.1		5.8		5.8		6.2		6.8		6.3	
:30:00	6.2		6.1		5.9		5.9		6.2		6.7		6.5	
:45:00	6.3	0.763	6.3	0.758	6.1	0.708	6.0	0.698	6.3	0.789	6.7	0.913	6.6	0.839
6:00:00	6.7		6.6		6.3		6.2		6.3		6.7		7.0	
:15:00	6.9		6.8		6.7		6.5		6.3		6.7		7.2	
:30:00	7.1		7.1		7.0		6.7		6.4		6.7		7.4	
:45:00	7.5	1.087	7.2	0.975	7.1	0.931	7.0	0.891	6.4	0.814	6.7	0.908	7.6	1.279
7:00:00	7.5		7.4		7.3		7.0		6.4		6.8		7.7	
:15:00	7.6		7.7		7.6		7.4		6.6		6.9		7.9	
:30:00	7.9		7.6		7.6		7.5		6.8		7.0		8.0	
:45:00	7.7	1.179	7.6	1.165	7.5	1.138	7.4	1.090	7.0	0.909	7.2	0.992	9.0	1.257
8:00:00	7.6		7.6		7.2		7.3		7.0		7.4		7.9	
:15:00	7.6		7.4		7.2		7.2		7.3		7.6		7.7	
:30:00	7.6		7.2		7.0		7.2		7.6		8.1		7.6	
:45:00	7.5	1.159	7.0	1.079	7.0	1.022	7.1	1.047	7.9	1.128	8.2	1.208	7.0	1.220
9:00:00	7.5		6.9		7.0		7.1		8.1		8.5		7.7	
:15:00	7.4		6.8		7.1		7.1		8.2		8.4		7.7	
:30:00	7.5		6.9		7.1		7.2		8.3		8.5		7.7	
:45:00	7.4	1.113	7.0	0.969	7.1	1.019	7.1	1.022	8.3	1.356	8.6	1.449	7.7	1.151
10:00:00	7.2		7.1		7.0		7.1		8.3		8.7		7.7	
:15:00	7.2		7.1		7.2		7.0		8.3		8.8		7.6	
:30:00	7.2		7.1		7.0		7.1		8.4		8.7		7.6	
:45:00	7.2	1.052	7.0	1.016	6.9	0.994	7.0	1.013	8.5	1.407	8.7	1.522	7.4	1.162
11:00:00	7.1		7.0		6.8		6.9		8.3		8.8		7.4	
:15:00	7.0		6.9		6.9		6.9		8.2		8.8		7.4	
:30:00	7.1		6.8		6.6		6.9		8.2		8.6		7.4	
:45:00	7.1	1.013	6.8	0.958	6.7	0.934	6.9	0.967	8.1	1.349	8.6	1.519	7.3	1.095

	TUESDAY AUG 8,1989		WEDNESDAY AUG 9,1989		THURSDAY AUG 10,1989		FRIDAY AUG 11,1989		SATURDAY AUG 12,1989		SUNDAY AUG 13,1989		MONDAY AUG 14,1989	
	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD
12:00:00	7.1		6.9		6.7		6.2		8.8		8.6		7.3	
:15:00	6.9		6.3		6.7		6.7		7.2		8.5		7.3	
:30:00	6.9		6.7		6.7		6.6		7.7		8.5		7.2	
:45:00	6.9	0.980	6.7	0.929	6.7	0.935	6.7	0.903	7.6	1.218	8.3	1.446	7.3	1.069
13:00:00	6.9		6.7		6.7		6.7		7.6		8.3		7.1	
:15:00	6.7		6.7		6.7		6.7		7.6		8.1		7.2	
:30:00	6.8		6.7		6.6		6.7		7.4		8.0		7.1	
:45:00	6.7	0.926	6.7	0.903	6.5	0.893	6.6	0.920	7.4	1.133	8.1	1.328	7.0	1.016
14:00:00	6.6		6.7		6.5		6.7		7.3		7.9		6.9	
:15:00	6.5		6.5		6.5		6.6		7.1		7.8		6.9	
:30:00	6.7		6.5		6.5		6.5		7.1		8.0		6.9	
:45:00	6.7	0.897	6.5	0.859	6.5	0.859	6.7	0.955	7.2	1.047	7.9	1.237	6.9	0.967
15:00:00	6.6		6.4		6.6		8.5		7.3		7.7		6.9	
:15:00	6.5		6.5		6.6		9.7		7.3		7.6		6.9	
:30:00	6.6		6.5		6.5		10.6		7.2		7.6		7.1	
:45:00	6.6	0.880	6.6	0.862	6.5	0.872	10.4	1.921	7.2	1.067	7.6	1.173	7.0	0.969
16:00:00	6.5		6.5		6.5		10.2		7.5		7.6		7.2	
:15:00	6.5		6.6		6.5		9.7		8.3		7.5		7.4	
:30:00	6.7		6.6		6.6		9.3		9.1		7.5		7.6	
:45:00	6.9	0.898	6.7	0.882	6.5	0.864	9.8	1.787	10.8	1.533	7.5	1.144	7.5	1.115
17:00:00	6.7		6.7		6.7		9.5		10.9		7.6		7.5	
:15:00	6.7		6.7		6.7		8.4		10.9		7.5		7.5	
:30:00	6.8		6.8		6.6		8.2		10.6		7.5		7.5	
:45:00	6.8	0.926	6.9	0.926	6.8	0.921	8.4	1.487	10.4	2.244	7.7	1.153	7.6	1.141
18:00:00	6.9		6.8		6.9		8.3		9.0		7.8		7.6	
:15:00	6.9		6.9		7.0		8.3		9.4		7.7		7.7	
:30:00	7.0		6.9		7.0		8.2		9.3		7.7		7.8	
:45:00	7.1	0.991	6.9	0.961	7.0	0.980	8.0	1.356	9.2	1.774	7.8	1.226	7.8	1.154
19:00:00	7.3		7.0		7.0		8.0		8.9		7.9		7.8	
:15:00	7.2		7.0		7.3		8.0		8.8		7.7		7.9	
:30:00	7.2		7.1		7.3		8.0		8.6		7.8		8.0	
:45:00	7.3	1.067	7.0	0.997	7.1	1.035	7.8	1.269	8.6	1.542	7.9	1.227	8.0	1.263
20:00:00	7.4		7.0		7.0		7.8		8.7		7.9		8.0	
:15:00	7.3		7.1		7.1		7.8		8.6		7.8		7.9	
:30:00	7.3		7.2		7.2		7.9		8.4		7.7		8.0	
:45:00	7.3	1.091	7.2	1.038	7.3	1.041	7.9	1.241	8.4	1.463	7.8	1.224	8.0	1.273
21:00:00	7.3		7.4		7.3		7.9		8.4		7.8		7.8	
:15:00	7.2		7.4		7.2		7.8		8.4		7.7		7.9	
:30:00	7.2		7.3		7.2		7.8		8.3		7.6		7.8	
:45:00	7.1	1.041	7.2	1.075	7.1	1.047	7.6	1.218	8.2	1.391	7.6	1.179	7.8	1.235
22:00:00	7.2		7.2		7.1		7.4		8.1		7.6		7.7	
:15:00	7.1		7.0		7.0		7.4		8.0		7.4		7.6	
:30:00	7.0		6.9		7.2		7.2		7.9		7.4		7.6	
:45:00	7.0	1.025	6.9	0.906	7.0	1.013	7.2	1.085	7.8	1.272	7.3	1.118	7.5	1.173
23:00:00	7.0		6.8		6.8		7.1		7.8		7.1		7.2	
:15:00	6.3		6.7		6.7		7.0		7.7		7.1		7.2	
:30:00	6.7		6.7		6.5		6.9		7.7		7.0		6.9	
:45:00	6.6	0.929	6.5	0.903	6.3	0.868	6.9	0.975	7.5	1.185	6.9	0.969	6.7	0.995
TOTAL FLOW		0.933		0.906		0.885		1.037		1.195		1.159		1.045
MINIMUMS	2:45:00	0.619	2:15:00	0.646	3:15:00	0.576	2:45:00	0.576	3:15:00	0.748	4:30:00	0.867	2:30:00	0.720
AM MINS	2:45:00	0.619	2:15:00	0.646	3:15:00	0.576	2:45:00	0.576	3:15:00	0.748	4:30:00	0.867	2:30:00	0.720
MAXIMUMS	7:30:00	1.212	7:15:00	1.228	7:30:00	1.176	15:30:00	2.196	17:00:00	2.323	11:00:00	1.555	23:00:00	1.296

Sensor : MAN Time of Report : 09-26-89 13:31:49 Flow Average for week : 1.023 Total Flow for week: 7.160

CITY OF NAPERVILLE QUADRASCAN NO: 3

SITEID : NWS PIPE DIAMETER : 27.000 BASIN : 2001 RIVER RD.
ID 1 : DIAMETER = 27.00 INCHES PIPE SHAPE : CIRCULAR RAIN GAUGE:
ID 2 : CITY OF NAPERVILLE NW FLOW ENERGY GRADIENT : 3.197 SQRT(S)/N MUD: 0.0

	TUESDAY AUG 15,1989		WEDNESDAY AUG 16,1989		THURSDAY AUG 17,1989		FRIDAY AUG 18,1989		SATURDAY AUG 19,1989		SUNDAY AUG 20,1989		MONDAY AUG 21,1989	
	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD
0:00:00	6.7		6.5		6.4		6.3		6.4		6.4		6.5	
:15:00	6.5		6.5		6.2		6.1		6.3		6.4		6.2	
:30:00	6.5		6.3		6.1		6.0		6.1		6.4		6.1	
:45:00	6.4	0.839	6.1	0.822	5.9	0.773	6.0	0.758	6.0	0.780	6.5	0.839	6.1	0.797
1:00:00	6.3		6.1		5.8		5.9		5.9		6.6		5.9	
:15:00	6.1		6.0		5.7		5.8		5.9		6.7		5.8	
:30:00	6.1		5.9		5.6		5.7		5.7		6.7		5.7	
:45:00	6.1	0.765	5.8	0.722	5.6	0.659	5.6	0.671	5.7	0.667	6.7	0.895	5.6	0.671
2:00:00	6.0		5.8		5.5		5.5		5.7		6.6		5.5	
:15:00	6.0		5.8		5.4		5.5		5.7		6.5		5.5	
:30:00	6.0		5.7		5.4		5.4		5.6		6.4		5.4	
:45:00	6.0	0.736	5.7	0.677	5.4	0.606	5.4	0.626	5.5	0.644	6.3	0.847	5.5	0.608
3:00:00	6.1		5.7		5.5		5.5		5.6		6.2		5.5	
:15:00	6.1		5.8		5.6		5.6		5.6		6.2		5.5	
:30:00	6.1		5.8		5.5		5.6		5.6		6.1		5.6	
:45:00	6.1	0.760	5.8	0.684	5.6	0.623	5.6	0.632	5.6	0.634	6.2	0.782	5.7	0.628
4:00:00	6.1		5.9		5.7		5.6		5.6		6.2		5.7	
:15:00	6.3		5.9		5.7		5.6		5.7		6.2		5.7	
:30:00	6.3		5.9		5.8		5.7		5.7		6.1		5.9	
:45:00	6.3	0.789	6.0	0.708	5.7	0.671	5.7	0.658	5.7	0.657	6.2	0.775	5.8	0.688
5:00:00	6.3		6.1		5.8		5.8		5.8		6.2		5.9	
:15:00	6.5		6.3		5.9		5.9		5.7		6.1		5.9	
:30:00	6.5		6.5		6.0		6.0		5.7		6.1		6.1	
:45:00	6.8	0.867	6.6	0.824	6.2	0.724	6.1	0.727	5.7	0.662	6.1	0.762	6.2	0.739
6:00:00	7.0		6.8		6.5		6.4		5.7		6.1		6.5	
:15:00	7.3		7.0		6.9		6.7		5.7		6.0		6.7	
:30:00	7.6		7.3		7.0		7.0		5.8		6.1		7.0	
:45:00	7.8	1.110	7.7	1.046	7.5	0.965	7.2	0.952	5.9	0.694	6.1	0.783	7.3	0.957
7:00:00	7.9		7.7		7.6		7.2		6.1		6.2		7.4	
:15:00	8.0		8.0		7.6		7.6		6.2		6.3		7.6	
:30:00	8.0		7.9		7.6		7.6		6.3		6.3		7.7	
:45:00	7.8	1.260	7.8	1.245	7.6	1.162	7.5	1.133	6.5	0.797	6.5	0.809	7.5	1.150
8:00:00	7.8		7.6		7.5		7.4		6.9		6.8		7.4	
:15:00	7.7		7.6		7.3		7.4		7.1		6.9		7.4	
:30:00	7.7		7.6		7.2		7.4		7.2		7.2		7.3	
:45:00	7.6	1.220	7.6	1.178	7.4	1.098	7.4	1.106	7.5	1.042	7.4	1.017	7.3	1.092
9:00:00	7.6		7.5		7.4		7.3		7.7		7.8		7.4	
:15:00	7.6		7.6		7.3		7.3		8.0		7.9		7.4	
:30:00	7.5		7.5		7.2		7.4		8.3		8.1		7.3	
:45:00	7.5	1.153	7.4	1.138	7.1	1.064	7.2	1.075	8.9	1.260	8.1	1.291	7.4	1.089
10:00:00	7.5		7.5		7.1		7.3		8.8		8.3		7.5	
:15:00	7.5		7.4		7.1		7.3		8.1		8.4		7.4	
:30:00	7.4		7.4		7.1		7.2		8.8		8.4		7.5	
:45:00	7.2	1.109	7.4	1.112	7.0	1.016	7.1	1.052	9.1	1.308	8.3	1.421	7.5	1.129
11:00:00	7.2		7.4		7.0		7.1		8.2		8.4		7.3	
:15:00	7.2		7.3		7.0		7.1		8.1		8.3		7.3	
:30:00	7.1		7.2		7.0		7.1		8.0		8.3		7.2	
:45:00	7.2	1.044	7.2	1.072	6.8	0.978	6.9	1.003	7.8	1.294	8.2	1.365	7.0	1.044

	TUESDAY AUG 15,1989		WEDNESDAY AUG 16,1989		THURSDAY AUG 17,1989		FRIDAY AUG 18,1989		SATURDAY AUG 19,1989		SUNDAY AUG 20,1989		MONDAY AUG 21,1989	
	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD
12:00:00	7.2		7.2		6.8		6.9		7.7		8.2		6.9	
:15:00	7.1		7.1		6.7		6.9		7.6		8.2		6.9	
:30:00	7.1		7.2		6.8		6.8		7.5		8.0		6.9	
:45:00	7.1	1.030	7.1	1.038	6.8	0.972	6.9	0.945	7.5	1.150	7.9	1.315	6.9	0.959
13:00:00	7.1		7.2		6.7		6.7		7.4		7.8		6.8	
:15:00	7.0		7.0		6.5		6.7		7.2		7.6		6.9	
:30:00	7.0		6.9		6.6		6.6		7.3		7.5		6.8	
:45:00	7.0	0.991	6.9	0.983	6.7	0.887	6.5	0.887	7.2	1.075	7.3	1.165	6.8	0.977
14:00:00	6.9		6.9		6.6		6.6		7.3		7.4		6.7	
:15:00	6.9		6.9		6.6		6.6		7.1		7.3		6.7	
:30:00	6.9		6.8		6.5		6.5		7.0		7.2		6.9	
:45:00	6.9	0.961	6.8	0.945	6.5	0.872	6.5	0.874	7.1	1.027	7.2	1.072	6.9	0.932
15:00:00	6.9		6.8		6.5		6.5		7.1		7.1		6.7	
:15:00	6.9		6.8		6.5		6.5		7.0		7.0		6.6	
:30:00	7.0		6.9		6.5		6.5		7.0		7.0		6.7	
:45:00	6.9	0.967	6.9	0.948	6.6	0.867	6.6	0.864	6.9	0.991	7.0	0.999	6.7	0.895
16:00:00	6.9		6.9		6.7		6.7		6.9		7.0		6.6	
:15:00	6.9		7.0		6.7		6.7		6.9		7.0		6.6	
:30:00	7.0		7.0		6.7		6.6		6.9		7.0		6.6	
:45:00	6.9	0.969	6.9	0.975	6.7	0.911	6.7	0.858	6.9	0.969	7.1	0.999	6.7	0.897
17:00:00	7.0		7.0		6.8		6.8		6.9		7.2		6.8	
:15:00	6.9		7.0		6.7		6.8		6.9		7.1		6.8	
:30:00	7.2		7.0		6.7		6.9		7.0		7.0		6.9	
:45:00	7.3	1.016	7.0	0.988	6.8	0.924	6.8	0.937	7.0	0.977	7.0	1.008	6.9	0.945
18:00:00	7.3		7.1		6.9		7.0		7.1		7.1		7.0	
:15:00	7.3		7.2		7.0		6.9		7.1		7.2		7.1	
:30:00	7.4		7.4		7.0		7.0		7.2		7.2		7.1	
:45:00	7.5	1.104	7.5	1.076	7.0	0.983	7.0	0.988	7.1	1.024	7.3	1.052	7.2	1.019
19:00:00	7.5		7.4		7.1		6.9		7.2		7.4		7.3	
:15:00	7.5		7.4		7.2		6.9		7.1		7.3		7.3	
:30:00	7.4		7.4		7.2		6.9		7.1		7.3		7.3	
:45:00	7.5	1.132	7.4	1.115	7.2	1.044	6.8	0.961	7.0	1.019	7.3	1.081	7.3	1.076
20:00:00	7.6		7.4		7.2		6.9		7.0		7.3		7.4	
:15:00	7.5		7.4		7.3		6.7		7.0		7.3		7.4	
:30:00	7.5		7.5		7.3		6.9		7.0		7.4		7.5	
:45:00	7.6	1.147	7.6	1.132	7.4	1.072	6.9	0.948	7.0	0.997	7.4	1.079	7.4	1.112
21:00:00	7.6		7.6		7.4		7.0		7.1		7.4		7.4	
:15:00	7.6		7.5		7.3		7.0		7.0		7.5		7.4	
:30:00	7.6		7.4		7.2		6.9		7.0		7.5		7.4	
:45:00	7.6	1.159	7.2	1.101	7.2	1.075	6.9	0.980	6.9	0.994	7.5	1.109	7.4	1.103
22:00:00	7.5		7.1		7.1		6.9		7.0		7.4		7.3	
:15:00	7.4		7.1		7.2		6.9		6.9		7.2		7.3	
:30:00	7.4		7.0		7.0		6.9		6.8		7.2		7.1	
:45:00	7.2	1.098	7.0	1.088	7.0	1.007	6.7	0.932	6.7	0.956	7.2	1.041	7.0	1.044
23:00:00	7.1		7.0		6.8		6.7		6.6		7.0		6.9	
:15:00	7.0		6.7		6.7		6.7		6.5		6.9		6.7	
:30:00	6.9		6.7		6.5		6.5		6.4		6.8		6.7	
:45:00	6.6	0.965	6.5	0.909	6.5	0.893	6.5	0.880	6.5	0.857	6.7	0.945	6.5	0.919
TOTAL FLOW		1.080		0.978		0.910		0.894		0.937		1.020		0.934
MINIMUMS	2:45:00	0.729	2:45:00	0.664	2:15:00	0.681	2:45:00	0.593	2:45:00	0.619	6:15:00	0.738	2:30:00	0.681
AM MINS	2:45:00	0.729	2:45:00	0.664	2:15:00	0.681	2:45:00	0.593	2:45:00	0.619	6:15:00	0.738	2:30:00	0.681
MAXIMUMS	7:15:00	1.284	7:15:00	1.296	7:00:00	1.164	7:15:00	1.164	11:00:00	1.346	10:30:00	1.423	7:30:00	1.126

Sensor : MAN Time of Report : 09-26-89 13:02:10 Flow Average for week : 0.954 Total Flow for week: 6.680

CITY OF NAPERVILLE QUADRASCAN NO: 4

SITEID : NMS
ID 1 : DIAMETER = 27.00 INCHES
ID 2 : CITY OF WARRENVILLE NW FLOW

PIPE DIAMETER : 27.000
PIPE SHAPE : CIRCULAR
ENERGY GRADIENT : 3.157 SQRT(S)/N

BASIN : 2001 RIVER RD.
RAIN GAUGE:
MUD: 0.0

	TUESDAY AUG 22,1989		WEDNESDAY AUG 23,1989		THURSDAY AUG 24,1989		FRIDAY AUG 25,1989		SATURDAY AUG 26,1989		SUNDAY AUG 27,1989		MONDAY AUG 28,1989	
	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD
0:00:00	6.3		6.5		6.3		6.4		6.3		6.3		6.2	
:15:00	6.2		6.3		6.1		6.3		6.1		6.1		6.0	
:30:00	6.1		6.3		5.9		6.1		6.0		6.0		5.9	
:45:00	6.0	0.765	6.1	0.824	5.8	0.739	5.9	0.775	5.9	0.751	5.9	0.758	5.8	0.724
1:00:00	5.9		6.0		5.8		5.9		5.8		5.9		5.7	
:15:00	5.7		5.8		5.7		5.7		5.7		5.8		5.6	
:30:00	5.6		5.7		5.6		5.7		5.7		5.8		5.5	
:45:00	5.5	0.660	5.7	0.689	5.5	0.653	5.6	0.666	5.7	0.671	5.7	0.687	5.4	0.624
2:00:00	5.4		5.7		5.5		5.5		5.6		5.7		5.3	
:15:00	5.4		5.6		5.4		5.4		5.5		5.6		5.2	
:30:00	5.4		5.6		5.4		5.4		5.4		5.5		5.2	
:45:00	5.4	0.597	5.5	0.637	5.3	0.591	5.4	0.604	5.3	0.602	5.5	0.628	5.2	0.567
3:00:00	5.4		5.6		5.3		5.4		5.3		5.4		5.2	
:15:00	5.4		5.6		5.4		5.5		5.3		5.4		5.2	
:30:00	5.5		5.6		5.4		5.4		5.4		5.3		5.2	
:45:00	5.6	0.626	5.7	0.643	5.5	0.591	5.5	0.606	5.4	0.578	5.4	0.589	5.2	0.553
4:00:00	5.6		5.7		5.6		5.5		5.4		5.5		5.4	
:15:00	5.6		5.8		5.6		5.6		5.5		5.6		5.4	
:30:00	5.7		5.9		5.6		5.6		5.5		5.6		5.4	
:45:00	5.7	0.658	5.9	0.696	5.6	0.639	5.6	0.632	5.6	0.612	5.6	0.628	5.5	0.599
5:00:00	5.7		5.9		5.7		5.7		5.5		5.6		5.6	
:15:00	5.8		6.1		5.8		5.8		5.4		5.7		5.7	
:30:00	6.0		6.1		5.9		5.9		5.4		5.6		5.9	
:45:00	6.2	0.722	6.2	0.755	6.1	0.703	6.0	0.723	5.4	0.602	5.5	0.637	5.9	0.662
6:00:00	6.5		6.5		6.4		6.2		5.5		5.5		6.3	
:15:00	6.8		6.9		6.7		6.6		5.6		5.5		6.6	
:30:00	7.3		7.1		7.0		6.9		5.6		5.5		6.8	
:45:00	7.5	1.005	7.4	0.982	7.2	0.955	7.1	0.913	5.7	0.641	5.5	0.619	7.3	0.939
7:00:00	7.7		7.2		7.3		7.3		5.8		5.6		7.4	
:15:00	7.8		7.6		7.5		7.5		6.0		5.7		7.5	
:30:00	7.8		7.6		7.6		7.5		6.1		5.9		7.6	
:45:00	7.7	1.208	7.4	1.121	7.5	1.130	7.5	1.121	6.4	0.751	6.2	0.782	7.4	1.106
8:00:00	7.5		7.4		7.4		7.5		6.6		6.2		7.3	
:15:00	7.5		7.2		7.3		7.4		6.8		6.3		7.2	
:30:00	7.4		7.2		7.3		7.4		6.9		6.7		7.1	
:45:00	7.4	1.127	7.1	1.055	7.3	1.084	7.4	1.118	7.2	0.960	7.0	0.873	7.2	1.058
9:00:00	7.5		7.2		7.2		7.4		7.4		7.4		7.2	
:15:00	7.5		7.1		7.2		7.3		7.7		7.5		7.3	
:30:00	7.4		7.2		7.1		7.2		8.0		7.8		7.2	
:45:00	7.4	1.129	7.1	1.038	7.1	1.036	7.2	1.078	8.1	1.231	7.9	1.177	7.2	1.053
10:00:00	7.6		7.1		7.1		7.2		8.1		8.0		7.3	
:15:00	7.5		7.2		7.0		7.2		8.1		8.0		7.3	
:30:00	7.4		7.0		7.0		7.2		8.1		8.1		7.2	
:45:00	7.4	1.124	7.0	1.013	7.0	0.999	7.0	1.038	8.0	1.315	8.1	1.293	7.2	1.067
11:00:00	7.3		7.0		6.9		7.2		8.0		8.1		7.2	
:15:00	7.2		7.0		6.9		7.2		8.0		8.0		7.2	
:30:00	7.2		7.0		7.0		7.1		8.0		8.0		7.2	
:45:00	7.2	1.052	6.9	0.903	6.9	0.969	6.9	1.019	7.9	1.275	7.8	1.278	7.1	1.247

	TUESDAY AUG 22,1989		WEDNESDAY AUG 23,1989		THURSDAY AUG 24,1989		FRIDAY AUG 25,1989		SATURDAY AUG 26,1989		SUNDAY AUG 27,1989		MONDAY AUG 28,1989	
	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD
12:00:00	7.1		6.9		6.8		6.6		7.8		7.7		7.2	
:15:00	7.0		6.6		6.7		6.7		7.6		7.8		7.2	
:30:00	6.9		6.7		6.8		6.7		7.6		7.6		7.0	
:45:00	6.9	0.983	6.8	0.937	6.9	0.924	6.6	0.905	7.6	1.173	7.6	1.200	6.9	1.014
13:00:00	6.9		6.7		6.7		6.5		7.4		7.5		6.9	
:15:00	6.9		6.6		6.7		6.6		7.2		7.4		6.9	
:30:00	6.9		6.5		6.6		6.5		7.2		7.3		6.9	
:45:00	6.9	0.964	6.6	0.882	6.6	0.908	6.5	0.867	7.1	1.058	7.2	1.092	6.7	0.948
14:00:00	6.8		6.7		6.6		6.6		7.0		7.2		6.8	
:15:00	6.7		6.5		6.5		6.6		7.1		7.1		6.7	
:30:00	6.7		6.5		6.7		6.5		7.1		7.0		6.6	
:45:00	6.7	0.924	6.5	0.872	6.7	0.882	6.5	0.864	7.0	1.023	7.0	1.013	6.7	0.908
15:00:00	6.8		6.5		6.5		6.5		7.0		7.0		6.6	
:15:00	6.7		6.5		6.5		6.5		6.9		7.0		6.7	
:30:00	6.8		6.5		6.5		6.5		6.9		7.0		6.7	
:45:00	6.8	0.926	6.5	0.864	6.5	0.864	6.5	0.859	6.9	0.967	7.0	0.991	6.6	0.895
16:00:00	6.8		6.5		6.5		6.5		6.9		6.9		6.7	
:15:00	6.9		6.5		6.5		6.6		6.8		7.0		6.7	
:30:00	6.8		6.6		6.5		6.5		6.9		7.0		6.7	
:45:00	6.7	0.904	6.6	0.869	6.5	0.854	6.7	0.874	6.8	0.948	6.9	0.983	6.8	0.916
17:00:00	6.9		6.6		6.6		6.7		6.7		6.9		6.8	
:15:00	7.0		6.7		6.6		6.7		6.8		6.9		6.9	
:30:00	7.1		6.8		6.6		6.7		6.9		6.9		6.9	
:45:00	7.1	0.994	6.9	0.913	6.6	0.885	6.8	0.921	6.9	0.945	7.0	0.969	6.9	0.959
18:00:00	7.4		6.9		6.8		6.9		6.9		7.0		7.0	
:15:00	7.4		7.1		6.9		7.0		7.0		7.1		7.2	
:30:00	7.4		7.1		6.8		7.1		6.9		7.2		7.2	
:45:00	7.5	1.109	7.1	1.005	6.9	0.945	7.0	0.991	6.9	0.975	7.2	1.036	7.3	1.047
19:00:00	7.6		7.2		7.0		7.0		7.0		7.2		7.4	
:15:00	7.5		7.2		7.2		7.0		7.0		7.2		7.4	
:30:00	7.6		7.2		7.2		7.0		7.0		7.2		7.6	
:45:00	7.7	1.159	7.3	1.058	7.3	1.039	7.0	0.999	7.0	0.983	7.3	1.055	7.0	1.153
20:00:00	7.7		7.3		7.3		7.0		7.0		7.3		7.0	
:15:00	7.6		7.3		7.3		6.9		6.9		7.4		7.0	
:30:00	7.6		7.3		7.3		6.9		7.0		7.4		7.0	
:45:00	7.6	1.173	7.3	1.075	7.5	1.109	7.0	0.983	6.9	0.980	7.4	1.092	7.0	1.230
21:00:00	7.6		7.2		7.4		7.0		7.0		7.4		7.0	
:15:00	7.7		7.3		7.3		7.0		6.9		7.4		7.7	
:30:00	7.6		7.2		7.3		7.0		6.8		7.3		7.5	
:45:00	7.4	1.159	7.2	1.058	7.3	1.084	7.0	0.988	6.8	0.948	7.2	1.051	7.4	1.159
22:00:00	7.5		7.0		7.2		6.9		6.7		7.1		7.3	
:15:00	7.3		7.0		7.2		6.9		6.7		6.9		7.2	
:30:00	7.2		7.0		6.9		6.7		6.6		6.9		7.1	
:45:00	7.1	1.075	6.8	0.978	6.9	1.003	6.7	0.921	6.6	0.898	6.8	0.978	7.0	1.036
23:00:00	7.0		6.7		6.9		6.7		6.5		6.7		6.9	
:15:00	6.9		6.6		6.8		6.5		6.4		6.7		6.8	
:30:00	6.9		6.5		6.7		6.5		6.3		6.4		6.6	
:45:00	6.7	0.962	6.5	0.880	6.5	0.915	6.4	0.859	6.3	0.834	6.4	0.878	6.4	0.896
TOTAL FLOW		0.958		0.928		0.895		0.888		0.984		0.926		0.923
MINIMUMS	2:30:00	0.593	2:45:00	0.619	2:45:00	0.568	2:45:00	0.593	3:00:00	0.568	3:30:00	0.576	2:30:00	0.551
AM MINS	2:30:00	0.593	2:45:00	0.619	2:45:00	0.568	2:45:00	0.593	3:00:00	0.568	3:30:00	0.576	2:30:00	0.551
MAXIMUMS	7:15:00	1.212	7:15:00	1.153	7:30:00	1.153	7:45:00	1.141	10:30:00	1.333	10:45:00	1.321	20:00:00	1.236

Sensor : MAN Time of Report : 09-26-89 13:02:51 Flow Average for week : 0.915 Total Flow for week: 6.405

SITEID : WWS PIPE DIAMETER : 27.000 BASIN : 2001 RIVER RD.
ID 1 : DIAMETER = 27.00 INCHES PIPE SHAPE : CIRCULAR RAIN GAUGE:
ID 2 : CITY OF NAPERVILLE WW FLOW ENERGY GRADIENT : 3.157 SERT(S)/N MUD: 0.0

	TUESDAY AUG 29,1989		WEDNESDAY AUG 30,1989		THURSDAY AUG 31,1989	
	WW DEPTH	MGD	WW DEPTH	MGD	WW DEPTH	MGD
0:00:00	6.3		6.1		6.0	
:15:00	6.2		5.9		6.0	
:30:00	5.9		5.8		5.9	
:45:00	5.8	0.734	5.7	0.706	5.7	0.710
1:00:00	5.7		5.6		5.6	
:15:00	5.6		5.5		5.4	
:30:00	5.5		5.4		5.4	
:45:00	5.4	0.634	5.3	0.602	5.3	0.601
2:00:00	5.3		5.2		5.2	
:15:00	5.2		5.2		5.2	
:30:00	5.2		5.1		5.1	
:45:00	5.2	0.561	5.0	0.541	5.0	0.535
3:00:00	5.3		5.1		5.0	
:15:00	5.4		5.2		5.1	
:30:00	5.4		5.2		5.1	
:45:00	5.4	0.584	5.2	0.549	5.2	0.533
4:00:00	5.4		5.3		5.3	
:15:00	5.5		5.4		5.4	
:30:00	5.5		5.4		5.4	
:45:00	5.5	0.608	5.5	0.591	5.4	0.586
5:00:00	5.6		5.6		5.5	
:15:00	5.7		5.7		5.7	
:30:00	5.9		5.8		5.9	
:45:00	6.0	0.657	6.1	0.633	6.1	0.683
6:00:00	6.4		6.4		6.5	
:15:00	6.9		6.9		7.0	
:30:00	7.3		7.4		7.4	
:45:00	7.5	1.005	7.8	1.026	7.7	1.035
7:00:00	7.8		8.3		7.8	
:15:00	7.8		8.2		8.2	
:30:00	7.8		8.3		8.3	
:45:00	7.7	1.218	7.6	1.264	7.6	1.246
8:00:00	7.5		7.7		7.7	
:15:00	7.3		7.5		7.4	
:30:00	7.1		7.4		7.2	
:45:00	7.0	1.064	7.3	1.130	7.1	1.096
9:00:00	6.9		7.2		7.1	
:15:00	7.0		7.1		6.9	
:30:00	6.9		6.9		6.8	
:45:00	6.7	0.936	6.8	0.992	6.8	0.964
10:00:00	6.7		6.8		6.9	
:15:00	6.8		6.7		6.9	
:30:00	6.7		6.7		6.8	
:45:00	6.8	0.924	6.7	0.911	6.8	0.948
11:00:00	6.8		6.7		6.7	
:15:00	6.7		6.6		6.7	
:30:00	6.6		6.5		6.7	
:45:00	6.7	0.900	6.5	0.869	6.5	0.893

	TUESDAY AUG 29,1989		WEDNESDAY AUG 30,1989		THURSDAY AUG 31,1989	
	RN DEPTH	MGD	RN DEPTH	MGD	RN DEPTH	MGD
12:00:00	6.7		6.5		6.4	
:15:00	6.7		6.4		6.4	
:30:00	6.6		6.3		6.3	
:45:00	6.6	0.890	6.3	0.821	6.3	0.824
13:00:00	6.6		6.4		6.3	
:15:00	6.7		6.3		6.3	
:30:00	6.7		6.3		6.3	
:45:00	6.7	0.903	6.3	0.829	6.2	0.799
14:00:00	6.7		6.2		6.2	
:15:00	6.6		6.2		6.2	
:30:00	6.6		6.1		6.3	
:45:00	6.4	0.858	6.1	0.775	6.3	0.767
15:00:00	6.5		6.1		6.3	
:15:00	6.5		6.2		6.2	
:30:00	6.5		6.3		6.3	
:45:00	6.5	0.854	6.3	0.784	6.3	0.804
16:00:00	6.5		6.3		6.2	
:15:00	6.5		6.3		6.3	
:30:00	6.6		6.4		6.3	
:45:00	6.5	0.864	6.4	0.824	6.4	0.869
17:00:00	6.7		6.4		6.5	
:15:00	6.7		6.6		6.7	
:30:00	6.7		6.7		6.8	
:45:00	6.9	0.916	6.7	0.892	6.8	0.908
18:00:00	6.9		6.9		6.9	
:15:00	6.9		6.9		7.0	
:30:00	7.0		7.0		7.2	
:45:00	7.3	0.995	7.0	0.978	7.2	1.022
19:00:00	7.3		7.1		7.4	
:15:00	7.4		7.2		7.2	
:30:00	7.3		7.3		7.3	
:45:00	7.4	1.092	7.3	1.061	7.3	1.075
20:00:00	7.4		7.3		7.3	
:15:00	7.6		7.2		7.4	
:30:00	7.7		7.4		7.7	
:45:00	7.6	1.159	7.6	1.101	7.6	1.156
21:00:00	7.4		7.6		7.8	
:15:00	7.4		7.4		7.7	
:30:00	7.4		7.3		7.6	
:45:00	7.3	1.095	7.2	1.107	7.5	1.176
22:00:00	7.2		7.1		7.4	
:15:00	7.0		7.0		7.2	
:30:00	6.9		6.9		7.0	
:45:00	6.9	0.986	6.8	0.975	6.9	1.025
23:00:00	6.7		6.7		6.9	
:15:00	6.6		6.5		6.6	
:30:00	6.5		6.3		6.5	
:45:00	6.3	0.872	6.1	0.827	6.4	0.893
TOTAL FLOW		0.691		0.648		0.800
MINIMUMS	2:15:00	0.559	2:45:00	0.519	2:45:00	0.511
AM MINS	2:15:00	0.559	2:45:00	0.519	2:45:00	0.511
MAXIMUMS	7:15:00	1.226	7:15:00	1.346	7:15:00	1.272

Sensor : MAN Time of Report : 09-26-89 13:32:45 Flow Average for week : 0.980 Total Flow for week: 2.639

APPENDIX B

NAPERVILLE FUTURE SANITARY FLOW CALCULATIONS

Computed: MDC
Date: 10-3-90
Checked:
Date:

SDI Consultants, Ltd.

Engineering Calculations

Project: ELMHURST CHICAGO SCENE

Subject: SANITARY SEWER

Sheet No: 1 of 4

AREA NAME	USE	ACRES	SQUARE FOOTAGE (F.A.R.)	UNITS	FLOW RATE (GPD/SF, AC. OR T)	AVG. DAILY DRY WEATHER FLOW (MG)
I. Tributary to 27" Dia. River Road Sewer						
1. AT&T-Bell Labs (ATT)	Office Research	174	2,000,000	—	0.15/SF	0.30
2. NI Gas Company (NIG)	Office	110	2,000,000	—	0.10/SF	0.20
3. Nalco Corporation East (NCE)	Office Research	43	600,000	—	0.15/SF	0.09
					TOTAL	0.59 MG
II. Tributary to 36" Dia. River Road Sewer.						
1. OR+I Area 2 (ORI2)		37	500,000 (0.3)	—	0.10/SF	0.05
2. R.R. Donelly Site (RRD)	Office	110	1,500,000 (0.3)	—	0.10/SF	0.15
3 OR+I Area 1 (ORI1)		28	370 000 (0.3)	—	0.10/SF	0.04
4. NCC+I (NCCI)		22	290,000 (0.3)		0.10/SF	0.03
5. Industrial (IDI) Developments International	Office	54 (net)	~ 700,000	—	0.10/SF	0.07
					TOTAL THIS PAGE	0.34 MG.

AREA NAME	USE	Acres	SQUARE FOOTAGE	UNITS	FLOW RATE (GPD/SF-1)NET	ADF (mid) DRY WEATHER
6. Cacciatore Property (CP)	Office, Commercial, Retail, Restaurant	6	100,000	–	0.20/SF	0.02
7. Country Lakes						
a. Unit 3 (CL3)	Residential			43	350/UNIT	0.02
b. Unit 4 (CL4)	Residential	43		172	350/UNIT	0.06
c. Unit 5 (CL5) Eagle Lakes	Multi-Family			716	250/UNIT	0.18
	Day Care	48	10,000		0.2/SF	
	Club House w/ Swimming Pool		6,000		0.3/SF	
d. Unit 6 (CL6) Royce Conference Center	Resort			300	150/UNIT	0.16
	Theater			1,800	5/UNIT	
	Banquet			1,800	10/UNIT	
	Hotel			320	150/UNIT	
	Office		260,000		0.10/SF	
	Racquet Club		20,000		0.50/SF	
e. Unit 7 (CL7)	Residential			60	250/UNIT	0.08
	Office		610,000		0.19/SF	
f. Unit 9 (CL9)	Office, Superstore, Restaurant	11	150,000		0.20/SF	0.03
g. Unit 14 (CL14)	Multi-Family	4		57	250/UNIT	0.02
h. Unit 15 (CL15)	Multi-Family	18		256	250/UNIT	0.06
					TOTAL THIS PAGE =	0.63

Computed: MDC
Date: 10-3-90
Checked:
Date:

SDI Consultants, Ltd.
Engineering Calculations

Project: ELMHURST CHICAGO STONE
Subject: SANITARY SEWER
Sheet No: 2 of 4

(ADD/ Ac. on Int)

AREA NAME	USE	Acres	SQUARE FOOTAGE (F.A.R.)	UNITS	FLOW RATE	ADF (MG) DRY WEATHER
8. Burlington Woods (BW)	Commercial: bank, 2 Restaurants, Retail, Day Care, Warehouse	13	170,000		0.30/SF	0.05
9. TTI Property (TTI)	Motel Restaurant	6	 5000	60	150/UNIT 0.5/SF	0.01
10. Auburn Pointe (AP) Business Centre	Commercial					0.07
11. Copley Press (CP)		64	1,100,000		0.10/SF	0.11
12. K-5 Construction (K5)		20	260,000	(0.3)	0.10/SF	0.03
13. Commuter Parking (COP)		50	550,000	(0.25)	0.10/SF	0.06

TOTAL THIS PAGE = 0.33
PAGE 1 = 0.34
PAGE 2 = 0.63

TOTAL 1.30 MG

EXISTING FLOWS IN 24" DIA. McDOWELL RD.

DATE/DAY	DAILY FLOW (MG)
1-25-89/We	0.710
1-26-89/Th	0.678
1-27-89/Fr	0.695
1-28-89/Sa	0.689
1-29-89/Su	0.739
1-30-89/Mo	0.783
1-31-89/Tu	0.739
2-01-89/We	0.768
2-02-89/Th	0.752

DATE/DAY	DAILY FLOW (MG)
8-4-90/Sa	0.611
8-5-90/Su	0.596
8-6-90/Mo	0.582

Ave. Daily Dry Weather: Q_{ADF} = 0.695 MG

Computed: MJC
Date: 10-3-90
Checked:
Date:

SDI Consultants, Ltd.
Engineering Calculations

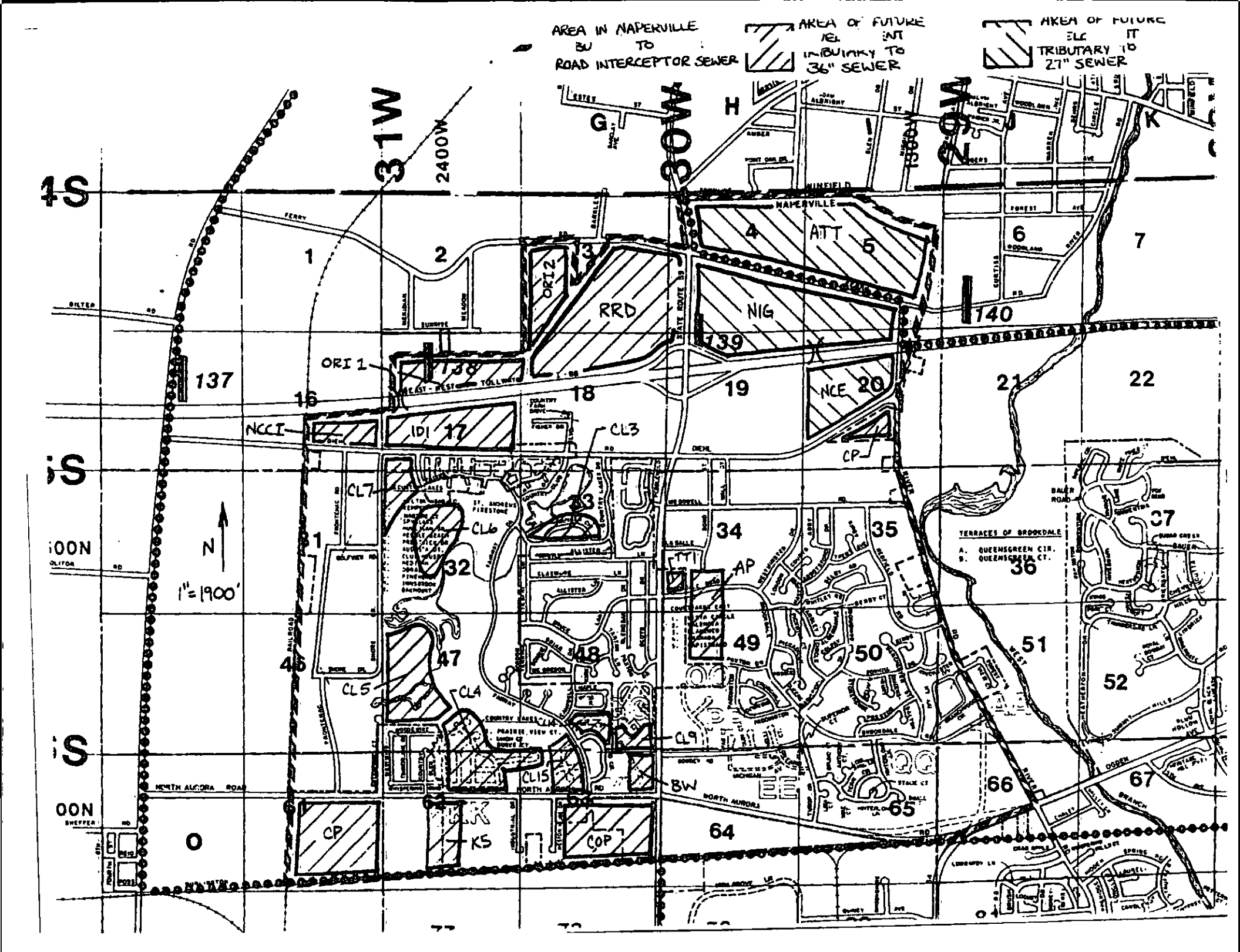
Project: ELMHURST CHICAGO STONE
Subject: SANITARY SEWER
Sheet No: 3 of 4

TOTAL FLOW IN 24" DIA. McDOWELL SEWER:

EXISTING FLOW	0.70 MGD
FUTURE FLOW	1.30 MGD
	2.00 MGD

CAPACITY: 24" RCP @ 0.12% → Q = 7.84 cfs = 5.06 MGD

Computed:	**SDI Consultants, Ltd.**	Project: ELMHURST CHICAGO STONE
Date:		
Checked:	Engineering Calculations	Subject: SANITARY SEWER
Date:		Sheet No: 4 of 4


AREA IN NAPERVILLE
BU TO
ROAD INTERCEPTOR SEWER
AREA OF FUTURE
TRIBUTARY TO
36" SEWER
AREA OF FUTURE
TRIBUTARY TO
27" SEWER
31W
30W
29W
2400W
4S
5S
6S
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1"=1900'
NAPERVILLE
WINFIELD
ATT
NIG
RRD
ORI 2
ORI 1
NCE
NCCI
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CL3
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CL5
CL6
CL7
CL9
CL15
CP
AP
BW
KS
COP
TERRACES OF BROOKDALE
A. QUEENSGREEN CIR.
B. QUEENSGREEN CT.
NORTH AURORA ROAD
EAST-WEST TOLLWAY
STATE ROUTE 59
DIEHL
BAUER ROAD
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138
139
140
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APPENDIX C

SURCHARGE DATA CALCULATIONS

Computed: MDC
Date: 9/7-90
Checked:
Date:

SDI Consultants, Ltd.
Engineering Calculations

Project: ELMHURST CHICAGO STONE
Subject: SANITARY
Sheet No:

MH	RIM	I.E.	DIA (in)	S(%)	Qcap. (cfs)	d*	Sf (%)	L (ft)	Hm (ft)	WATER LEVEL	d
20	699.55	672.82							0.004	675.07	2.25
			27	-0.03			0.09	232			
21	704.89	672.74								675.28	2.54
			27	0.10	9.79	1.71	0.09	292			
22	706.38	673.03								675.55	2.52
			27	0.14	11.59	1.51	0.09	282			
23	714.56	673.44								675.81	2.37
			27	0.08			0.09	583			
24	695.32	673.90								676.34	2.44
			27	007			0.09	615			
25	697.04	674.36								676.90	2.54
			27	0.06			0.09	516			
26	702.73	674.65								677.37	2.72
			27	0.01			0.09	142			
27	703.97	674.78								677.50	2.72
			27	0.07			0.09	440			
28	696.67	675.69								677.94	2.25
			27	0.07			0.09	345			
29	701.95	676.38							0.004	678.63	2.25

27" DIAMETER
Q = 6 MGD

*FROM FIG. 1 ATTACHED

[redacted] n = 0.013 Q [redacted] 9 [redacted] 13.95 CFS A = 3.98 [redacted] Q/A Hm [redacted] 0.05 [redacted]

MH	RIM	I.E.	DIA (IN)	S(%)	Qcap. (CFS)	d*	Sf (%)	L (Ft)	Hm (Ft)	WATER LEVEL	d
20	699.55	672.82							0.010	675.07	2.25
			27	-0.03			0.21	232			
21	704.89	672.74								675.57	2.83
			27	0.10			0.21	292			
22	706.38	673.03								676.19	3.16
			27	0.14			0.21	282			
23	714.56	673.44								676.79	3.35
			27	0.08			0.21	583			
24	695.32	673.90								678.02	4.12
			27	0.07			0.21	615			
25	697.04	674.36								679.32	4.96
			27	0.06			0.21	516			
26	702.73	674.65								680.41	5.76
			27	0.07			0.21	142			
27	703.97	674.78								680.72	5.94
			27	0.07			0.21	440			
28	696.67	675.69								681.65	5.96
			27	0.07			0.21	345			
29	701.95	676.38							0.010	682.38	6.00

27" DIAMETER

Q = 9 MGD

*FROM FIG. 1 ATTACHED

Computed: MDC
Date: 9-17-90
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Date:

SDI Consultants, Ltd.
Engineering Calculations

Project: ELMHURST CHICAGO STONE
Subject: SANITARY
Sheet No:

Computed: MDC
Date: 9-17-90
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Date:

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Engineering Calculations

MH	RIM	I.E.	DIA (in)	S(%)	Q cap. (cfs)	d*	S_f (%)	L (ft)	H_m (ft)	WATER LEVEL	d
20	699.55	672.82							0.026	675.07	2.25
			27	-0.03			0.56	232			
21	704.89	672.74								676.40	3.66
			27	0.10			0.56	292			
22	706.38	673.03								678.06	5.03
			27	0.14			0.56	282			
23	714.56	673.44								679.67	6.23
			27	0.08			0.56	583			
24	685.32	673.90								682.96	9.06
			27	0.07			0.56	615			
25	697.04	674.36								686.43	12.07
			27	0.06			0.56	516			
26	702.73	674.65								689.35	14.70
			27	0.01			0.56	142			
27	703.97	674.78								690.17	15.39
			27	0.07			0.56	440			
28	696.67	675.69								692.66	16.97
			27	0.07			0.56	345			
29	701.95	676.38							0.026	694.62	18.24

27" DIAMETER

Q = 15 MGD

* FROM FIG. 1 ATTACHED

Project: ELMHURST CHICAGO STONE

Subject: SANITARY

Sheet No:

Computed: NKC
Date: 9-17-90
Checked:
Date:

SDI Consultants, Ltd.

Engineering Calculations

Project: ECSD
Subject: SANITARY
Sheet No:

MH	RIM	I.E.	DIA(in)	S	Q cap.(cfs)	Depth*	Sf	Length(ft)	Hm	Water Level	Depth from IE
									0.005	668.88	1.56
7	725.02	667.32	36	0.22	31.28	1.56		453		670.27	1.95
8	698.42	668.32	36	0.11	22.12	1.95		456		671.82	3.00
9	692.92	668.82	36	0.05			0.07	452		672.14	3.11
10	697.50	669.03	36	0.06			0.07	455		672.46	3.14
11	696.00	669.32	36	0.37	40.57	1.35	0.07	103		672.54	2.84
11A	696.20	669.70	36	0.07			0.07	327		672.92	3.00
12	700.07	669.92	36	-0.01	-		0.07	243		673.10	3.20
13	701.12	669.90	36	0.00			0.07	460		673.43	3.53
14	693.68	669.90	36	0.11	22.12	1.95	0.07	598		673.85	3.31
15	692.08	670.54	36	0.12	23.11	1.89	0.07	285		673.63	2.74
15A	690.54	670.89	36	0.04			0.07	306		674.01	3.00
16	688.45	671.01	36	0.08	18.87	2.19	0.07	605		674.44	2.96
17	698.04	671.48	36	0.09	20.01	2.10	0.07	341		674.68	2.87
17A	701.25	671.81	36	0.03			0.07	98		674.75	2.91
18	694.28	671.84	36	0.07			0.07	526		675.12	2.92
19	693.44	672.20	36	0.14	24.96	1.80		440	0.005	675.43	2.61
20	699.55	672.82									

* FROM FIG. 1 attached

36" DIAMETER; Q = 11 MGD

Computed: NKL
Date: 9-17-90
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SDI Consultants, Ltd.
Engineering Calculations

Project: ECSD
Subject: SANITARY
Sheet No:

MH	RIM	I.E.	DIA(in)	S	Q cap(cfs)	Depth	Sf	Length(ft)	Hm	Water Level	Depth from IE
7	733.02	667.32							0.008	669.39	2.07
			36	0.22	31.28	2.07		453			
8	698.42	668.32								671.32	3.00
			36	0.11			0.12	456			
9	692.92	668.82								671.88	3.06
			36	0.05			0.12	452			
10	697.50	669.03								672.43	3.40
			36	0.06			0.12	455			
11	696.00	669.32								672.98	3.66
			36	0.37	40.57		0.12	103			
11A	696.20	669.70								673.11	3.41
			36	0.07			0.12	327			
12	700.07	669.92								673.51	3.59
			36	-0.01			0.12	243			
13	701.12	669.90								673.81	3.91
			36	0.00			0.12	460			
14	673.68	669.90								674.37	4.47
			36	0.11			0.12	598			
15	692.08	670.54								675.10	4.56
			36	0.12			0.12	285			
15A	690.54	670.89								675.45	4.56
			36	0.04			0.12	306			
16	688.45	671.01								675.83	4.82
			36	0.08			0.12	605			
17	698.04	671.48								676.56	5.08
			36	0.09			0.12	341			
17A	701.25	671.81								676.98	5.17
			36	0.03			0.12	98			
18	694.28	671.84								677.11	5.27
			36	0.07			0.12	526			
19	693.44	672.20								677.75	5.55
			36	0.14	24.96		0.12	440			
20	699.55	672.82								678.28	5.46

* FROM FIG. 1 attached

36" DIAMETER; Q = 15 MGD

n = 0.013 Q = 24 MGD = 37.20 CFS A = 7.07 sf V = $\frac{Q}{A}$ Hm = 0.05 ft/g

MH	RIM	I.E.	DIA(in)	S	Q cap.(cfs)	Depth*	Sf	Length(ft)	Hm	Water Level	Depth from IE
7	703.02	667.32							0.021	670.32	3.00
			36	0.22			0.31	453			
8	698.42	668.32								671.75	3.43
			36	0.11			0.31	456			
9	692.92	668.82								673.18	4.36
			36	0.05			0.31	452			
10	697.50	669.03								674.60	5.57
			36	0.06			0.31	455			
11	696.00	669.32								676.03	6.71
			36	0.37			0.31	103			
11A	696.20	669.70								676.37	6.67
			36	0.07			0.31	327			
12	700.07	669.92								677.40	7.48
			36	-0.01			0.31	243			
13	701.12	669.90								678.17	8.27
			36	0.00			0.31	460			
14	693.68	669.90								679.62	9.72
			36	0.11			0.31	598			
15	692.08	670.54								681.49	10.95
			36	0.12			0.31	285			
15A	690.54	670.89								682.39	11.50
			36	0.04			0.31	306			
16	688.45	671.01								683.36	12.35
			36	0.08			0.31	605			
17	698.04	671.48								685.26	13.78
			36	0.09			0.31	341			
17A	701.25	671.81								686.34	14.53
			36	0.03			0.31	98			
18	694.28	671.84								686.66	14.82
			36	0.07			0.31	526			
19	693.44	672.20								688.31	16.11
			36	0.14			0.31	440			
20	699.55	672.82							0.021	689.70	16.88

* FROM FIG. 1 attached

36" DIAMETER; Q = 24 MGD

Computed: MCC
Date: 9-17-90
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Engineering Calculations

Project: ECSQ
Subject: SANITARY
Sheet No:

n = 0.013 Q = 20 MGD = 31.00 CFS A = 9.62 sf V = Q/A H_m = 0.05 V/2g

MH	RIM	I.E.	DIA (IN)	S(%)	$Q_{CAP.}$ (CFS)	d *	S_f (%)	L (ft)	H_m (ft)	WATER LEVEL	d
WW	638.00	618.02							0.005	620.31	2.29
			48	0.13	51.79	2.28	0.13	347			
JMH	637.70	621.40							0.008	623.58	2.18
			42	0.22	47.19	2.17	0.22	396			
1	637.83	622.23							0.008	624.46	2.23
			42	0.22	47.19	2.17	0.22	407			
2	637.07	623.15							0.008	625.36	2.21
			42	0.22	47.19	2.17	0.22	485			
3	637.31	624.21							0.008	626.44	2.23
			42	0.23	48.25	2.14	0.23	505			
4	640.71	625.41							0.008	627.61	2.20
			42	0.22	47.19	2.17	0.22	499			
5	647.03	626.63							0.008	628.80	2.17
			42	0.17	41.48	2.42	0.17	500			
6	651.00	627.50							0.008	629.92	2.42
			42	0.18	42.69	2.35	0.18	461			
7	652.95	628.35							0.008	630.76	2.41
			42	0.20	44.99	2.28	0.20	543			
8	661.67	629.47							0.008	631.85	2.36
			42	0.58	76.62	1.54	0.58	558			
9	665.02	632.72							0.008	635.09	2.37
			42	0.48	69.70	1.58	0.48	561			
10	650.03	635.43							0.008	637.79	2.36
			42	0.36	60.37	1.75	0.36	430			
11	646.77	636.97							0.008	639.35	2.38
			42	0.73	85.96	1.44	0.73	425			
12	652.09	640.09							0.008	642.46	2.37
			42	0.45	67.49	1.65	0.45	531			
13	663.83	642.48							0.008	644.86	2.38
			42	0.49	70.43	1.61	0.49	514			
14	666.45	645.00							0.008	647.39	2.38
			42	0.54	73.93	1.55	0.54	531			
15	663.57	647.87							0.008	651.37	3.50
			42	0.08	—	—	0.09	529			
16	666.98	648.28							0.008	651.86	3.58

* FROM FIG. 1

42" DIAMETER; Q = 20 MGD

Computed: MDC
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SDI Consultants, Ltd.
Engineering Calculations

Project: ELMHURST CHICAGO STONE
Subject: SANITARY
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n = [redacted]13 Q = 20 MGD = 31.00 CFS A = 9.62 SF V = Q/A H = 0.05 V²/2g [redacted]

Computed: MDC
Date: 9-17-90
Checked:
Date:

SDI Consultants, Ltd.
Engineering Calculations

Project: ELMHURST CHICAGO STONE
Subject: SANITARY
Sheet No: 2 OF 3

MH	RIM	I.E.	DIA (IN)	S(%)	Q(CAP.) (CFS)	d*	S_f (%)	L (FT)	Hm (FT)	WATER LEVEL	d
			42"	0.09	—	—	0.09	499			
17	668.57	649.77							0.008	652.32	3.55
				0.12	34.85	2.87	0.09	506			
18	669.00	649.40								652.78	3.38
				0.04	—	—	0.09	445			
19	669.88	649.58								653.19	3.61
				0.11	33.37	2.98	0.09	506			
20	675.46	650.16								653.65	3.49
				0.11	33.37	2.98	0.09	499			
21	681.42	650.72								654.11	3.39
				0.13	36.28	2.73	0.09	498			
22	678.87	651.37								654.57	3.20
				0.04	—	—	0.09	499			
23	681.75	651.55								655.03	3.48
				0.10	31.82	3.26	0.09	506			
24	684.50	652.45								655.49	3.26
				0.12	34.85	3.26	0.09	497			
25	682.00	653.06								656.32	3.26
				0.10	31.82	3.26	0.10	505			
26	688.36	653.61								656.87	3.26
				0.10	31.82	3.26	0.10	492			
27	682.08	653.78								657.04	3.26
				0.10	31.82	3.26	0.10	504			
28	675.50	654.53								657.79	3.26
				0.10	31.82	3.26	0.10	300			
29	682.70	654.70								658.20	3.50
				0.08	—	—	0.09	401			
30	678.43	655.03								658.57	3.54
				0.15	38.97	2.59	0.09	503			
31	677.62	655.82								659.03	3.21
				—	—	—	—	—			
31	677.62	665.26								668.76	3.50
				0.08	—	—	0.09	489			
37	693.94	665.64								669.21	3.57
				0.07	—	—	0.09	549			
36	684.63	666.03								669.71	3.68

* FROM FIG 1

Computed: MDC
Date: 9-17-20
Checked:
Date:

SDI Consultants, Ltd.
Engineering Calculations

Project: ELMHURST CHICAGO STONE
Subject: SANITARY
Sheet No: 3 of 3

MH	RIM	I.E.	DIA (in)	S(%)	Qcap. (cfs)	d*	Sf (%)	L (ft)	Hm (ft)	WATER LEVEL	d
			42	0.14	31.64	2.63	0.09	550			
39	680.13	666.83							0.008	670.21	3.38
			42	0.05	–	–	0.09	505			
40	701.00	667.10								670.67	3.51
			42	0.05	–	–	0.09	497			
41	689.05	667.35								671.13	3.78
			42	0.12	34.85	2.87	0.09	496			
42	678.47	667.97								671.58	3.61
			42	0.11	33.37	2.98	0.09	504			
43	680.44	668.54								672.04	3.50
			42	0.05	–	–	0.09	498			
44	685.21	668.81								672.50	3.69
			42	0.08	–	–	0.09	551			
45	689.47	669.27								673.00	3.73
			42	0.11	33.37	2.98	0.09	506			
46	679.74	669.84								673.46	3.62
			42	0.10	31.82	3.19	0.09	507			
47	679.87	670.37								673.92	3.55
			42	0.10	31.82	3.19	0.09	506			
48	680.12	670.90								674.38	3.48
			42	0.10	31.82	3.19	0.09	513			
49	681.57	671.51								674.85	3.34
			42	0.10	31.82	3.19	0.09	505			
50	681.94	672.04								675.31	3.27
			42	0.10	31.82	3.19	0.09	498			
51	681.08	672.48								675.77	3.29
			42	0.10	31.82	3.19	0.09	520			
52	682.46	673.06								676.25	3.19
			42	0.17	41.48	2.45	0.17	385			
53	684.24	673.74								676.91	3.17
			42	0.07			0.09	407			
54	685.74	674.04								677.28	3.24
			42	0.23	48.25	2.10		385			
55	700.05	674.95							0.008	677.63	2.66
↓			42	—							
60	693.68	682.51									

12.51 st

Q [redacted] M [redacted] 46.[redacted]5 A [redacted] 9.6 [redacted] 9 Hm [redacted] 42

Computed: MDC
Date:
Checked:
Date:

SDI Consultants, Ltd.
Engineering Calculations

Project: ELMHURST CHICAGO STONE
Subject: SANITARY
Sheet No: 1 of 3

MH	RIM	I.E.	DIA (in)	S(%)	Qcap. (cfs)	d*	Sf (%)	L (ft)	Hm (ft)	WATER LEVEL	d	d/D above crown
WW	638.00	618.62							0.01	622.03	4.01	0.01
			48	0.13	51.79	3.32	0.13	347				
JMH	637.70	621.40							0.02	624.75	3.35	
			42	0.22	47.19	3.33	0.22	296				
1	637.83	622.23								625.64	3.41	
			42	0.22	47.19	3.33	0.21	407				
2	637.07	623.15								626.51	3.36	
			42	0.22	47.19	3.33	0.22	465				
3	637.31	624.21								627.60	3.39	
			42	0.22	48.25	3.15	0.21	505				
4	640.71	625.41								628.66	3.27	
			42	0.22	47.19	3.33	0.22	499				
5	647.03	626.63								630.13	3.50	
			42	0.17	–	–	0.21	500				
6	651.00	627.50										
			42	0.18	–	–	0.21	461				
7	652.95	628.35										
			42	0.20	–	–	0.21	543				
8	661.67	629.47								633.35	3.88	0.33
			42	0.56	76.62	2.00		558				
9	665.02	632.72										
			42	0.48	69.70	2.21		561				
10	650.03	635.43										
			42	0.36	60.37	2.49		430				
11	646.77	636.97										
			42	0.73	85.96	1.86		425				
12	652.09	640.09										
			42	0.45	67.49	2.28		531				
13	663.83	642.48										
			42	0.49	70.43	2.17		514				
14	666.45	645.00										
			42	0.54	73.93	2.07		531				
15	663.57	647.87										
			42	0.08	–	–	0.21	529				
16	666.98	648.78							0.02	651.78	3.50	

* FROM FIG. 1

INCREMENTAL CAPACITY

42" DIAMETER; Q = 30 MGD

[redacted] Q. [redacted] MG [redacted] A [redacted] Q/f [redacted]

Computed: MDC Date:
Checked: Date:

SDI Consultants, Ltd.
Engineering Calculations

Project: ELMHURST, CHICAGO STONE
Subject: SANITARY
Sheet No: 2 of 3

MH	RIM	I.E.	DIA (in)	S(%)	Q cap. (cfs)	d*	Sf (%)	L (ft)	Hm (ft)	WATER LEVEL	d	
			42	0.09	–	–	0.21	499				
17	668.57	648.77							0.02	652.85	4.08	0.58
			42	0.12	–	–	0.21	506				
18	669.00	649.40								653.93	4.53	1.03
			42	0.04	–	–	0.21	445				
19	669.88	649.58										
			42	0.11	–	–	0.21	506				
20	675.46	650.16										
			42	0.11	–	–	0.21	499				
21	681.42	650.72										
			42	0.13	–	–	0.21	498				
22	678.87	651.37										
			42	0.04	–	–	0.21	499				
23	681.75	651.55										
			42	0.10	–	–	0.21	506				
24	684.50	652.45										
			42	0.12	–	–	0.21	497				
25	682.00	653.06										
			42	0.10	–	–	0.21	505				
26	688.36	653.61										
			42	0.10	–	–	0.21	492				
27	682.08	653.78										
			42	0.10	–	–	0.21	504				
28	675.50	654.53										
			42	0.10	–	–	0.21	300				
29	682.70	654.70										
			42	0.08	–	–	0.21	401				
30	678.43	655.03										
			42	0.15	–	–	0.21	503				
31	677.62	655.82							0.02	667.12	11.30	7.90
			–	–	–	–	–	–				
31	677.62	665.26							0.01	668.76	3.50	
			42	0.08	–	–	0.15	489				
37	693.94	665.64										
			42	007	–	–		549				
38	684.63	666.03							0.01			

Q = 25 MGD = 38.75 CFS

Q = [redacted] MG [redacted] 68.7 [redacted] A [redacted] 62 [redacted] V = Q/A [redacted] Hm = [redacted] 45 V²/2g

Computed: MDC
Date:
Checked:
Date:

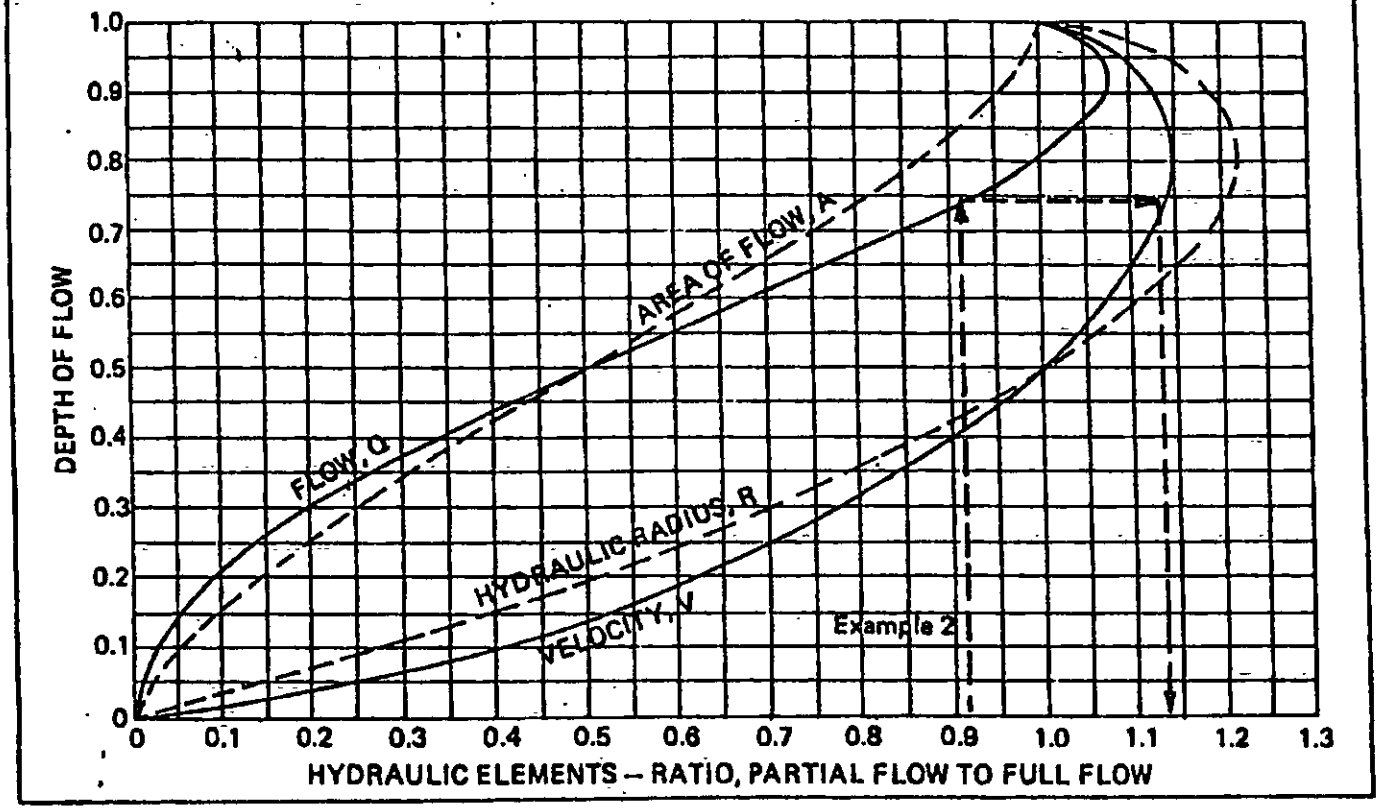
SDI Consultants, Ltd.
Engineering Calculations

Project: ELMHURST CHICAGO STONE
Subject: SANITARY
Sheet No: 3 of 3

MH	RIM	I.E.	DIA (in)	S(%)	Q cap. (cfs)	d*	Sf (%)	L (ft)	Hm (ft)	WATER LEVEL	d	
			42	0.14			0.15	550				
39	690.13	666.83							0.01			
				0.05			0.15	505				
40	701.00	667.10										
				0.05			0.15	497				
41	689.05	667.35										
				0.12			0.15	496				
42	678.47	667.97								673.45	5.48	1.98
				0.11			0.15	504				
43	680.44	668.54								674.22	5.68	2.18
				0.05			0.15	498				
44	685.21	668.81										
				0.08			0.15	551				
45	689.47	669.27										
				0.11			0.15	506				
46	679.74	669.84								676.58	6.74	3.24
				0.10			0.15	507				
47	679.87	670.37								677.35	6.98	3.48
				0.10			0.15	506				
48	680.12	670.90										
				0.10			0.15	513				
49	681.57	671.51										
				0.10			0.15	505				
50	681.94	672.04										
				0.10			0.15	498				
51	681.08	672.48								680.42	7.94	4.44
				0.10			0.15	520				
52	682.46	673.06										
				0.17			0.15	385				
53	684.24	673.74										
				0.07			0.15	407				
54	685.72	674.04								682.42	8.38	4.88
				0.23			0.15	385				
55	700.05	674.95								683.01	8.07	4.57
			42	0.10			0.15	385				
56	701.04	674.97							0.01	683.59	8.62	5.12
60	683.66	682.51						1580	0.05	685.03	3.52	0.02

42" DIAMETER
Q = 25 MGD

FIGURE 1: Relative Velocity and Flow in Circular Pipe for Any Depth of Flow.



Appendix GG

NAPERVILLE COLLECTION SYSTEM

Gravity Main (Miles)	Force Mains (Miles)	Manholes	Wastewater Customers
515.63	9.37	12,185	44,434

Pipe Material

Asset Material	Sewer Force Main	Sewer Gravity Main
Vitrified Clay Pipe		24.23%
Steel Pipe	8.61%	
Reinforced Plastic Pipe (Truss pipe)		0.77%
Reinforced Concrete Pipe		2.51%
Polyvinyl Chloride	17.91%	42.00%
Polyethylene	1.22%	0.08%
Not Known	1.81%	0.85%
Ductile Iron Pipe	57.99%	3.41%
Cured-In-Place Pipe (CIPP)	12.39%	25.36%
Concrete Pipe (non-reinforced)		0.27%
Cast Iron	0.07%	0.10%
Asbestos Cement		0.44%

Manhole Types

Type of Manhole	Totals
Interceptor Manhole	358
Drop Manhole	923
Drop Interceptor Manhole	73
Collector Manhole	10,831
Total	**12,185**

Lift Station	Backflow Prevention Stations
23	6

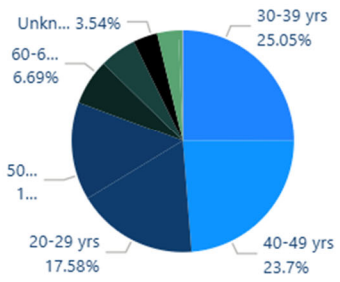
O&M Work Orders Initiated

1,128

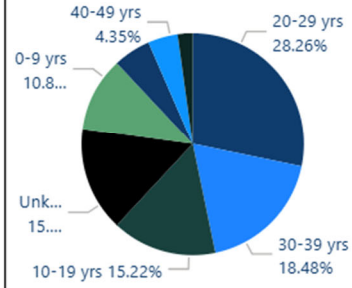
O&M Work Orders Initiated

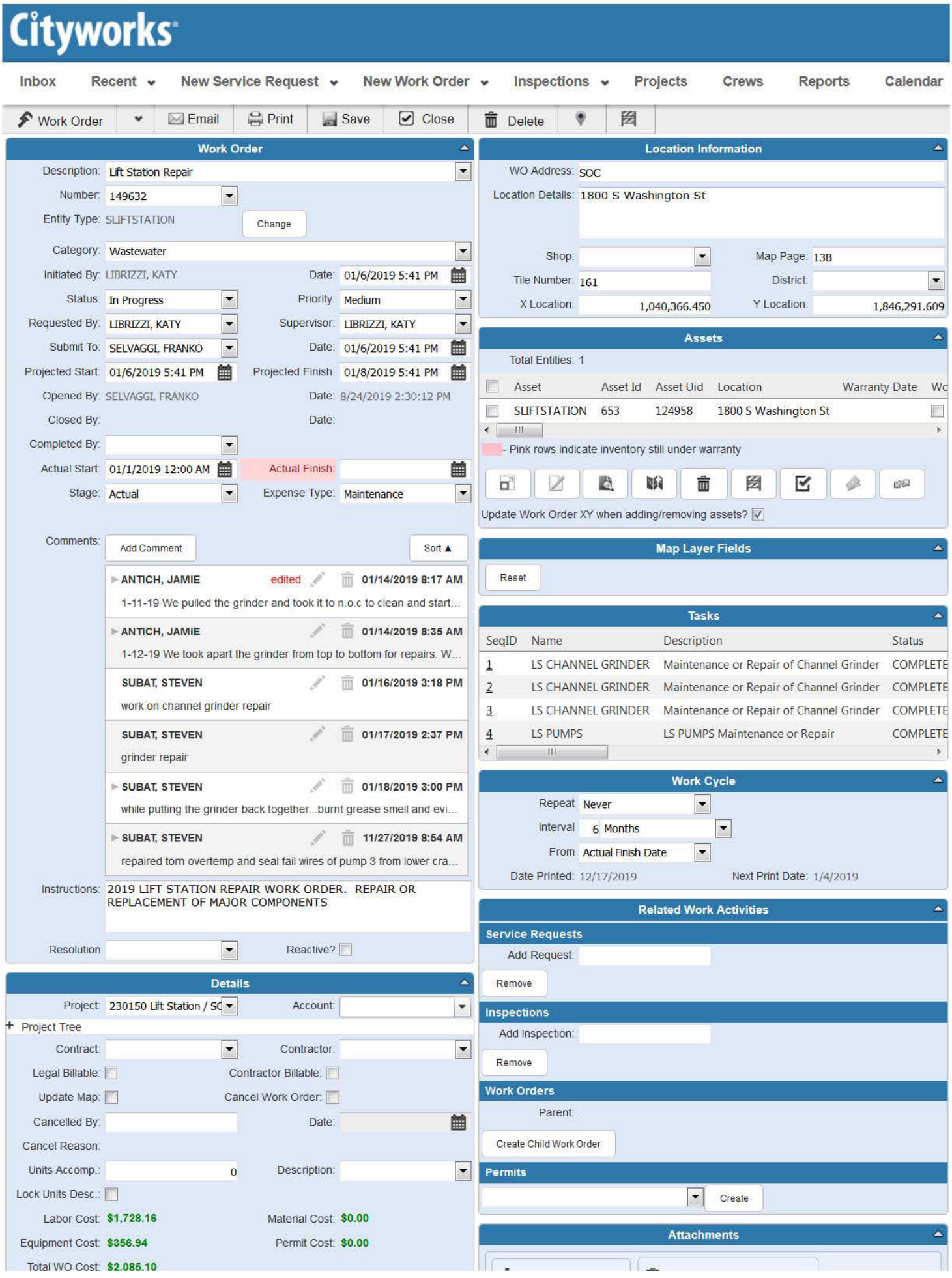
Type of Work	Percentage
Planned Work	91.67%
Unplanned Work	8.33%
Total	**100.00%**

Gravity Main Ages



Forcemain Ages




Cityworks
Inbox
Recent
New Service Request
New Work Order
Inspections
Projects
Crews
Reports
Calendar
Work Order
Email
Print
Save
Close
Delete
Work Order
Description: Lift Station Repair
Number: 149632
Entity Type: SLIFTSTATION
Change
Category: Wastewater
Initiated By: LIBRIZZI, KATY
Date: 01/6/2019 5:41 PM
Status: In Progress
Priority: Medium
Requested By: LIBRIZZI, KATY
Supervisor: LIBRIZZI, KATY
Submit To: SELVAGGI, FRANKO
Date: 01/6/2019 5:41 PM
Projected Start: 01/6/2019 5:41 PM
Projected Finish: 01/8/2019 5:41 PM
Opened By: SELVAGGI, FRANKO
Date: 8/24/2019 2:30:12 PM
Closed By:
Date:
Completed By:
Actual Start: 01/1/2019 12:00 AM
Actual Finish:
Stage: Actual
Expense Type: Maintenance
Comments:
Add Comment
Sort ▲
ANTICH, JAMIE edited 01/14/2019 8:17 AM
1-11-19 We pulled the grinder and took it to n.o.c to clean and start...
ANTICH, JAMIE 01/14/2019 8:35 AM
1-12-19 We took apart the grinder from top to bottom for repairs. W...
SUBAT, STEVEN 01/16/2019 3:18 PM
work on channel grinder repair
SUBAT, STEVEN 01/17/2019 2:37 PM
grinder repair
SUBAT, STEVEN 01/18/2019 3:00 PM
while putting the grinder back together...burnt grease smell and evi...
SUBAT, STEVEN 11/27/2019 8:54 AM
repaired torn overtemp and seal fail wires of pump 3 from lower cra...
Instructions: 2019 LIFT STATION REPAIR WORK ORDER. REPAIR OR REPLACEMENT OF MAJOR COMPONENTS
Resolution
Reactive?
Details
Project: 230150 Lift Station / SC
Account:
Project Tree
Contract:
Contractor:
Legal Billable:
Contractor Billable:
Update Map:
Cancel Work Order:
Cancelled By:
Date:
Cancel Reason:
Units Accomp.: 0
Description:
Lock Units Desc.:
Labor Cost: $1,728.16
Material Cost: $0.00
Equipment Cost: $356.94
Permit Cost: $0.00
Total WO Cost: $2,085.10
Location Information
WO Address: SOC
Location Details: 1800 S Washington St
Shop:
Map Page: 13B
Tile Number: 161
District:
X Location: 1,040,366.450
Y Location: 1,846,291.609
Assets
Total Entities: 1
Asset
Asset Id
Asset Uid
Location
Warranty Date
SLIFTSTATION
653
124958
1800 S Washington St
- Pink rows indicate inventory still under warranty
Update Work Order XY when adding/removing assets?
Map Layer Fields
Reset
Tasks
SeqID
Name
Description
Status
1 LS CHANNEL GRINDER Maintenance or Repair of Channel Grinder COMPLETE
2 LS CHANNEL GRINDER Maintenance or Repair of Channel Grinder COMPLETE
3 LS CHANNEL GRINDER Maintenance or Repair of Channel Grinder COMPLETE
4 LS PUMPS LS PUMPS Maintenance or Repair COMPLETE
Work Cycle
Repeat Never
Interval 6 Months
From Actual Finish Date
Date Printed: 12/17/2019
Next Print Date: 1/4/2019
Related Work Activities
Service Requests
Add Request:
Remove
Inspections
Add Inspection:
Remove
Work Orders
Parent:
Create Child Work Order
Permits
Create
Attachments

2024 Yearly Flow Monitoring Study

City of Naperville, IL

Prepared for: City of Naperville, IL

2025



ADS ENVIRONMENTAL SERVICES

ADS ENVIRONMENTAL SERVICES®

INTRODUCTION

ADS Environmental Services (ADS) was retained by the city of Naperville, IL to gather and evaluate wastewater flow monitor and rainfall monitor data within portions of its existing sanitary sewer collection system located in Naperville, IL. The scope of this study is to characterize dry weather and wet weather flow conditions within areas served by the city of Naperville, IL, evaluate key performance indicators, and rank the relative severity of observed rainfall dependent infiltration and inflow (RDII) to assist the city of Naperville, IL to direct subsequent planning, condition assessment, and rehabilitation activities.

METHODOLOGY

Dry weather and wet weather performance data were obtained within the study area by installing wastewater flow monitors to observe and document existing flow conditions. A total of 35 sewer basins were evaluated using 35 long term flow monitors, and five rainfall monitors. Descriptions of the monitor basins, equipment, study period, and data format are detailed in the following sections.

STUDY PERIOD

All the permanent flow monitors were installed by 01/01/24. Based on these installation dates, the Study Period began on 01/01/24 and continued through 12/31/24 – a 366-day period. For analysis purposes, the study was broken up into seasons labeled Summer and Winter. The winter season is the first half of the year, from January 1st to June 20th. The summer season is the second half of the year, from June 21st to December 31st. This isn't true winter and summer seasons but breaks up the year between wetter and dryer periods.

FLOW MONITOR EQUIPMENT

Wastewater flow monitoring was performed using TRITON+® area-velocity flow monitors manufactured, installed, and maintained by ADS. Each flow monitor is mounted near the top of a manhole and is connected to area-velocity (AV) sensors positioned in an incoming sewer. Each flow monitor is equipped with an ADS Peak Combo™ or ADS Surface Combo™ AV Sensor which includes an ultrasonic depth sensor, a velocity sensor, and a pressure depth sensor.

RAINFALL MONITOR EQUIPMENT

Rainfall monitoring was performed using RAINALERT® III rainfall monitors manufactured, installed, and maintained by ADS. Each rainfall monitor is equipped with a TB6 standard tipping bucket rain gauge manufactured by HyQuest Solutions.

FLOW MONITOR AND RAIN GAUGE LOCATIONS

Basins for this study were selected by ADS as a collaborative effort. Preliminary monitor locations for each basin were selected using Geographic Information System (GIS) mapping available from the city of Naperville, IL. Final locations were selected based on observed flow conditions, site access, and site safety considerations. Descriptions of each sewer basin and its associated flow monitor location are provided in Table 1.

TABLE 1: Basin Size in Acres and Length in LF

Monitor ID	Basin ID	Area (Acres)	Basin Size (LF)
NAPER_BAILWASH	BAILWASH	632	72630
NAPER_BMILL	BMILL	983	106045
NAPER_BP	BP	202	11120
NAPER_BURNTREE	BURNTREE	151	12599
NAPER_COACHDRN	COACHDRN	435	61001
NAPER_COACHDRS	COACHDRS	426	58132
NAPER_COACHDRS2	COACHDRS2	232	34832
NAPER_COACHDRS3	COACHDRS3	413	52103
NAPER_FERRY	FERRY	1299	225999
NAPER_HOBSMILL	HOBSMILL	1152	136777
NAPER_HOBSON	HOBSON	945	120223
NAPER_MAYWATTS	MAYWATTS	630	67079
NAPER_MCDOWELL	MCDOWELL	402	53982
NAPER_N16-090	N16-090	223	29900
NAPER_NAPPLAIN	NAPPLAIN	3578	355590
NAPER_NCC	NCC	972	127713
NAPER_NPSINT	NPSINT	622	81306
NAPER_NWPS	NWPS_14	318	33264
NAPER_OGDENMAN	OGDENMAN	537	70257
NAPER_OXFORDLANE	OXFORDLANE	364	41535
NAPER_PEBBWOOD	PEBBWOOD	1173	89316
NAPER_PRESCOTT	PRESCOTT	966	97511
NAPER_RVIEW	RVIEW	852	111452
NAPER_S17-007	S17-007	689	87097
NAPER_SBCOD	SBCOD	555	69951
NAPER_SBROOK	SBROOK	932	113605
NAPER_SHERI	SHERI	802	103480
NAPER_SOC24	SOC24	379	48655
NAPER_SUNDLAND	SUNDLAND	641	79222
NAPER_T01-020A	T01-020A	875	81370
NAPER_T03-028	T03-028	156	15304
NAPER_T03-029	T03-029	868	65521
NAPER_T04-009	T04-009	777	64023
NAPER_T13-001	T13-001	862	98120
NAPER_T14-003	T14-003	1,613	184087

The location of each flow monitor and associated basin are shown in Figure 1 as provided by the Engineer. All flow monitors and their associated basins convey wastewater flows to the City of Naperville Springbrook Water Reclamation Center for treatment as shown in the flow monitor schematic provided in Figure 2.

FIGURE 1: Flow Monitor and Basin Locations

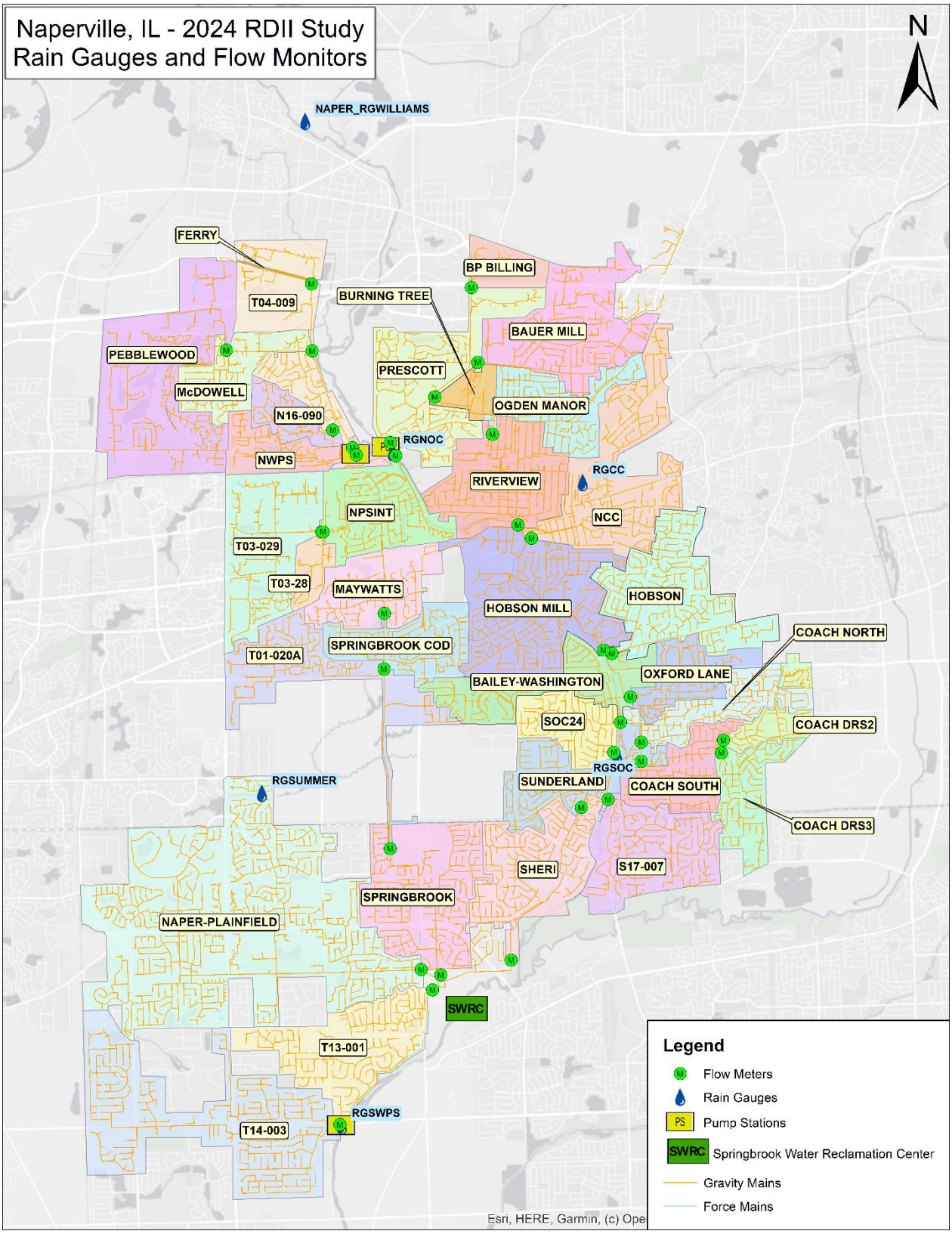
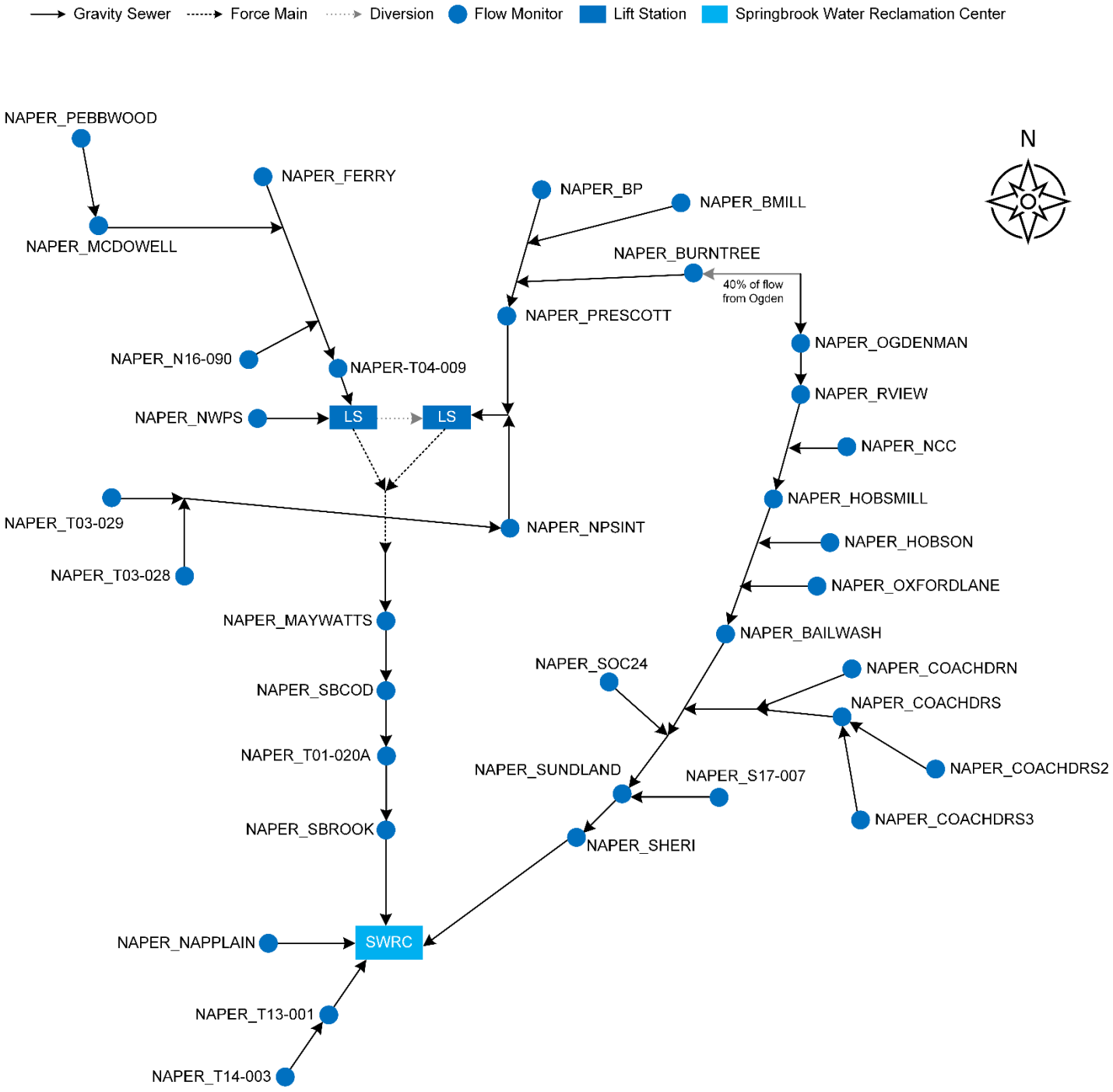


FIGURE 2: Flow Monitor Schematic



RIVER GAUGE AND LEVEL ONLY MONITORING EQUIPMENT (SSO ALARMS)

The City of Naperville has a multitude of level monitoring devices throughout the collections system. Currently there are 19 level monitoring devices in the sanitary collection system. These devices are depth monitors that have alarming services to detect, analyze and transmit notifications to city staff when flow levels exceed predetermined high depths. This can indicate early-stage development of high flow conditions that can cause sanitary sewer overflows (SSOs) and/or residential sanitary sewer backups. There are also 5 level devices monitoring river levels with similar alarm notifications alerting of high-level events. These notifications will notify city personnel so they can deploy flooding countermeasures.

RIVER GAUGE AND LEVEL ONLY (SSO ALARMS) LOCATIONS

Descriptions of each river gauge and level only location are listed below in Tables 2 and 3, with a map of locations in Figure 3.

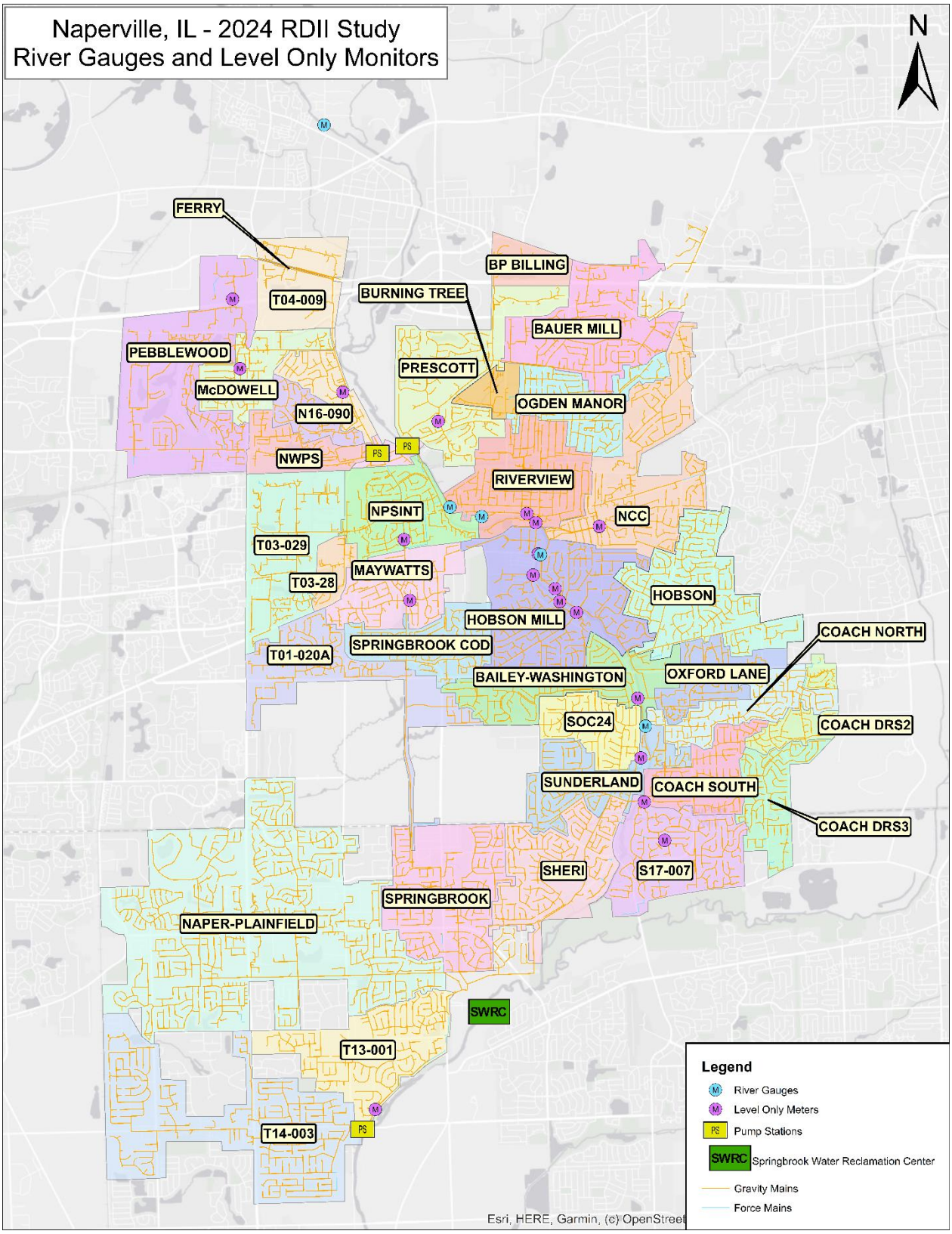
TABLE 2: River Gauges

Site ID	Meter Type	Latitude	Longitude
NAPER_BAILEY	ECHO	41.740295	-88.12681
NAPER_EAGLEBRDG	ECHO	41.771496	-88.15923
NAPER_HILLSIDEBRDG	ECHO	41.765812	-88.14759
NAPER_JEFFERSON	ECHO	41.772923	-88.16555
NAPER_WILLIAMSBRDGE	ForeSITE-UL	41.82977	-88.19044

TABLE 3: Level Only (SSO Alarms)

Site ID	Meter Type	Latitude	Longitude	Site ID	Meter Type	Latitude	Longitude
NAPER_C08-092	Triton Plus	41.768102	-88.174667	NAPER_S20-001	ECHO	41.729023	-88.12709
NAPER_C10-002	ECHO	41.7705768	-88.1484989	NAPER_S36-005	ECHO	41.72329	-88.12305
NAPER_C11-001	Triton Plus	41.76594	-88.14805	NAPER_S46-009	ECHO	41.68338	-88.18059
NAPER_C13-025C	Triton Plus	41.770004	-88.135895	NAPER_SOCWETWELL	ECHO	41.73557	-88.12774
NAPER_C20-052	ECHO	41.762794	-88.14906	NAPER_T05-011	Triton Plus	41.78568	-88.167854
NAPER_C24-040	ECHO	41.75906	-88.17355	NAPER_T07-003	Triton Plus	41.76075	-88.14468
NAPER_C30-003A	ECHO	41.757236	-88.14046	NAPER_T08-003	ECHO	41.771942	-88.15028
NAPER_C43-001	ECHO	41.75884	-88.14379	NAPER_W02-017A	ECHO	41.803883	-88.20868
NAPER_N16-020	ECHO	41.79003	-88.1868	NAPER_W06-018	Triton Plus	41.79357	-88.20724
NAPER_S03-001	ECHO	41.744442	-88.12834				

FIGURE 3: River Gauge and Level Only Monitor Locations



RESULTS

Wastewater flow monitor and rainfall monitor data provide insight into sewer performance – revealing important information about how the existing sewer system accommodates observed flow rates. The following sections evaluate flow monitor data observed during both dry weather and wet weather periods using a variety of key performance indicators (KPIs).

The KPIs used in this report are the following:

- d/D: Depth-to-Diameter Ratio. This ratio is used to assess the collection system's capacity.
- GWI: Groundwater Infiltration. These values are expressed as a percent of the net average dry weather flow rate compared with the industry rule of thumb. Also sometimes seen as Base Infiltration (BI).
- RDII: Rainfall Dependent Infiltration and Inflow. Infiltration is water that enters a sanitary sewer through defects. Inflow is storm water runoff that enters a sanitary sewer system from direct connections.

A more detailed description of each KPI will be in its associated section.

DEPTH-TO-DIAMETER RATIOS

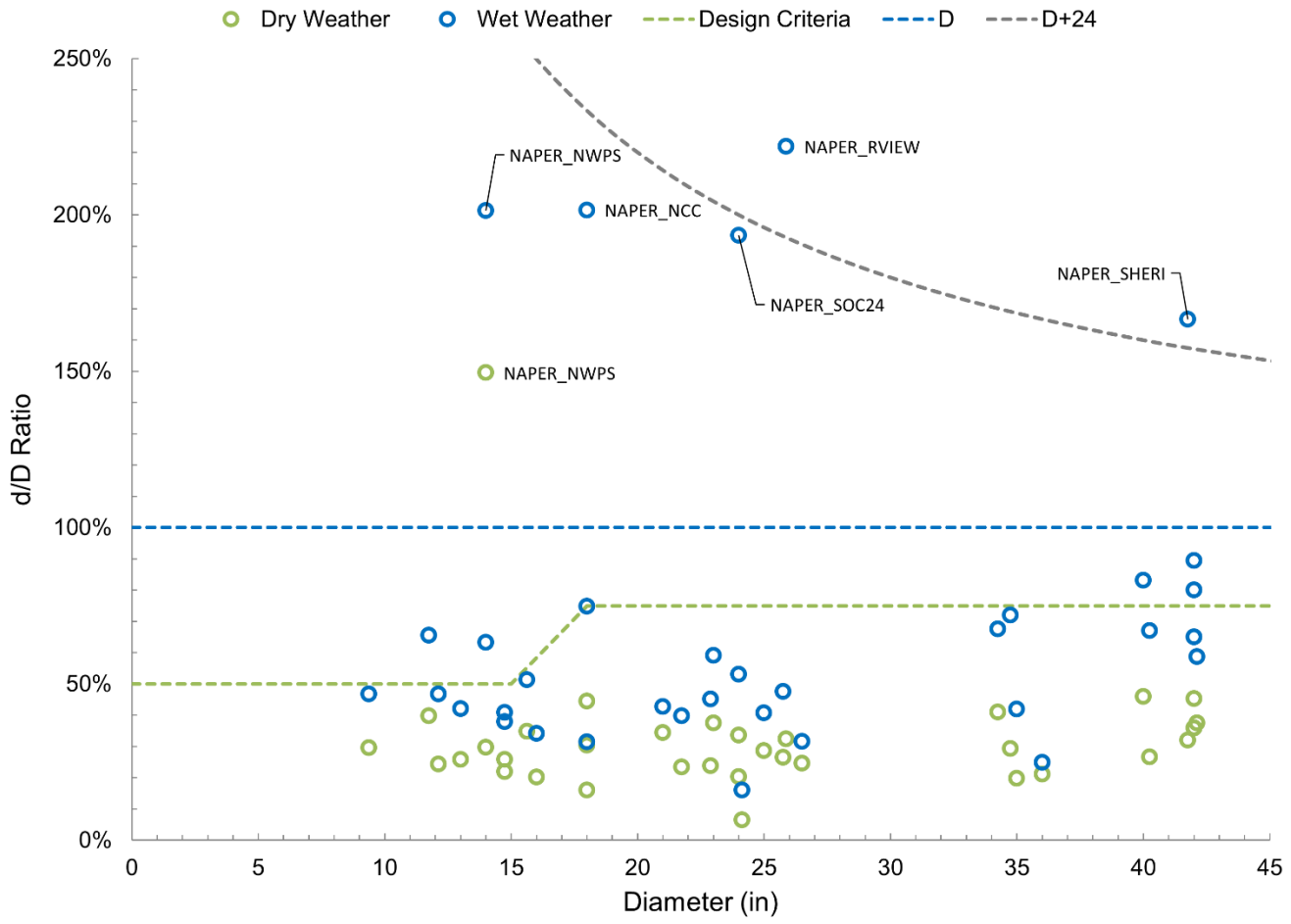
Once dry weather and wet weather flow rates are characterized, the hydraulic conditions under which they occur are evaluated. The average flow depth observed during dry weather ($d_{avg\text{-}D}$) and wet weather ($d_{avg\text{-}W}$) and their corresponding flow depth-to-diameter (d/D) ratios observed during the Study Period are provided in Table 4. The average dry weather flow depth is the average flow depth that is consistently observed each day during normal dry weather conditions. The average wet weather flow depth may or may not be directly associated with the average wet weather flow rate, depending on the hydraulic conditions observed at a given flow monitor location.

TABLE 4: Dry and Wet Weather Depth-to-Diameter Ratios

Monitor	D (inches)	d_{max-D} (inches)	d_{max-D} / D (%)	d_{max-W} (inches)	d_{max-W} / D (%)
NAPER_BAILWASH	40.25	10.69	27%	26.98	67%
NAPER_BMILL	22.88	5.45	24%	10.33	45%
NAPER_BP	24.13	1.55	6%	3.86	16%
NAPER_BURNTREE	11.75	4.68	40%	7.70	66%
NAPER_COACHDRN	14.75	3.24	22%	5.58	38%
NAPER_COACHDRS	18.00	5.48	30%	13.46	75%
NAPER_COACHDRS2	12.13	2.95	24%	5.67	47%
NAPER_COACHDRS3	14.75	3.80	26%	6.02	41%
NAPER_FERRY	25.75	6.83	27%	12.23	47%
NAPER_HOBSMILL	34.75	10.18	29%	25.00	72%
NAPER_HOBSON	18.00	2.88	16%	5.67	32%
NAPER_MAYWATTS	42.00	15.09	36%	27.31	65%
NAPER_MCDOWELL	24.00	8.06	34%	12.74	53%
NAPER_N16-090	13.00	3.35	26%	5.46	42%
NAPER_NAPPLAIN	36.00	7.59	21%	8.95	25%
NAPER_NCC	18.00	8.01	45%	36.28	202%
NAPER_NPSINT	35.00	6.94	20%	14.68	42%
NAPER_NWPS	14.00	20.93	150%	28.19	201%
NAPER_OGDENMAN	14.00	4.15	30%	8.86	63%
NAPER_OXFORDLANE	16.00	3.22	20%	5.46	34%
NAPER_PEBBWOOD	25.00	7.17	29%	10.19	41%
NAPER_PRESCOTT	23.00	8.63	38%	13.60	59%
NAPER_RVIEW	25.88	8.39	32%	57.42	222%
NAPER_S17-007	15.63	5.43	35%	8.03	51%
NAPER_SBCOD	42.00	19.03	45%	33.60	80%
NAPER_SBROOK	42.13	15.78	37%	24.73	59%
NAPER_SHERI	41.75	13.37	32%	69.56	167%
NAPER_SOC24	24.00	4.87	20%	46.44	194%
NAPER_SUNDLAND	42.00	15.09	36%	37.54	89%
NAPER_T01-020A	40.00	18.37	46%	33.23	83%
NAPER_T03-028	9.38	2.78	30%	4.39	47%
NAPER_T03-029	21.75	5.09	23%	8.66	40%
NAPER_T04-009	34.25	14.05	41%	23.12	68%
NAPER_T13-001	26.50	6.52	25%	8.36	32%
NAPER_T14-003	21.00	7.22	34%	8.98	43%

The d/D ratio is a performance indicator used to assess sewer capacity. Sewers are often designed to flow under open channel conditions with some reserve capacity. As a result, ASCE and WEF recommend that sewers with diameters up to 15 inches be designed to flow with dry weather d/D ratios of 50%, and larger diameter sewers be designed to flow with dry weather d/D ratios of 75%. Sewers are not generally designed to operate under surcharge conditions with wet weather d/D ratios greater than 100%.[1]

FIGURE 4: d/D Ratios Compared to Design and Capacity Assurance Criteria



During dry weather conditions, all the d/D ratios except for at the flow monitor location NAPER_NWPS, are within design criteria recommended by ASCE and WEF, indicating there is sufficient capacity at most flow monitor locations to accommodate dry weather flow rates observed during the Study Period.

During wet weather conditions, five of the flow monitor locations had a d/D ratio that was not within design criteria. The d/D ratio at flow monitor locations NAPER_NWPS, NAPER_NCC, NAPER_SOC24, NAPER_RVIEW, and NAPER_SHERI indicate that there is not sufficient capacity for the wet weather flow rates at these locations observed during the study period.

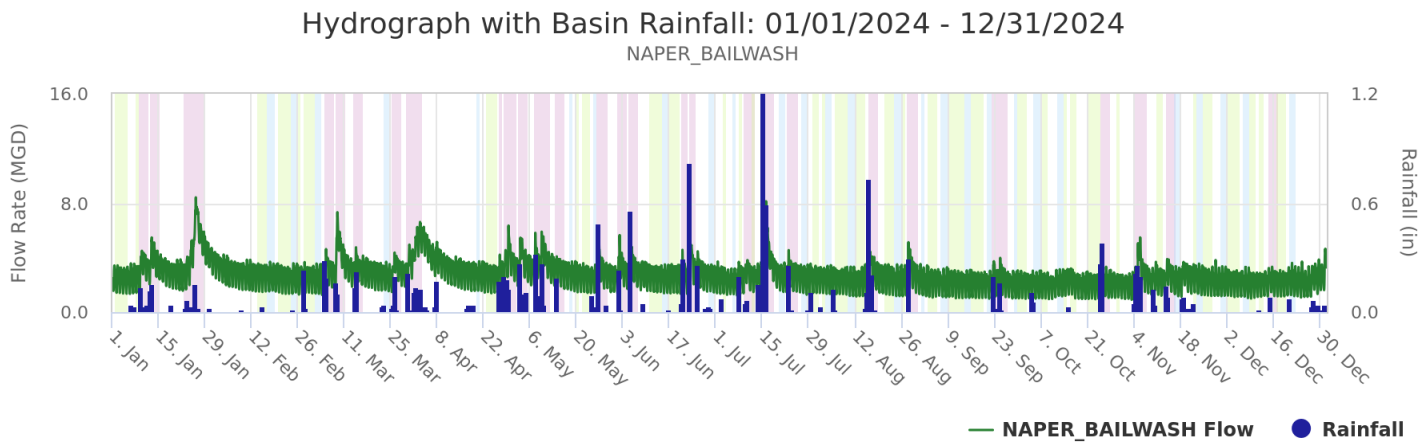
The flow meter location NAPER_SHERI experienced wet weather flow depths greater than the D+24 capacity assurance criteria and NAPER_RVIEW exceeded the R-36 capacity assurance criteria.

2.1 - DRY DAYS

Figure 5 is an example hydrograph from the flow monitor located at NAPER_BAILWASH. The purple hyetographs are the recorded rainfall from a blend of all rain gauges. The dry days selected for analysis are highlighted in green (weekdays) and blue (weekends) shaded bands. Dry days are those that are not influenced by prior rainfall and do not deviate from the characteristic diurnal pattern of the sewershed.

Storms of over ½ inch that resulted in a system-wide response were selected for analysis and those 34 events are shown as magenta bands along the bottom of the hydrograph.

FIGURE 5: Flow hydrograph, rainfall hyetograph, selected dry days and storms



2.2 – DRY DAY VALUES

GROUNDWATER INFILTRATION

Infiltration and inflow (I/I) are common problems in sanitary sewer collection systems. While inflow typically gets the most attention in wet weather, groundwater infiltration can also be a significant problem in dry weather, silently stealing sewer capacity 24 hours per day, 7 days per week, 365 days per year. While groundwater infiltration (Q_{GWI}) is often of interest to wastewater professionals, it is not measured directly by flow monitors. Rather, it is assumed that $0 \leq Q_{GWI} \leq Q_{min\text{-}D}$ and is *estimated* using a variety of empirical methods. The Stevens-Schutzbach Method was used to estimate groundwater infiltration during the Study Period. The results are provided in Table 5 and Table 6.

TABLE 5: Summer Groundwater Infiltration Estimates

Basin ID	Gross Q_{min-D} (MGD)	Gross Q_{avg-D} (MGD)	Gross Q_{GWI} (MGD)	Net Q_{GWI} (MGD)	Net Q_{avg-D} (MGD)	Net Q_{GWI}/Q_{avg-D} (%)
BAILWASH	1.119	2.255	0.542	0.082	0.231	35%
BMILL	0.182	0.463	0.111	0.111	0.463	24%
BP	0.056	0.060	0.055	0.055	0.060	92%
BURNTREE	0.119	0.215	0.093	0.093	0.215	43%
COACHDRN	0.133	0.277	0.096	0.096	0.277	35%
COACHDRS	0.278	0.604	0.170	0.098	0.367	27%
COACHDRS2	0.047	0.104	0.039	0.039	0.104	38%
COACHDRS3	0.046	0.132	0.034	0.034	0.132	26%
FERRY	0.524	0.901	0.329	0.329	0.901	37%
HOBSMILL	0.701	1.550	0.352	-0.017	0.275	0%
HOBSON	0.114	0.342	0.071	0.071	0.342	21%
MAYWATTS	2.469	4.885	1.068	-0.385	0.000	0%
MCDOWELL	0.409	0.826	0.242	0.079	0.252	31%
N16-090	0.057	0.133	0.044	0.044	0.133	33%
NAPPLAIN	0.555	1.381	0.275	0.275	1.381	20%
NCC	0.162	0.385	0.105	0.105	0.385	27%
NPSINT	0.304	0.752	0.170	0.102	0.349	29%
NWPS_14	0.454	0.956	0.256	0.256	0.956	27%
OGDENMAN	0.091	0.214	0.067	0.067	0.214	31%
OXFORDLANE	0.049	0.137	0.036	0.036	0.137	26%
PEBBWOOD	0.263	0.574	0.163	0.163	0.574	28%
PRESCOTT	0.663	1.256	0.371	0.111	0.518	21%
RVIEW	0.451	0.900	0.264	0.197	0.686	29%
S17-007	0.139	0.344	0.091	0.091	0.344	26%
SBCOD	3.154	5.914	1.354	0.285	1.029	28%
SBROOK	3.111	5.918	1.330	0.132	0.518	25%
SHERI	2.408	4.633	1.057	0.106	0.488	22%
SOC24	0.147	0.256	0.114	0.114	0.256	45%
SUNDLAND	2.153	4.167	0.957	0.035	0.776	5%
T01-020A	2.754	5.363	1.184	-0.170	0.000	0%
T03-028	0.013	0.060	0.010	0.010	0.060	17%
T03-029	0.097	0.343	0.058	0.058	0.343	17%
T04-009	1.397	2.769	0.657	0.086	1.042	8%
T13-001	0.298	0.737	0.167	0.047	0.203	23%
T14-003	0.196	0.529	0.115	0.115	0.529	22%

TABLE 6: Winter Groundwater Infiltration Estimates

Basin ID	Gross Q_{min-D} (MGD)	Gross Q_{avg-D} (MGD)	Gross Q_{GWI} (MGD)	Net Q_{GWI} (MGD)	Net Q_{avg-D} (MGD)	Net Q_{GWI}/Q_{avg-D} (%)
BAILWASH	1.531	2.769	0.746	0.039	0.383	10%
BMILL	0.213	0.494	0.133	0.133	0.494	27%
BP	0.072	0.076	0.071	0.071	0.076	93%
BURNTREE	0.163	0.269	0.128	0.128	0.269	48%
COACHDRN	0.174	0.289	0.135	0.135	0.289	47%
COACHDRS	0.512	0.788	0.352	0.242	0.509	48%
COACHDRS2	0.064	0.119	0.054	0.054	0.119	45%
COACHDRS3	0.073	0.160	0.056	0.056	0.160	35%
FERRY	0.696	1.098	0.441	0.441	1.098	40%
HOBSMILL	0.999	1.851	0.520	-0.002	0.348	0%
HOBSON	0.200	0.392	0.138	0.138	0.392	35%
MAYWATTS	3.389	5.783	1.501	-0.546	0.003	0%
MCDOWELL	0.528	0.952	0.320	0.158	0.431	37%
N16-090	0.114	0.203	0.091	0.091	0.203	45%
NAPPLAIN	0.785	1.583	0.407	0.407	1.583	26%
NCC	0.257	0.484	0.174	0.174	0.484	36%
NPSINT	0.428	0.871	0.250	0.153	0.441	35%
NWPS_14	0.616	0.930	0.415	0.415	0.930	45%
OGDENMAN	0.161	0.281	0.123	0.123	0.281	44%
OXFORDLANE	0.062	0.144	0.048	0.048	0.144	33%
PEBBWOOD	0.251	0.520	0.161	0.161	0.520	31%
PRESCOTT	0.943	1.546	0.544	0.212	0.707	30%
RVIEW	0.577	1.019	0.348	0.225	0.738	30%
S17-007	0.179	0.374	0.123	0.123	0.374	33%
SBCOD	3.889	6.547	1.702	0.202	0.763	26%
SBROOK	3.996	6.811	1.733	0.118	0.510	23%
SHERI	3.759	5.987	1.704	0.246	0.736	33%
SOC24	0.263	0.368	0.214	0.214	0.368	58%
SUNDLAND	3.323	5.394	1.518	0.071	1.181	6%
T01-020A	3.642	6.286	1.589	-0.113	0.021	0%
T03-028	0.019	0.068	0.015	0.015	0.068	22%
T03-029	0.131	0.362	0.082	0.082	0.362	23%
T04-009	1.649	2.747	0.838	0.078	0.697	11%
T13-001	0.319	0.723	0.185	0.042	0.160	26%
T14-003	0.230	0.557	0.138	0.138	0.557	25%

Net groundwater infiltration (GWI) expressed as a percent of net average dry weather flow rate is provided in Figure 6 and Figure 7 and compared with industry rules-of-thumb. Net groundwater infiltration less than or equal to 20% is considered reasonable. Values less than or equal to 40% are considered marginal, and values greater than 40% are considered significant problems.

Stevens-Schutzbach Method for GWI:

$$Q_{GWI} = \frac{0.4Q_{min-D}}{1 - 0.6\left(\frac{Q_{min-D}}{Q_{avg-D}}\right)^{(Q_{avg-D})^{0.7}}}$$

where: Q_{GWI} = groundwater infiltration, MGD

Q_{min-D} = minimum dry weather flow rate, MGD

Q_{avg-D} = average dry weather flow rate, MGD

Figure 8 and Figure 9 show on a map from the highest to lowest Net GWI percentage.

FIGURE 6: Summer Net Groundwater Infiltration Estimates

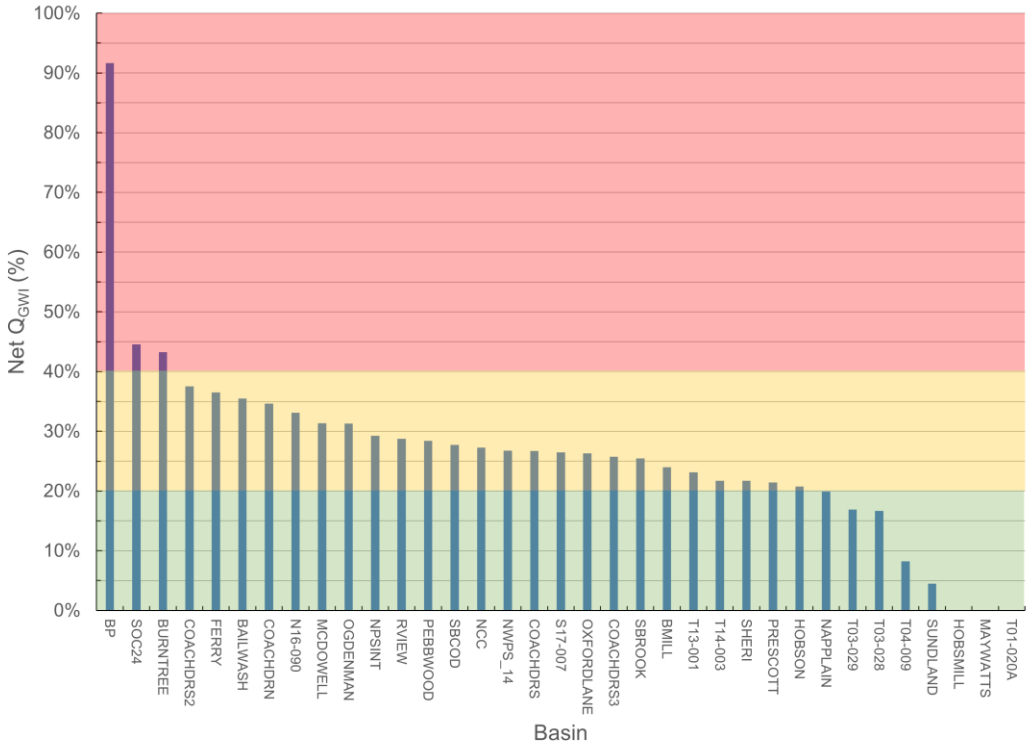


FIGURE 7: Winter Net Groundwater Infiltration Estimates

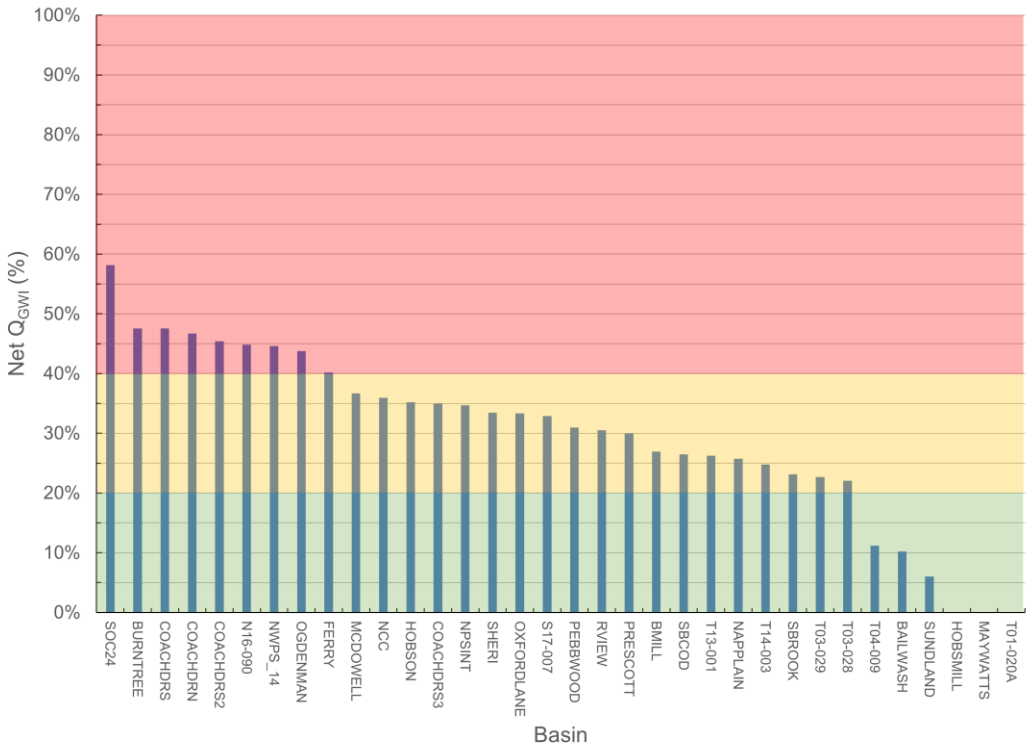
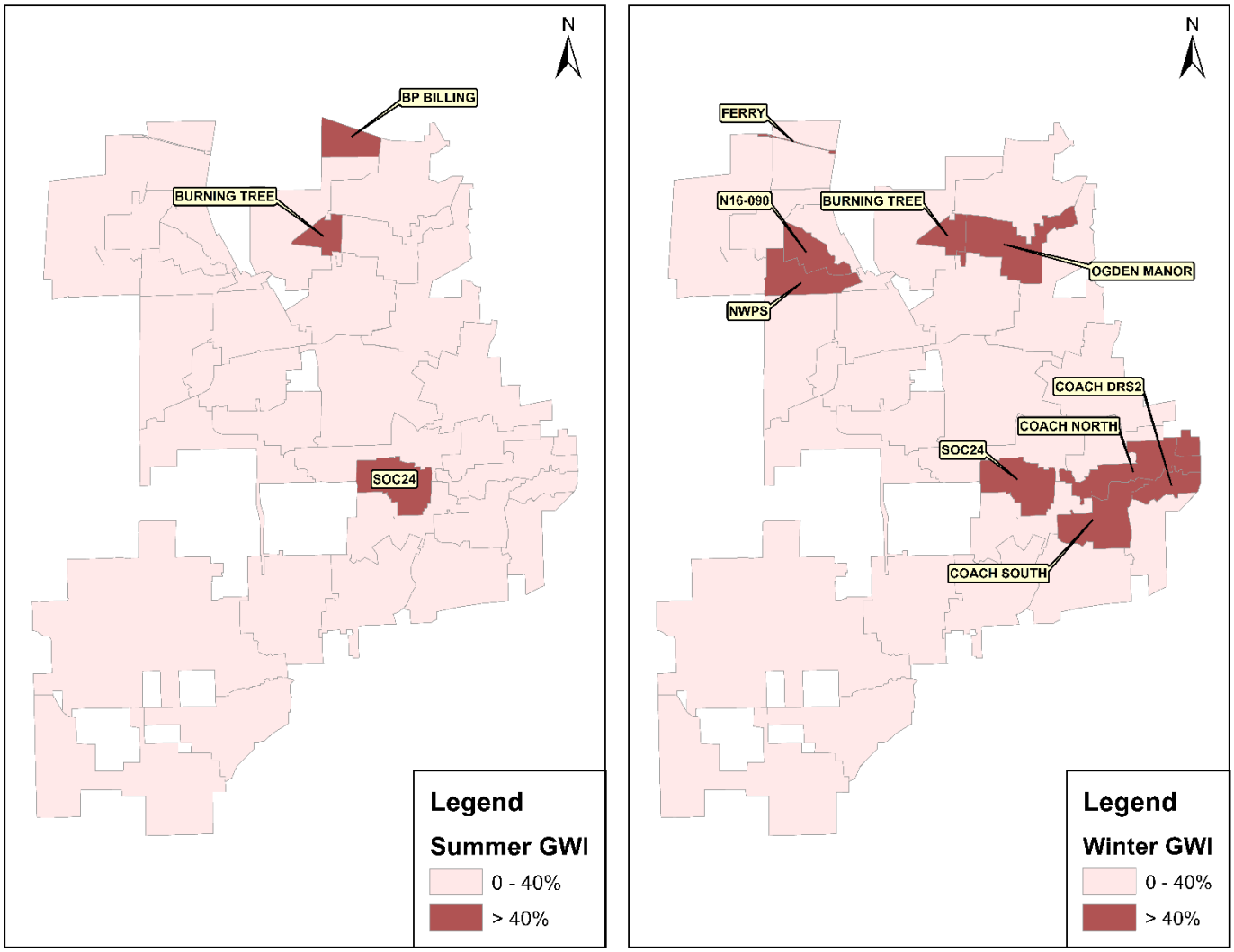


FIGURE 8: Summer and Winter Net Groundwater Infiltration Estimates Map



2.3 - RAINFALL ANALYSIS

Up to 25 rainfall events of interest were observed and evaluated for each flow monitor basin during the Study Period. Return frequency assessments were made by comparing observed rainfall data to rainfall depth-duration-frequency (DDF) data published by the Illinois State Water Survey.

TABLE 7: Total rainfall measured in inches by each rain gauge for each storm and the Maximum Return Frequency recorded at each gauge.

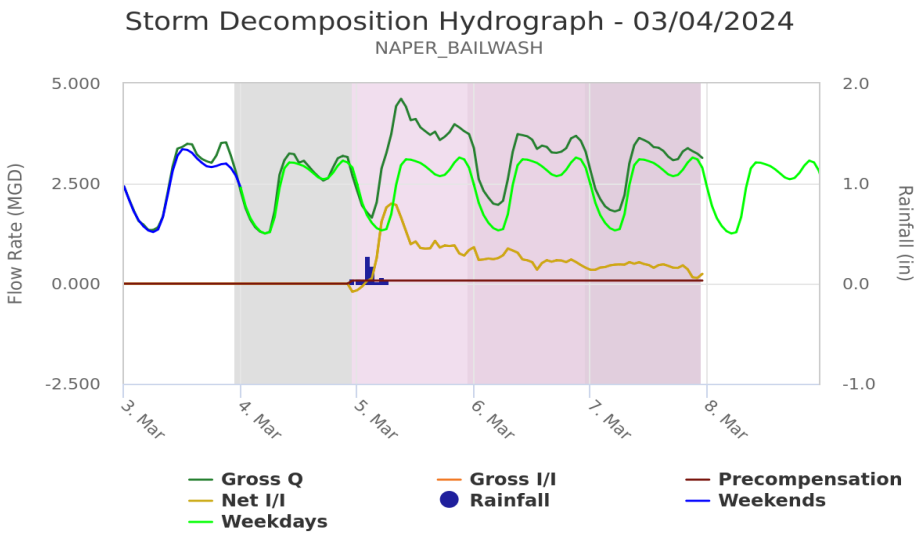
	Storm Total Inches						Maximum Return Frequency and Corresponding Duration				
Storm	RGCC	RGNOC	RGSOC	RGSUMMERLS	RGSWPS		RGCC	RGNOC	RGSOC	RGSUMMERLS	RGSWPS
1/9/2024	0.79	1.08	1.01	0.62	1.14		3.1-mos, 4320 mins	4.3-mos, 1440 mins	4.0-mos, 4320 mins	2.7-mos, 1440 mins	4.5-mos, 4320 mins
1/12/2024	0.63	0.9	0.67	0.76	0.86		4.1-mos, 360 mins	5.1-mos, 720 mins	4.1-mos, 360 mins	4.3-mos, 720 mins	5.2-mos, 360 mins
1/22/2024	0.58	0.04	0.71	0.71	0.85		2.9-mos, 180 mins	3.6-mos, 4320 mins	3.1-mos, 360 mins	2.9-mos, 720 mins	3.6-mos, 2880 mins
1/25/2024	0.53	0.57	0.63	0.61	0.76		2.7-mos, 720 mins	2.8-mos, 720 mins	3.3-mos, 720 mins	3.1-mos, 720 mins	3.6-mos, 720 mins
3/4/2024	0.61	0.91	0.68	0.74	0.91		3.7-mos, 360 mins	5.4-mos, 360 mins	4.0-mos, 360 mins	4.5-mos, 360 mins	5.3-mos, 360 mins
3/8/2024	0.97	1.22	0.96	1.06	1.16		5.4-mos, 720 mins	6.8-mos, 720 mins	5.3-mos, 720 mins	5.8-mos, 720 mins	6.4-mos, 720 mins
3/13/2024	0.42	0.49	0.49	0.55	0.6		3.1-mos, 180 mins	3.7-mos, 180 mins	3.6-mos, 180 mins	4.0-mos, 180 mins	3.9-mos, 180 mins
3/25/2024	0.76	0.81	0.76	0.68	0.75		3.9-mos, 180 mins	4.1-mos, 180 mins	4.1-mos, 180 mins	3.7-mos, 180 mins	4.0-mos, 180 mins
3/29/2024	0.61	0.64	0.67	0.55	0.74		3.7-mos, 360 mins	3.9-mos, 360 mins	4.1-mos, 360 mins	3.3-mos, 360 mins	4.7-mos, 360 mins
3/31/2024	1.29	1.49	1.37	1.31	1.67		5.1-mos, 4320 mins	5.9-mos, 4320 mins	5.4-mos, 4320 mins	5.2-mos, 4320 mins	6.6-mos, 4320 mins
4/26/2024	0.51	0.54	0.59	0.51	0.66		5.1-mos, 4320 mins	5.9-mos, 4320 mins	5.4-mos, 4320 mins	5.2-mos, 4320 mins	6.6-mos, 4320 mins
4/28/2024	0.49	0.46	0.56	0.46	0.67		5.1-mos, 4320 mins	5.9-mos, 4320 mins	5.4-mos, 4320 mins	5.2-mos, 4320 mins	6.6-mos, 4320 mins
4/29/2024	0.55	0.59	0.94	0.52	0.81		3.5-mos, 360 mins	3.7-mos, 360 mins	6.0-mos, 360 mins	3.2-mos, 360 mins	5.2-mos, 360 mins
5/2/2024	0.86	0.82	1.11	0.8	0.98		4.3-mos, 720 mins	4.1-mos, 360 mins	5.1-mos, 720 mins	3.8-mos, 720 mins	3.9-mos, 4320 mins
5/7/2024	0.61	0.49	0.55	0.36	0.62		5.0-mos, 120 mins	4.0-mos, 120 mins	4.5-mos, 120 mins	3.2-mos, 4320 mins	5.2-mos, 120 mins
5/9/2024	0.58	0.68	0.94	0.89	1.34		3.0-mos, 180 mins	3.3-mos, 360 mins	4.9-mos, 180 mins	4.8-mos, 180 mins	6.6-mos, 180 mins
5/13/2024	0.27	0.37	0.33	0.24	0.73		1.7-mos, 120 mins	2.4-mos, 60 mins	1.8-mos, 720 mins	1.5-mos, 360 mins	4.0-mos, 720 mins
5/26/2024	1.25	1.2	1.18	1.19	1.31		7.5-mos, 360 mins	7.0-mos, 360 mins	7.1-mos, 360 mins	7.1-mos, 360 mins	8.2-mos, 360 mins
6/1/2024	0.81	1.81	0.48	0.56	0.61		4.6-mos, 720 mins	10.4-mos, 720 mins	2.7-mos, 720 mins	3.2-mos, 720 mins	3.5-mos, 720 mins
6/4/2024	0.79	1.1	0.74	1.03	1.26		6.0-mos, 180 mins	8.4-mos, 180 mins	5.8-mos, 180 mins	7.9-mos, 180 mins	9.4-mos, 180 mins
6/20/2024	0.58	0.41	0.43	0.5	0		5.3-mos, 60 mins	3.5-mos, 60 mins	3.6-mos, 60 mins	4.4-mos, 2880 mins	5.3-mos, 2880 mins
6/22/2024	1.67	1.59	1.34	1.23	0		2.6-years, 120 mins	1.8-years, 120 mins	11.1-mos, 120 mins	10.1-mos, 120 mins	5.0-mos, 4320 mins
7/9/2024	0.58	0.55	0.53	0.41	0.56		1.6-mos, 180 mins	2.9-mos, 720 mins	2.6-mos, 720 mins	2.0-mos, 1440 mins	2.7-mos, 1440 mins
7/14/2024	2.48	2.61	2.11	2.49	1.8		8.9-years, 60 mins	8.6-years, 60 mins	3.0-years, 60 mins	8.5-years, 60 mins	10.7-mos, 60 mins
7/15/2024	0.76	0.94	0.82	0.8	0.83		6.2-mos, 120 mins	7.6-mos, 120 mins	6.6-mos, 120 mins	6.5-mos, 120 mins	6.6-mos, 120 mins
7/22/2024	0.15	0.19	1.18	0.28	0.32		1.4-mos, 60 mins	1.5-mos, 120 mins	9.6-mos, 120 mins	2.6-mos, 60 mins	1.5-mos, 60 mins
8/16/2024	1.31	1.95	1.39	0.93	1.27		8.4-mos, 120 mins	2.6-years, 120 mins	8.7-mos, 180 mins	5.4-mos, 120 mins	8.4-mos, 60 mins
8/27/2024	1.29	1.08	1.14	0.52	0.67		7.8-mos, 360 mins	6.6-mos, 360 mins	6.6-mos, 360 mins	3.2-mos, 180 mins	4.5-mos, 360 mins
9/22/2024	0.65	0.55	0.61	0.67	0.8		3.5-mos, 360 mins	4.6-mos, 2880 mins	3.7-mos, 360 mins	3.7-mos, 120 mins	4.9-mos, 360 mins
9/23/2024	0.56	0.65	0.5	0.57	0.52		3.3-mos, 360 mins	3.4-mos, 360 mins	2.9-mos, 360 mins	3.1-mos, 180 mins	3.1-mos, 180 mins
10/25/2024	1.01	0.94	0.95	0.86	1.04		7.2-mos, 180 mins	6.6-mos, 180 mins	6.7-mos, 180 mins	6.1-mos, 180 mins	7.5-mos, 180 mins
11/4/2024	1.95	2.13	2.15	1.41	1.86		6.3-mos, 360 mins	9.0-mos, 1440 mins	9.1-mos, 2880 mins	4.0-mos, 180 mins	7.9-mos, 2880 mins
11/13/2024	0.5	0.55	0.49	0.48	0.52		2.4-mos, 180 mins	3.2-mos, 720 mins	2.8-mos, 720 mins	2.6-mos, 180 mins	3.0-mos, 720 mins
12/14/2024	0.53	0.57	0.53	0.52	0.53		2.5-mos, 360 mins	3.0-mos, 720 mins	2.8-mos, 720 mins	1.6-mos, 180 mins	2.9-mos, 720 mins



2.4 - RAINFALL-DEPENDENT INFILTRATION AND INFLOW (RDII)

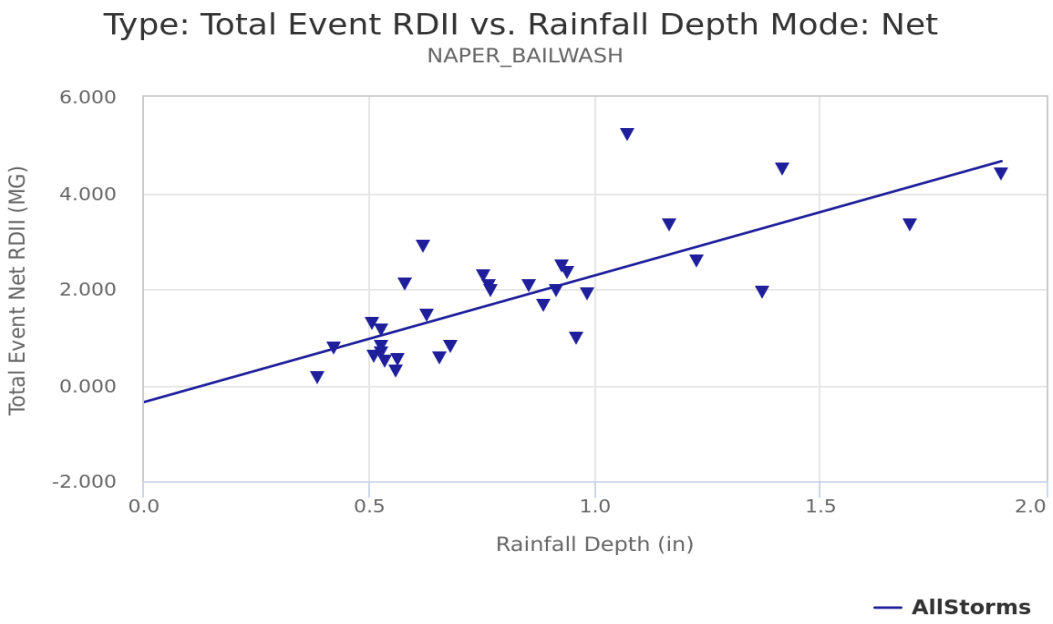
During wet weather events, significant amounts of extraneous water can enter a wastewater collection system, resulting in sanitary sewer overflows (SSOs), basement backups, and/or problems at the wastewater treatment plant (WWTP). A comparison of flow monitor data from dry weather and wet weather periods provides a quantification of RDII, which is calculated by subtracting the measured flow during a rainfall event from the flow during an average dry day. A wet weather hydrograph from the Study Period is provided in Figure 9. The storm event is depicted by the purple bands, and a pre-compensation period prior to the storm is depicted by the light gray band. Adjustments to the average dry day pattern are made as needed to account for antecedent conditions prior to each storm event.

FIGURE 9: Wet Weather Hydrograph



After the RDII calculations are made for each storm event, the results are plotted as a function of rainfall total. An example is shown in Figure 10 in which the relationship between the Storm Event RDII (MG) is plotted with respect to the Storm Event rainfall (inches) for all significant storm events. These relationships can then be used to evaluate the consistency of rainfall responses within the sanitary sewer system and estimate the RDII response for various rainfall amounts.

FIGURE 10: RDII vs. Rainfall



Based on the regression results, Net RDII per inch of rainfall are reported for each basin, and the results are summarized in Table 8. Net RDII volumes are computed by subtracting the Gross RDII volume of any upstream flow monitor basin from the Gross RDII volume measured at the outlet of each flow monitor basin. This process identifies and isolates RDII to the basin sizes shown. Normalized Net RDII is then calculated by dividing the net RDII volume by the associated basin size.

TABLE 8: Net RDII per Inch of Rainfall

Basin ID	Gross RDII (MG/in)	Net RDII (MG/in)	Basin Size (LF)	Net RDII (Gal/LF/in)	Basin Size (acres)	Net RDII (% Rainfall)
BAILWASH	2.29	2.29	72,630	31.46	632	13.31%
BMILL	0.51	0.51	106,045	4.77	983	1.90%
BP	0.05	0.05	11,120	4.77	202	0.97%
BURNTREE	0.19	0.19	12,599	14.68	151	4.51%
COACHDRN	0.25	0.25	61,001	4.13	435	2.13%
COACHDRS	0.71	0.33	58,132	5.63	426	2.83%
COACHDRS2	0.19	0.19	34,832	5.34	232	2.95%
COACHDRS3	0.20	0.20	52,103	3.76	413	1.75%
FERRY	0.89	0.89	225,999	3.92	1,299	2.51%
HOBSMILL	1.72	0.44	136,777	3.19	1,152	1.39%
HOBSON	0.37	0.37	120,223	3.06	945	1.43%
MAYWATTS	3.65	0.58	67,079	8.57	630	3.36%
MCDOWELL	0.65	0.37	53,982	6.78	402	3.35%
N16-090	0.12	0.12	29,900	3.95	223	1.95%
NAPPLAIN	0.69	0.69	355,590	1.94	3,578	0.71%
NCC	0.49	0.49	127,713	3.85	972	1.86%
NPSINT	0.79	0.55	81,306	6.70	622	3.23%
NWPS_14	0.85	0.85	33,264	25.46	318	9.81%
OGDENMAN	0.24	0.24	70,257	3.43	537	1.65%
OXFORDLANE	0.08	0.08	41,535	1.95	364	0.82%
PEBBWOOD	0.31	0.31	89,316	3.52	1,173	0.99%
PRESCOTT	0.92	0.25	97,511	2.51	966	0.93%
RVIEW	0.79	0.59	111,452	5.29	852	2.55%
S17-007	0.21	0.21	87,097	2.41	689	1.12%
SBCOD	3.73	0.27	69,951	3.83	555	1.78%
SBROOK	4.46	0.92	113,605	8.11	932	3.64%
SHERI	4.73	0.77	103,480	7.46	802	3.54%
SOC24	0.20	0.20	48,655	4.13	379	1.95%
SUNDLAND	4.20	0.84	79,222	10.63	641	4.84%
T01-020A	3.54	0.26	81,370	3.17	875	1.09%
T03-028	0.12	0.12	15,304	7.91	156	2.86%
T03-029	0.17	0.17	65,521	2.59	868	0.72%
T04-009	2.13	2.13	64,023	33.25	777	10.09%
T13-001	0.37	0.16	98,120	1.62	862	0.68%
T14-003	0.32	0.32	184,087	1.71	1,613	0.72%

Example calculations:

Net RDII [Gal/LF/in] = (Net RDII [MG/in] * 1000000) / (Basin Size [LF])

Net RDII [% Rainfall] = (Net RDII [MG/in] * 1000000) / (Gal of Rainfall)

Normalized Net RDII results are compared with an industry rule-of-thumb for excessive RDII of 5 Gal/LF/inch of rainfall as shown in Figure 11. **Note that 14 basins have projected RDII greater than this key performance indicator.** Normalized Net RDII results are also compared with and industry rule-of-thumb for excessive RDII of 5% Rainfall Capture (also known as Capture Coefficient), as shown in Figure 12. **Note that three basins have projected RDII greater than this key performance indicator.** Based on the magnitude of the Net RDII observed as % Rainfall, many of these basins either contain combined sewers or contain sanitary sewers that function in a similar manner.

FIGURE 11: RDII Volume (Gal/LF/in) Compared to Industry Rule-of-Thumb

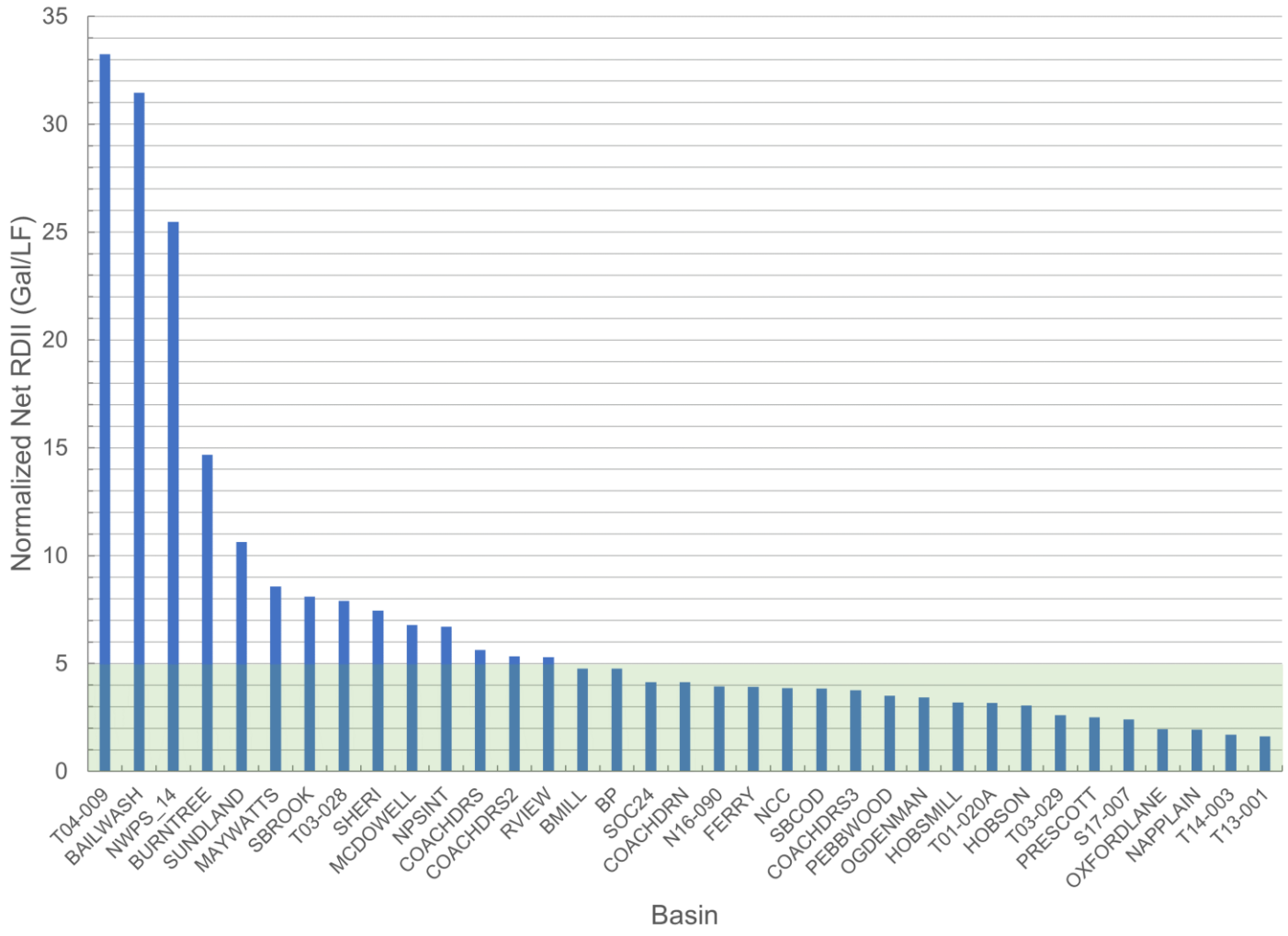


FIGURE 12: RDII Volume (% Rainfall Capture) Compared to Industry Rule-of-Thumb

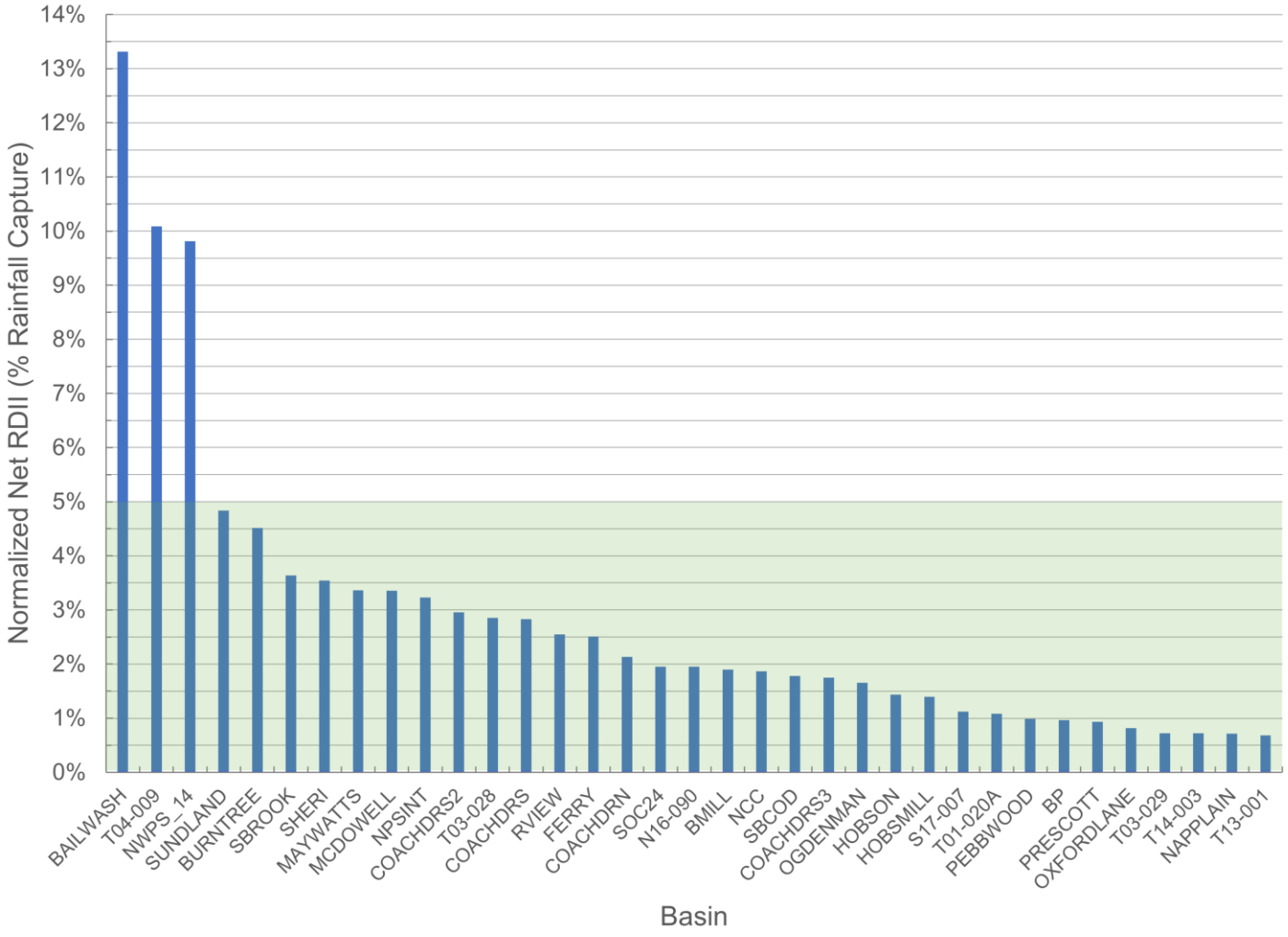
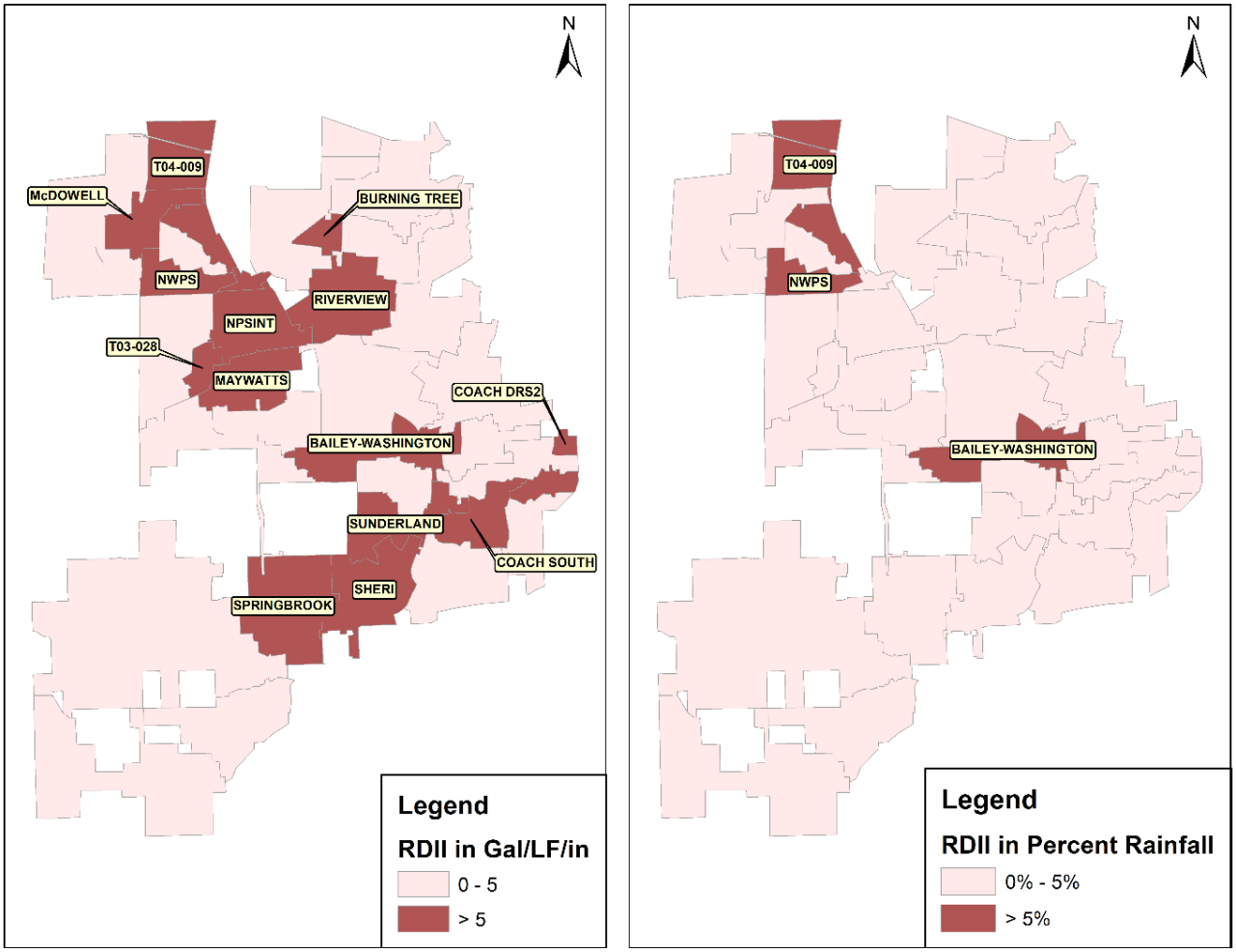


FIGURE 13: RDII Volume (Gal/LF/in) and RDII Volume (% Rainfall Capture)

Compared to Industry Rule-of-Thumb Maps



2.5 – RDII COMPARISON BETWEEN 2015 AND 2024

In 2015, a RDII report was completed for the City of Naperville consisting of 25 wastewater basins. This report covered the first half of the year, from January 1st to June 30th. Using those dates and 21 basins that match the 2024 study, Table 9 below shows the difference in RDII between 2015 and 2024.

TABLE 9: Net RDII Comparison between 2015 and 2024

	2015		2024		Did RDII decrease between 2015 and 2024?
Basin ID	Net RDII (Gal/LF/in)	Net RDII (% Rainfall)	Net RDII (Gal/LF/in)	Net RDII (% Rainfall)	
BAILWASH	20.60	8.70%	31.52	13.34%	No
BMILL	5.80	2.30%	4.74	1.88%	Yes
BURNTREE	8.10	3.70%	16.54	5.08%	No
COACHDRN	10.30	5.50%	4.18	2.16%	Yes
COACHDRS	11.80	5.30%	12.23	6.15%	No
FERRY	3.70	1.40%	3.90	2.50%	No
HOBSMILL	9.60	4.60%	12.55	5.49%	No
HOBSON	15.00	6.10%	3.03	1.42%	Yes
MAYWATTS	13.90	5.10%	54.67	21.43%	No
MCDOWELL	14.60	7.00%	12.21	6.04%	Yes
NAPPLAIN	4.50	1.80%	2.00	0.73%	Yes
NCC	11.70	5.70%	3.92	1.90%	Yes
NWPS_14	27.80	11.90%	20.91	8.06%	Yes
OGDENMAN	8.20	4.70%	3.45	1.66%	Yes
PEBBWOOD	9.60	2.60%	3.49	0.98%	Yes
PRESCOTT	10.50	3.60%	9.52	3.54%	Yes
RVIEW	20.80	10.90%	7.03	3.39%	Yes
SBCOD	7.90	3.60%	53.17	24.68%	No
SBROOK	14.90	6.40%	39.24	17.61%	No
SHERI	16.50	8.20%	45.87	21.79%	No
SUNDLAND	12.10	6.30%	52.71	23.99%	No

When comparing the same basins that were studied in 2015 and 2024, out of 21 basins, 11 of them showed a decrease in RDII. In 2015 there were 13 storms in this time frame and 22 storm events in 2024 indicating that 2024 could have had a wetter first half of the year than 2015. This data should be used for illustrative purposes only and an in-depth study would be needed to determine the actual change in RDII between the two years, as the number of rain events and the total rain were not considered in this comparison.

3.0 – OBSERVATIONS AND RECOMMENDATIONS

Specific recommendations for further planning, evaluation, or condition assessment activities based on flow monitor and rainfall monitor data from the Study Period are provided below.

DRY WEATHER PERFORMANCE

During dry weather conditions, all the d/D ratios except for at the flow monitor location NAPER_NWPS, are within design criteria recommended by ASCE and WEF, indicating there is sufficient capacity at most flow monitor locations to accommodate dry weather flow rates observed during the Study Period.

WET WEATHER PERFORMANCE

During wet weather conditions, five of the flow monitor locations had a d/D ratio that was not within design criteria. The d/D ratio at flow monitor locations NAPER_NWPS, NAPER_NCC, NAPER_SOC24, NAPER_RVIEW, and NAPER_SHERI indicate that there is not sufficient capacity for the wet weather flow rates at these locations observed during the study period.

The flow meter location NAPER_SHERI experienced wet weather flow depths greater than the D+24 capacity assurance criteria and NAPER_RVIEW exceeded the R-36 capacity assurance criteria.

GROUNDWATER INFILTRATION

Groundwater infiltration (GWI) estimates for the Summer season indicate that basins BP, SOC24, AND BURNTREE have groundwater infiltration greater than 40% of average dry weather flow. The Winter season GWI estimates that basins SOC24, BURNTREE, COACHDRS, COACHDRN, COACHDRS2, N16-090, NWPS_14, OGDENMAN, AND FERRY have GWI greater than 40% of average dry weather flow.

Such percentages over 40% are generally considered excessive. Manhole inspections and closed-circuit television (CCTV) inspections are recommended to locate specific sources of groundwater infiltration in these basins.

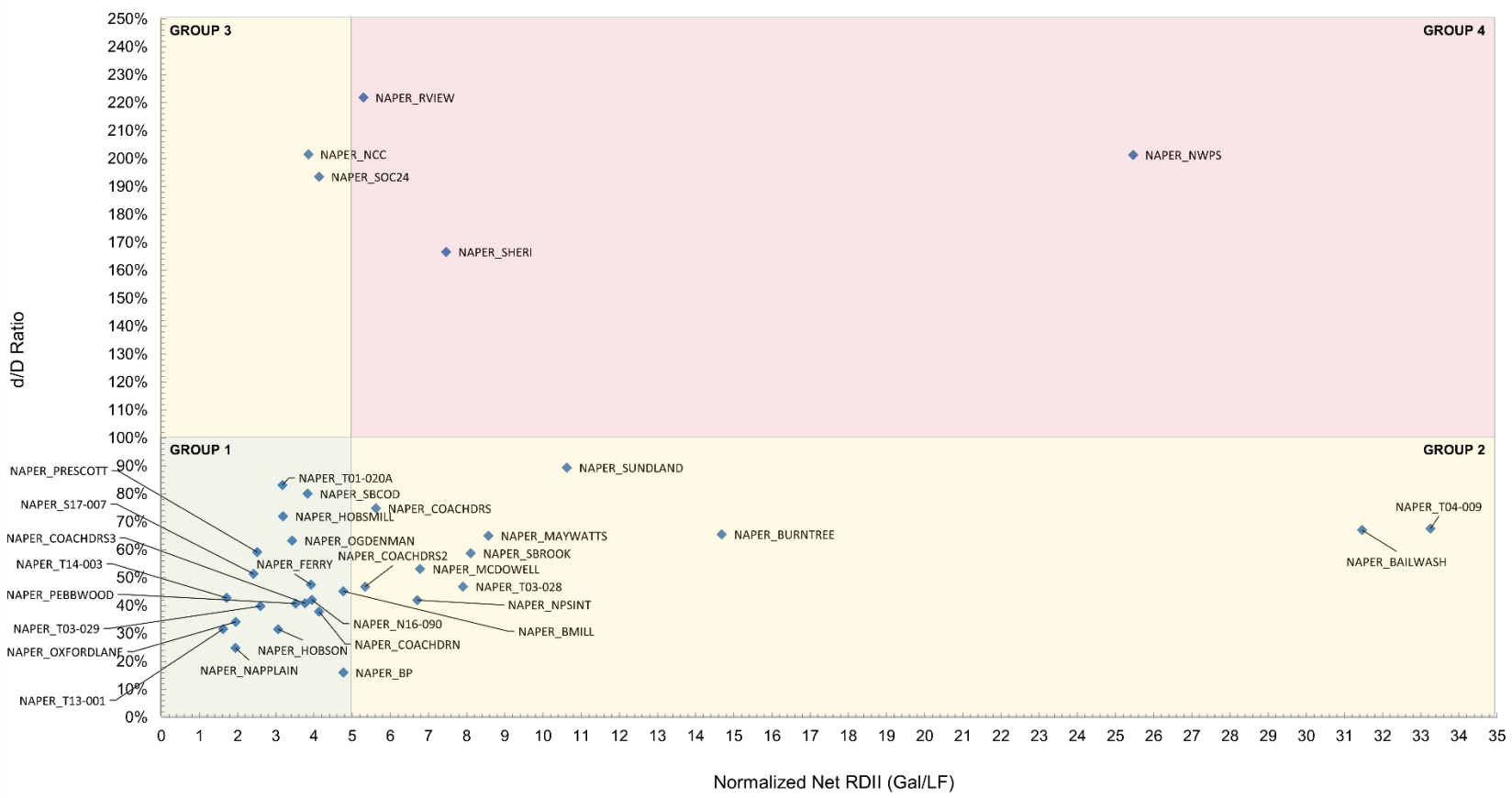
RAINFALL-DEPENDENT INFLOW AND INFILTRATION

To further prioritize, **Normalized Net RDII is compared to the maximum wet weather flow depth-to-diameter ratio (d_{max-W} / D)** as shown in Figure 14. This comparison classifies flow monitor basins into four distinct groups:

Group	Description	Monitor Locations	
1	RDII is not excessive, and no wet weather surcharge conditions are observed. This is the most preferred group and is least problematic. **Wet weather SSO risk is low.**	NAPER_BAILWASH NAPER_BMILL NAPER_BURNTREE NAPER_COACHDRS2 NAPER_COACHDRS3 NAPER_FERRY NAPER_HOBSMILL NAPER_MCDOWELL NAPER_N16-090 NAPER_NWPS	NAPER_OGDENMAN NAPER_OXFORDLANE NAPER_PEBBWOOD NAPER_RVIEW NAPER_S17-007 NAPER_SUNDLAND NAPER_T03-028 NAPER_T04-009 NAPER_T13-001 NAPER_T14-003
2	RDII is excessive, but no wet weather surcharge conditions are observed. While more RDII is observed than desired, sufficient capacity is available to accommodate it. **Wet weather SSO risk is low but is higher than Group 1.**	NAPER_NAPPLAIN NAPER_SHERI	
3	RDII is not excessive, but wet weather surcharge conditions are observed. Wet weather system capacity is limited which limits RDII ingress as a result. **Wet weather SSO risk is moderate to high.**	NAPER_BP NAPER_COACHDRN NAPER_COACHDRS NAPER_HOBSON NAPER_MAYWATTS	NAPER_NCC NAPER_SBCOD NAPER_SOC24 NAPER_T01-020A NAPER_T03-029
4	RDII is excessive, and wet weather surcharge condition are observed. This is the least preferred group and is most problematic. **Wet weather SSO risk is moderate to high.**	NAPER_NPSINT NAPER_PRESCOTT NAPER_SBROOK	

Manhole inspections, smoke testing, and closed-circuit television (CCTV) inspections are recommended in basins with excessive RDII to locate and identify individual defects contributing to RDII within these basins. The remaining basins can be prioritized for SSES inspections by their respective contributions of RDII.

FIGURE 14: Normalized Net RDII for Project 1-inch Storm vs. Depth-to-Diameter Ratio

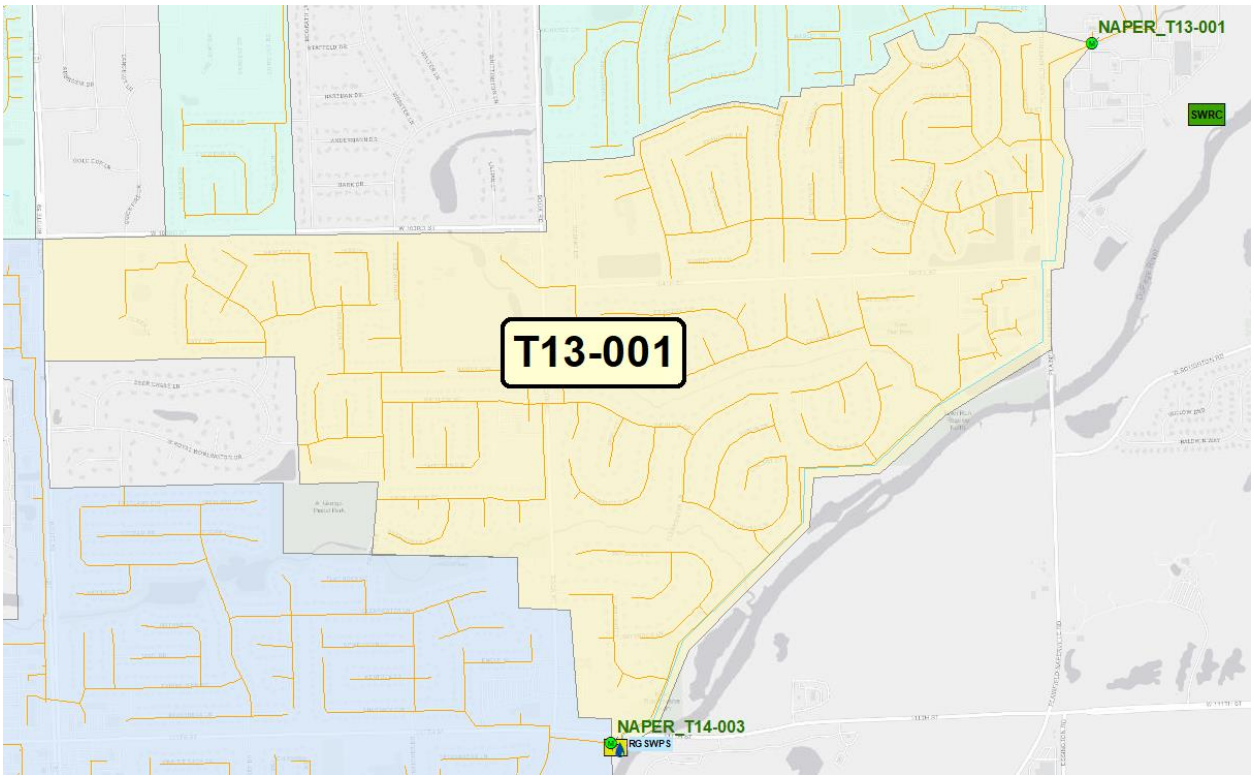


FUTURE METERING RECOMMENDATIONS

Throughout the 2023 and 2024 metering year, a few areas have stood out as potential future metering locations. These recommendations are not set in stone, but rather to be used to help facilitate future decision making.

In 2024, the meter location NAPER_T13-001 was added to capture the flow in the areas along 104th St, Book Rd, and south of 103rd St. In Figure 14, the new basin for 2024 is shown in yellow.

FIGURE 15: New Basin for 2024 – T13-001



For the 2025 flow monitoring season, four new meters will be installed to better pinpoint the source of RDII in the collection system.

The basin OGDENMAN has a diversion at manhole N14-002DIV. It has been assumed that 40% of the flow from OGDENMAN diverts east into the BURNTREE basin and the rest goes south into the RVIEW basin. To further clarify what is happening at this diversion, two meters will be installed. The monitors will be placed to the east before the diversion and to the south, after the diversion.

In 2023, the basin MAYWATTS ranked high in RDII. To further determine the cause of the inflow and infiltration, two meters will be added to the basin, splitting it in two. These will be located upstream of the current NAPER_MAYWATTS location, one monitoring flow from the east and one from the west.

DEFINITIONS

Basin – a designation given to a series of interconnected sewers within a sanitary sewer system that collect and convey wastewater to a common manhole, pump station, or wastewater treatment plant. The size and geographic extent of a given basin are system specific. Basin designations are established to provide a consistent nomenclature for system components to facilitate effective planning, operation, and maintenance.

CCTV Inspection – a common diagnostic method used to visually inspect and document the general location, connectivity, and condition of a sewer. CCTV inspection is accomplished using a variety of specially designed camera systems.

Depth-to-Diameter (d/D) Ratio – a ratio of maximum flow depth to sewer diameter. d/D ratios are often calculated to describe both dry weather and wet weather periods and are one measure used to assess sewer capacity utilization. In this study, d/D ratios are computed using hourly average data.

Infiltration – water than enters a sanitary sewer system from the ground through defective system components including, but not limited to, defective sewers, manholes, service connections, or other system appurtenances. Infiltration is primarily dependent on groundwater elevations but may also be influenced by storm events and leaking water mains.

Inflow – storm water runoff that enters a sanitary sewer system from direct connections including, but not limited to, building downspouts, clean-outs, foundation drains, sump pumps, basement and area drains, and cross connections with storm sewer systems.

Manhole Inspection – a common diagnostic method used to visually inspect and document the location and condition of a manhole. Manhole inspection can be accomplished using confined space entry or non-entry techniques.

Peaking Factor (PF) – a ratio of maximum flow rate to average flow rate. Peaking factors are often calculated to describe by dry weather and wet weather periods, where maximum flow rates are compared to average dry weather flow rates. In this study, peaking factors are computed using hourly average data.

Rain-Dependent Infiltration and Inflow (RDII) – the collective infiltration and inflow that enter a sewer system as a direct result of rainfall.

Sanitary Sewer Overflow (SSO) – a discharge of untreated wastewater from a sanitary sewer system, caused by a variety of reasons including, but not limited to, inadequate sewer design and construction, insufficient operation and maintenance, power failures, and vandalism.

Sanitary Sewer System – a collection of sewers, manholes, pump stations, and other appurtenances designed for the collection and transportation of wastewater.

Sewer Cleaning – a common method used to dislodge and removed accumulated debris, grease, and roots within a sewer line to achieve desired conditions for CCTV inspection. Under

routine conditions, sewer cleaning is performed using hydraulic jetting and vacuum debris removal techniques.

Sewer System Evaluation Survey – a detailed investigation of a selected portion of a sanitary sewer system to identify system defects that contribute to infiltration and inflow. The results of such an investigation are used to provide recommendations for system planning, operation, and maintenance.

Smoke Testing – a common diagnostic method used to locate and identify potential infiltration and inflow sources within a sanitary sewer system. During smoke testing, a special non-toxic, non-staining smoke is blown into a selected portion of the system. Potential infiltration and inflow sources are evidence by visible smoke.

Tractive Force Method – a method used to evaluate the self-cleansing status of gravity sewers. This approach is recommended by the American Society of Civil Engineers and the Water Environment Federation.

REFERENCES

Bizier, Paul, Editor (2007). Gravity Sanitary Sewer Design and Construction, ASCE Manuals and Reports on Engineering Practice No. 60, American Society of Civil Engineers: Reston, VA.

Enfinger, K.L. and Surber, M.L. (2016). "Depth Perception – Tracking Sewer Performance Using Design Guidelines and Regulatory Expectations," *Proceedings of the Water Environment Federation Technical Exhibition and Conference*; New Orleans, LA; Water Environt Federation: Alexandria, VA.

Enfinger, K.L. and Stevens, P.L. (2006). "Scattergraph Principles and Practice – Tools and Techniques to Evaluate Sewer Capacity," *Proceedings of the Pipeline Division Specialty Conference*; Chicago, IL; American Society of Civil Engineers: Reston, VA.

Enfinger, K.L. and Mitchell, P.S. (2010). "Scattergraph Principles and Practice – Evaluating Self-Cleansing in Existing Sewers Using the Tractive Force Method," *Proceedings of the World Environmental and Water Resources Congrees*; Providence, RI. American Society of Civil Engineers: Reston, VA.

Enfinger, K.L. and Stevens, P.L. (2020). "Infiltration and Inflow Measurement and Methods – Estimating Groundwater Infiltration in Sewers," *Proceedings of the Pipeline Division Specialty Conference*; San Antonio, TX; American Society of Civil Engineers: Reston, VA.

CITYWORKS WORK ORDER # 79189

Appendix KK

Description: CUSTOMER SERVICE SEWER **Address:** HILLSIDE AND MELODY

General Location Main line backup 11-3-13 **City Grid#:** 99

Timesheet Code 242227

Created By: SELVAGGI, FRANKO 11/4/13

SUBMITTO SELVAGGI, FRANKO

Work Order Comments/Details:

1/1/1970 12:00:00AM

By SELVAGGI, FRANKO: 11/4/2013 12:36:00 PM
At 7:30 p.m. city dispatch received a call that water is coming out of the manhole just west of the hillside bridge on Hillside . While Terald was enroute we received other call regarding a sewer backup @ 619 N. Washington Street. Frank advised Terald to respond to the sewer backup call 1st on Washington Street. Terald arrived on site and confirmed sewer backup. Terald then drove to Hillside and Melody and found manhole lid off in the street just west of the bridge on Hillside . He called Frank who contacted city dispatch for 1 person to assist Terald. Terald located the manhole just east of the river had heavy grease buildup not allowing water to flow towards the interceptor. Crew setup at Hillside siphon to breakup grease inside the manhole. Grease plug was about 24" in diameter and over 3ft deep inside the manhole. After about 25 mins crew was able to breakup grease and flush system, around 9:00 p.m. system was draining. While we were handing this situation Keith the owner of 4 rental units called stating all of his units were having a sewer backup. Informed him we would arrive on Main Street once the situation at Hillside and Melody was resolved. He was leaving the units and on his way home, but I did inform him I would check the units once we were done making sure the system was flowing normally with no possibility of it reoccurring while system was recovering.

Frank and Terald arrived at 630 S. Main Street @ 10:00 a.m. renter allowed us into the unit. We took photos, basement had about 1/2 of water through out. Boxes, rug with padding and some other items. (Please see photos) The remaining units (628, empty 622 and 620) no one answered the door. Also 619 S. Washington office was closed. Spoke with Keith the owner of the 4 units on Main Street told him I'll be on site at 8:00 a.m. with name of person he should contact regarding a claim. Told him it's best he speaks with them not us based on we don't know how the city reviews claim or resolves them with residents.

On Monday morning at 8:00 a.m. spoke and met with Keith the owners of the 4 units on Main Street. He had Service Master out to clean all 4 units. I entered 628 S. Main, unit was vacant, water receded, unfinished basement, see photos.

622 S. Main Street: unfinished basement, renter did have items on the ground, water had receded bout 1/2 of water at one time.

620 S. Main Street: Unfinished basement, less than 1/4 of inch at one time, water did receded; only half of the basement was effected by the water. Most of the renter's belongings were stored on the north side of the basement. Water stayed on the Southside of basement. See photos

Arrived at 619 S. Washington Street: All water had receded, owner had items throughout the basement floor, basement not finished, and water level appears to have reached approx 3" throughout the basement, near furnace and old rough out wall. Please see photos. Gave owner the phone number to contact city's claim adjuster and to address all her questions to them. Not happy.

By SELVAGGI, FRANKO: 11/5/2013 11:05:42 AM
On11-5-13 Tony recieved notification that a claim was filed for 564 S. Washington Street. Frank arrived on site at 9:45 a. m. (11-5-13) Spoke with office personal for Phili PAE & Associates CPA'S who occupy the lower level of the building. They stated, they weren't aware of any problems regarding sewer backup. Walked around the office (all on the lower level / basement) Spoke with serveral people no one had any complaints regarding smell or water on the carpet.(carpeting throughout all office space and walking area) Located furnace room towards the far westend of basement, floor drain had some evidence of problems not sure how long ago. Carpet and boxes plus dust on floor showed no backup damaged everything is dry (see photos) walk around located 2 more utility closets again no signs of sewer backups. After

speaking with people in the office who have been their since Monday morning , not sure what happen. Reviewed what happen with Tony.

By WARFEL, MICHAEL: 4/22/2014 7:47:33 AM
Changed WO Description from "TV Inspect Sewer Main" to "Customer Service Sewer" and attached the sewer main segment C11-001A>C20-044A to the work order.

Date Started Work _____ **Date Completed** _____

Restoration Required? _____ **Yes** _____ **No**

CUSTFIELDNAME	CUSTFIELDVALUE
LF TV'D	
C&P DATA ENTRY COMPLETE?	1

Field Completion Comments:

Cityworks

Inbox | Recent | New Service Request | New Work Order | Inspections | Projects | Crews | Reports | Calendar

Work Order | Email | Print | Save | Close | Delete

Work Order

Description: CUSTOMER SERVICE SEWER
Number: 79189
Entity Type: SLATERALLINE [Change]
Category: Wastewater
Initiated By: SELVAGGI, FRANKO — Date: 11/4/2013 11:04 AM
Status: CLOSED — Priority: Medium
Requested By: SELVAGGI, FRANKO — Supervisor: CONN, TONY
Submit To: SELVAGGI, FRANKO — Date: 11/5/2013 11:06 AM
Projected Start: 11/3/2013 12:00 AM — Projected Finish:
Opened By: SELVAGGI, FRANKO — Date: 11/4/2013 12:36:44 PM
Closed By: WARFEL, MICHAEL — Date: 4/22/2014 7:51:48 AM
Completed By:
Actual Start: 11/3/2013 12:00 AM — Actual Finish:
Stage: Actual — Expense Type: Maintenance

Comments: [Add Comment] [Sort ▲]

By SELVAGGI, FRANKO: 11/5/2013 11:05:42 AM
On11-5-13 Tony recieved notification that a claim was filed for 564 S. Washington Street. Frank arrived on site at 9:45 a.m. (11-5-13) Spoke with office personal for Phili PAE & Associates CPA'S who occupy the lower level of the building. They stated, they weren't aware of any problems regarding sewer backup. Walked around the office (all on the lower level / basement) Spoke with serveral people no one had any complaints regarding smell or water on the carpet.(carpeting throughout all office space and walking area) Located furnace room towards the far westend of basement, floor drain had some evidence of problems not sure how long ago. Carpet and boxes plus dust on floor showed no backup damaged everything is dry (see photos) walk around located 2 more utility closets again no signs of sewer backups. After speaking with people in the office who have been their since Monday morning, not sure what happen. Reviewed what happen with Tony.

By WARFEL, MICHAEL: 4/22/2014 7:47:33 AM
Changed WO Description from "TV Inspect Sewer Main" to "Customer Service Sewer" and attached the sewer main segment C11-001A>C20-044A to the work order.

Instructions:

Resolution — Reactive? ☑

Details

Project: — Account:
+ Project Tree
Contract: — Contractor:
Legal Billable: ☐ — Contractor Billable: ☐
Update Map: ☐ — Cancel Work Order: ☐
Cancelled By: — Date:
Cancel Reason:
Units Accomp.: 0 — Description:
Lock Units Desc.: ☐

Labor Cost: $567.41 — Material Cost: $0.00
Equipment Cost: $153.72 — Permit Cost: $0.00
Total WO Cost: $721.13

Location Information

WO Address: HILLSIDE AND MELODY
Location Details: Main line backup 11-3-13
Shop: — Map Page:
Tile Number: 99 — District:
X Location: 1,034,644.000 — Y Location: 1,857,676.000

Assets

Total Entities: 8

Asset	Asset Id	Asset Uid	Location	Warranty Date
SGRAVITYMAIN	49575	45138	623 MELODY LN	
SLATERALLINE	209932	205842	630 S MAIN ST	
SLATERALLINE	196148	153482	628 S MAIN ST	
SLATERALLINE	209931	205839	622 S MAIN ST	
SLATERALLINE	196527	154959	620 S MAIN ST	
SLATERALLINE	196147	153478	619 S WASHINGTON ST	
SLATERALLINE	196162	154195	564 S WASHINGTON ST	
SGRAVITYMAIN	53713	49758	623 MELODY LN	

- Pink rows indicate inventory still under warranty.

Update Work Order XY when adding/removing assets? ☑

Map Layer Fields

[Reset]

Tasks

SeqID	Name	Description	Stat
1	Check City Main	Check City Main for sewer backup	COM
1	Code Brown	Flush city main to clear blockage	COM
1	Code Brown Customer	Customer Back-Up Caused by City Main Blockage	COM
2	Meet Resident	Meet with resident and give info handout.	COM
3	Code Brown Customer	Customer Back-Up Caused by City Main Blockage	COM
3	Meet Resident	Meet with resident and give info handout.	COM

Work Cycle

Repeat: Never
Interval: 6 Months
From: Actual Finish Date
Date Printed: 11/5/2013 — Next Print Date: 11/1/2013

Related Work Activities

Service Requests

Add Request:

Id	Date Initiated	Description	Priority	Category	S
178286	11/3/2013	Investigate Sewer Backup	1	WDC	C
178287	11/3/2013	Investigate Misc. Sewer Problem	1	WDC	C
178288	11/3/2013	Investigate Sewer Backup	1	WDC	C

[Remove]

Inspections

Appendix LL

City of Naperville 10 Year I&I Reduction Plan						
Revised 3/26/2026 EE						
Additional Flow Monitors	**Year**	**Status**	**Completion Date**	**Manholes**	**Subdivision**	**Comments**
C13-032 & T12-024	2026	Pending	-	C13-032 & T12-024	Downtown & Frontier Park	2 additional permenant flow meters
RDII Dependant	2027	Not Started	-	TBD	-	
RDII Dependant	2028	Not Started	-	TBD	-	
RDII Dependant	2029	Not Started	-	TBD	-	
RDII Dependant	2030	Not Started	-	TBD	-	
RDII Dependant	2031	Not Started	-	TBD	-	
RDII Dependant	2032	Not Started	-	TBD	-	
RDII Dependant	2033	Not Started	-	TBD	-	
RDII Dependant	2034	Not Started	-	TBD	-	
RDII Dependant	2035	Not Started	-	TBD	-	
Micro-Flow Basin Study	**Year**	**Status**	**Completion Date**	**Manholes**	**Subdivision**	**Comments**
RDII Dependant	2026	Not Started	-	TBD	-	
RDII Dependant	2027	Not Started	-	TBD	-	
RDII Dependant	2028	Not Started	-	TBD	-	
RDII Dependant	2029	Not Started	-	TBD	-	
RDII Dependant	2030	Not Started	-	TBD	-	
RDII Dependant	2031	Not Started	-	TBD	-	
RDII Dependant	2032	Not Started	-	TBD	-	
RDII Dependant	2033	Not Started	-	TBD	-	
RDII Dependant	2034	Not Started	-	TBD	-	
RDII Dependant	2035	Not Started	-	TBD	-	
Dye Water Flooding	**Year**	**Status**	**Completion Date**	**Manholes**	**Subdivision**	**Comments**
Old Naperville	2026	Not Started	-	TBD	Downtown	
Old Naperville	2027	Not Started	-	TBD	Downtown	
Odgen Av	2028	Not Started	-	TBD	Downtown/ Ogden Av	
Naperville Heights & Misc.	2029	Not Started	-	TBD	Naperville Heights	
TBD	2030	Not Started	-	TBD	-	
TBD	2031	Not Started	-	TBD	-	
TBD	2032	Not Started	-	TBD	-	
TBD	2033	Not Started	-	TBD	-	
TBD	2034	Not Started	-	TBD	-	
TBD	2035	Not Started	-	TBD	-	
Smoke Testing	**Year**	**Status**	**Completion Date**	**Manholes**	**Subdivision**	**Comments**
N/A (Repairs)	2026	In Progress	-	N/A	-	
N/A (Repairs)	2027	Not Started	-	N/A	-	
Sheri Tributary	2028	Not Started	-	TBD	Rivercrest Estates, Knoch Knolls,Prairie Ridge, Old Farm, Winchester Place, Chesnut Creek, Chesnut River Point	
N/A (Repairs)	2029	Not Started	-	N/A	-	
N/A (Repairs)	2030	Not Started	-	N/A	-	
Sheri Tributary	2031	Not Started	-	TBD	Rivercrest Estates, Knoch Knolls,Prairie Ridge, Old Farm, Winchester Place, Chesnut Creek, Chesnut River Point	

N/A (Repairs)	2032	Not Started	-	N/A	-	
N/A (Repairs)	2033	Not Started	-	N/A	-	
Sheri Tributary	2034	Not Started	-	TBD	Rivercrest Estates, Knoch Knolls,Prairie Ridge, Old Farm, Winchester Place, Chesnut Creek, Chesnut River Point	
N/A (Repairs)	2035	Not Started	-	N/A	-	
3-D Manhole Scanning Inspections	**Year**	**Status**	**Completion Date**	**Manholes**	**Subdivision**	**Comments**
N/A	2026	n/a	-	N/A	-	
TBD	2027	Not Started	-	TBD	-	
TBD	2028	Not Started	-	TBD	-	
TBD	2029	Not Started	-	TBD	-	
TBD	2030	Not Started	-	TBD	-	
TBD	2031	Not Started	-	TBD	-	
TBD	2032	Not Started	-	TBD	-	
TBD	2033	Not Started	-	TBD	-	
TBD	2034	Not Started	-	TBD	-	
TBD	2035	Not Started	-	TBD	-	
CCTV Saturated Grounds	**Year**	**Status**	**Completion Date**	**Manholes**	**Subdivision**	**Comments**
T04-009 Tributaries	2026	In Progress	-	Basins: N01, N15, N16, N28	Brookdale, Arbors of Brookdale, Chantecleer Lakes Apartments, McDowell Grace, Terraces of Brookdale Condo, Tellabs, Monarch Landing, Prairie Point Corporate Park, Citygate Centere, Calamos Corporate Center, Westings Corporate Community	
T04-009 Tributaries	2027	Not Started	-	Basins: N01, N15, N16, N28	Brookdale, Arbors of Brookdale, Chantecleer Lakes Apartments, McDowell Grace, Terraces of Brookdale Condo, Tellabs, Monarch Landing, Prairie Point Corporate Park, Citygate Centere, Calamos Corporate Center, Westings Corporate Community	
T04-009 Tributaries	2028	Not Started	-	Basins: N01, N15, N16, N28	Brookdale, Arbors of Brookdale, Chantecleer Lakes Apartments, McDowell Grace, Terraces of Brookdale Condo, Tellabs, Monarch Landing, Prairie Point Corporate Park, Citygate Centere, Calamos Corporate Center, Westings Corporate Community	
Sheri Tributaries	2029	Not Started	-	TBD	Rivercrest Estates, Knoch Knolls,Prairie Ridge, Old Farm, Winchester Place, Chesnut Creek, Chesnut River Point	
Sheri Tributaries	2030	Not Started	-	TBD	Rivercrest Estates, Knoch Knolls,Prairie Ridge, Old Farm, Winchester Place, Chesnut Creek, Chesnut River Point	
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Sheri Tributaries	2032	Not Started	-	TBD	Rivercrest Estates, Knoch Knolls,Prairie Ridge, Old Farm, Winchester Place, Chesnut Creek, Chesnut River Point	
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City of Naperville
Department of Public Utilities- Water/Wastewater
Sanitary Sewer Asset Management Strategy
December 2019

Revision	Date

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   1.1 Purpose of the Asset Management Strategy
   1.2 Level of Service
   1.3 Asset Inventory

2. Asset Business Risk Exposure Methodology
   2.1 Probability of Failure Score
   2.2 Consequence of Failure Score
   2.3 Business Risk Exposure Score

3. Capital Improvement Plan

4. Long Range Funding Strategy

5. Future Expansion of the Asset Management Strategy

DRAFT

1. INTRODUCTION

1.1 Purpose of the Asset Management Strategy

Asset management is a continuous process that guides the acquisition, use, and disposal of infrastructure assets. The purpose of asset management is to optimize service delivery and minimize the cost of any given asset over its service life. The City of Naperville asset management strategy is structured around three principles:

- Customer service
- Asset life cycles and risk management
- Life cycle costing

The goal of the asset management strategy is to achieve desired levels of service and operational objectives at the best possible cost to the customer.

The City has an ongoing asset management program for sanitary sewer assets. Data from the City's GIS system, CMMS system (Cityworks), flow monitoring program and CUES Granite Net CCTV inspection records are used to assess the condition of various assets. The CMMS system also contains a database of cleaning, inspection, lining, spot repairs and other maintenance and repair activities.

The City uses a risk-based approach to analyze and prioritize maintenance and repairs to the sanitary sewer system. Data collected from the various systems, including GIS, Cityworks, CUES, and InfoSWMM is used to develop Probability of Failure (PoF) and Consequent of Failure (CoF) criteria for each sanitary sewer collection system asset. These criteria are used to calculate a Business Risk Exposure (BRE) score for each asset. The BRE score is used to help target the City's resources in the most efficient way possible to optimize performance of the collection system, to eliminate SSO's and other system problems.

1.2 Level of Service

A desired Level of Service will be used as the measurable outcome for the Asset Management Strategy.

Level of Service goals are as follows:

Regulatory Compliance. No signification NPDES permit violations. No USEPA or IEPA Notices of Violation. *Goal: No violations.*

Public Confidence/System Service Impact. Minimal loss of service or impacts to other services. No sanitary sewer overflows (SSOs) into homes, businesses or waterways. Minor disruptions (eg traffic, noise, dust). *Goal: Reduce service interruptions. Reduce complaints. No SSOs.*

Safety of Public and Employees. No reportable injuries. No lost-time injuries or medical attention required. No impact to public health. *Goal: no injuries or public health advisories.*

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Business Risk Evaluation (BRE) Score. Assess condition of system assets to develop a BRE score for each asset. *Goal: Reduction in BRE scores across the system*.

1.3 Asset Inventory

The City of Naperville's Wastewater Collection system includes:

- 2,692,818 linear feet (510 miles) of gravity sewer and interceptors
- 12,059 manholes
- 22 lift/pump stations
- 43,349 linear feet (8.21 miles) of force mains
- 42,221 customers

The diameter of sanitary sewer mains ranges in sizes from 6-inches to 60-inches, depending upon the type and location of the pipe. Sewer piping construction materials consist of vitrified clay pipe (VCP), polyvinyl chloride (PVC) pipe, ductile iron pipe (DIP), reinforced concrete pipe (RCP), asbestos cement pipe and cast-iron pipe.

The system includes two (2) permitted interceptors that convey sewage to the Springbrook Water Reclamation Center (SWRC). Each interceptor has specified tributary areas that include smaller trunk sewers, sewer main lines and pump stations/forcemains. Both interceptors are constructed of reinforced concrete pipe (RCP).

The age, construction system/material, elevations and other key information is recorded in the City's geographic information system (GIS). Design plans are stored in the City's OnBase records management system and all maintenance history of each section of sewer, forcemain, interceptor, manhole and lift station are recorded in the City's CMMS.

Below is the current pipe material breakdown of the Collection System:

City of Naperville
Water Utilities
Pipe Material 2019

PIPE MATERIAL	GRAVITY MAINS	FORCEMAINS
Asbestos Cement Pipe	0.5%	0%
Cast Iron	0.5%	0%
Non-Reinforced Concrete Pipe	0.5%	0%
Ductile Iron	3.5%	77.5%
High Density Polyethylene (HDPE)	0.5%	1.5%
Polyvinyl Chloride (PVC)	40%	8.5%
Reinforced Concrete Pipe (RCP)	3%	0%
Steel Pipe	0%	10%

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Truss Plastic	1.5%	0%
Vitrified Clay Pipe (VCP)	28.5%	0%
Cured-In-Place Pipe (CIPP)	21.5%	2.5%
Total	100.0%	100%

2. Asset Business Risk Exposure Methodology

Business Risk Exposure (BRE) scores will help the Utility prioritize pipes "worst first", as well as prioritizing acceptable level of service for critical facilities.

Two sets of criteria were developed to calculate the BRE of an asset: Probability of Failure and Consequence of Failure.

Probability of Failure captures criteria likely to cause a failure of the pipe, such as pipe material, age and maintenance history.

Consequence of Failure captures criteria such as pipe size, difficult to repair locations, and number of customers served. Siphons and divertibles were also given special scores due to their functions within the system.

After the criteria was enumerated and ranked, each criteria was given a weight to indicate its importance to the probability of failure and consequence of failure calculation. A higher weight indicates a more important criteria.

2.1 Probability of Failure Score

Several Probability of Failure criteria were evaluated. The first criteria incorporated was pipe material. Pipe materials were given a score corresponding to the stability, longevity and strength of the material. Materials with the highest scores indicate poorer materials more prone to failure. Pipe material was given a weight of 2 in the calculation of the BRE.

Material	Score
Asbestos Cement	10
Cast Iron	4
Concrete Pipe (Non Reinforced)	8
Ductile	4
Polyethylene	1
PVC	1
Reinforced Concrete	6
Reinforced Plastic (Truss)	9
Vitrified Clay	10

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CIPP	2
Fold In Form	6

The second criteria considered was age of the pipe. In general, older pipes were given worse scores. The age brackets with the worst score of 10 reflect construction practices during times of rapid growth in the city. Asset age is weighted as 3 in the calculation of BRE.

Asset Age (years)	Score
118-109	9
108-99	9
98-89	9
88-79	9
78-69	9
68-59	9
58-49	10
48-39	10
38-29	7
28-19	3
18-9	2
9-0	1

The third criteria considered is maintenance, to include both history and frequency. Pipes requiring more frequent maintenance were given the worst scores. For example, pipes requiring monthly rootsawing were scored the worst at a 10. This category is weighted a 1 in the BRE calculation.

Maintenance	Score
Rootsaw -Monthly	10
Rootsaw -Quartely	8
Rootsaw - Semi - Annual	7
Rootsaw - Annual (1-2 year Cycle)	5
Flush - Monthly	5
Flush - Quartely	4
Flush - Semi - Annual	4
Flush - Annual	3
Flush - 2-3 Years	2
Flush - 4-5 Years	1

2.2 Consequence of Failure Score

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Several Consequence of Failure criteria were evaluated. The first criteria was pipe size. Larger pipes were given a higher score, as the consequence of their failure is more severe. These pipes carry greater volumes and service larger numbers of customers. Pipe size was given a weight of 4 in the BRE calculation.

Diameter (in)	Score
3	4
4	4
6	6
8	6
10	6
12	8
14	8
15	9
16	9
18	9
20	9
21	9
24	9
27	9
30	9
33	9
36	10
42	10
48	10
60	10

The second criteria evaluated was pipe location. Pipes with a higher score have a higher consequence of failure. Pipes with higher scores may be in locations that are difficult to access and repair, could cause disruption to transportation facilities, could cause environmental damage, have unknown connection or bottlenecks. Pipe location was given a weight of 5 in the BRE calculation.

Location	Score
None	1
Interstate, RR, River (50 foot)	10
Blind Ties (upstream)	5
Bottlenecks	8

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Number of customers was also evaluated as a criteria. Higher scores indicate a greater number of customers will be impacted by a failure of the asset. Number of customers was given a weight of 3 in the BRE calculation.

Number of Customers	Score
0	1
1-5	4
6-10	6
11-15	8
15+	10

Special system features were enumerated in the BRE calculation. Siphons and divertibles were given consequence of failure scores due to their critical functions in the system. Single barrel siphons represent a single point of failure and have the highest score. Divertibles serve a specific system function during high flows or downstream disruption. Siphons are given a weight of 2 and divertibles a weight on 1 in the BRE calculation.

Siphon	Score
Single	10
Double	5
Triple	1

Divertible	Score
Yes	3
No	1

2.3 Business Risk Exposure Score

The Probability of Failure and Consequence of Failure scores are multiplied together to yield a Business Risk Exposure score.

$$PoF \times CoF = BRE$$

BRE scores fall in the range of 1.50 to 59.42. The higher the BRE score, the greater the risk if the asset were to fail. A color-coded map of the system BRE scores is included as Figure 1.1. Assets with the highest scores, and therefore the greater risk, are coded dark red.

The system BRE scores have been divided into percentiles to indicate the range of scores in the system. A mean BRE score of 13.82 was also calculated. One percentile point represents approximately xx feet of pipe.

Percentile	Score
95th	30.77
90th	29.62

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85th	28
80th	24.77
70th	19.62
60th	12.92
50th	8.31
40th	7.38
30th	6.46
20th	5.54
10th	4.85

Mean:	13.82

BRE scores will help the Utility prioritize pipes "worst first", as well as prioritizing acceptable level of service for critical facilities.

Several observations can be made by examining the BRE map. First, areas with large amounts of sewer lining have better BRE scores than areas that have not been lined; so even though the original sanitary sewers in these areas may be older they have better BRE due to the lining. Second, it is easy to identify the interceptors or larger-diameter sewers because their color scheme indicates an increased risk due to their size. Other observations

3. Capital Improvement Plan

   The Capital Improvement Plan (CIP) provides a guide to identify long-term needs, improvements, rehabilitation and replacement needs for the Wastewater Utility for a period of 10 years. The CIP will allow the utility to plan and budget for these expenditures and consider the anticipated project costs during the rate-making process.

   Infrastructure improvement priorities have been developed based on current evaluation of the system. Specific program areas are shown on the CIP, with corresponding details such as number of manholes or feet of pipe. The 10-year CIP is shown in Figure X.

   The proposed Capital Improvement Project funding levels per year are summarized as follows:

Year	Program Cost
2019	
2020	
2021	
2022	
2023	

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2024	
2025	
2026	
2027	
2028	
Total:	

In 2019, all of the rehabilitation targets were met. Actual CIP spending on the sanitary sewer rehabilitation program was $xxx. The funding of sanitary sewer system rehabilitation represented xx% of the total CIP in 2019.

4. Long Range Funding Strategy

The City of Naperville performs rate studies every three to five years to develop cost of service rates that are fair and transparent for each customer class, as well as ensure that stable funding is available to operate and maintain the sanitary sewer assets. In 2020, the City will be in the fourth year of the previous rate study conducted in 2016. In 2020 the City will conduct a new rate study to set water and wastewater rates to take effect in January 2021. It is anticipated that the rates will be set for a three-year period.

Wastewater rate setting will involve an examination of the level of capital improvements required to maintain and improve the level of service in the sanitary sewer system, address deficiencies that may be identified, as well as comply with current regulations and prepare for future regulations.

The current collection system rehabilitation and maintenance program is currently funded pay-as-you go each year by the wastewater rates. It is anticipated that this funding structure will continue into the future.

5. Future Expansion of the Asset Management Strategy

The current Asset Management Strategy is focused on gravity sanitary sewer piping, including the manholes on the piping segments. In the future, sanitary sewer lift stations and forcemains will be evaluated and added to the Asset Management Strategy. We anticipate that these assets will be added in 2020 and 2021.

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2. BACKGROUND

2.1 PURPOSE

The purpose of this Facilities Plan is to identify capital improvement needs at the Springbrook Water Reclamation Center (SWRC) by providing evaluations with special focus on the disinfection system, areas of aging infrastructure, and regulatory requirements, and development of treatment alternatives around those needs identified. Treatment alternatives are evaluated holistically with economic and non-economic criteria. The Facilities Plan recommends improvements to the facilities with phases and an implementation schedule to meet the needs identified for the future.

Overall, the Facility Plan is guided by the following mission statement:

The Facility Plan will produce improved data and detailed planning documents for comprehensive decision making for maintenance, replacement, and expansion of facilities at Springbrook Water Reclamation Center.

This will be done while targeting the following five goals:

Regulatory Compliance	Planning for compliance with current and future regulations, including phosphorus requirements.
Aging Infrastructure	Providing reliable service and treatment performance by rehabilitation of aging facilities.
Financial Stewardship	Protecting community resources by producing a clear and concise Facility Plan Report documenting comprehensive evaluations of future improvements..
Environmental Stewardship	Protecting the environment through a flexible and reliable facility.
Public Safety	Protecting the community and City staff.

2.2 SERVICE AREA

2.2.1 CITY OF NAPERVILLE

The City of Naperville is 39.4 square miles, located in DuPage and Will counties, 28 miles west of Chicago. Naperville is the third-largest city in Illinois by population with 149,540 residents as of the 2020 census. This represents a 5.4% increase from the 2010 census. The City's drinking water is sourced from Lake Michigan and purchased through the DuPage Water Commission from the City of Chicago. The City operates one wastewater treatment plant, the Springbrook Water Reclamation Center, which receives wastewater from the City of Naperville along with the City of Warrenville, which is directly north of Naperville.

2.2.2 CITY OF WARRENVILLE

The City of Warrenville is 5.6 square miles, located in DuPage County, and shares its southern border with the City of Naperville. The 2020 census population is 13,553, which represents a small increase in population since 2010.

2.3 SPRINGBROOK WATER RECLAMATION CENTER

SWRC is located in the southern half of the City, just west of the DuPage River. An aerial view of SWRC is shown in Figure 2-1.

2.3.1 EXISTING PERMIT

SWRC is permitted under the National Pollutant Discharge Elimination System (NPDES) Permit No. IL0034061, effective January 1, 2019 through December 31, 2023, for a design average flow of 26.25 million gallons per day (MGD), and a design maximum flow of 55.13 MGD. A summary of permit limits is in Table 2-1.

Table 2-1 NPDES IL0034061 Permit Limits

Parameter	Load Limits (lbs/day)			Concentration Limits (mg/L)			Sample Frequency (days)	Sample Type[A]
	Monthly Average	Weekly Average	Daily Max	Monthly Average	Weekly Average	Daily Max		
$CBOD_5$	2089		4379	10		20	3/week	C
Suspended Solids	2627		5254	12		24	3/week	C
pH	6-9 standard units						3/week	G
Fecal Coliform	Daily Maximum shall not exceed 400 per 100 mL (May through October)						3/week	G
Chlorine Residual						0.05	3/week	C
NH_3-N								
April-October	307		832	1.4		3.8	3/week	C
November-February	635		1051	2.9		4.8		
March	328	832	1029	1.5	3.8	4.7		
Total Phosphorus[B]	219			1.0			1/month	C

[A] – C = Composite, G = Grab

[B] – Total Phosphorus limits will change during the duration of this permit – see below

Special Conditions 6-8 of this permit address phosphorus removal. Items 6 and 7 involve submittal of a Phosphorus Discharge Optimization Evaluation Plan and a Feasibility Study, both of which have been completed and submitted. The conclusions of the feasibility study are discussed in Chapter 5 of this report. Special Condition 8 stipulates future effluent limits. Effective date for effluent limits is variable based on the type of phosphorus removal targeted.

Table 2-2 Anticipated Future Phosphorus Effluent Limits

Limit	Effective Date	Extended Effective Date[1]	Treatment Method
1.0 mg/L TP	January 1, 2029	2034	Chemical Treatment
1.0 mg/L TP	January 1, 2030	2035	Biological Treatment

[1]Dates shown in Table 2-2 above are further impacted by work with the Lower DuPage River Watershed Coalition and Illinois Environmental Protection Agency (IEPA). It is anticipated that the next permit renewal will extend the effective dates for phosphorus limits an additional five years.

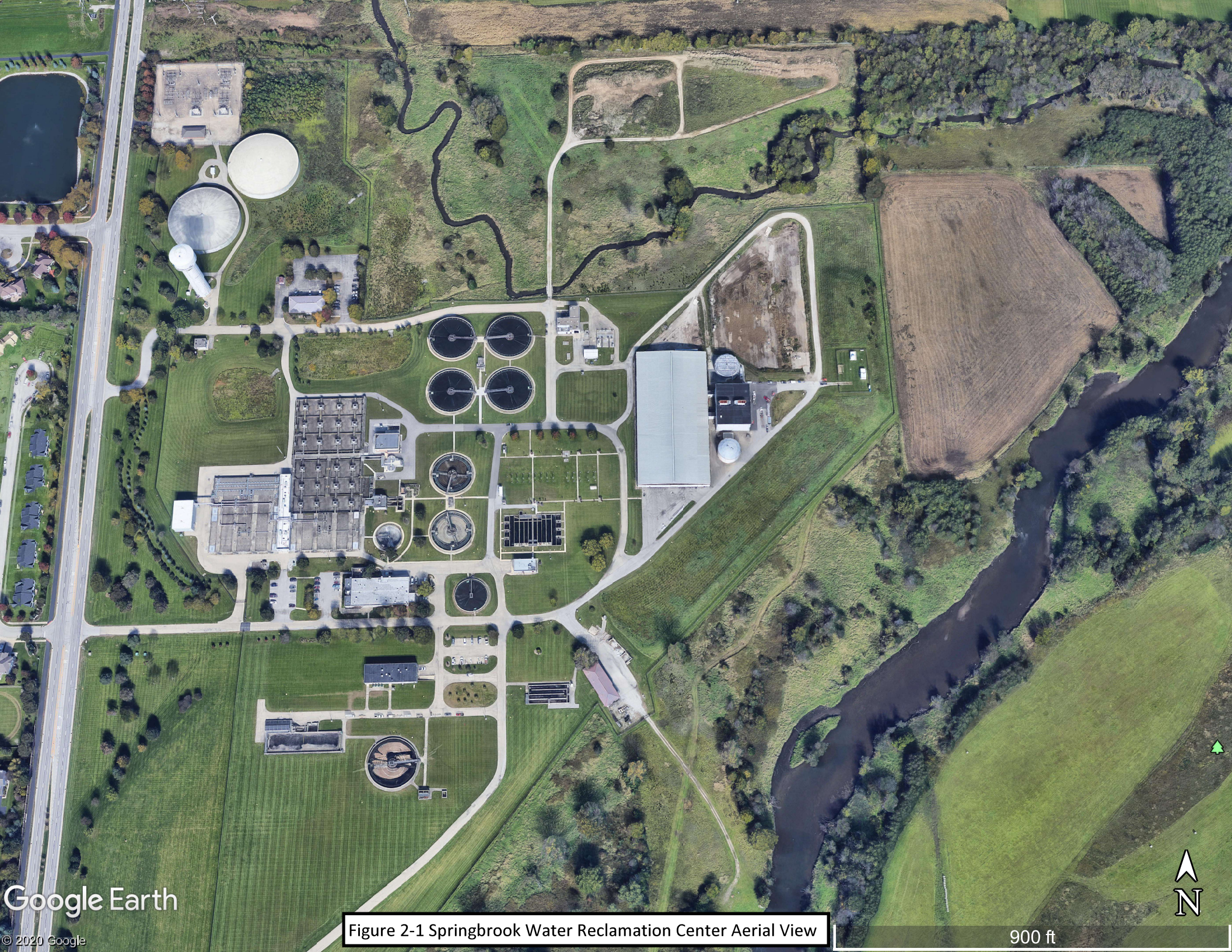


Figure 2-1 Springbrook Water Reclamation Center Aerial View

July 16, 2025

Mr. Tony Conn Sr
Deputy Director – Water Operations
Department of Public Utilities-Water
City of Naperville
1200 West Ogden Avenue
Naperville, Illinois 60563

SUBJECT: 2025 NAPERVILLE FORCE MAIN ASSESSMENTS

Dear Mr. Conn,

RJN Group, Inc. (RJN) is pleased to submit this report to the City of Naperville (City) for the internal inspections of the Century Hill Lift Station and Paddock Lift Station force mains (FM). Additional deliverables include reports from INGU for each inspection and KMZ files displaying anomaly locations along the force main path.

BACKGROUND

The City owns twenty-three (23) wastewater lift stations throughout the City. Each of the lift stations is on the City's SCADA system and the staff inspects the stations monthly. The force mains are mapped in GIS and a break history is maintained; however, most have never been inspected prior to 2021. Force mains are important components of the City's infrastructure system and are challenging to inspect due to their design, criticality, and difficulty to take off-line and access.

The City's force main evaluation program began in 2021 with a successful deployment in the Cinnamon Creek force main. In 2022, the Hobson Oaks, Rivermist, Riverwoods and Country Lakes force mains were inspected by RJN. In 2023, the Northwest Lift Station, Southwest Lift Station, and South Lift Station (LS) North and East force mains were inspected by RJN. In 2024, the Barclay Manor, Bonnema Woods, Royce Road, and Summerfield force mains were inspected by RJN. Continuing the City's force main inspection program, the Century Hill, Paddock, North Operations Center (NOC), and West Jefferson force mains have been selected for in-line screening assessments in 2025.

Table 1 highlights their features including their age, material, and length. Figure 1 showcases their locations on an aerial map of the City.

Table 1 - Force Main Features

Lift Station	Lift Station Address	Force Main Size (inches)	Force Main Length (feet)	Force Main Material	No. of Air Release Valves	Year Installed
Century Hill	25W220 Chicago Ave	6	1287	DIP/CIPP	0	1965
Paddock	1900 Saddle Farm Ln	4	439	DIP	0	2006
North Operations Center (NOC)*	1200 W Odgen Ave	24	7998	DIP	2	2006
West Jefferson*	1033 W Jefferson Ave	3	604	HDPE	0	2003

* These force mains were removed from the force main inspection program due to various reasons identified during field investigations

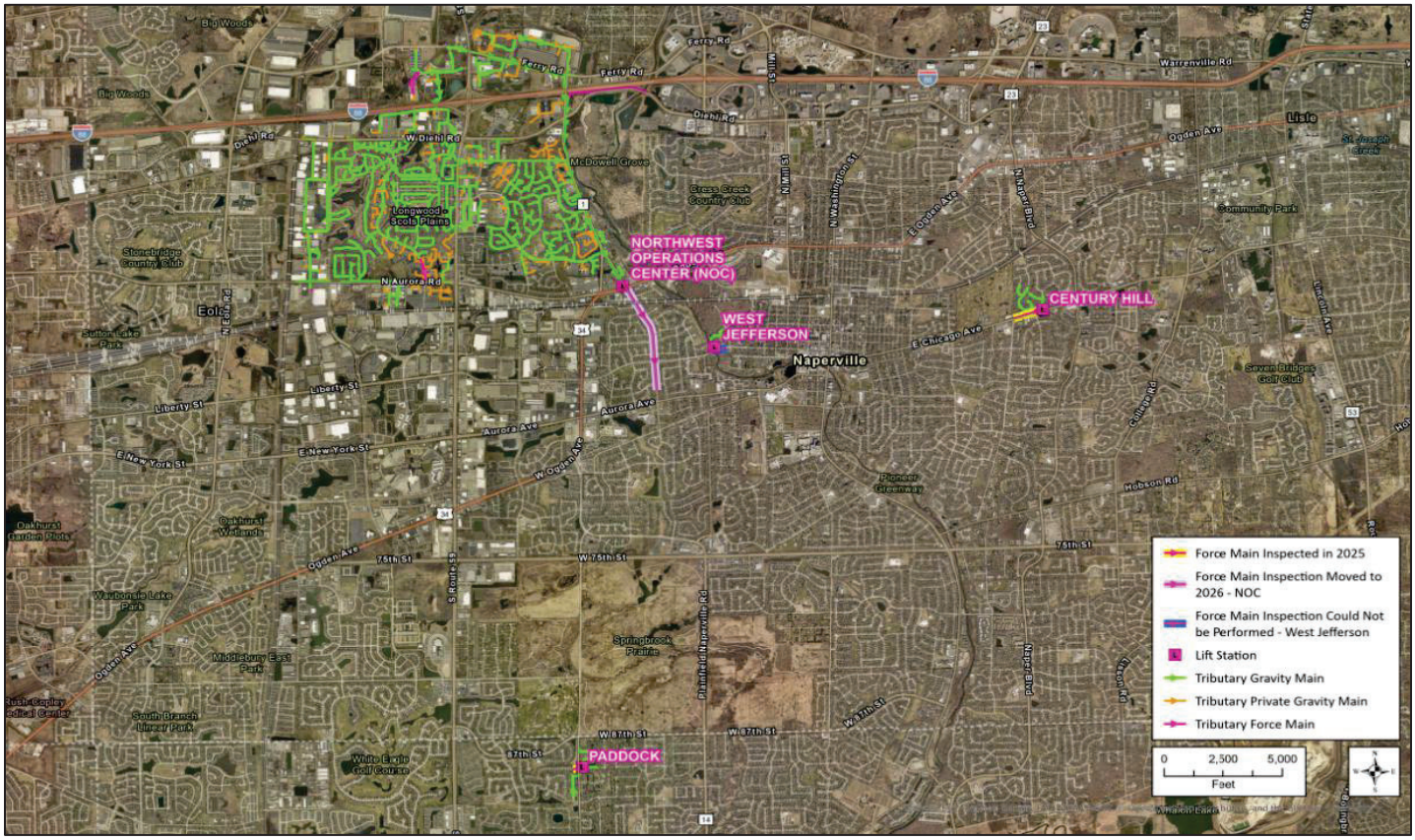


Figure 1 - Force Main Locations

OBJECTIVES

Following the completion of this project, the objective is for the City to have actionable intelligence regarding these two force mains as well as recommendations for future testing and/or rehabilitation.

RESULTS

The in-line screening assessments, performed by RJN, revealed that the Century Hill LS and Paddock LS force mains have anomalies warranting further rehabilitation. Table 6 within the "Conclusions and Recommendations" section summarizes the recommendations, minor improvements, and budgetary cost estimates for each option.

With the Northwest Pump Station currently shut down for rehabilitation, the flows from the Northwest force main are currently being re-directed into the NOC force main. The large quantity of flow restricted the lift station's ability to perform a continuous Pipers® run. While a proving Piper® was deployed and successfully caught at the discharge manhole, the NOC force main deployment has been rescheduled to be performed in 2026 once the Northwest Pump Station is back online. Additionally, the West Jefferson force main deployment was unsuccessful due to the Pipers® not being able to navigate bends and tees in force main and was thus removed from the project scope.

Attachments

Appendix A – Force Main Exhibits and Rating System

Appendix B – Pipers® Survey Methods and Common Force Main Issues

Appendix C – Magnetic Flux Anomaly and Structure Inspection Tables

Appendix D – Pipers® Findings Reports

PROJECT UNDERSTANDING

The Century Hill Lift Station serves the northeastern corner of the City, bounded roughly by the Burlington North Santa Fe railroad line to the north, Naperville Country Club to the west, Naper Boulevard to the east, and Maple Avenue to the south. The tributary system is largely residential. The Paddock LS serves a residential area located south of 87th Street along Book Road. The sanitary sewer lines along Book Road, Douglas Road, Sharon Court, and Saddle Farm Lane all direct flow into the Paddock LS.



Figure 2 – Century Hill LS Valve Vault Topside

Both lift stations have had their electrical system updated and maintenance is performed annually on each of them. None of these force mains have been inspected previously.

The primary tasks of these assessments included:

- Desktop Study
  - Data Review and Preliminary Calculations
- General Lift Station Assessment
- In-Line Screening Assessment of the Force Main
  - Leak Detection Survey
  - Air/Gas Pocket Detection
  - Pressure and Deposit Survey
- Magnetometer survey
  - Detects variations in bulk wall thickness and internal corrosion, with a minimum wall loss threshold of 30%.
- Results and Recommendations

DATA REVIEW AND PRELIMINARY SITE INSPECTIONS

The first phase in the assessment was gathering and reviewing all available data from the City regarding the lift station and force mains. This included pump curves, pump run times, GIS maps and databases, and design and/or record drawings. The objective of this phase is to prepare for a preliminary site visit.

Data Review

A successful deployment requires meticulous planning. This includes calculating travel times, reviewing record drawings and pump information for the lift stations and force mains, and selecting launch and retrieval locations. Elevation profiles for each force main were assembled based on the available plans.



Figure 3 – Paddock LS Valve Vault Topside

Preliminary Site Inspections

The primary focus of the site visit on February 14, 2025, was the following:

- **Calculate Precise Travel Times –** Perform timed dye test runs to precisely calculate the Pipers® travel times to ensure retrieval success.
- **Confirmation of Deployment Procedure –** Assess the lift station function, insertion points of the Pipers®, assess the wet well for obtaining sufficient water levels per deployment times required, and visit the discharge manhole to plan for retrieval.
- **Accessibility of the Force Main –** Documenting areas where the force main was accessible.
- **Structure Inspections –** Locate and inspect any known structures on force mains to assess structure and functionality.

During the preliminary site visit, mock deployments using green dye were conducted to confirm run times and the retrieval method. This step served multiple purposes, including validating the accuracy of travel time calculations, ensuring successful guidance of the Pipers® to the retrieval location, and verifying sufficient flow for the pumps to operate throughout the deployment.

The travel time calculations were crucial for both the retrieval process and determining the necessary flow rate for each deployment's duration. These calculations provided anticipated travel time ranges based on various pump combinations. Keeping the Pipers® submerged throughout the deployment is essential for optimal results, requiring continuous pump operation during the entire travel time. An initial run using dye and a proving Pipers® device was performed to confirm travel time and velocity. The velocity calculations are equally important, as data collection by the devices is only effective at a velocity of 6 LF/s or below.



Figure 4 – Successful Century Hill Mock Deployment

FORCE MAIN INSPECTIONS

INTERNAL PIPE INSPECTION TECHNOLOGY

RJN explored alternatives and found a viable solution in INGU's Pipers® In-Line screening technology. The free-floating Pipers® spheres, as seen in Figure 5, can detect leaks and air pockets, gross wall thickness changes of greater than 30%, pressure differentials, and any deposits or blockages along a pipeline. Consecutive runs through a pipeline deliver additional layers of information that can enhance inspection quality and reliability. In addition, this vital information on a pipeline's performance can be delivered at a fraction of the cost of other technologies by simply eliminating mobilization costs. A full explanation of the Pipers® survey methodology and common force main issues can be found in Appendix B.



Figure 5 – 1.5" Pipers® Devices

PIPERS® DEPLOYMENTS

RJN and the City conducted Pipers® deployments into the force mains on March 17th. For both force mains, the pumps were shut off, and the Pipers® were inserted at the launch locations with dye. Bar screens were set up at the outlet(s) of each of the discharge manholes, with a crew member on standby with an extended catch basket available to collect the Pipers® upon arrival. In the end, four (4) Pipers® in total were deployed successfully for the two force mains. None of the devices were lost or damaged during inspections. Figure 6 shows the Pipers® retrieval setup at the Paddock discharge manhole.



Figure 6 – Paddock LS Bar Screen and Catch Basket Setup

The devices were shipped back to INGU Solutions (INGU) for analysis. INGU is based in Canada and licenses the Pipers® for use in America. Data extraction from each deployed Piper® is performed by INGU.

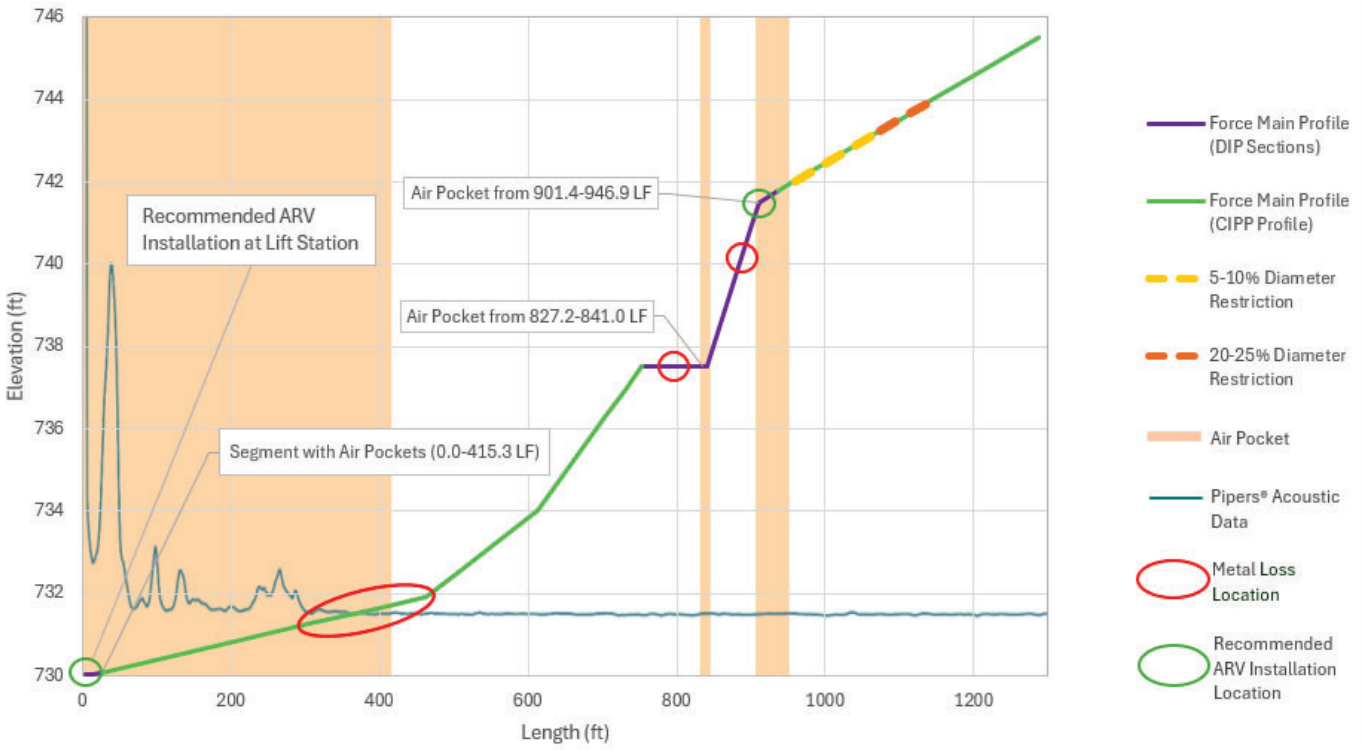
RESULTS

The internal pipe investigation provided valuable insight into the current condition of the two inspected force mains. Overall, for the two force mains, many acoustic anomalies were found, severe deposit build-ups were identified in the Paddock force main, and metal loss was identified in both force mains. There were no leaks identified in either force main. The report from INGU with their findings is attached in Appendix D.

CENTURY HILL LIFT STATION FORCE MAIN FINDINGS

The internal pipe investigation provided valuable insight on the current condition of the Century Hill LS force main. Overall, the 6" DIP/CIPP force main is in concerning condition given the acoustic anomalies, deposit build-up, metal loss, and magnetic flux anomalies identified during the inspection. Figure 7 below shows the elevation profile of the FM, including the expected hydraulics of the pipe between cycles and features located along the pipe.

Figure 7 – Century Hill LS FM Elevation Profile



Acoustic Data Results

The Pipers® inspection of the Century Hill LS force main provided a sound acoustic data set that allowed analysts to confirm that there are zero leaks over the length of the force main. Three (3) acoustic anomalies were observed throughout the force main indicating the presence of air. The results of the acoustic survey may be seen in Figure 7 above. Two (2) of the air pocket observations indicated a localized air pocket, with each being approximately 15-45 LF in size. One (1) anomaly, from 0.0-415.3 LF, was noted to be a segment with air pockets. This classification is due to the significant size of the air pocket, extending over 400 LF in length.

Pressure Monitoring Results

Table 2 – Century Hill LS FM Pressure Deposit Survey Results

Pipe Segment (LF)	Maximum Diameter Restriction (inches)	Percentage Restriction	Debris Volume (cf)
60 - 753	N/A	-	-
773 - 947	N/A	-	-
960 - 1,075	0.3	6%	1.6
1,075 - 1,140	1.3	24%	3.6
1,140 - 1,265	N/A	-	-
		Total	5.2

The pressure survey revealed moderate restrictions in the force main. Table 2 displays the maximum diameter restriction for each segment of pipe in INGU's analysis.

The observed hydraulic gradient contained large increased fluctuations for approximately the first 950 LF of force main and the last 125 LF of the force main. This is likely due to elevation discrepancies between the provided and actual force main elevation. Due to these fluctuations, the corresponding line-of-best fit and maximum diameter restriction could not be determined for these segments.

The hydraulic grade line from 960-1,075 LF was found to be larger than expected for a clean, 6-inch, DIP force main. This can likely correspond to a build-up of deposits up to 0.3 inches (6% of the pipe's internal diameter). Similarly, the hydraulic grade line is at its steepest from 1,075-1,140 LF. This can likely be attributed to a larger build-up of deposits in this portion of the force main. The hydraulic gradient from 1,075-1,140 LF indicated a build-up of deposits up to approximately 1.3 inches (24% of the internal pipe's diameter).

Magnetic Flux Analysis Results

Table 3 – Century Hill LS FM Magnetic Flux Risk Analysis

Century Hill Force Main	
Anomaly Risk	**Count**
High	2
Medium	7
Low	10

All anomalies found in the magnetic flux analysis are discussed in more detail in INGU's report in Appendix D and are mapped in the exhibit in Appendix A. Table 3 summarizes the risk associated with the anomalies observed. Two (2) high risk anomalies were identified, seven (7) medium risk anomalies were identified, and ten (10) low risk anomalies were identified.

High risk anomalies were observed at 769.4 LF and 902.9 LF. The high-risk anomalies align with metal loss within the force main that was identified by the Pipers®. These two (2) metal loss anomalies were found in sections of the force main that have not been CIPP lined in the past. The Pipers® calculate the remaining pipe wall thickness (or hoop thickness) by measuring the present hoop strength averaged out over 6-foot sections. By comparing the measured wall strength with the designed wall strength, the wall thickness and corresponding metal loss within the pipe can be assessed at a high resolution. The Pipers® denote metal loss anomalies at locations where the average wall thickness was found to be 30% lower than the design thickness. Even within such a tight resolution, it can be easily assumed that throughout each 6-foot section there will be greater and lesser pits of metal loss than the average of 30%. Metal loss and deterioration within the force main's pipe can potentially lead to breaks, so they should be inspected, rehabilitated, and monitored in the future.

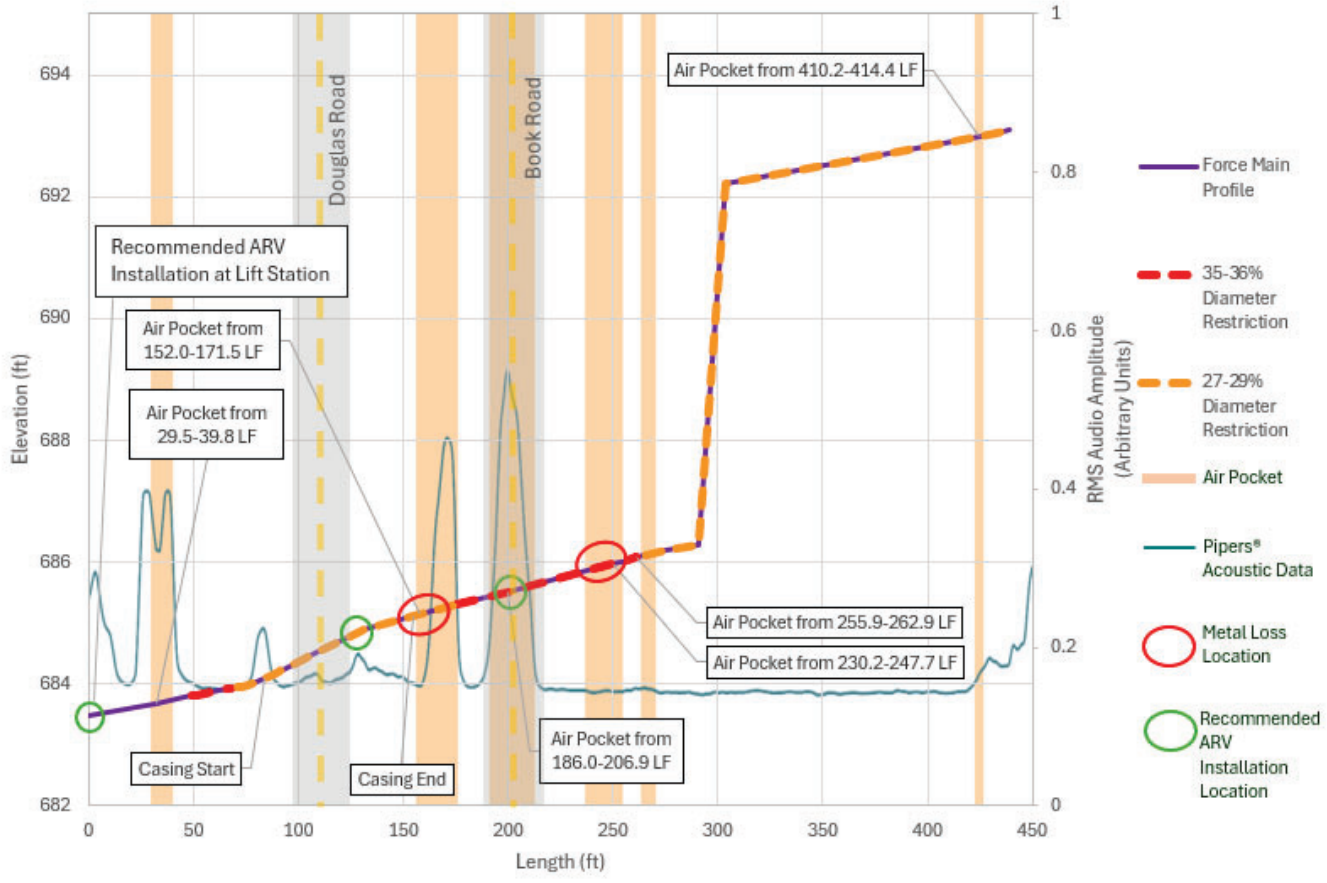
Three (3) metal loss anomalies were observed by the Pipers® at 333.8 LF, 425.6 LF and 479.8 LF. These metal loss locations were found to be within sections of the Century Hill force main that have been CIPP lined. INGU confirmed that the Pipers® metal loss detection pertains to the host pipe and not the CIPP liner. Due to this, these three (3) metal loss anomalies were associated to be low risk.

A total of seven (7) magnetic anomalies were associated to be of medium risk. These anomalies were noted to be "magnetic structure changes" by the Pipers®. Since the direct cause of these anomalies is unknown, they have been assessed to be of medium risk. However, INGU confirmed that the "magnetic structure change" anomalies are not attributed to metal loss at these locations. The remaining anomalies were noted to be low risk anomalies due to their alignment with joints or extra metal (fittings or clamps) on the force main and are provided in Appendix C.

PADDOCK LIFT STATION FORCE MAIN FINDINGS

The internal pipe investigation provided valuable insight on the current condition of the Paddock LS force main. Overall, the 4" DIP force main is in concerning condition given the acoustic anomalies, deposit build-up, metal loss, and magnetic flux anomalies identified during the inspection. Figure 8 below shows the elevation profile of the FM, including the expected hydraulics of the pipe between cycles and features located along the pipe.

Figure 8 – Paddock LS FM Elevation Profile



Acoustic Data Results

The Pipers® inspection of the Paddock LS force main provided a sound acoustic data set that allowed analysts to confirm that there are zero leaks over the length of the force main. Six (6) acoustic anomalies were observed throughout the force main indicating the presence of air. Figure 8 displays the acoustic amplitude recorded by the Pipers®. The largest air pockets were found to be present along the section of the force main that crosses Book Road.

Pressure Monitoring Results

The pressure survey revealed severe restrictions in the force main as seen in Table 4.

Table 4 – Paddock FM Pressure Deposit Survey Results

Pipe Segment (LF)	Maximum Diameter Restriction (inches)	Percentage Restriction	Debris Volume (cf)
49 - 68	1.5	36%	0.7
68 - 176	1.2	29%	3.0
176 - 261	1.5	35%	2.8
266 - 437	1.1	27%	4.4
		Total	10.8

The observed hydraulic gradient was higher than expected for a clean, 4-inch, DIP force main. This can at least partially be explained by a combination of factors, being a build-up of deposits restricting the diameter up to 1.5 inches of the pipe's internal diameter, an increase in hydraulic roughness, and elevation differences.

Overall, the hydraulic grade line is at its steepest in the segments from 49-68 LF and 176-261 LF. This can likely be attributed to a deposit build-up of 1.5 inches (35-36% of the pipe's internal diameter).

Magnetic Flux Analysis Results

All the anomalies found in the magnetic flux analysis are discussed in more detail in INGU's report in Appendix D and are mapped in the exhibit in Appendix A. Table 5 summarizes the risk associated with the anomalies observed. Two (2) high risk anomalies were identified, three (3) medium risk anomalies were identified, and five (5) low risk anomalies were identified.

Table 5 – Paddock LS FM Magnetic Flux Risk Analysis

Paddock Force Main	
Anomaly Risk	Count
High	2
Medium	3
Low	5

Metal loss was observed at 161.0 and 250.1 LF. The high-risk anomalies align with metal loss within the force main that was identified by the Pipers®. Both metal loss locations were within sections of the force main where air pockets have been identified. The entrapped air is likely a contributing factor to the metal loss observed in these areas, as the air cannot escape and gradually leads to the deterioration of the pipe wall. With the pipe's age only being 19 years old, these metal loss anomalies will need to be rehabilitated to avoid failure in the force main in the near future.

Three (3) anomalies observed to be at 413.1 LF, 424.4 LF and 433.4 LF were noted to be magnetic structure changes. Since their cause could not be directly determined, they have been associated as medium risk. However, INGU noted that the magnetic structure change anomalies do not denote metal loss at these locations. The remaining anomalies were noted to be low risk because they denote joints, extra metal such as a fitting or clamp on the force main, and a casing on the force main from 83.8-154.9 LF.

REHABILITATION OPTIONS

Debris was identified throughout both pipelines, effectively limiting the hydraulic capacity, and risking the integrity of the pipeline due to abrasion. In addition to debris build up, numerous anomalies were found along the force mains which could indicate additional stresses that align with grade changes, bends, and deposits. Below are recommendations to restore the hydraulic capacity and preventative measures to prolong the life of each force main. The recommendations include cleaning, CIPP Lining, air release valve installation, and continued monitoring and inspection.

FORCE MAIN CLEANING

The data extracted from the Pipers® revealed a higher level of pressure loss throughout numerous portions of each force main. For metallic force mains, these are most likely tuberculation build-ups along the pipe. Pressure losses caused by uniform deposits or localized restrictions decrease the overall efficiency of pumps in a lift station by decreasing the volume of water the pumps can push through the force main. An inefficient lift station increases the risk of surcharges upstream of the lift station during severe wet weather events. Cleaning of the force main reduces these pressure losses and restores efficiency and capacity. To restore the hydraulic capacities of these force mains, it is recommended to conduct pigging procedures to clean out the debris built up. It is important to note that ice pigging and mechanical pigging are effective methods to clean force mains. Ice pigging is highly effective and quick for nonmetallic force mains. Mechanical pigging is more effective on metallic force mains but comes at a higher cost due to the need for a pigging port at the lift station. Ice pigging, while less effective on metallic force mains, is still a cost-effective solution and can remove a percentage of buildups within metallic force mains. However, ice pigging will not remove any tuberculation within force mains.

FORCE MAIN REHABILITATION

Force Main Lining

With regards to force main lining, RJN would recommend utilizing cured-in-place pipe liner (CIPP) to rehabilitate the Paddock force main and the remaining metallic sections of the Century Hill force main. The DIP sections of the Century Hill force main are located from the lift station (0.0 LF) to approximately 26 LF and from 753-937 LF, totaling approximately 210 LF of DIP sections remaining in the force main. With the force main's age being 60 years old, RJN recommends applying a CIPP liner to the remaining DIP sections of the force main to ensure that the force main is entirely CIPP material and extending its useful life. Additionally, RJN recommends applying a CIPP liner to the Paddock force main across its entire length.

Open-Cut Sewer Replacement

Due to the Century Hill force main exhibiting high-risk metal loss anomalies within the DIP sections of the force main, RJN recommends utilizing open-cut sewer replacement as a rehabilitation option for the Century Hill force main. The combination of metal loss findings and the force main's age increases the likelihood of future breaks on the force main. Replacing the force main with PVC pipe will introduce new sections with a 50-year design life and will eliminate the risk of future metal loss on the force main.

Following this, additional monitoring and inspection are recommended to confirm that further deterioration has ceased.

Furthermore, it may be difficult to install a CIPP liner the metallic sections of the Century Hill force main. The large metallic section from 753-937 LF is located right in the middle of the force main, which means that it will be very difficult to line. With this in mind, open-cut sewer replacement may be a more feasible option for the City to rehabilitate the Century Hill force main. However, the disadvantages to open-cut sewer replacement include public disruption during construction, the need for traffic control measures, and potential restoration to Chicago Avenue, Concord Road, and any other affected area once construction is complete.

Structure Rehabilitation

Air pockets were observed in both the Century Hill and Paddock force mains. Air pockets tend to trap hydrogen sulfide gas (H_2S) which can be corrosive towards a metallic force main. Over time, as air pockets go unchecked, H_2S will corrode the force main to the point of rupture. From this, it is recommended that the City should consider the installation of air release valves (ARVs) at the lift stations and localized locations for both the Century Hill and Paddock force mains.

Introducing ARVs at localized high points will alleviate the force mains of the significant air presence that was indicated in the Pipers® findings. RJN recommends that the City installs an ARV at the localized high point on the Century Hill force main (approximately at 910 LF). Additionally, an ARV at the Century Hill lift station will help alleviate the force main of the extended air pocket from 0.0-415.3 LF. In total, RJN recommends installing two (2) ARVs, one at the lift station, and one at the localized high point, for the Century Hill force main.

In addition, RJN recommends installing an ARV at the lift station and at two (2) additional locations along the Paddock force main. The first recommended ARV installation location on the Paddock force main is located after the force main crosses Douglas Road (approximately 120 LF). The second recommended ARV installation location is at the Book Road crossing (approximately 200 LF). The largest air pockets within the Paddock force main were found to be present throughout the section of the force main that crosses Douglas Road and Book Road. Installing ARVs at these road crossings will help alleviate the force main of the air pockets present at Douglas Road and Book Road. To summarize, RJN recommends installing three (3) ARVs, one at the lift station, one after the Douglas Road crossing (120 LF), and one at the Book Road crossing (200 LF) for the Paddock force main.

CONTINUED MONITORING & INSPECTION

It is recommended that the City conducts follow-up investigations and begin a monitoring program with additional Pipers® deployments. Magnetic flux anomalies can be monitored and evaluated more thoroughly with multiple deployments of the Pipers®. Continued monitoring provides the opportunity to see changes in the presence or magnitude of anomalies observed in previous inspections. The locations of some anomalies coincide with changes in the elevation profile, bends in the force main, or air pockets. The first deployment assesses the baseline magnetic flux anomalies, and every future deployment uses this baseline to determine if anomalies are growing. If they are growing, this would be a prime indication of wall loss, and if they remain stagnant the anomaly is likely a valve, previous repair, or different fitting along the pipeline. A monitoring program with the Pipers® provides a rare glimpse

into the development of a force main's condition, which is crucial in avoiding unforeseen breaks and emergencies. Pigging operations become cheaper over time, as the force main will require fewer passes to be cleaned. Additionally, running a Pipers® device through a clean pipe will result in the most accurate data. Incorporating a preventive maintenance plan featuring both a Pipers® inspection and cleaning is highly recommended to the City. Lastly, performing continued monitoring and inspection will help provide the City with some clarity into the cause of the "magnetic structure change" anomalies identified by the Pipers®.

CONCLUSIONS AND RECOMMENDATIONS

The data extracted from the Pipers® inspection has provided the City with actionable intelligence on their force mains. The Century Hill LS and Paddock LS force mains are all high priority for cleaning and repair. As broken down in the Rehabilitation Options section of this report, next steps include cleaning, CIPP lining or open-cut sewer replacement, air release valve installation, and continued monitoring and inspection. Table 6 below provides a list of recommendations for the force mains along with their corresponding budgetary cost estimates.

Table 6 - Force Main Recommendation Summary

Force Main	Cleaning Rating	Condition Rating	Overall Rating	Recommendations	Short Term (1-3 Years)	Long Term (5 Years)	Budgetary Cost Estimates
Century Hill	4	5	5	1. Pressure-Rated CIPP Pipelining to the Ductile Iron Sections of Force Main OR Open-Cut Sewer Replacement	X		$150,000 (Per Option)
				2. Air Release Valve Installation	X		$25,000/Structure
				3. Monitoring and Inspection Program		X	$80,000
Paddock	5	5	5	1. Mechanical Pigging and Pigging Port Installation	X		$150,000
				2. Ice Pigging	X		$50,000
				3. Air Release Valve Installation	X		$25,000/Structure
				4. Pressure-Rated CIPP Pipelining		X	$180,000
				5. Monitoring and Inspection Program		X	$80,000

Anomalies and observations are noted in Appendix C. A monitoring and inspection program is recommended to be implemented for each force main to monitor and assess the development of high-risk and medium risk anomalies every 5 years. Air release valve installations are recommended for both force mains along with performing CIPP lining and/or open-cut sewer replacement for the Century Hill force main.

CENTURY HILL LIFT STATION FORCE MAIN

The Century Hill LS force main requires further attention. Diameter restrictions of up to 24% were observed, along with the presence of acoustic and magnetic anomalies throughout the force main. Additionally, metal loss within the force main was identified by the Pipers® at multiple locations.

The force main contains a large air pocket as it exits the lift station from 0.0-415.3 LF, and multiple air pockets as it rises in elevation, so the installation of an ARV at the lift station and at the localized high point (around 910 LF) would be able to help alleviate these air pockets within the Century Hill LS force main.

Also, RJN recommends performing pipelining to the remaining DIP sections of the force main which are exhibiting metal loss. There are approximately 210 LF of DIP sections within the force main that have not been lined to this point. With the force main being 60 years old, installing a CIPP liner to the DIP sections of the force main would allow the force main to be entirely CIPP material and extend its useful life.

However, due to the locations of the remaining DIP sections, it may be very difficult to perform CIPP pipelining to the Century Hill force main. Because of this, open-cut sewer replacement is an alternative rehabilitation recommendation from RJN. Open-cut sewer replacement would allow for the DIP sections to be replaced with a new PVC pipe containing a fresh 50-year design life. In addition, a new PVC pipe would not be at risk of further deterioration from any metal loss anomalies. RJN recommends performing CIPP pipelining or open-cut sewer replacement to as rehabilitation options for the Century Hill force main.

PADDOCK LIFT STATION FORCE MAIN

The Paddock LS force main requires further attention. Multiple acoustic and magnetic anomalies were identified along with diameter restrictions of up to 36% of the pipe's internal diameter. RJN recommends the installation of a pigging port at the lift station to allow for mechanical pigging to be used to clean the force main. However, ice pigging can also be a viable option for cleaning the Paddock force main if the City chooses to go in that direction. Additionally, RJN recommends installing ARVs at the lift station, after the Douglas Road crossing (around 120 LF), and at the point on the force main where it crosses Book Road (around 200 LF) to help alleviate the force main of the identified air pockets.

Furthermore, RJN recommends conducting CIPP pipelining within the next 5 years to the Paddock LS force main. The presence of significant metal loss within a 19-year-old force main is not to be expected, so the addition of CIPP pipelining to the force main will help avoid failure in the force main in the near future. Lastly, it is also recommended, before the force main is rehabilitated, to continue to monitor and inspect the force main every 5 years to assess the force main's condition and ensure that the force main has not deteriorated any further.

RJN would be happy to provide additional services with regards to a preliminary design to research cost benefits, product benefits, and different bypass operations for different methods of rehabilitation to these force mains.

We appreciate the opportunity to continue providing the City with professional services on this important project. Please do not hesitate to reach out to us concerning additional questions or clarifications.

Sincerely,

RJN Group, Inc.



Yann M. Gallin
Principal Project Manager



Patrick Hulsebosch, P.E.
Project Manager



Jack Flood, E.I.
Staff Engineer

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APPENDIX A – FORCE MAIN EXHIBITS AND RATING SYSTEM

Force Main Overall Rating System

The overall ratings were determined based upon the cleaning and condition ratings to identify force mains that require more attention than others. The condition rating, which considers a force main's age, past breaks, and anomalies, is weighted heavier than the cleaning rating.

Cleaning Ratings

1. 0% to 10% Diameter Restriction
2. 10% to 15% Diameter Restriction
3. 15% to 20% Diameter Restriction
4. 20% to 30% Diameter Restriction
5. 30% or Greater Diameter Restriction

Condition Ratings

1. Zero Anomalies
2. Low Risk Anomalies
3. Low Risk Anomalies, Structure Deterioration
4. Medium to High-Risk Anomalies
5. Numerous High-Risk Anomalies

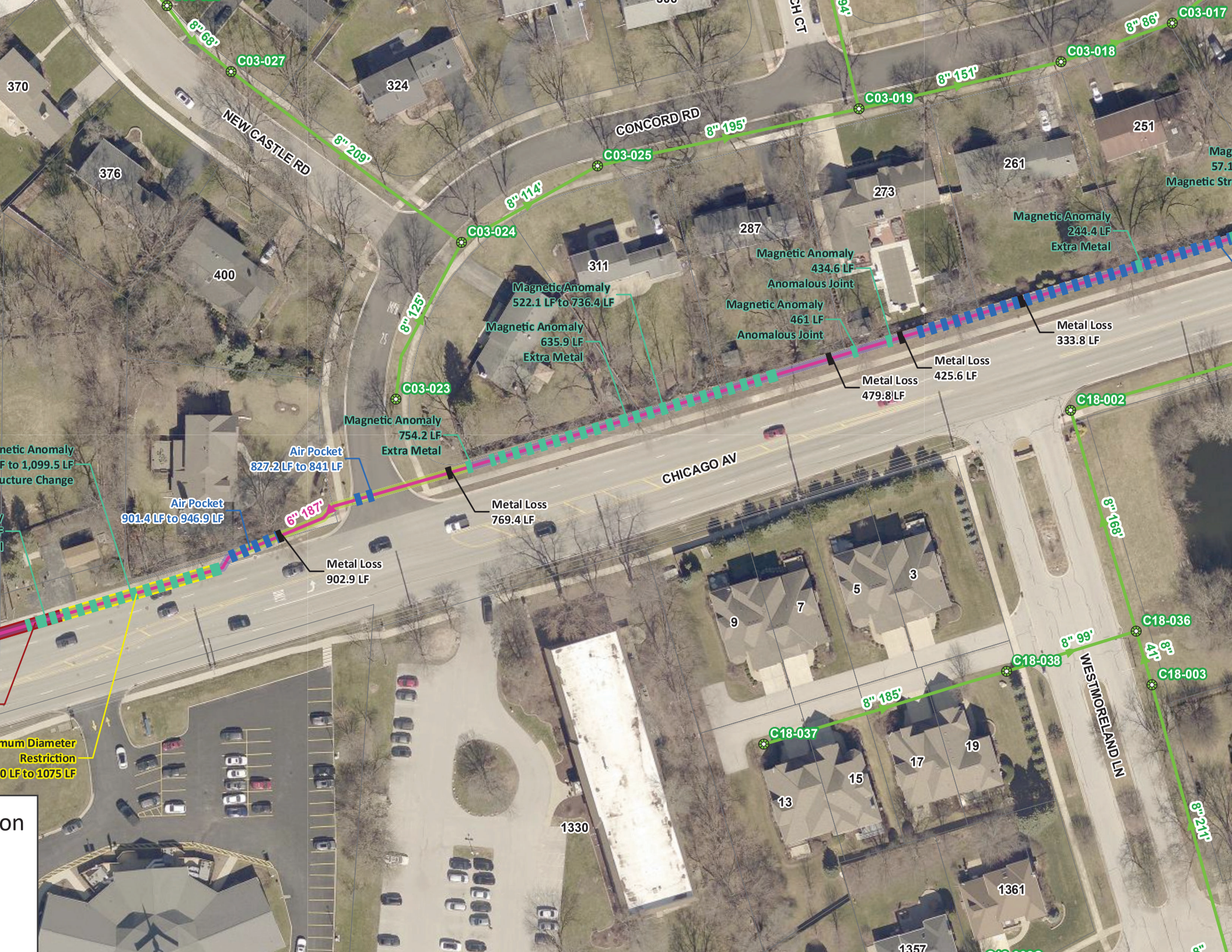
Overall Ratings

1. Produced via weighted average of Cleaning and Condition Ratings
2. 30% weight for Cleaning Rating
3. 70% weight for Condition Rating
4. Rating rounded up to nearest whole number

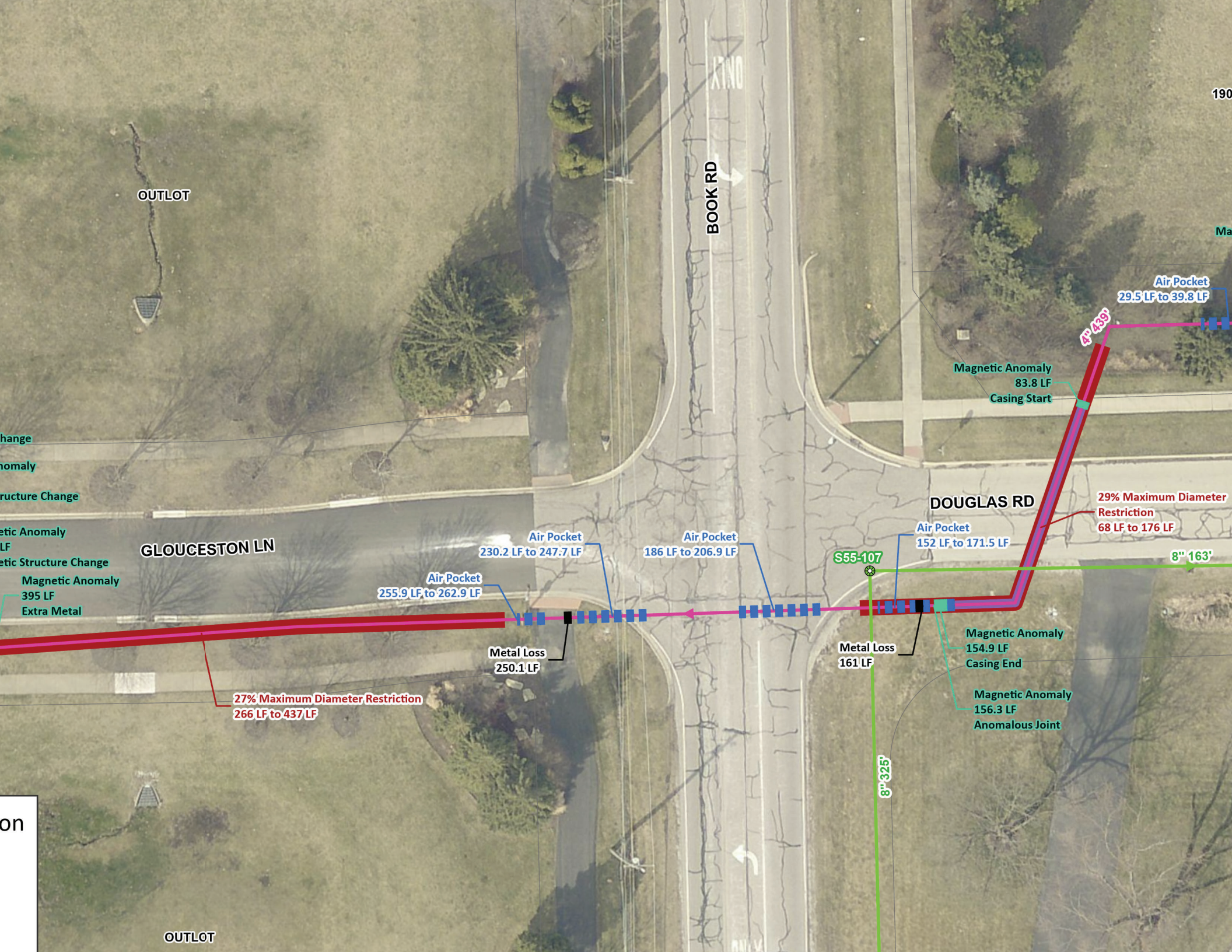
EX: Cleaning Rating = 2; Condition Rating = 5; (0.3 x 2) + (0.7 x 5) = 4.10; Overall Rating of 5

Pressure Survey Rating Scale

Pressure Survey Rating Scale	
Diameter Restriction %	Color Rating
Less than 10% Restriction	
10-15% Restriction	
15-20% Restriction	
20-25% Restriction	
25-30% Restriction	
Greater than 30% Restriction	



NEW CASTLE RD
CONCORD RD
CHICAGO AV
WESTMORELAND LN
C03-027
C03-025
C03-024
C03-023
C03-019
C03-018
C03-017
C18-002
C18-036
C18-038
C18-003
C18-037
8" 68'
8" 209'
8" 114'
8" 125'
8" 195'
8" 151'
8" 86'
8" 168'
8" 99'
8" 41'
8" 185'
8" 211'
6" 187'
370
376
400
324
311
287
273
261
251
1330
1361
1357
3
5
7
9
13
15
17
19
Magnetic Anomaly
244.4 LF
Extra Metal
Magnetic Anomaly
434.6 LF
Anomalous Joint
Magnetic Anomaly
461 LF
Anomalous Joint
Magnetic Anomaly
522.1 LF to 736.4 LF
Magnetic Anomaly
635.9 LF
Extra Metal
Metal Loss
333.8 LF
Metal Loss
425.6 LF
Metal Loss
479.8 LF
Magnetic Anomaly
754.2 LF
Extra Metal
Air Pocket
827.2 LF to 841 LF
Air Pocket
901.4 LF to 946.9 LF
Metal Loss
769.4 LF
Metal Loss
902.9 LF
netic Anomaly
F to 1,099.5 LF
ucture Change
mum Diameter
Restriction
0 LF to 1075 LF
on


OUTLOT
BOOK RD
GLOUCESTON LN
DOUGLAS RD
Air Pocket
230.2 LF to 247.7 LF
Air Pocket
186 LF to 206.9 LF
Air Pocket
255.9 LF to 262.9 LF
Air Pocket
152 LF to 171.5 LF
Air Pocket
29.5 LF to 39.8 LF
S55-107
4" 439'
8" 163'
8" 325'
Magnetic Anomaly
395 LF
Extra Metal
Magnetic Anomaly
83.8 LF
Casing Start
Magnetic Anomaly
154.9 LF
Casing End
Magnetic Anomaly
156.3 LF
Anomalous Joint
Metal Loss
250.1 LF
Metal Loss
161 LF
27% Maximum Diameter Restriction
266 LF to 437 LF
29% Maximum Diameter
Restriction
68 LF to 176 LF
OUTLOT

APPENDIX B – PIPERS® SURVEY METHODS AND COMMON FORCE MAIN ISSUES

PIPERS® SURVEY METHODS AND COMMON FORCE MAIN ISSUES

Acoustic Data

Pipers® are equipped with an acoustic leak detection sensor**.** The Pipers® record sounds caused by air pockets, pumps, and other noise sources in the pipeline.

Air pockets are usually louder than the background noise in the pipeline and can be confirmed by the specific spectral signature at its location. Air pockets in force mains are dangerous, as they can effectively throttle a force main's capacity by restricting flow in both metallic and non-metallic force mains. In metallic force mains, air pockets make the force main susceptible to H_2S corrosion and may lead to an emergency break if not remedied.

Any other background noises that don't produce enough amplitude to be considered an air pocket are referred to as acoustic anomalies. Acoustic anomalies are short sections where the pipe is not completely full. The acoustic data could be picking up noise where the flow gets slightly more turbulent at a bend or sudden change in the force main's profile. For that reason, these anomalies should be monitored to ensure they do not develop into air pockets over time as more air gets trapped.

Pressure Monitoring

While moving through a pipeline, Pipers® continuously measure the pressure. The hydraulic grade line (HGL) is calculated based on the measured pressure and the force main elevation to account for the effects of hydrostatic pressure. The HGL is an indication of the amount of frictional pressure loss throughout the force main, where regions of the HGL with a steeper slope experience more flow friction suggesting increased internal surface roughness and/or diameter restrictions.

As wastewater flows through gravity and force main pipes, heavier particles can accumulate in a solid deposit. Depending on the type of particles, this results in a flow regime with a sliding bed or a stationary bed. A sliding bed can cause abrasion of the pipe's interior, which wears away at the pipe's interior wall over time. Conversely, a stationary bed reduces the cross-sectional area available in the pipe effectively reducing the hydraulic capacity. By and large, both types of solid deposits can cause long-term force main problems to occur if left unaddressed.

In addition, a loss of capacity in pipes can lead to pumps working outside their ideal operating conditions. The pumps will inevitably need to operate longer to push the same amount of flow through a smaller force main which will ultimately decrease the pump's life spans. Additionally, during wet weather events, the lift station will not be operating as efficiently as possible which can lead to sanitary basement backups in the upstream tributary system.

Magnetic Flux

Magnetic flux is an indication of metallic hardware along the pipeline and is intended to identify bends, areas of potential deterioration, material changes, air release valves, cleanout structures, and additional fittings along the force main. As an overall condition assessment, pipelines with wider spread in the magnetic flux are expected to be in worse condition compared to those with narrower spread and smoother magnetic flux.

APPENDIX C – MAGNETIC FLUX ANOMALY AND STRUCTURE INSPECTION TABLES

Owner: City of Naperville
Force Main: Century Hill
Inspection Date: Mar-25

Anomaly Distance (LF)	Risk	Features	INGU Notes	Additional Notes	Rehabilitation Recommendation
0.0	Low	Launcher		Segment with air pockets from 0.0-415.3 LF	ARV Installation & CIPP Lining
57.1	Medium	Magnetic Structure Change	Magnetic Structure Change Start	Likely attributed to additional metallic hardware or a change in material properties	Monitor and Inspect
172.7	Medium	Magnetic Structure Change	Magnetic Structure Change End		Monitor and Inspect
244.4	Low	Magnetic Anomaly	Extra Metal		
333.8	Low	Metal Loss		Metal loss anomalies pertain to the host pipe of a force main. This anomaly was identified within a section of force main that has been CIPP lined previously	ARV Installation & CIPP Lining
425.6	Low	Metal Loss		Metal loss anomalies pertain to the host pipe of a force main. This anomaly was identified within a section of force main that has been CIPP lined previously	ARV Installation & CIPP Lining
434.6	Low	Magnetic Anomaly	Anomalous Joint		
461.0	Low	Magnetic Anomaly	Anomalous Joint		
479.8	Low	Metal Loss		Metal loss anomalies pertain to the host pipe of a force main. This anomaly was identified within a section of force main that has been CIPP lined previously	ARV Installation & CIPP Lining
522.1	Medium	Magnetic Anomaly	Magnetic Anomaly Start	Likely attributed to additional metallic hardware or a change in material properties	Monitor and Inspect
635.9	Low	Magnetic Anomaly	Extra Metal		
736.4	Medium	Magnetic Anomaly	Magnetic Anomaly End		Monitor and Inspect
754.2	Low	Magnetic Anomaly	Extra Metal		
769.4	High	Metal Loss		Air Pocket from 827.2-841.0 LF	ARV Installation & CIPP Lining
902.9	High	Metal Loss		Air Pocket from 901.4-946.9 LF	ARV Installation & CIPP Lining
955.7	Medium	Magnetic Structure Change	Magnetic Structure Change Start	Likely attributed to additional metallic hardware or a change in material properties	Monitor and Inspect
1,088.3	Low	Magnetic Anomaly	Extra Metal		
1,099.5	Medium	Magnetic Structure Change	Magnetic Structure Change End		Monitor and Inspect
1,181.8	Medium	Magnetic Structure Change		Likely attributed to additional metallic hardware or a change in material properties	Monitor and Inspect
1,201.6	Low	Magnetic Anomaly	Extra Metal		

Owner: City of Naperville
Force Main: Paddock
Inspection Date: Mar-25

Anomaly Distance (LF)	Risk	Features	INGU Notes	Additional Notes	Rehabilitation Recommendation
2.2	Low	Magnetic Anomaly	Extra Metal	Air Pocket from 29.5-39.8 LF	ARV Installation & Mechanical Pigging
83.8	Low	Magnetic Anomaly	Casing Start		
154.9	Low	Magnetic Anomaly	Casing End	Air Pocket from 152.0-171.5 LF	ARV Installation & Mechanical Pigging
156.3	Low	Magnetic Anomaly	Anomalous Joint		
161.0	High	Metal Loss		Air Pocket from 186.0-206.9 LF	ARV Installation & Mechanical Pigging
250.1	High	Metal Loss		Air Pocket from 230.2-247.7 LF	ARV Installation & Mechanical Pigging
395.0	Low	Magnetic Anomaly	Extra Metal	Air Pocket from 255.9-262.9 LF	ARV Installation & Mechanical Pigging
413.1	Medium	Magnetic Anomaly	Magnetic Structure Change	Air Pocket from 410.2-414.4 LF; Magnetic Structure Change likely attributed to additional metallic hardware or a change in material properties	ARV Installation & Mechanical Pigging; Monitor and Inspect
424.4	Medium	Magnetic Anomaly	Magnetic Structure Change	Likely attributed to additional metallic hardware or a change in material properties	Monitor and Inspect
433.4	Medium	Magnetic Anomaly	Magnetic Structure Change	Likely attributed to additional metallic hardware or a change in material properties	Monitor and Inspect

Appendix RR

City of Naperville

Bailey Rd River Monitor
FEMA Flood Hazard Map

Rim Elev: 651.04'
Crown Elev: 642.46'

Rim Elev: 651.35'
Crown Elev: 642.1'

Rim Elev: 650.58'
Crown Elev: 641.38'

Rim Elev: 650.13'
Crown Elev: 641.8'

Rim Elev: 649.97'
Crown Elev: 642.31'

1% Flood
653.7'

0.2% Flood
655.5'

Floodway
651.7'

River Monitor
657'

RIVERBED
644.1'

KILLDEER DR

BAILEY RD

SWALLOW ST

WASHINGTON ST

BAY CT

COVE CT

POLL CT

PIER AV

PIER CT

LIGHTHOUSE DR

OXFORD LN

HARLOWE LN

S11

S27

S04

N

DEPARTMENT OF PUBLIC UTILITIES - WATER
Collection & Pumping
Created By: Jeffrey Burger, Utility Specialist
Edited On: 2/8/2024

Document Path: M:\data\GISUsers\DPU\Collection & Pumping\Jeffrey\Misc. Maps\5.16.23 - River Monitor Flood Map\River Monitoring _Jeffery.mxd

LEGEND

Including Feet Above Sea Level

River Meter - 657'

FEMA Flood Hazard Zones

0.2% Annual Chance Flood Hazard

1% Annual Chance Flood Hazard

Regulatory Floodway

City of Naperville

Jefferson Av River Monitor
FEMA Flood Hazard Map

Rim Elev: 675.12'
Crown Elev: 665.7'

River Monitor
682.8'

RIVERBED
667.4'

0.2% Flood
678.9'

Floodway
674.8'

1% Flood
676.2'

PAGE CT

DOUGLAS AV

JEFFERSON AV

POMONA CT

WILLOWAY DR

C04

C02

C54

C09

N

LEGEND

Including Feet Above Sea Level

- River Meter - 682.8'

FEMA Flood Hazard Zones

- 0.2% Annual Chance Flood Hazard
- 1% Annual Chance Flood Hazard
- Regulatory Floodway

DEPARTMENT OF PUBLIC UTILITIES - WATER
Collection & Pumping
Created By: Jeffrey Burger, Utility Specialist
Edited On: 2/8/2024

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City of Naperville
Eagle St. River Monitor
FEMA Flood Hazard Map

MILL ST

JACKSON AV

EAGLE ST

WEBSTER ST

WATER ST

AURORA AV ALLEY

Rim Elev: 672.7'
Crown Elev: 666.95'

Rim Elev: 672.57'
Crown Elev: 665.12'

0.2% Flood
673.1'

1% Flood
673.5'

RIVERBED
660.9'

River Monitor
672.9'

Rim Elev: 673.45'
Crown Elev: 668.53'

Rim Elev: 673.83'
Crown Elev: 669'

Rim Elev: 672.24'
Crown Elev: 667.49'

Rim Elev: 672.24'
Crown Elev: 667.99'

Rim Elev: 672.77'
Crown Elev: 667.27'

Rim Elev: 672.95'
Crown Elev: 665.95'

Rim Elev: 671.66'
Crown Elev: 665.41'

Rim Elev: 673.16'
Crown Elev: 665.09'

Rim Elev: 674.54'
Crown Elev: 670.36'

Legend

River Monitor

FEMA Flood Hazard Zones

0.2% Annual Chance FLood Hazard

1% Annual Chance Flood Hazard

Regualtory Floodway

*Values are feet above see level

Date: 10/1/2024

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City of Naperville
Hillside Rd. River Monitor
FEMA Flood Hazard Map

MAIN ST

HILLSIDE RD

WASHINGTON ST

MELODY LN

RIVERVIEW DR

WILLOW RD

RIVERBED
657.95'

River Monitor
668.4'

1% Flood
666.4'

0.2% Flood
670.4'

Rim Elev: 665.27'
Crown Elev: 659.47'

Rim Elev: 662.83'
Crown Elev: 662.33'

Rim Elev: 668.01'
Crown Elev: 662.21'

Rim Elev: 666.39'
Crown Elev: 655.89'

Rim Elev: 667.13'
Crown Elev: 658.93'

Rim Elev: 667.43'
Crown Elev: 661.75'

Rim Elev: 666.66'
Crown Elev: 660.96'

Legend

River Monitor

FEMA Flood Hazard Zones

0.2% Annual Chance FLood Hazard

1% Annual Chance Flood Hazard

Regualtory Floodway

*Values are feet above see level

Date: 7/1/2024

M:\data\GISUsers\DPU\Collection & Pumping\Emily- Wastewater PM\Projects\River Monitors\RiverMonitors_hillside.mxd


City of Naperville
Williams Rd.
Warrenville
River Monitor
RIVERBED
688.2'
River Monitor
700'
N

Appendix TT

City of Naperville 10 Year Rehabilitation Plan

Revised 2/19/2026 EE

Upper Structure Manhole Lining	Year	Number of Manholes	Estimated Cost	Status	Completion Date	Subdivision
T04-009 Tributaries	2026	300	$85,000	Not Started	-	Brookdale, Arbors of Brookdale, Chantecleer Lakes Apartments, McDowell Grace, Terraces of Brookdale Condo, Tellabs, Monarch Landing, Prairie Point Corporate Park, Citygate Centere, Calamos Corporate Center, Westings Corporate Community
T04-009 Tributaries	2027	300	$85,000	Not Started	-	Brookdale, Arbors of Brookdale, Chantecleer Lakes Apartments, McDowell Grace, Terraces of Brookdale Condo, Tellabs, Monarch Landing, Prairie Point Corporate Park, Citygate Centere, Calamos Corporate Center, Westings Corporate Community
T04-009 Tributaries	2028	300	$85,000	Not Started	-	Brookdale, Arbors of Brookdale, Chantecleer Lakes Apartments, McDowell Grace, Terraces of Brookdale Condo, Tellabs, Monarch Landing, Prairie Point Corporate Park, Citygate Centere, Calamos Corporate Center, Westings Corporate Community
Sheri Tributaries	2029	300	$85,000	Not Started	-	Rivercrest Estates, Knoch Knolls,Prairie Ridge, Old Farm, Winchester Place, Chesnut Creek, Chesnut River Point
Sheri Tributaries	2030	300	$85,000	Not Started	-	Rivercrest Estates, Knoch Knolls,Prairie Ridge, Old Farm, Winchester Place, Chesnut Creek, Chesnut River Point
Sheri Tributaries	2031	300	$85,000	Not Started	-	Rivercrest Estates, Knoch Knolls,Prairie Ridge, Old Farm, Winchester Place, Chesnut Creek, Chesnut River Point
Sheri Tributaries	2032	300	$85,000	Not Started	-	Rivercrest Estates, Knoch Knolls,Prairie Ridge, Old Farm, Winchester Place, Chesnut Creek, Chesnut River Point
Sheri Tributaries	2033	300	$85,000	Not Started	-	Rivercrest Estates, Knoch Knolls,Prairie Ridge, Old Farm, Winchester Place, Chesnut Creek, Chesnut River Point
Sheri Tributaries	2034	300	$85,000	Not Started	-	Rivercrest Estates, Knoch Knolls,Prairie Ridge, Old Farm, Winchester Place, Chesnut Creek, Chesnut River Point
Sheri Tributaries	2035	300	$85,000	Not Started	-	Rivercrest Estates, Knoch Knolls,Prairie Ridge, Old Farm, Winchester Place, Chesnut Creek, Chesnut River Point
Manhole Rehabilitation	**Year**	**Number of Manholes**	**Estimated Cost**	**Status**	**Completion Date**	**Subdivision**
W06 - Ph. 1	2026	65	$400,000	Not Started	-	Scots Plains & Willowbend
W06 - Ph. 2	2027	65	$400,000	Not Started	-	Scots Plains & Willowbend
W05	2028	65	$400,000	Not Started	-	Naperville Center for Commerce & Industry
W03	2029	65	$400,000	Not Started	-	Green of Country & Fairway of Country Lakes
W09 & W04	2030	65	$400,000	Not Started	-	Country Lakes, Autumn Run, Astor Place, & Pebblewood Estates
N15 - Ph. 1	2031	65	$400,000	Not Started	-	Brookdale, Hampton Park, Bridgewater, Kingspointe, Brookdale Manor, Word of Life, & Brookdale Apartments
N15 - Ph. 2	2032	65	$400,000	Not Started	-	Brookdale, Hampton Park, Bridgewater, Kingspointe, Brookdale Manor, Word of Life, & Brookdale Apartments
N16 - Ph. 1	2033	65	$400,000	Not Started	-	Terraces of Brookdale Condos, Brookdale, Arbors of Brookdale, St. Thomas the Apostle Parish, St. Patricks, Riverbrook Condos, Riverbrook Center, River West Plaza, River North, Ogden River Sub., Kingston Green, Flynn-Lauth Lot 8, & Riverbrook West
N16 - Ph. 2	2034	65	$400,000	Not Started	-	Terraces of Brookdale Condos, Brookdale, Arbors of Brookdale, St. Thomas the Apostle Parish, St. Patricks, Riverbrook Condos, Riverbrook Center, River West Plaza, River North, Ogden River Sub., Kingston Green, Flynn-Lauth Lot 8, & Riverbrook West
N28	2035	65	$400,000	Not Started	-	Tabor Hills & Brookdale
Manhole Replacement	**Year**	**Number of Manholes**	**Estimated Cost**	**Status**	**Completion Date**	**Subdivision**
C01-130, C21-044, C40-027, N14-001, N14-003	2026	5	$75,000	In Progress	-	WSC, East Highlands, Maplebrook, Mill Crossing Condos
C15-014, TBD	2027	5	$75,000	Not Started	-	Kings Terrace
TBD	2028	5	$75,000	Not Started	-	-
TBD	2029	5	$75,000	Not Started	-	-
TBD	2030	5	$75,000	Not Started	-	-
TBD	2031	5	$75,000	Not Started	-	-
TBD	2032	5	$75,000	Not Started	-	-
TBD	2033	5	$75,000	Not Started	-	-
TBD	2034	5	$75,000	Not Started	-	-
TBD	2035	5	$75,000	Not Started	-	-

Force Main Rehabilitation/ Replacement	Year	Linear Feet	Estimated Cost	Status	Completion Date	Subdivision
River Mist	2026	469	$500,000	In Progress	-	River Mist
Royce Rd	2027	937	$1M	Not Started	-	Royce Woods
Hobson Oaks	2028	770	$1M	Not Started	-	Hobson Oaks
Riverwoods	2029	1634	$1M	Not Started	-	Scotts Crossing
SOC North	2030	3229	$1M	Not Started	-	South Operations Center
SOC East	2031	3446	$1M	Not Started	-	South Operations Center
TBD	2032	-	-	Not Started	-	-
TBD	2033	-	-	Not Started	-	-
TBD	2034	-	-	Not Started	-	-
TBD	2035	-	-	Not Started	-	-
Lateral Lining (about 240 per year)	**Year**	**Number of Laterals**	**Estimated Cost**	**Status**	**Completion Date**	**Subdivision**
W06 - Ph. 2 & W09	2026	240	$2M	Not Started	-	Scots Plains, Willowbend, Country Lakes, & Autumn Run
W06 - Ph. 3 & W03 - Ph. 1 & W04	2027	240	$2M	Not Started	-	Scots Plains, Willowbend, Green of Country, Fairway of Country Lakes, Astor Place, & Pebblewood Estates
W03 - Ph. 2 & N16 - Ph. 1	2028	245	$2M	Not Started	-	Green of Country, Fairway of Country Lakes, Terraces of Brookdale Condos, Brookdale, Arbors of Brookdale, St. Thomas the Apostle Parish, St. Patricks, Riverbrook Condos, Riverbrook Center, River West Plaza, River North, Ogden River Sub., Kingston Green, Flynn-Lauth Lot 8, & Riverbrook West
N16 - Ph. 2	2029	250	$2M	Not Started	-	Terraces of Brookdale Condos, Brookdale, Arbors of Brookdale, St. Thomas the Apostle Parish, St. Patricks, Riverbrook Condos, Riverbrook Center, River West Plaza, River North, Ogden River Sub., Kingston Green, Flynn-Lauth Lot 8, & Riverbrook West
N15 - Ph. 1	2030	234	$2M	Not Started	-	Brookdale, Hampton Park, Bridgewater, Kingspointe, Brookdale Manor, Word of Life, & Brookdale Apartments
N15 - Ph. 2 & N28 - Ph. 1	2031	240	$2M	Not Started	-	Brookdale, Hampton Park, Bridgewater, Kingspointe, Brookdale Manor, Word of Life, Brookdale Apartments, Tabor Hills & Brookdale
N28 - Ph. 2 & S17 - Ph. 2	2032	235	$2M	Not Started	-	Tabor Hills, Brookdale, Greenway Knolls, Old Farm, Foxcroft Apartments, Lancaster Coach Homes, Old Farm Center, Honey Tree Village, & Old Farms Market Place Shopping Center
S17 - Ph. 3 & S13 - Ph. 1	2033	238	$2M	Not Started	-	Greenway Knolls, Old Farm, Foxcroft Apartments, Lancaster Coach Homes, Old Farm Center, Honey Tree Village, Old Farms Market Place Shopping Center, Old Farm
S13 - Ph. 2 & S18 - Ph. 1	2034	241	$2M	Not Started	-	Old Farm
S18 - Ph. 2 & S23 - Ph. 1	2035	238	$2M	Not Started	-	Old Farm & Prairie Ridge
Small Diameter Lining (14,500 lf)	**Year**	**Linear Feet**	**Estimated Cost**	**Status**	**Completion Date**	**Subdivision**
S13 & S17 - Ph. 1	2026	14,501	$1M	Not Started	-	Old Farm, Greenway Knolls, Old Farm, Foxcroft Apartments, Lancaster Coach Homes, Old Farm Center, Honey Tree Village & Old Farms Market Place Shopping Center
S13 & S17 - Ph. 2	2027	14,777	$1M	Not Started	-	Old Farm, Greenway Knolls, Old Farm, Foxcroft Apartments, Lancaster Coach Homes, Old Farm Center, Honey Tree Village & Old Farms Market Place Shopping Center
S13 - Ph. 3 & T04-009 Tributary - Ph. 1 & S10 Ph. 1	2028	14,958	$1M	Not Started	-	Old Farm, Greenway Knolls, Old Farm, Foxcroft Apartments, Lancaster Coach Homes, Old Farm Center, Honey Tree Village, Old Farms Market Place Shopping Center & Maplebrook
S10 - Ph. 2 & S18 - Ph. 1	2029	14,881	$1M	Not Started	-	Maplebrook & Old Farm
S18 - Ph. 2 & S23 - Ph. 1	2030	14,561	$1M	Not Started	-	Old Farm & Prairie Ridge
S23 - Ph. 2	2031	14,298	$1M	Not Started	-	Old Farm & Prairie Ridge
S23 - Ph. 3 & S29 - Ph. 1	2032	14,255	$1M	Not Started	-	Old Farm, Prairie Ridge, Knoch Knolls & Brookwood Trace
S29 - Ph. 2	2033	13,871	$1M	Not Started	-	Knoch Knolls & Brookwood Trace
S31, S14, S17 - Ph. 3, S15 & S08 - Ph. 1	2034	14,214	$1M	Not Started	-	Orleans, Naper Carriage Hill, Kettel, La Toscana & Signal Point
S08	2035	14,356	$1M	Not Started	-	Signal Point
Interceptor Test & Seal	**Year**	**Linear Feet**	**Estimated Cost**	**Status**	**Completion Date**	**Subdivision**
South (T02) - Ph. 1	2026	4118	$600,000	Not Started	-	Old Farm
South (T02) - Ph. 2	2027	3841	$600,000	Not Started	-	Old Farm, Knoch Knolls & Springbrook Plant
South (T02) - Ph. 3	2028	3841	$600,000	Not Started	-	Knoch Knolls & Springbrook Plant
South (T02) - Ph. 4	2029	3841	$600,000	Not Started	-	Knoch Knolls & Springbrook Plant
Baily/Clyde - Ph. 1	2030	2554	$600,000	Not Started	-	Maplebrook & Hawthoorn Square
Baily/Clyde - Ph. 2	2031	2554	$600,000	Not Started	-	Maplebrook & Hawthoorn Square

TBD	2032	TBD	$600,000	Not Started	-	-
TBD	2033	TBD	-	Not Started	-	-
TBD	2034	TBD	-	Not Started	-	-
TBD	2035	TBD	-	Not Started	-	-
Interceptor Lining	**Year**	**Linear Feet**	**Estimated Cost**	**Status**	**Completion Date**	**Subdivision**
Springbrook (T01) - Ph. 1	2026	4809	$3.2M	In Progress	-	Springbook Crossing
Springbrook (T01) - Ph. 2	2027	4752	$3.2M	Not Started	-	Brook Crossing
Springbrook (T01) - Ph. 3	2028	4752	$3.2M	Not Started	-	Brook Crossing, Breckenridge Estates
Springbrook (T01) - Ph. 4	2029	4752	$3.2M	Not Started	-	Breckenridge Estates & Timber Creek
Springbrook (T01) - Ph. 5	2030	4752	$3.2M	Not Started	-	Timber Creek & Springbrook Plant
T02 - Ph. 1	2031	3910	$3.2M	Not Started	-	Old Farm
T02 - Ph. 2	2032	3910	$3.2M	Not Started	-	Old Farm, Knoch Knolls & Springbrook Plant
T02 - Ph. 3	2033	3910	$3.2M	Not Started	-	Knoch Knolls & Springbrook Plant
T02 - Ph. 4	2034	3910	$3.2M	Not Started	-	Knoch Knolls & Springbrook Plant
TBD	2035	5000	$3.2M	Not Started	-	-

About the CMOM Program Self Assessment Checklist

Introduction

A sanitary sewer collection system is a vital element of any community's infrastructure and a critical component of the wastewater treatment process. The nation's sanitary sewer infrastructure has been built over the last 100 years or more using a variety of materials, design standards, installation techniques, and maintenance practices. As this valuable infrastructure ages, the importance of preventive and predictive maintenance increases.

What is CMOM?

CMOM stands for "capacity, management, operations, and maintenance." It is a flexible, dynamic framework for municipalities to identify and incorporate widely-accepted wastewater industry practices to:

- Better manage, operate, and maintain collection systems
- Investigate capacity constrained areas of the collection system
- Respond to sanitary sewer overflow (SSO) events

The CMOM approach helps municipal wastewater utility operators provide a high level of service to customers and reduce regulatory noncompliance. CMOM can help utilities optimize use of human and material resources by shifting maintenance activities from "reactive" to "predictive"–often leading to cost savings through avoided overtime, emergency construction costs, increased insurance premiums, and the possibility of lawsuits. CMOM information and documentation can also help improve communications with the public, other municipal works and regional planning organizations, and regulators.

In CMOM planning, the utility selects performance goal targets, and designs CMOM activities to meet the goals. The CMOM planning framework covers operation and maintenance (O&M) planning, capacity assessment and assurance, capital improvement planning, and financial management planning. Information collection and management practices are used to track how well each CMOM activity is meeting the performance goals, and whether overall system efficiency is improving. On an ongoing basis, activities are reviewed and adjusted to better meet the performance goals. As the CMOM program progresses, performance goals can change. For instance, an initial goal may be to develop a geographic information system (GIS) of the system. Once the GIS is complete, a new goal might be to use the GIS to track emergency calls and use the information to improve maintenance planning.

An important component of a successful CMOM program is to periodically collect information on current systems and activities and develop a "snapshot-in-time" analysis. From this analysis, the utility establishes its performance goals and plans its CMOM program activities.

Additional information describing CMOM can be found at: www.epa.gov/npdes/sso or www.epa.gov/region4/water/wpeb/pdfs/self-audit_review2-3.pdf.

About this Checklist (Continued)

What is the purpose of the CMOM program checklist?

This document is a screening-level tool that can help utilities evaluate CMOM programs and identify general areas of strength and weakness. Completing this CMOM assessment will allow the utility to flag CMOM program areas that need improvement and establish priorities for additional, more detailed assessments. In addition, the checklist will allow the utility to compare annual performance (e.g., percent of employees meeting training standards).

This document is not intended to be all-inclusive. It addresses the types of practices EPA believes should be considered by most utilities when implementing a CMOM program. However, the ways in which utilities use the information gathered through the checklist will depend on the complexity and site-specific issues facing individual collection systems. When reviewing the questions, utilities should use their judgment to determine if the question is reasonable for their collection system size and design.

How do I use this checklist?

The questions on the checklist will request answers in three different formats:

- Check yes, no, or not applicable (NA),
- Fill in the blank, and
- Check all that apply.

At the end of each section, additional space is provided to allow for comments on or explanations of the answers recorded (information that will be useful to the utility in follow-on planning). Each utility should make an effort to answer all the questions that are applicable to its system. If a particular question takes a significant amount of time to answer, this could be an indication of an area of weakness. Utilities should plan to invest approximately one day to complete the checklist.

This document is designed to help utilities perform an initial evaluation of CMOM activities. **It is not intended to serve as an absolute indicator of a successful CMOM program, nor will all of the questions apply to every utility.** By working through these questions, utilities will be able to identify strengths and areas for improvements in their CMOM programs. If a utility has a significant number of “no” answers or very few items selected in the checklist, this could indicate an area of weakness. The utility manager then can make a more detailed evaluation, including identifying specific actions needed to address areas for improvement.

General Information

CHECKLIST COMPLETED BY:

Emily Eichholzer
Name

Date 3/23/2026

630-420-6108
Daytime Telephone Number

UTILITY CONTACT INFORMATION

Utility Name City of Naperville Department of Public Utilities - Water

LOCATION

1200 W Ogden Av
Street Address

Street Address (continued)

Naperville IL 60563
City State Zip

STAFF

Tony Conn
Name

Deputy Director - Water/ Wastewater
Title

ConnT@naperville.il.us
Email

Phone (630) 305 - 5537 Fax ( ) -

PERMITTED TREATMENT & COLLECTION FACILIITES

NPDES or STATE PERMIT #	PERMITTEE/CO-PERMITTEE/JURISDICTIONS	PERMIT COVERAGE: WWTP Effluent	Collection System	Wet-Weather Facility
IL0034061		☑	☑	☑
		☐	☐	☐
		☐	☐	☐
		☐	☐	☐
		☐	☐	☐

Collection System Description

SYSTEM INVENTORY

Treatment Facilities

1 NUMBER # of Treatment facilities

WWTP design capacity	55.13	MGD
Average daily flow	18.41	MGD
Average dry weather fow	16.83	MGD

Access & Maintenance

Manholes	14,191	NUMBER
Number of air vacuum relief valves	30	NUMBER

Conveyance & Pumping

	Gravity Sewers	Force Mains	Pump Stations
Pipes and pumps Length/quantity	515.8 MILES	8.97 MILES	23 NUMBER
Age of system 0 - 25 years old	14 % PERCENT	26.4 % PERCENT	5 % NUMBER
26 - 50 years old	61.3 % PERCENT	70.4 % PERCENT	14 % NUMBER
51 - 75 years old	22.45% PERCENT	2.4 % PERCENT	4 % NUMBER
>76 years old	3.15 % PERCENT	.9 % PERCENT	0 % NUMBER

Number of inverted siphons: 9

SERVICE AREA CHARACTERISTICS

Service area	25935.5	ACRES
Service population	170,470	PEOPLE
Annual precipitation	35-40	INCHES

Number of Service Connections

Residential		Commercial		Industrial		TOTAL
40,987 NUMBER	+	3,320 NUMBER	+	21 NUMBER	=	44,328 NUMBER

Collection system service lateral responsibility *(check one)*

- ☐ At main line connection only
- ☐ From main line to property line or easement/cleanout
- ☐ Beyond property line/clean out
- ☑ Other: See City ordinance

Combined Sewer Systems

What percent of sewer system is served by combined sewers (i.e., sanitary sewage and storm water in the same pipe)? 0 % PERCENT

Collection System Description

	Gravity Sewers	Force Mains
PIPE DIAMETER		
8 inches or less	75.3 % PERCENT	36.3 % PERCENT
9 - 18 inches	19 % PERCENT	21.9 % PERCENT
19 - 36 inches	4 % PERCENT	41.8 % PERCENT
>36 inches	1.8 % PERCENT	0 % PERCENT
PIPE MATERIALS		
Prestressed concrete cylinder pipe (PCCP)	0 % PERCENT	0 % PERCENT
High density polyethylene (HDPE)	0.08 % PERCENT	1.22 % PERCENT
Reinforced concrete pipe (RCP)	2.51 % PERCENT	0 % PERCENT
Polyvinyl chloride (PVC)	42 % PERCENT	17.91 % PERCENT
Vitrified clay pipe (VCP)	24.23 % PERCENT	0 % PERCENT
Ductile iron	3.41 % PERCENT	57.99 % PERCENT
Non-reinforced concrete pipe	0.27 % PERCENT	0 % PERCENT
Asbestos cement pipe	0.44 % PERCENT	0 % PERCENT
Cast iron	0.1 % PERCENT	0.07 % PERCENT
Brick	0 % PERCENT	0 % PERCENT
Fiberglass	0 % PERCENT	0 % PERCENT
Other (*Explain*) CIPP	25.36 % PERCENT	12.39 % PERCENT
Steel	0%	8.61%

Engineering Design (ED)

ED-01	Is there a document which includes design criteria and standard construction details?	☑ YES	☐ NO
ED-02	Is there a document that describes the procedures that the utility follows in construction design review?	☑ YES	☐ NO
ED-03	Are WWTP and O&M staff involved in the design review process?	☑ YES	☐ NO
ED-04	Is there a procedure for testing and inspecting new or rehabilitated system elements both during and after the construction is completed?	☑ YES	☐ NO
ED-05	Are construction sites supervised by qualified personnel (such as professional engineers or certified engineering technicians) to ascertain that the construction is taking place in accordance with the agreed upon plans and specifications?	☑ YES	☐ NO
ED-06	Are new manholes tested for inflow and infiltration?	☑ YES	☐ NO
ED-07	Are new gravity sewers checked using closed circuit TV inspection?	☑ YES	☐ NO
ED-08	Does the utility have documentation on private service lateral design and inspection standards?	☑ YES	☐ NO
ED-09	Does the utility attempt to standardize equipment and sewer system components?	☑ YES	☐ NO

Satellite Communities and Sewer Use Ordinance (SUO)

SUO-01	Does the utility receive flow from satellite communities? IF NO, GO TO PAGE 6	☑ YES	☐ NO
SUO-02	What is the total area from satellite communities that contribute flow to the collection system? *(Acres or square miles)*	5.74 sq miles	
SUO-03	Does the utility require satellite communities to enter into an agreement? IF NO, GO TO QUESTION SUO-06.	☑ YES	☐ NO
SUO-04	Does the agreement include the requirements listed in the sewer use ordinance (SUO)?	☑ YES	☐ NO
SUO-05	Do the agreements have a date of termination and allow for renewal under different terms?	☑ YES	☐ NO
SUO-06	Does the utility maintain the legal authority to control the maximum flow introduced into the collection system from satellite communities?	☑ YES	☐ NO
SUO-07	Are standards, inspections, and approval for new connections clearly documented in a SUO?	☐ YES	☑ NO
SUO-08	Does the SUO require satellite communities to adopt the same industrial and commercial regulator discharge limits as the utility?	☐ YES	☑ NO
SUO-09	Does the SUO require satellite communities to adopt the same inspection and sampling schedules as required by the pretreatment ordinance?	☐ YES	☑ NO
SUO-10	Does the SUO require that satellite communities or the utility to issue control permits for significant industrial users?	☐ YES	☑ NO
SUO-11	Does the SUO contain provisions for addressing overstrength wastewater from satellite communities?	☑ YES	☐ NO

SUO-12 Does the SUO contain procedures for the following? *(Check all that apply)*

☐ Inspection standards ☐ Pretreatment requirements ☐ Building/sewer permit issues

SUO-13 Does the SUO contain general prohibitions of the following materials? *(Check all that apply)*

☐ Fire and explosions hazards ☐ Corrosive materials ☐ Obstructive materials

☐ Oils or petroleum ☐ Material which may cause interference at the wastewater treatment plant

SUO-14 Does the SUO contain procedures and enforcement actions for the following? *(Check all that apply)*

☐ Fats, oils, and grease (FOG)
☐ Infiltration and inflow
☐ Building structures over the sewer lines
☐ Storm water connections to sanitary lines (downspouts)
☐ Defects in service laterals located on private property
☐ Sump pumps, air conditioner connections

Organizational Structure (OC)

OC-01	Is an organizational chart available that shows the overall personnel structure for the utility, including operation and maintenance staff?	☑ YES	☐ NO
OC- 02	Are up-to-date job descriptions available that delineate responsibilities and authority for each position?	☑ YES	☐ NO

OC-03 Are the following items discussed in the job descriptions? *(Check all that apply)*

- ☑ Nature of work to be performed
- ☑ Minimum requirements for the position
- ☑ Necessary special qualifications or certifications
- ☑ Examples of the types of work
- ☑ List of licenses required for the position
- ☑ Performance measures or promotion potential

OC-04	What percent of staff positions are currently vacant?	0 %
OC-05	On average how long do positions remain vacant? *(months)*	2 months
OC-06	What percent of utility work is contracted out?	10 %

Internal Communications (IC)

IC-01 Which of the following methods are used to communicate with utility staff? *(Check all that apply)*

☑ Regular meetings ☑ Bulletin boards ☑ E-mail ☑ Other (walkie talkie/pager) Cell & Radio

IC-02 How often are staff meetings held? *(e.g., Daily, Weekly, Monthly, etc.)* Daily

IC-03 Are incentives offered to employees for performance improvements? YES ✓ NO

IC-04 Does the utility have an "Employee of the Month/Quarter/Year" program? YES NO ✓

IC-05 How often are performance reviews conducted? *(e.g. Semi-annually, Annually, etc.)* Semi-annually &Annually

IC-06 Does the utility regularly communicate/coordinate with other municipal departments? YES ✓ NO

Budgeting (BUD)

BUD-01	What is the average annual fee for residential users?	$ 57
BUD-02	How often are user charges evaluated and adjusted? *(e.g. annually, biannually, etc.)*	Annually
BUD-03	Are utility-generated funds used for non-utility programs?	YES ☐ NO ☑
BUD-04	Are costs for collection system operation and maintenance (O&M) separated from other utility services such as water, storm water, and treatment plants? IF NO, GO TO QUESTION BUD-07.	YES ☑ NO ☐
BUD-05	What is your average annual (O&M) budget? 2026	$ 2.89M
BUD-06	What percentage of the utility's overall budget is allocated to maintenance of the collection system?	70 %
BUD-07	Does the utility have a Capital Improvement Plan (CIP) that provides for system repairs/replacements on a prioritized basis?	YES ☑ NO ☐
BUD-08	What is your average annual CIP budget? 2026	$ 14.95M

BUD-09 What percentage of the maintenance budget is allotted to the following maintenance?

Predictive maintenance (tracking design, life span, and scheduled parts replacements)	20 %
Preventive maintenance (identifying and fixing system weaknesses which, if left unaddressed, could lead to overflows)	70 %
Corrective maintenance (fixing system components that are functioning but not at 100% capacity/efficiency; for example partially blocked lines)	5 %
Emergency maintenance (reactive maintenance, overflows, equipment breakdowns)	5 %

BUD-10	Does the utility have a budgeted program for the replacement of under-capacity pipes?	YES ☑ NO ☐
BUD-11	Does the utility have a budgeted program for the replacement of over-capacity pipes?	YES ☑ NO ☐

Training (TR)

TR-01 Does the utility have a formal job knowledge, skills, and abilities (KSA) training program? YES ☐ NO ☑

TR-02 Does the training program address the fundamental mission, goals, and policies of the utility? YES ☑ NO ☐

TR-03 Does the utility have mandatory training requirements identified for key employees? YES ☑ NO ☐

TR-04 What percentage of employees met or exceeded their annual training goals during the past year? 100 %

TR-05 Does the utility provide training in the following areas? *(Check all that apply)*

- ☑ Safety
- ☑ Routine line maintenance
- ☑ Confined space entry
- ☑ Other
- ☑ Traffic control
- ☑ Record keeping
- ☑ Electrical and instrumentation
- ☑ Pipe repair
- ☐ Bursting CIPP
- ☑ Public relations
- ☑ SSO/Emergency response
- ☑ Pump station operations and maintenance
- ☑ CCTV and trench/shoring

TR-06 Are operator and maintenance certification programs used? IF NO, GO TO QUESTION TR-08 YES ☑ NO ☐

TR-07 Are operator and maintenance certification programs required? YES ☑ NO ☐

TR-08 Is on-the-job training progress and performance measured? YES ☐ NO ☑

TR-09 Which of the following methods are used to assess the effectiveness of the training? *(Check all that apply)*

☑ None ☐ Periodic testing ☐ Drills ☐ Demonstrations

TR-10 What percentage of the training offered by the utility is in the form of the following?

Manufacturer training 10 %

In-house classroom training 30 %

On-the-job training 50 %

Industry-wide training 10 %

Safety (SAF)

SAF-01	Does the utility have a written safety policy?	☑ YES	☐ NO
SAF-02	How often are safety procedures reviewed and revised? *(e.g. Semiannually, Annually, etc.)*	☑ YES	☐ NO
SAF-03	Does the utility have a safety committee?	☑ YES	☐ NO
SAF-04	Are regular safety meetings held with the utility employees?	☑ YES	☐ NO
SAF-05	Does the utility have a safety training program?	☑ YES	☐ NO
SAF-06	Are records of employee safety training kept up to date?	☑ YES	☐ NO

SAF-07 Does the utility have written procedures for the following? *(Check all that apply)*

- ☑ Lockout/tagout
- ☑ Material safety date sheets (MSDS)
- ☑ Chemical handling
- ☑ Confined spaces permit program
- ☑ Trenching and excavations safety
- ☑ Biological hazards in wastewater
- ☑ Traffic control and work site safety
- ☑ Electrical and mechanical systems
- ☑ Pneumatic and hydraulic systems safety

SAF-08 What is your agency's lost-time injury rate? 0 % or 0 hours

SAF-09 Are the following equipment items available and in adequate supply? *(Check all that apply)*

- ☑ Rubber/disposable gloves
- ☑ Confined space ventilation equipment
- ☑ Hard hats, safety glasses, rubber boots
- ☑ Antibacterial soap and first aid kit
- ☑ Tripods or non-entry rescue equipment
- ☑ Fire extinguishers
- ☑ Equipment to enter manholes
- ☑ Portable crane/hoist
- ☑ Atmospheric testing equipment and gas detectors
- ☑ Oxygen sensors
- ☑ H_2S Monitors
- ☑ Full body harness
- ☑ Protective clothing
- ☑ Traffic/public access control equipment
- ☑ 5-minute escape breathing devices
- ☑ Life preservers for lagoons
- ☑ Safety buoy at activated sludge plants
- ☑ Fiberglass or wooden ladders for electrical work
- ☑ Respirators and/or self contained breathing apparatus
- ☑ Methane gas or optical vector (OVA) analyzer
- ☑ Lower explosion limit (LEL) metering

SAF-10	Are safety monitors clearly identified?	☑ YES	☐ NO

Customer Service (CS)

CS-01 Does the utility have a customer service and public relations program? IF NO GO TO QUESTION CS-03 — ☑ YES ☐ NO

CS-02 Does the customer service program include giving formal presentations on the wastewater field to the following? *(Check all that apply)*

- ☐ Schools and universities
- ☐ Local officials
- ☐ Media
- ☐ Building Inspector(s)
- ☐ Community gatherings
- ☐ Businesses
- ☑ Citizens
- ☑ Public utility officials

CS-03 Are employees of the utility specifically trained in customer service? — ☑ YES ☐ NO

CS-04 Are there sample correspondence, Q/A's, or "scripts" to help guide staff through written or oral responses to customers? — ☑ YES ☐ NO

CS-05 What methods are used to notify the public of major construction or maintenance work? *(Check all that apply)*

- ☑ Door hangers
- ☑ Newspaper
- ☑ Fliers
- ☑ Signs
- ☑ Other
- ☐ None
- ☑ Public radio or T.V. announcements

CS-06 Is a homeowner notified prior to construction that his/her property may be affected? — ☑ YES ☐ NO

CS-07 Do you provide information to residents on cleanup and safety procedures following basement backups and overflows from manholes when they occur? — ☑ YES ☐ NO

CS-08 Does the utility have a customer service evaluation program to obtain feedback from the community? — ☑ YES ☐ NO

CS-09 Do customer service records include the following information? *(Check all that apply)*

- ☑ Personnel who received the complaint or request
- ☑ Name, address, and telephone number of customer
- ☑ Nature of the complaint or request
- ☑ Location of the problem
- ☑ To whom the follow-up action was assigned
- ☑ Date the follow up action was assigned
- ☑ Date of the complaint or request
- ☑ Cause of the problem
- ☑ Date the complaint or request was resolved
- ☑ Feedback to customer
- ☑ Total days to end the problem

CS-10 Does the utility have a goal for how quickly customer complaints (or ermergency calls) are resolved? IF NO, GO TO THE NEXT PAGE. — ☑ YES ☐ NO

CS-11 What percentage of customer complaints (or emergency calls) are resolved within the timeline goals? 100 %

Equipment and Collection System Maintenance (ESM)

ESM-01 Is a maintenance card or record kept for each piece of mechanical equipment within the collection system? IF NO, GO TO QUESTION ESM-03. ☑ YES ☐ NO

ESM-02 Do equipment maintenance records include the following information? *(Check all that apply)*

- ☑ Maintenance recommendations
- ☑ Maintenance schedule
- ☑ Instructions on conducting the specific maintenance activity
- ☑ A record of maintenance on the equipment to date
- ☑ Other observations on the equipment

ESM-03 Are dated tags used to show out-of-service equipment? ☑ YES ☐ NO

ESM-04 Is there an established system for prioritizing equipment maintenance needs? ☑ YES ☐ NO

ESM-05 What percent of repair funds are spent on emergency repairs? 10 %

ESM-06 Are corrective repair work orders backlogged more than six months? ☐ YES ☑ NO

ESM-07 Do collection system personnel coordinate with state, county, and local personnel on repairs, before the street is paved? ☑ YES ☐ NO

Equipment Parts Inventory (EPI)

EPI-01	Have critical spare parts been identified?	☑ YES	☐ NO
EPI-02	Are adequate supplies on hand to allow for two point repairs in any part of the system?	☑ YES	☐ NO
EPI-03	Is there a parts standardization policy in place?	☑ YES	☐ NO
EPI-04	Does the utility have a central location for storing spare parts?	☑ YES	☐ NO
EPI-05	Does the utility maintain a stock of spare parts on its maintenance vehicles?	☑ YES	☐ NO
EPI-06	Does the utility have a system in place to track and maintain an accurate inventory of spare parts?	☑ YES	☐ NO
EPI-07	For those parts which are not kept in inventory, does the utility have a readily available source or supplier?	☑ YES	☐ NO

Management Information System (MIS)

MIS-01 Does the utility have a management information system (MIS) in place for tracking maintenance activities? *(Either electronic or good paper files)* IF NO, GO TO PAGE 15. ☑ YES ☐ NO

MIS-02 Are the MIS records maintained for a period of at least three years? ☑ YES ☐ NO

MIS-03 Is the MIS able to distinguish activities taken in response to an overflow event? ☑ YES ☐ NO

MIS-04 Are there written instructions for managing and tracking the following information? *(Check all that apply)*

- ☑ Complaint work orders
- ☑ Scheduled work orders
- ☑ Customer service
- ☑ Scheduled preventive maintenance
- ☑ Scheduled inspections
- ☑ Sewer system inventory
- ☑ Safety incidents
- ☑ Scheduled monitoring/ sampling
- ☑ Compliance/overflow tracking
- ☑ Equipment/tools tracking
- ☑ Parts inventory

MIS-05 Do the written instructions for tracking procedures include the following information? *(Check all that apply)*

- ☑ Accessing data and information
- ☑ Instructions for using the tracking system
- ☑ Updating the MIS
- ☑ Developing and printing reports

MIS-06 How often is the management information system updated? *(Check one)*

- ☑ Immediately
- ☐ Monthly
- ☐ Within one week of the "incident"
- ☐ As time permits

System Mapping (MAP)

MAP-01 Are "as built" plans (record drawings) or maps available for use by field crews in the office and in the field? ☑ YES ☐ NO

MAP-02 Is there a procedure for field crews to record changes or inaccuracies in the maps and update the mapping system? ☑ YES ☐ NO

MAP-03 Do the maps show the date the map was drafted and the date of the last revision? ☑ YES ☐ NO

MAP-04 Do the sewer line maps include the following? *(Check all that apply)*

- ☑ Scale
- ☑ North arrow
- ☑ Date the map was drafted
- ☑ Date of last revision
- ☑ Service area boundaries
- ☑ Property lines
- ☑ Other landmarks (Roads, water bodies, etc.)
- ☑ Manhole and other access points
- ☑ Location of building laterals
- ☑ Street names
- ☑ SSOs occurrences/CSOs outfalls
- ☑ Flow monitors
- ☑ Force mains
- ☑ Pump stations
- ☑ Lined sewers
- ☑ Main, trunk, and interceptor sewers
- ☑ Easement lines and dimensions
- ☑ Pipe material
- ☑ Pipe diameter
- ☑ Installation date
- ☑ Slope
- ☑ Manhole rim elevation
- ☑ Manhole coordinates
- ☑ Manhole invert elevation
- ☑ Distance between manholes

MAP-05 Are the following sewer attributes recorded? *(Check all that apply)*

- ☑ Size
- ☑ Shape
- ☑ Invert elevation
- ☑ Material
- ☐ Separate/combined sewer
- ☑ Installation Date

MAP-06 Are the following manhole attributes recorded? *(Check all that apply)*

- ☑ Shape
- ☑ Depth
- ☑ Age
- ☑ Type (e.g., precast, cast in place, etc.)
- ☑ Material

MAP-07 Is there a systematic numbering and identification method/system established to identify sewer system manhole, sewer lines, and other items (pump stations, etc.)? ☑ YES ☐ NO

Internal TV Inspection (TVI)

TVI-01 Does the utility have a standardized pipeline condition assessment program? ☑ YES ☐ NO

TVI-02 Is internal TV inspection used to perform condition assessment? IF NO, GO TO PAGE 17. ☑ YES ☐ NO

TVI-03 Are there written operation procedures and guidelines for the internal TV inspection program? ☑ YES ☐ NO

TVI-04 Do the internal TV record logs include the following? *(Check all that apply)*

- ☑ Pipe size, type, length, and joint spacing
- ☑ Distance recorded by internal TV
- ☑ Results of the internal TV inspection (including a structural rating)
- ☑ Internal TV operator name
- ☑ Cleanliness of the line
- ☑ Location and identification of line being televised by manholes

TVI-05 Is a rating system used to determine the severity of the defects found during the inspection process? ☑ YES ☐ NO

TVI-06 Is there documentation explaining the codes used for internal TV results reporting? ☑ YES ☐ NO

TVI-07 Approximately what percent of the total defects determined by TV inspection during the past 5 years were the following?

Failed coatings or linings	4 %	Line deflection	5 %
House connection leaks	15 %	Joint separation	4 %
Illegal connections	1 %	Crushed pipes	5 %
Pipe corrosion (H_2S)	5 %	Collapsed pipes	1 %
Fats, oil, and grease	10 %	Offset joints	15 %
Broken pipes	10 %	Root intrusions	15 %
Debris	10 %	Minor cracks	5 %
Other	5 %		

TVI-08 Are main line and lateral repairs checked by internal TV inspection after the repair(s) have been made? ☑ YES ☐ NO

Sewer Cleaning (CLN)

CLN-01	What is the system cleaning frequency? (the entire system is cleaned every "X" years)	5
CLN-02	What is the utility's plan for system cleaning (% or frequency in years)?	100 %
CLN-03	What percent of the sewer lines are cleaned, even high/repeat cleaning trouble spots, during the past year?	25 %

CLN-04	Is there a program to identify sewer line segments, with chronic problems, that should be cleaned on a more frequent schedule?	☑ YES	☐ NO
CLN-05	Does the utility have a root control program?	☑ YES	☐ NO
CLN-06	Does the utility have a fats, oils, and grease (FOG) program?	☑ YES	☐ NO

CLN-07	What is the average number of stoppages experienced per mile of sewer pipe per year?	0 %

CLN-08 Has the number of stoppages increased, decreased, or stayed the same over the past 5 years?

☐ Increased ☑ Decreased ☐ Stayed the same

CLN-09	Are stoppages plotted on maps and correlated with other data such as pipe size and material or location?	☑ YES ☐ NO

CLN-10 Do the sewer cleaning records include the following information? *(Check all that apply)*

- ☑ Date and time
- ☑ Method of cleaning
- ☑ Identity of cleaning crew
- ☑ Cause of stoppage
- ☑ Location of stoppage or routine cleaning activity
- ☑ Further actions necessary/initiated

CLN-11	If sewer cleaning is done by a contractor are videos taken of before and after cleaning?	☐ YES ☑ NO

Manhole Inspection and Assessment (MAN)

MAN-01 Does the utility have a routine manhole inspection and assessment program? IF NO, GO TO QUESTION MAN-06. ☑ YES ☐ NO

MAN-02 Are the results and observations from the routine manhole inspections recorded? ☑ YES ☐ NO

MAN-03 Does the utility have a goal for the number of manholes inspected annually? ☑ YES ☐ NO

MAN-04 How many manholes were inspected during the past year? 10,024

MAN-05 Do the records for manhole/pipe inspection include the following? *(Check all that apply)*

- ☑ Conditions of the frame and cover
- ☑ Evidence of surcharge
- ☑ Offsets or misalignments
- ☑ Atmospheric hazards measurements (especially hydrogen sulfide)
- ☑ Details on the root cause of cracks or breaks in the manhole or pipe including blockages
- ☑ Recording conditions of (corbel, walls, bench, trough, and pipe seals)
- ☑ Presence of corrosion
- ☑ If repair is necessary
- ☑ Manhole identifying number/location
- ☑ Wastewater flow characteristics (flowing freely or backed up)
- ☑ Accumulations of grease, debris, or grit
- ☑ Presence of infiltration, location, and estimated quantity
- ☑ Inflow from manhole covers

MAN-06 Does the utility have a grouting program? ☑ YES ☐ NO

Pump Stations (PS)

PS-01	Are Standard Operation Procedures (SOPs) and Standard Maintenance Procedures (SMPs) used for each pump station?	☑ YES	☐ NO
PS-02	Are there enough trained personnel to properly maintain all pump stations?	☑ YES	☐ NO
PS-03	Is there an emergency operating procedure for each pump station?	☑ YES	☐ NO
PS-04	Is there an alarm system to notify personnel of pump station failures and overflow?	☑ YES	☐ NO
PS-05	Percent of pump stations with back up power sources	91 %	
PS-06	Does the utility use the following methods when loss of power ocurs? *(Check all that apply)*		

☑ On-site electrical generators ☑ Portable electric generators ☑ Alternate power source ☑ Other bypass pumping
☑ Vacuum trucks to bypass pump station

PS-07	Is there a procedure for manipulating pump operations (manually or automatically) during wet weather to increase in-line storage of wet weather flows?	☑ YES	☐ NO
PS-08	Are wet well operating levels set to limit pump start/stops?	☑ YES	☐ NO
PS-09	Are the lead, lag, and backup pumps rotated regularly?	☑ YES	☐ NO
PS-10	Are operation logs maintained for all pump stations?	☑ YES	☐ NO
PS-11	Are the original manuals that contain the manufacturers recommended maintenance schedules for all pump station equipment easily available?	☑ YES	☐ NO
PS-12	On average, how often were pump stations inspected during the past year?	☑ YES	☐ NO
PS-13	Are records maintained for each inspection?	☑ YES	☐ NO
PS-14	Average annual labor hours spent on pump station inspection	2900	
PS-15	Percent of pump stations with pump capacity redundancy	100 %	
PS-16	Percent of pump stations with dry weather capacity limitations	0 %	
PS-17	Percent of pump stations with wet weather capacity limitations	80 %	
PS-18	Percent of pump stations calibrated annually	100 %	
PS-19	Percent of pump stations with permanent flow meters	65.2 %	

Capacity Assessment (CA)

CA-01	Does the utility have a flow monitoring program?	☑ YES	☐ NO
CA-02	Does the utility have a comprenhensive capacity assessment and planning program?	☑ YES	☐ NO
CA-03	Are flows measured prior to allowing new connections?	☐ YES	☑ NO
CA-04	Do you have a tool (hydraulic model, spreadsheet, etc.) for assessing whether adequate capacity exists in the sewer system? IF NO, GO TO QUESTION CA-06.	☐ YES	☑ NO
CA-05	Does your capacity assessment tool produce results consistent with conditions observed in the system?	☐ YES	☐ NO

CA-06 What is the ratio of peak wet weather flow to average dry weather flow at the wastewater treatment plant? N/A

CA-07 How many permanent flow meters are currently in the system? *(Include meters at pump stations and wastewater treatment plants)* 53

CA-08 How frequently are the flow meters checked? *(e.g. Daily, Weekly, Monthly, etc.)* weekly

CA-09 Do the flow meter checks include the following? *(Check all that apply)*

- ☑ Independent water level
- ☑ Velocity reading
- ☑ Downloading data
- ☑ Checking the desiccant
- ☑ Cleaning away debris
- ☑ Battery condition

CA-10	Are records maintained for each inspection? IF NO, GO TO QUESTION CA-12.	☑ YES	☐ NO

CA-11 Do the flow monitoring records include the following? *(Check all that apply)*

- ☑ Descriptive location of flow meter
- ☑ Frequency of flow meter inspection
- ☑ Type of flow meter
- ☑ Frequency of flow meter calibration

CA-12	Does the utility maintain any rain gauges or have access to local rainfall data?	☑ YES	☐ NO
CA-13	Does the utility have any wet weather capacity problems?	☑ YES	☐ NO
CA-14	Are low points or flood-plain areas monitored during rain events?	☑ YES	☐ NO
CA-15	Does the utility have any dry weather capacity problems?	☐ YES	☑ NO
CA-16	Is flow monitoring used for billing purposes, capacity analysis, and/or inflow and infiltration investigations?	☑ YES	☐ NO

Tracking SSOs (TRK)

TRK-01	How many SSO events have been reported in the past 5 years?	0

TRK-02	What percent of the SSOs were less than 1,000 gallons in the past 5 years ?	%

TRK-03	Does the utility document and report all SSOs regardless of size?	☑ YES	☐ NO
TRK-04	Does the utility document basement backups?	☑ YES	☐ NO
TRK-05	Are there areas that experience frequent basement or street flooding?	☑ YES	☐ NO

TRK-06 Approximately what percent of SSOs discharges were from each of the following in the last 5 years?

Manholes	0 %	Main and trunk sewers	0 %	Structural bypasses	0 %
Pump stations	0 %	Lateral and branch sewers	0 %		

TRK-07 Approximately what percent of SSOs discharges were caused by the following in the last 5 years?

Debris buildup	0 %	Root intrusion	0 %	Excessive infiltration and inflow	0 %
Collapsed pipe	0 %	Capacity limitations	0 %	Fats, oil, and grease	0 %
Vandalism	0 %				

TRK-07A What percentage of SSOs were released to:

Soil	0 %	Basements	0 %	Paved area	0 %
Surface water (rivers/lakes/streams)	0 %	Coastal, ocean, beaches	0 %		

TRK-07B For surface water releases, what percent are to areas that could affect:

Contact recreation (beaches, swimming, areas)	0 %	Drinking water sources	0 %
Shellfish growing areas	0 %		

TRK-08	How many chronic SSO locations are in the collection system?	0

TRK-09	Are pipes with chronic SSOs being monitored for sufficient capacity and/or structural condition?	☑ YES	☐ NO
TRK-10	Prior to collapse, are structurally deteriorating pipelines being monitored for renewal or replacement?	☑ YES	☐ NO

Overflow Emergency Response Plan (OERP)

OERP-01	Does the utility have a documented OERP available for utility staff to use? IF NO, GO TO QUESTION OERP-04.	☑ YES	☐ NO
OERP-02	How often is the OERP reviewed and updated? *(Annually, Biannually, etc.)*	annually	
OERP-03	Are specific responsibilities detailed in the OERP for personnel who respond to emergencies?	☑ YES	☐ NO
OERP-04	Are staff continuously trained and drilled to respond to emergency situations?	☑ YES	☐ NO
OERP-05	Do work crews have immediate access to tools and equipment during emergencies?	☑ YES	☐ NO
OERP-06	Does the utility have standard procedures for notifying state agencies, local health departments, the NPDES authority, the public, and drinking water authorities of significant overflow events?	☑ YES	☐ NO
OERP-07	Does the procedure include a current list of the names, titles, phone numbers, and responsibilities of all personnel involved?	☑ YES	☐ NO
OERP-08	Does the utility have a public notification plan?	☑ YES	☐ NO
OERP-09	Does the utility have procedures to limit public access to and contact with areas affected with SSOs? *(Procedure can be delegated to another authority)*	☑ YES	☐ NO
OERP-10	Does the utility use containment techniques to protect the storm drainage systems?	☑ YES	☐ NO

OERP-11 Do the overflow records include the following information? *(Check all that apply)*

- ☑ Date and time
- ☑ Location
- ☑ Any remediation efforts
- ☑ Cause s)
- ☑ How it was stopped
- ☑ Estimated flow/volume discharged
- ☑ Names of affected receiving water(s)
- ☑ Duration of overflow

OERP-12	Does the utility have signage to keep public from effected area?	☑ YES	☐ NO

Smoke and Dye Testing (SDT)

SDT-01	Does the utility have a smoke testing program to identify sources of inflow and infiltration?	☑ YES	☐ NO
SDT-01A	Does the utility have a smoke testing program to identify sources of inflow and infiltration in illegal connectors?	☑ YES	☐ NO
SDT-01B	Does the utility have a smoke testing program to identify sources of inflow and infiltration in house laterals (private service laterals)?	☑ YES	☐ NO
SDT-02	Are there written procedures for the frequency and schedule of smoke testing?	☑ YES	☐ NO
SDT-03	Is there a documented procedure for isolating line segments?	☑ YES	☐ NO
SDT-04	Is there a documented procedure for notifying local residents that smoke testing will be conducted in their area?	☑ YES	☐ NO
SDT-05	What is the guideline for the maximum amount of the line to be tested at one time? *(Feet or Miles)*	1,000	
SDT-06	Are there guidelines for the weather conditions under which smoke testing should be conducted?	☐ YES	☑ NO
SDT-07	Does the utility have a goal for the percent of the system smoke tested each year?	☐ YES	☑ NO
SDT-08	What percent of the system has been smoke tested over the past year?	0 %	
SDT-09	Do the written records contain location, address, and description of the smoking element that produced a positive result?	☑ YES	☐ NO
SDT-10	Does the utility have a dye testing program?	☑ YES	☐ NO
SDT-11	Are there written procedures for dye testing?	☑ YES	☐ NO
SDT-12	Does the utility have a goal for the percent of the system dye tested each year?	☐ YES	☑ NO
SDT-13	What percent of the main collection system has been dye tested over the past year?	0 %	
SDT-14	Does the utility share smoke and dye testing equipment with another utility?	☐ YES	☑ NO

Hydrogen Sulfide Monitoring and Control (HSMC)

HSMC-01 How would you rate the systems vulnerability for hydrogen sulfide corrosion? *(Check only one)*

☐ Not a problem ☑ Only in a few isolated areas ☐ A major problem

		YES	NO
HSCM-02	Does the utility have a corrosion control program?	☑	☐
HSCM-03	Does the utility take hydrogen sulfide corrosion into consideration when designing new or replacement sewers?	☑	☐
HSCM-04	Does the utility have written procedures for the application of chemical dosages?	☐	☑
HSCM-05	Are the chemical dosages, dates, and locations documented?	☐	☑
HSCM-06	Does the utility document where odor is a continual problem in the system?	☑	☐
HSCM-07	Does the utility have a program in place for renewing or replacing severely corroded sewer lines to prevent collapse?	☑	☐

HSCM-08 Are the following methods used for hydrogen sulfide control? *(Check all that apply)*

☐ Aeration	☐ Chlorine	☐ Potassium permanganate
☐ Iron salts	☐ Sodium hydroxide	☐ Biofiltration
☐ Enzymes	☐ Hydrogen peroxide	☑ Other replace/ rehab
☐ Activated charcoal canisters		

		YES	NO
HSCM-09	Does the system contain air relief valves at the high points of the force main system?	☑	☐

HSCM-10 How often are the valves maintained and inspected? *(Weekly, Monthly, etc.)* annually

		YES	NO
HSMC-11	Does the utility enforce pretreatment requirements?	☑	☐

Infrastructure Security

Although outside the scope of a CMOM program, municipal wastewater utilities should also consider security vulnerabilities. To reduce the threat of both intentional and natural disasters, the utility should take steps to implement appropriate countermeasures and develop or update emergency response plans.