



**CLEAN WATER SYSTEM
(Sanitary Sewer)
IMPROVEMENTS

PHASING PLAN**

4.5 Collection System Evaluation

The overall collection system appears to be operating as intended; however, there are known areas of concern. As detailed in the 2021 Sanitary Sewer Evaluation the following two (2) areas of the collection system are severely deteriorated (**Appendix B**).

1. **Lake Lovely Project Area** (**Figure 4-4**) – The primary issue in the Lake Lovely Project Area is significant root growth into the pipes and lateral lines, which causes blockage and significant I/I. Manhole 437 (MH-437) near the intersection of W. Kennedy Blvd. and Deacon Jones Blvd. collapsed and the Town did not replace the manhole. The repair work to MH-437 is temporary and could cause public safety issues and concerns.
2. **Eastern Project Area** (**Figure 4-5**) – The primary issue in the Eastern Project Area is aging vitrified clay pipes partially broken or extensive cracks and fractures. The area is also experiencing blockage and I/I from root growth within the pipe joints and service laterals. Additionally, sags along the gravity sewer system are disrupting proper flow and causing slopes less than the minimum design standard slope.

The Town has recently repaired and replaced the Campus View sanitary sewer system which is in a flood prone area as identified in the FEMA Flood map (**Figure 2-4**, presented previously).

4.5.1 Infiltration/Inflow Study/Plan and Implementation Program

The Town has experience some “Infiltration/Inflow” (I/I) during periods of heavy rain. I/I is common in collection/transmissions systems that contain older gravity sewer systems, comprised of vitrified clay pipe (VCP). Periods of heavy flow can cause operational difficulties.

Specifically, *infiltration* occurs when groundwater enters the existing sewer lines because of material and/or joint degradation and deterioration, as well as when sewer lines are poorly designed, constructed and/or maintained. *Inflow* occurs when rainfall enters the sewer system through direct connections such as roof drains, yard drains, open cleanouts, pick holes in manhole covers and frame seals or indirect connections with storm sewers.

FIGURE 4-4: Suggested Lake Lovely Service Area Repair and Replacement

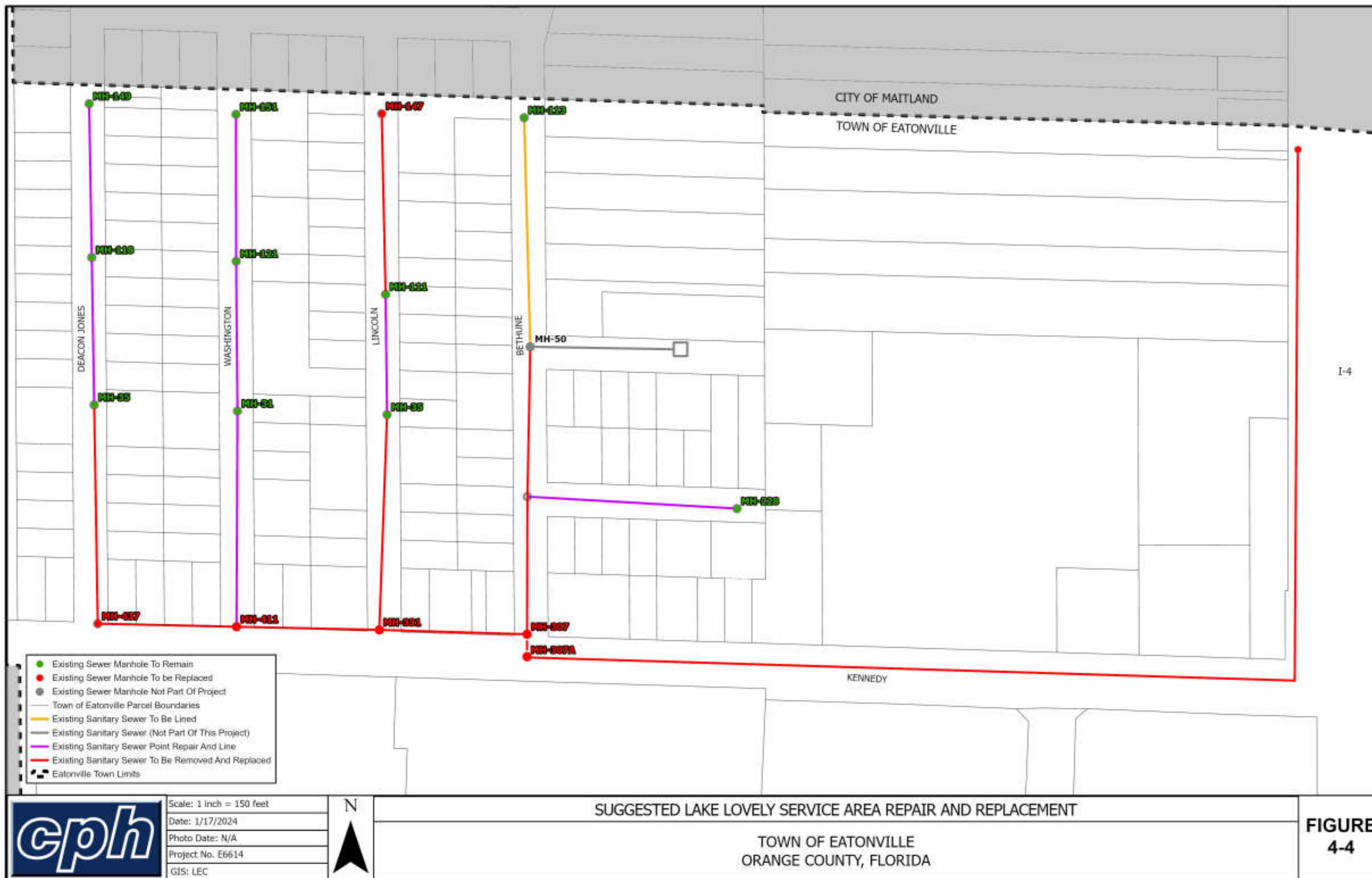
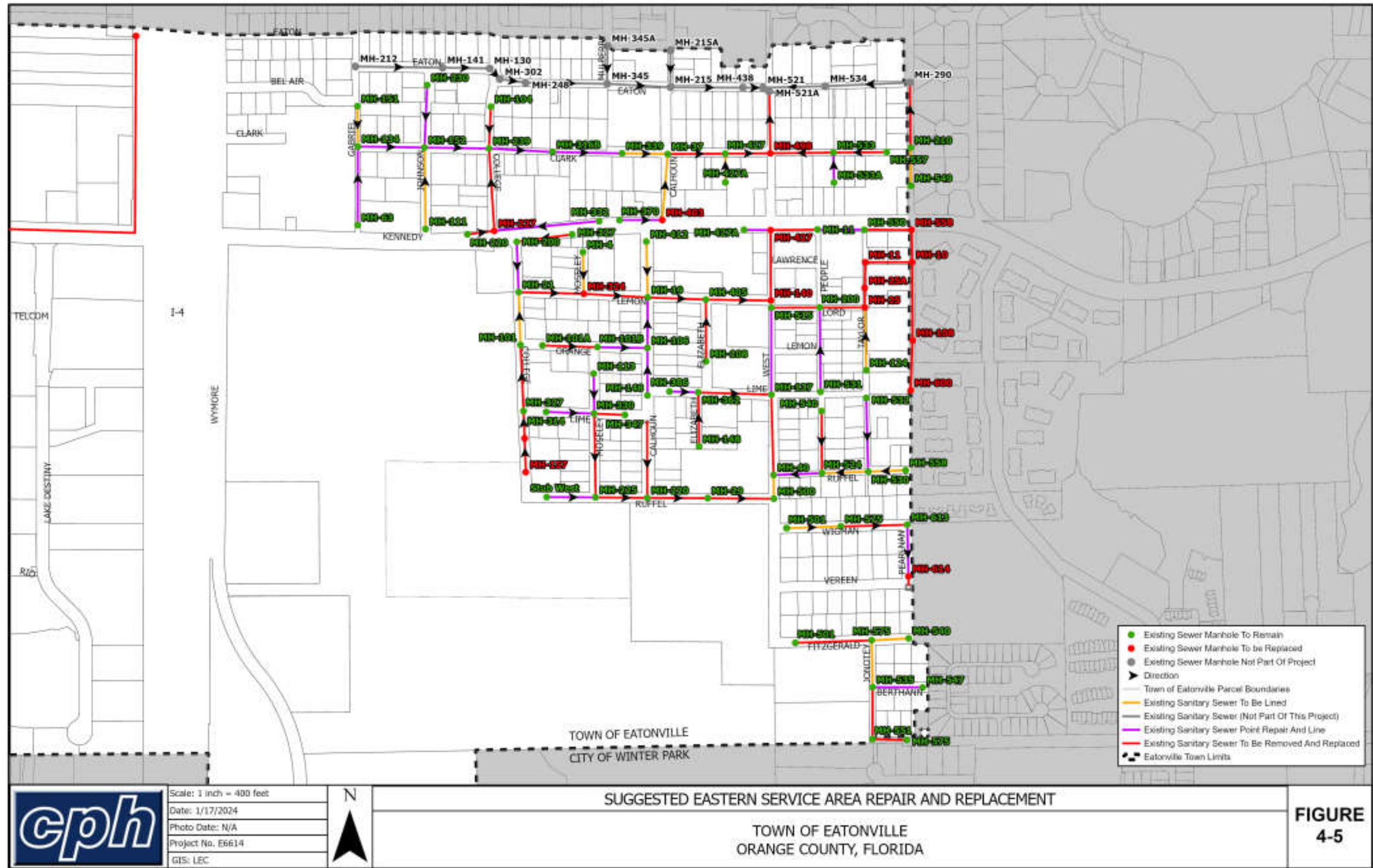


FIGURE 4-5: Suggested Eastern Service Area Repair and Replacement



Extraneous water from I/I sources reduces capacity and capability of sewer systems and treatment facilities to transport and treat domestic wastewaters. During periods of high groundwater and large or sudden storm events, I/I entering the system may cause sewer surcharging, with potential of wastewater backups into homes and businesses.

Localized overflows of untreated sewage and inadequate treatment at treatment facilities cause an increase in the cost of operating the collection and treatment systems, and adversely impact public health, welfare and the environment.

The control of I/I by sewer system rehabilitation and an on-going operations and maintenance program to identify areas of concern is essential to protect the Town's investment in the sewer collection/transmission systems and the Wholesale Sewer Agreement with Altamonte Springs.

The Town's collection sub-systems are designed to handle a quantified volume of flow. Significant damage can occur if collection systems are forced to transport larger volumes than the systems are designed to handle. I/I can contribute considerably to increased volumes, placing an unnecessary burden on collection system and lift station facilities.

Without monitoring, systems with I/I challenges may encounter problems such as sewer backups, flooding, collapsed streets, and contamination of nearby water resources. Problems can lead to fines by the State and Federal government, increased facility operating costs due to the need for additional run time for pumps and pump stations, as well as increased costs for energy, maintenance, and repair.

Additionally, sanitary sewer overflows (SSOs) can occur when wastewater flow volumes exceed the design capacity of the collection/transmission systems. Monitoring and correcting SSOs can be very costly. Therefore, periodic I/I evaluations are highly recommended as a preventative measure to identify potential and probable problem areas.

The Town has made repairs to parts of the system and has replaced the Campus View Sewer Service Area that have known to have I&I issues. However, the Town should continue to evaluate the collection system and develop an I/I Study to initiate a "repair and replacement" (R&R) program to solve issues in the areas of concern. An I/I study is intended to supplement and strengthen what the Town currently performs related to I/I issues. The I/I study should include at a minimum the following:

4.0 Existing Wastewater System Overview

1. **Televising Lines** - The Town can determine where groundwater and stormwater is entering the sanitary sewer system by televising lines during rainfall events or when high groundwater conditions exist. Also, evidence of infiltration, such as mineral deposits and staining is commonly evident on the video inspections. Televising lines is also an effective method of locating illegal connections.
2. **Manhole Inspections** - The Town should visually inspect manholes for signs of infiltration from the cover, walls, joints, and pipe connections. Manhole inspections should be conducted on a routine basis.
3. **Smoke Testing** - Smoke testing is an effective method for locating I/I areas of concern. Smoke is blown into the system and escapes through openings in the system. The escaping smoke will identify leaks in pipes and illegal connections to the system. **Notify residents when conducting smoke testing, because of the potential for smoke to enter residences.**
4. **Dye Testing** - Dye testing is an effective method for testing for inflow problems. Dye is poured into storm water locations such as drain tiles and sump pumps. If the dye ends up in the sanitary sewer system, there is an improper connection to the system. **Because of privacy concerns, the Town should consult the Town attorney before conducting dye testing.**
5. **Home Inspections** - Home inspections are a good way to determine whether residents are illegally connected to the sanitary sewer system. In order to establish such an inspection program, the Town sewer ordinance should contain a provision requiring residents to submit to an inspection by (1) a qualified Town representative; or (2) a licensed plumber of the resident's choosing when applying for building permits. The Town could assess a service fee to residents refusing to allow the inspection and/or neglecting to fix the illegal connection. **Because of privacy concerns, the Town should consult the Town attorney prior to conducting home-to-home inspections.**
6. **Repair and Replace (R&R) Infrastructure** – Develop a schedule for repairing and replacing sewer lines and manholes that have infiltration problems. Repair of infrastructure may be accomplished through slip lining, spot repairs or replacement. The Town's R&R schedule should prioritize repair and replacement activities, considering the Town's budget, areas of concern, and equipment and manpower limitations.

4.0 Existing Wastewater System Overview

7. **Notify and Educate the Public** - Notify and educate the public about I/I issues and the steps the Town is taking to address the issues. Residents can be educated about I/I reduction efforts through mailings included with utility bills, newspaper announcements, and on the Town's web site. Informed residents will understand the nature and impact of I/I challenges and therefore be more likely to voluntarily correct illegal connections and consent to Town inspections.
8. **Reporting** – Develop a summary report of the work done to identify problems; as well as the actual work performed to eliminate I/I challenges should be prepared and kept on file at Town Hall, in case inspections are done by the regulatory agencies, or questions are asked by the media. The summary report should include:
 - a. A map that identifies the areas of investigation for the year; as well as the corrective actions taken to rectify deficiencies.
 - b. A map to show the anticipated areas for upcoming investigations.
 - c. A calculation of the estimated I/I volumes corrected and compared to billed and treated flows.
 - d. A summary of the expenditures for I/I related investigations and corrective measures taken for the year.
 - e. A summary of identified illegal or identified unauthorized connections to the Town's systems.
 - f. A summary of known overflows and the determined cause for the overflow.

Town staff should implement an I/I study by first cleaning and then conducting video inspections in older parts of the collection system to determine the areas that are compromised by roots growing through the sewer mains and/or pipe settlement causing cracks or joint separation. The inspections should include providing an inventory of brick laid manholes, because brick laid manholes contribute significantly to I/I conditions.

Once the information has been gathered on the areas of the collection system that need repair or replacement, then the R&R program should be developed and budgeted. The R&R program should have a 5-year completion period, or less, depending on the length of gravity pipe needing work, the number of manholes needing improvement, and the Town's finances to budget such work. The areas

4.0 Existing Wastewater System Overview

where problems are located, type of pipe failure, and the associated cost would dictate the repair method selected. There are several in-situ methods available in repairing/replacing defective gravity mains, such as the pipe bursting method, and pipe lining.

4.5.2 Manholes

Older manholes, especially manholes made of brick, can develop cracks leading to infiltration. Additionally, manholes receiving force main discharge can deteriorate by erosion from hydrogen sulfide (H₂S) gas. Review of existing system maps indicate there are three (3) manholes that receive force main discharges. The manholes should be checked to assess condition and be quickly repaired, if needed.

To repair compromised manholes, either fiberglass inserts or a “spray on” lining can be used, with both methods having a 50-year life expectancy. **Figure 4-6** presents an Orange County standard manhole detail. The standard manhole detail should include a note stating that manholes receiving force main discharge shall be lined with a fiberglass or high-density polyethylene (HDPE) liner, coated with a corrosion-resistant coating or provided with a waterproofing concrete admix.

4.5.3 Gravity Sewer Main and Manhole Design Factors

Design criteria for gravity sewer main and manholes are based on requirements of the FDEP Chapter 62-604, Florida Administrative Code (F.A.C.) as reference in “*Ten-States Standards – Recommended Standards for Wastewater Facilities*”. Key design factors are as follows:

- a. Gravity Sewer Material = Polyvinylchloride (PVC) meeting ASTM D3034 – Type PSM PVC Sewer Pipe and Fittings.
- b. Minimum Pipe Diameter = 8 inches
- c. Minimum Slope = 0.40%, for a velocity of 2.0 feet per second (FPS).
- d. Maximum Velocity = 15 fps.
- e. Manholes will be precast concrete meeting ASTM C478 with a minimum diameter of 48 inches with minimum access diameter if 22 inches.
- f. Maximum Manhole Spacing = 400 feet.